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D2.2 Microcredential Learning Content documents

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An introduction to climate change and its effects on older persons' health MC1 EQF4

Microcredential Title	**An introduction to climate change and its effects on older persons' health**
Short Code / ID	MC1
EQF Level	4
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, Portuguese, German, Finnish, Greek
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Hospital da Luz Learning Health
Module Lead / Author	Cátia Costa, Carolina Silveiro, Paulo Fonseca and André Rodrigues

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Identify the key drivers of climate change on a global level and critically analyse the consequences of this for climate globally and locally.
LO 2	Differentiate between key direct and indirect effects of climate change on human health.
LO 3	Define the likely climate change impacts on the older person in their local region and the consequences for the health and social care service.
LO 4	Understand the difference between climate mitigation, adaptation and resilience as concepts.
LO 5	Discuss climate adaptation solutions for their own work context.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards climate change.
Alignment Notes	This microcredential introduces learners to the relationship between climate change and health, with a particular focus on older adults and vulnerable populations. The module was adapted for EQF Level 4 learners and therefore prioritises accessible scientific explanations, practical understanding, early recognition of climate-related risks, and safe supportive actions within healthcare and social care settings. The course progressively builds learners' understanding of: • climate change concepts; • environmental hazards; • direct and indirect health effects; • chronic disease vulnerability; • adaptation and resilience; • the vulnerability of older adults. The microcredential emphasises practical awareness and real-world application rather than advanced scientific analysis. Throughout the course, learners are encouraged to connect climate-related environmental changes with the health and wellbeing of individuals, communities, and healthcare systems. The content integrates:

	• simplified scientific explanations; • case-based learning; • reflective activities; • quizzes and knowledge checks; • interactive H5P resources; • practical examples relevant to frontline care workers. The microcredential also promotes awareness of prevention, preparedness, adaptation, and community support strategies for older adults during climate-related events.
Keywords	climate change, health, resilience, older adults, mitigation, adaptation

Learning Activities

E-Learning Format	Text, Interactive H5P content and Youtube videos. Note: [ ] brackets in this document refers to further content on Moodle.
Activities	Pre and post module quizzes, case studies and knowledge check questions.
Estimated Study Time	25 hours

Content & Topics

1. Overview of Climate Change and Its Effects on the World
2. Key Definitions: Climate Mitigation, Adaptation and Resilience
3. Direct and Indirect Effects of Climate Change on Health
4. Specific Vulnerability of Older People to Climate Change Effects
5. Assessment of Learning

1. Overview of Climate Change and Its Effects on the World

[Differentiation of climate versus weather]

Defining climate change:

"Climate change refers to **long-term shifts in temperatures and weather patterns.**" (United Nations).

Key Effects:

- The melting of polar ice sheets and rising sea levels.
- More common extreme weather events like storms and very heavy rainfall.
- More common droughts and heat waves.

Inequalities in effect: Climate change impacts are unevenly experienced, influenced by factors such as ethnicity, race, socioeconomic status, and gender. Vulnerability to climate change is shaped by **structural and socioeconomic inequalities.** For example, the effects of a severe storm or flood are worse if you live in an overcrowded city, in a poorly constructed house, and must attend work in person. [Optional learning: Gender inequalities in climate change vulnerability]

Causes of Climate Change Globally (Natural vs. Human-Made Climate Change):

Natural Climate Change: Volcanic emissions, changes in the sun's radiation, variations in the Earth's orbit, natural fluctuations in the Earth's carbon dioxide (CO2) levels. **Source:** British Geological Society.

Human-Induced Climate Change: Humans are the primary drivers of climate change globally. [Graph of relative effect of natural versus climate change]
The primary issue is **global warming**, which results from a vicious cycle centred around greenhouse gases, carbon dioxide, methane, ozone, nitrous oxide, chlorofluorocarbons, and water vapour.

The **greenhouse effect** is the process by which these gases trap heat near the Earth's surface, leading to rising temperatures. **Global warming** in turn **increases water vapor** in the atmosphere, which then **amplifies the greenhouse effect**. [Global warming and greenhouse gases explained in more detail]

In short, the burning of **fossil fuels, non-greenhouse gas pollutants**, deforestation, livestock farming, and nitrogen-based fertilizers contribute to climate change. **Source:** European Commission

Absorption of Sunlight

Apart from greenhouse gases and trapped water vapour, sunlight absorption by the earth's surface can increase the Earth's surface temperature. Human activities like farming, deforestation, and building roads can alter the Earth's reflectivity, leading to local warming or cooling. **Sources:** National Aeronautics and Space Administration (NASA); Environmental Protection Agency (EPA)

➔ **Students directed to watch** the video by National Geographic and consider the causes and effects of global warming. https://youtu.be/G4H1N_yXBiA

Relevant Regional and Local Climate Change Related Change consequences

Clickable 5HP graphic: Information presented below.

Regional examples presented throughout the learning materials illustrate how climate change affects different parts of the world, including increased wildfires, drought, flooding, food insecurity, biodiversity loss, and threats to infrastructure and livelihoods.

Key Environmental Effects of Climate Change: Biodiversity loss, wildfires, drought and floods.

Key Socioeconomic Effects of Climate Change: Changing energy requirements and energy poverty; challenges to agriculture; food insecurity and migration.

[Content for all subheadings provided; migration given as an example].

Emerging Health Risks of International Climate Migration

Climate change-driven migration is becoming an urgent issue, and with it comes a range of serious health risks. As more people are displaced due to extreme weather, rising sea levels, and droughts, their health becomes increasingly vulnerable. Many displaced populations face **food and water insecurity**, leading to malnutrition and the **spread of waterborne diseases** like cholera.

Another major concern is **limited access to healthcare**. Migrants and displaced communities often struggle to get medical attention, either due to financial barriers, lack of infrastructure, or legal status in the places they move to. This makes pre-existing conditions worse and increases the likelihood of disease outbreaks, particularly in overcrowded settlements. **Mental health** is another overlooked issue—forced displacement can cause extreme stress, anxiety, and trauma, especially for those who lose their homes, communities, and ways of life.

Heat-related illnesses are also expected to rise as global temperatures increase. **Vulnerable groups**, like the elderly, children, and outdoor workers, face higher risks of dehydration, heat stroke, and cardiovascular diseases. Climate change is also expanding the range of **vector-borne diseases** like malaria and dengue, exposing migrants to new health threats.

Urban migration creates further challenges. Many climate migrants end up in cities, putting additional pressure on already strained public health systems. Overcrowded informal settlements with poor sanitation can become hotspots for disease outbreaks.

Addressing these health risks requires proactive policies. Governments and international organizations must strengthen healthcare systems, ensure access to clean water and sanitation, and incorporate mental health support. Planned migration strategies, rather than reactive crisis responses, will be essential in minimizing health consequences of climate-driven displacement.

The UNESCO Policy Lab on Climate Change 2022 Report highlighted the following as key points of concern when discussing climate migration:

- Climate migration is complex – influenced by population growth, adaptive capacity, socioeconomic development, and policies.
- Increased displacement risk – more frequent/severe floods, storms, and droughts.
- Some areas will become uninhabitable – forcing either autonomous or planned migration.
- Policies and governance matter – future migration depends on climate impact and government planning at all levels.
- Climate change and poverty – By 2030, an additional 122 million people may face extreme poverty, limiting their ability to migrate.
- Mobility as a coping strategy – Severe climate impacts can both force displacement and reduce people's ability to move, worsening exposure to risks.
- Immobility is a key issue – Some people stay due to vulnerability, lack of agency, or deliberate cultural/livelihood choices.
- Planned relocation is rare but necessary – not common yet but will likely grow in need.

2. Key Terminology in Climate Change

Climate Mitigation: This means preventing or reducing the emission of greenhouse gases into the atmosphere to make the impacts of climate change less severe such as using renewable energy and carbon free transportation. [Examples of reducing greenhouse emissions/enhancing carbon absorption].

Climate Adaptation: *Adaptation* means anticipating the adverse effects of climate change and taking appropriate action to prevent or minimise the damage they can cause or taking advantage of opportunities that may arise. **Adaptation Strategies:** Infrastructure investments (flood barriers), efficient resource management (water conservation programs), social protection measures (disaster relief funds) and preventive actions (early warning systems and urban planning). **Watch** the video describing the difference between mitigation and adaptation. https://youtu.be/J3IXx9A7-m4 [Mitigation versus adaptation examples and video].

Climate Resilience: The capacity of a community or environment to anticipate and manage climate impacts, minimize their damage, and recover and transform as needed after the initial shock. United Nations Development Dictionary (2023, p.75)

3. Direct and Indirect Effects of Climate Change on Health

The following sections are based on copyrighted material from the CLIMATEMED project, licensed under CC BY 4.0.

Climate change is already impacting health in many ways see image below and is expected to cause approximately 250,000 additional deaths per year between 2030-2050.

Source and Image: World Health Organization (WHO)

Direct Effects: Heat; Cold exposure; floods and storms can cause damage to health services, spread infectious diseases and have negative impacts on mental health.

Indirect Effects:

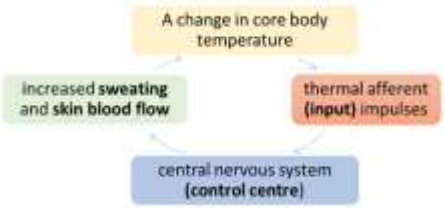
Air pollution *(*premature deaths and increased airborne allergens levels); **Wildfires** (acute deaths, emergent evacuation of healthcare structures and PTSD); **UV Radiation** (unknown impact on skin cancers and eye diseases); increased food, water and vector borne **infectious diseases**; **livelihoods and poverty** (infections, injuries, mortality and harms to financial security) and lastly **sustained conflict** for nations dependent on agriculture.

Additionally, to the health care system there can be financial losses, exacerbating existing inequities negatively impacting service quality.
[Can we reduce health risks from climate change?] [Effects on healthcare systems: cost, access, quality]

Health Care Workers: Climate change also impacts healthcare workers experiencing climate change's physical and mental health risks more acutely impacting travel, burnout and increasing challenges.

Temperature effects: hyperthermia and hypothermia

Heat Regulation in the Body:
Heat production in the body is largely out of our direct control, and it occurs constantly through: Cell respiration, Physical activity and Digestion of food.
Heat Loss occurs in two main ways: dry heat exchange (touching a solid surface, heating air and infrared heat rays from our body) and evaporative (wet) heat exchange (sweating).



[Heat Exchange Inside the Body- mainly due to circulating blood]

[Heat balance- thermoregulation]

Hyperthermia

Effects of Heat on the Human Body: Heat illnesses occur when the body is exposed to high temperatures and cannot cool itself effectively.

Secondary Risks (due to heat fatigue): Reduced alertness can lead to accidents or injuries.

Dehydration and Heat Stress: These conditions can exacerbate existing health issues, increasing the risk of medication toxicity as well as cardiac and respiratory complications.

[Vulnerable Subpopulations for Heat Illnesses]

Why Are Older Adults More Vulnerable to Heat? Several **physiological changes** in older adults make them more susceptible to overheating:

- **Delayed Sweating Response**: It takes longer for their bodies to start sweating when they get hot. They feel less thirsty even when they are hot and sweating.
- **Reduced Sweat Rate**: They produce less sweat, which means they can't cool down as easily.
- **Decreased Skin Blood Flow**: Their blood flow to the skin doesn’t increase as much when they get hot, making it harder to release heat.
- **Lower Cardiac Output During Heat Stress**: Their heart doesn't pump as much blood during heat stress, so less blood goes to the limbs and skin to cool down.
- **Diminished Thirst Sensation**: They feel less thirsty even when they are hot and sweating.
- **Impaired Sodium and Water Conservation**: Their bodies have a reduced ability to hold onto water and sodium, which are important for staying hydrated.

How else are Older People More at Risk from heat? ***Living alone*** (less able to escape heat or access to water); ***living in a care home*** (frailty); ***Chronic illness***; ***Mental illness*** and ***cognitive impairment*** (inability

to adapt behaviour to keep cool); ***Addiction*** (dehydration resulting in a reduced response to danger and risk for heatstroke); ***Medications*** and ***Environmental factors*** (living on top floors or outdoor activities may involve high levels of physical exertion). Source: Intergovernmental Panel on Climate Change

Simple Ways to Prevent Heat Illnesses in Older Patients:

Keep the **inside cool**, **check the temperature** of the room and the person's body, **supply fluids**, and **electrolytes** if the person has been sweating, and **restrict physical activity**.

Review the person regularly. **Teach families/neighbours** what to look out for (confusion/fatigue).

Heatstroke is the most severe heat illness and can impact the brain through cognitive impairment, disrupted sleep, alterations in oxygen delivery, increased blood-brain barrier permeability, hormonal changes and in severe cases neurological damage. Source: Löhmus (2018). It can be differentiated into exertion related (physical activity on a hot day) or non-exertion related. [Details]

➔ ***What should you do about Heat Illness?***

Mild: Hydrate and get out of heat. **Severe (Heat Exhaustion)**: Hydrate, cool, move to a cooler location. **Heat Stroke**: Follow the guidelines of special emergency care.

[How Medication Affects the Body's Cooling Mechanisms- general effects]

[Effect of Heat on Medicines]

Key Messages on heat-related illness

- **Heat-Related Deaths:** During heatwaves, most deaths in older adults are due to heart disease, lung disease, or ischemic cerebral infarcts. Dehydration and heat stress can exacerbate existing cardiovascular conditions, making even moderate excess heat a serious risk.
- **Hyperthermia and Heatstroke:** Older adults are at higher risk of hyperthermia and heatstroke. Heatstroke is a form of encephalopathy caused by severe hyperthermia.
- **Medication Risks:** Healthcare professionals should be vigilant about older individuals taking multiple medications during heatwaves, particularly high-risk drugs. Be aware that medications causing drowsiness or sedation can impair a patient's ability to respond to and avoid excessive heat exposure. If you notice a patient struggling with heat, report it to your supervisory healthcare professional immediately.
- **Drug Toxicity in Heat:**
  - Dehydration and slower metabolism in the liver and kidneys can increase the risk of drug toxicity, even for normally safe medications.
  - Medications applied to the skin or under the skin (subcutaneous) might be absorbed more quickly in hot weather, raising the risk of toxicity.
- **Delirium as a Warning Sign:** Older adults, especially those with existing cognitive impairment, may present with delirium (confusion) due to excessive heat exposure even without heatstroke. These patients are at high risk of progressing to heatstroke in the following hours or days, requiring immediate preventative measures. Source: Cimons (2019): Nexus Media News

Hypothermia and water submersion

[Polar vortex explained]

Climate Change and Cold Waves/Snaps can increase the likelihood of hypothermia.

Hypothermia is a serious condition that occurs when the core body temperature drops below 35°C (95°F). Hypothermia is often caused by exposure to cold weather or immersion in a cold body of water. It is a medical emergency in which the body loses heat faster than it can produce it, leading to dangerously low body temperatures. Without treatment, hypothermia can cause the heart and

respiratory system to fail, ultimately resulting in death. Hypothermia can be fatal and must be recognized as early as possible to prevent death.

Symptoms:
Shivering; Slurred speech
Shallow breathing; Weak pulse;
Reduced coordination/balance;
Drowsiness ; Confusion
Loss of consciousness *(Mayo clinic)*

What To Do to help: Follow the 7 Steps of DRSABCD First Aid, then:

- Move the person to a warm, dry place
- Help the patient to lie down
- Remove wet clothing and place the person in a blanket
- Cover the head to retain body heat
- Give the patient warm drinks
- Use hot water bottles and heat packs

Source: St John Ambulance Australia

[Preventing Hypothermia]

Older People are More Vulnerable to Hypothermia due to various factors: 1) environmental (housing issues, falls and water exposure), 2) physiological (reduced temperature regulation and communication barriers) and 3) medical factors (underlying health conditions and medications). [Details of each]

Water Immersion, frostbite, and cold shock are additional impacts from cold snaps.

[Cold water immersion effects: details on frostbite; hypothermia; cold shock; Treatment of a person taken out of the water; older person vulnerability to harm from water immersion]

Food and Drought

Drought causes water and food shortages, which may impact the affected population's life chances and increase the risk of disease and death. Drought may have acute and chronic health effects, including:

- Malnutrition, including micronutrient deficiency, such as iron-deficiency anaemia.
- Increased risk of infectious diseases, such as cholera, diarrhoea, and pneumonia, due to acute malnutrition, lack of water and sanitation, and displacement.
- Psycho-social stress and mental health disorders.
- Disruption of local health services due to a lack of water supplies, loss of buying power, migration and/or health workers being forced to leave local areas.

Severe drought can also affect air quality by making wildfires and dust storms more likely. Source: WHO

Reproduced from: Beltrame et al. ludovica.beltrame@bristol.ac.uk

Examples of content: Meteo Drought
Pathway/control: Atmospheric pollution. **Interventions:** Use of relationships between atmospheric patterns and weather extremes for prediction and early warning.
Agri Drought
Pathway/control: Occurrence of wildfires. **Interventions:** Land use control including soil water content monitoring.

Altered infectious diseases

1. Infectious Diseases Overview
2. Vectorborne Diseases
3. Waterborne Diseases
4. Climate Change and Fungi

Stressors Influencing Disease Emergence and Spread

Over the past few decades, the global infectious disease risk has been altered by several factors:

- **Climatic**: Caused by the activities of mankind (mainly global warming).
- **Demographic**: Increased urbanization, population growth, land-use change, migration, ageing populations.
- **Technological**: Cheaper, faster global travel, increased international trade, versus improved health care and vaccination.

These affect infectious diseases in three main ways: [details on all]
1. New Pathogens; 2. Disease Dynamics (transmission; host susceptibility); **3. Global Spread**

Learning on specific diseases:

Vectorborne Diseases

The World Health Organisation states that approximately one sixth of worldwide disability and illness is due to vector-borne diseases (VBDs). VBDs are infections transmitted by the bite of an infected arthropod species (the vector). Examples are insects, spiders, and crustaceans.

[Worked examples of effects of:
Higher CO2 Concentration
Temperature Increase (Regional/Temporal Variation)
Rainfall; Urbanisation; Irrigation and Water Storage
Intensification of Agriculture; Chemical Pollution
Increased Trade; Increased Travel]

➔ Content on specific diseases, spread by ticks, mosquitos, and other vectors.

Tick-Borne Diseases: Babesiosis, Lyme disease, tick borne encephalitis.

Mosquito-Borne Diseases: Malaria, Japanese encephalitis, Zika Virus disease, Yellow Fever, Aedes (Stegomyia) Albopictus, Chikungunya Virus (CHIKV), Dengue fever, West Nile virus, Lymphatic Filariasis and Rift Valley Fever (RVF).

Flea-Borne Diseases: Plague, Tungiasis, Typhus.

Snail Diseases: Schistosomiasis, Hookworm Infection.

Biting Flies and Bugs: Leishmaniasis and Sand Fly Fever/Toscana Virus Infection, Trypanosomiasis (African sleeping sickness) and Chagas disease (American trypanosomiasis).

Possible Prevention and Mitigation Methods: [details given for each sub-heading; summarised here]

Methods for avoiding or ameliorating these effects can be grouped in three broad categories:

- **Environmental** (good land management, minimization of habitat destruction and avoidance of contact between wild and domestic animals and humans).
- **Societal** (VBD surveillance and educational programs and public access to medical treatment).
- **Technological** (vector elimination/containment, development of tests and vaccines).

Key Messages on VBD:

- Three groups of complex, interlinked and often poorly understood stressors influence the emergence and propagation of VBDs: climatic, demographic, and technological changes.
- Major climate hazards for disease aggravation are warming, rain, floods, drought and storms.
- Vector Borne Diseases (VBDs) constitute the largest single climate-affected group, especially mosquitoes (39%), followed by ticks (22%), fleas (13%), snails (9%), and sand flies (9%).
- 22 out of 23 of the major VBDs examined have been shown to or are predicted to show changes in geographical range, disease occurrence, and/or frequency/seasonal duration, from climate change.
- 18 of the 23 VBDs (78%) considered have been shown to or are predicted to affect areas of Europe.
- Prevention and mitigation of climate change-aggravated VBDs revolves around environmental, societal, and technological control methods, including:
  - Improved VBD surveillance of the human and domestic animal reservoir host populations.
  - Enhanced public awareness of VBD threats; Development of effective VBD vaccines.

Waterborne Diseases

Waterborne diseases are caused by drinking or coming into contact with **contaminated water** caused by man-made or natural pollutants, or faeces from an infected person or animal. Cholera and typhoid are a leading cause of human morbidity and mortality worldwide. As climate change impacts global temperatures and weather events, the risk of these infectious diseases will only worsen.

[Detailed learning on Cholera and Typhoid]

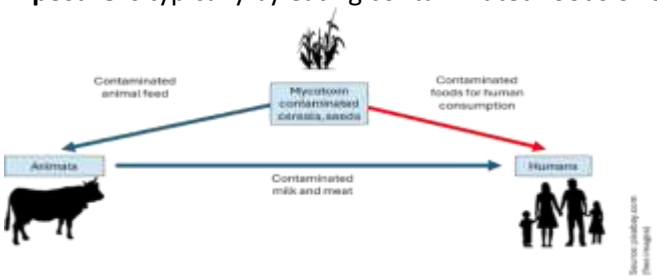
How to Reduce the Risk of Waterborne Diseases

- Provide universal access to care and disease management
- Improve disease surveillance
- Develop and invest in early warning systems to monitor changes in climatic conditions
- Upgrade water catchment, storage, treatment and distribution systems
- Protect critical infrastructure from floods, storms and sea level rise
- Limit water overuse
- Use household water purification systems

Fungal Diseases

Impact of Climate Change on Fungal Diseases: Climate changes may significantly impact fungal colonization of crops — changes in the fungal biodiversity and emergence of new diseases.

Exposure is typically by eating contaminated foods or eating animals fed contaminated foods.



Risk is reduced by: Timely planting, providing plant nutrition, controlling weeds, crop rotation, drying; storing properly and use non-toxic fungi or bacteria to replace the toxic strains.

Source: Kumar et al, (2017); Awasthi et al., (2012)

Smoke Inhalation and Burns

The most common injury caused by wildfires is burns, usually second- or third-degree burns.

Due to the extraordinary circumstances of the injury, patients with wildfire burns may need psychological services and support groups in addition to professional care for their burns.

The other frequent injuries in addition to the burns are:

- Eye, nose, throat and lung irritation
- Decreased lung function, including coughing and wheezing
- Pulmonary inflammation, bronchitis, exacerbations of asthma, and other lung diseases
- Exacerbation of cardiovascular diseases, such as heart failure

Wildfires

The size and frequency of wildfires are growing due to climate change.

Direct Effects: Burning Damages and Other Injuries*:* The most common injury caused by wildfires is burns. Other injuries include eye, nose, throat and lung irritation. Wildfires also release significant amounts of mercury into the air, which can lead to impairment of speech, hearing and walking, muscle weakness and vision problems for people of all ages.

Indirect Effects: Impact on Mental Health: People may experience depression, anxiety, post-traumatic stress disorder, and other mental health issues including difficulty sleeping, flashbacks, intrusive thoughts and hypervigilance. The fear of future wildfires and their potential destruction can be a source of ongoing distress. → video on link between wildfires and mental health. https://youtu.be/ACnxzmFlO8s

Smoke Pollution: Wildfire smoke is a complex mixture of particulate matter (PM) and gaseous pollutants. Chen et al. 2021 analysed mortality data for 750 cities in 43 countries in 2021 and found that

wildfire smoke pollution increases all-cause, cardiovascular and respiratory mortality. Thus, wildfire smoke exposure can be interpreted as a complex mortality factor.

Source: Акутагава - Own work, CC BY-SA 3.0

Climate Change Effects on Specific Body Systems

This topic is divided into six parts:

1. Cancer
2. Renal diseases
3. Allergy and dermal diseases
4. Respiratory illnesses
5. Metabolic disorders
6. Cardiovascular diseases

Cancer

Impact of Climate Change on Cancer: Lung cancer is the top cause of cancer deaths worldwide, with lung, bronchus, and tracheal cancers causing 1.9 million deaths in 2017 globally. Tobacco consumption is still the first cause of cancer mortality, but pollution cause **43% of lung-cancer deaths**. Particulate air pollution causes **15% of all lung cancer deaths**. This is a **20% increase during the last three decades**.

Ultraviolet Radiation & Skin Cancers: Skin cancer is the most common cancer worldwide — although many are not fatal. Incidence rates have increased substantially in last 20 years.

There is extensive data linking increased exposure to UV radiation to increased incidence of skin cancers as melanoma. Some ethnic groups, such as fair-skinned people, are more at risk.

Why is skin cancer increasing?

Stratospheric ozone (O3) plays a major part in protection from UV radiation. The use of aerosols contributed to increasing UV radiation exposure and skin cancer. In Australia, UV radiation levels have increased by 2-6% each year since 1990. In 2011, a large hole in the ozone layer appeared over the Arctic resulting in a 60% increase in UV radiation exposure at the ground level in the area.

The Montreal Protocol (1987), an international environmental policy, mandated the incremental phasing out of ozone-depleting substances. Ratified by every nation, it:

- Reduced ozone layer depletion
- Prevented millions of skin cancers worldwide

Increases in skin cancer incidence are still expected before the full recovery of the stratospheric ozone layer.

Cancer-Related to Disruptions in Food and Water Supply:

Diet: a healthy diet with whole grains, fruits, and vegetables is protective for colorectal and breast cancer. Climate change has an impact on the quality and quantity of this food production.

Air pollution: Particles from the environment can pass through the outer layer of the skin and may move deeper through hair follicles and sweat glands. **Heatwaves and fires** due to climate change mainly contribute to this cause.

Contaminated drinking water: Exposure to arsenic and its compounds, as a result of flooding or drought. Sources: Hiatt and Beyeler (2020) ; Springmann et al., (2016)

Renal Disease [Overview of the key role of the kidneys]

Climate Change and Heat Stress Nephropathy:

One consequence of climate-related extreme heat exposure is dehydration and volume loss. This can directly lead to acute kidney injury (AKI; a rapid (hours to days) decrease in kidney function), manifesting as reduced urine output and often confusion. AKI is more likely in already vulnerable kidneys.

Recent studies have shown that recurrent heat exposure with physical exertion and inadequate hydration can lead to chronic kidney disease. Epidemics of chronic kidney disease consistent with heat stress nephropathy are now occurring across the world.
Source: Borg et al., 2017.

Older people have reduced renal function due to **ageing**.
In addition, they often have diseases which can further affect the kidney:

- Diabetes High blood pressure Heart failure
- Vascular disease (e.g., prior myocardial infarction, stroke or peripheral vascular disease)
- Obesity Smoking History of acute kidney injury

Other Renal Complications of Heat

- Heat stress and dehydration lead to low-volume, concentrated urine that increases the risk of **kidney stones**.
- **Urinary tract infections** are also more common in heatwaves as lower levels of urine production can hamper the removal of pathogens. This risk increases as the temperature increases.

Take Home points:

- Older people are prone to heat-related acute kidney injury (AKI).
- The diagnosis of dehydration is challenging in primary care.
- Timely introduction of anticipatory measures to reduce heat exposure and increase fluid intake in this group will help reduce heat-related AKI.
- At risk groups should monitor their urinary output and have blood tests during heat waves.
- Health service providers should be prepared for increased presentations of kidney diseases such as AKI and kidney stones during warm seasons.
- During heat waves, extra caution is needed when using medications that can harm the kidneys, especially for older individuals with pre-existing kidney disease. Such medications include antibiotics, nonsteroidal anti-inflammatory drugs (NSAIDs) like ibuprofen, among others.

Allergy and Skin Diseases

Allergies affect up to 30-40% of the population worldwide. The severity and complexity of these diseases continue to increase due to lifestyle and diet changes, climate change, pollution, urbanisation, and reduced biodiversity.

Dermal (skin) diseases were the 4th leading cause of non-fatal disease burden worldwide (in 2013). Climate change is expected to exacerbate the distribution and frequency of these, particularly those associated with infectious etiologies, sun exposure, environmental irritants, and aquatic transmission.

There are more than 40 allergy and dermal diseases that can be affected by one or more of 10 climate change stressors via many different disease causes or triggers.

[Lists of allergy diseases; Chronic Inflammatory Skin Diseases; and Infectious Skin Diseases affected by climate change]

Climate Change Hazard	Disease Causes/Triggers	Disease Categories
• Warming • Drought • Heatwaves • Fires • Precipitation • Floods • Storms • Sea level rise • Ocean climate change • Natural land cover change	• **Airborne insects:** dust mites • **Airborne pathogens:** viruses, bacteria, fungi, animal hair/fur/dander • **Biological airborne particles:** pollen, spores • **Contact** allergens, pathogens, food, chemicals, irritants • **Contact insects:** venom, larvae, mites, parasites • **Gaseous air pollution** • **Human migration** • **Human physical environment:** sun, heat, cold • **Human physiology:** genetic predisposition, hormonal change • **Lifestyle:** exercise, diet, smoking • **Non-biological airborne particles:** sand, dust, smoke, PM • **Psychological effects:** stress, psychodermal factors	• Allergy • Chronic inflammatory dermal • Infectious dermal • Malignancies

Environmental Changes	Health Outcomes
More frequent extreme climate events	—
Heatwaves, wildfires, higher temperatures, etc.	Amplification of exacerbation rate, morbidity, and mortality of respiratory diseases
Intense rain and flooding	Dampness in affected households with subsequent proliferation of molds and cockroaches
Thunderstorms	Increase in asthma exacerbations and hospitalizations following thunderstorm-related asthma episodes
More intense and more prolonged pollen seasons. Possibly similar changes for other allergens (e.g. fungi)	Increase in the severity and alteration of the seasonality of symptoms of allergic rhinitis and asthma
Alteration of the local vegetation patterns with changes in the geographical spread and migration of plants. Colonization of geographical areas by new species with alteration of the species dominating distinct ecological niches. Possibly, similar changes for fungi.	Increased prevalence and severity of allergic rhinitis and asthma due to both de novo sensitizations and cross-reactivity with pre-existing species.
Possibly changes in the growth pattern and distribution of pathogenic microorganisms	Possibly changes in the pattern of respiratory tract infections.
Reproduced from: Reinmuth-Selzle et al. (2017)	Reproduced from: Eguiluz-Gracia et al. (2018)

Atopic Dermatitis (Eczema)

Atopic dermatitis (eczema) has been found to result from both genetic predisposition and environmental factors, like diet, stress, heat, sweating, dampness, pollen exposure, air pollutants, construction materials and dust mites. Climate change-related flooding events are anticipated to increase the prevalence of atopic dermatitis, amongst other chronic inflammatory skin diseases. Stress, caused as a result of uncontrollable environmental conditions such as flooding, have been shown to aggravate primarily underlying diseases including atopic dermatitis, alopecia, prurigo nodularis, psoriasis and vitiligo. Source: Chen et al. (2021) and Tempark et al., (2013)

Prevention and Mitigation Methods

1) Environmental Control Methods:

Pollen allergies: Use plants that rely on insect pollination to produce smaller pollen quantities, prune hedges and mow lawns before flowering and eliminate allergenic plant species from public spaces. **Air pollution**: Strict controls on exhaust gases from vehicles etc., elimination of cars from highly populated environments, rapid response systems to wildfires. **Flooding**: Identification of areas most at risk from major flooding; adoption of appropriate plans for prompt evacuations prior to flooding.

2) Societal Control Methods:

Public awareness: education programmes, public information campaigns and improved access to medical treatment and vaccines.

Allergic and chronic inflammatory dermal diseases: Develop better understanding of the psychological, social, and environmental effects of migration on these diseases.

Infectious dermal diseases: Effective travel and controls on people migrating/travelling from infected areas, with appropriate medical treatment.

Skin cancer: Publication of up-to-date information on lifestyle actions for risk minimisation and better access to UVR skin protection methods.

3) Technological Control Methods*:*

- Efforts include implementing automated pollen and spore monitoring, developing allergen-specific immunotherapies, and bacteriotherapies for chronic skin inflammation.
- Vaccine development for dermal diseases, where applicable (see table). Of the 24 applicable diseases discussed here, 8 (33%) have vaccines available, and 9 (56%) of the remaining 16 have vaccines under development.

Key Take Home Messages:

- All of the 10 main climate change hazards (global warming, heatwaves, fires, floods, storms, precipitation, sea level rise, natural land cover change, drought, and ocean climate change) cause aggravation of these diseases to a greater or lesser extent, and often in combination.
- Climate change effects have been shown to or are predicted to show changes in disease incidence, severity, frequency/seasonal duration, and/or geographical range.
- For allergy diseases, the major climate change-originating aggravating factors are air pollution, biological aeroallergens (pollen, etc.), and temperature and humidity increases.
- For chronic inflammatory dermal diseases, the major aggravating factors are increases in temperature, humidity, UVR exposure; flooding; storms; psychological effects of natural disasters.
- For infectious dermal diseases, the major climate change-originating aggravating factors are temperature and humidity increases, flooding, and human migration caused by climate change.
- For skin malignancies, the major climate change-originating aggravating factors are excess UVR exposure and nano-particulate air pollution.

Respiratory Illness

Heat and Respiratory Illness:

High temperatures are associated with increased risks of hospitalisations and mortality in people with respiratory disease (Baccini et al., 2008). Patients may need rescue medication (like salbutamol) (Royé et al, 2021). High humidity can worsen asthma, as hot and humid air is harder to breathe, causing coughing in patients with allergic rhinitis (Khosravi et al., 2014) and asthma (Hayes et al., 2012).

The following all affect respiratory illness: [more details provided for some]

Air Quality: Climate change impacts air quality - some outdoor air pollutants (ozone and particulate matter) are expected to increase. This can lead to respiratory illnesses, including asthma.

Ground (tropospheric) ozone (O_3): Major secondary pollutant. Its formation is promoted by burning of fossil fuels in industrial processes, homes and motor vehicles, in a sunlit atmosphere. Ozone irritates the respiratory system, causing shortness of breath and inflammation and increasing susceptibility to other triggers of inflammation, such as pollen and mould spores. Spikes in ground-level ozone are linked with increased hospitalizations for chronic obstructive pulmonary disease (COPD), pneumonia, asthma, allergies, and other lung problems. Long-term exposure is particularly linked with COPD. Globally, 11% of deaths from COPD in 2019 were associated with ozone exposure.

Particulate Matter (PM): This is a mixture of solid and liquid substances that arise from natural sources (e.g. sand and salt), **agricultural sources** (e.g. ammonia-based fertilizer) **and anthropogenic sources** (burning of fossil fuels). **PM** can be categorized according to **size**:

- PM 10 are inhalable particles with an aerodynamic diameter of <10 micrometres
- PM 2.5 are fine particles <2.5 µm PM 0.1 are ultrafine particles <0.1 µm

PM size determines mode of transport of particles and where they settle within the respiratory tract. The WHO air quality guidelines have lowered their recommended levels (<5 µg/m3 for annual levels and <15 µg/m3 for daily levels).

Pollen: Earlier spring warming, precipitation changes, and rising temperatures and carbon dioxide concentrations can increase the length and severity of the pollen season. Older people spending time outdoors may face more exposure to pollen and other allergens that cause hay fever or asthma.

Wildfires: These cause lung inflammation and decreased lung function.

Desert Dust: This can worsen asthma and bronchitis, and cause respiratory tract infections (from carried pathogens, including fungi). As sand and dust storms affect >150 countries worldwide, billions of people are at risk from these storms. A warming climate, the El Niño phenomenon and larger differences in temperature between land and sea, create strong winds, a reduction in rainfall, loss of soil moisture and deforestation. The main component of sand and dust storms is PM 10, but substantial amounts of coarse PM (PM2.5–10) and PM2.5 are also present.

Indoor Environments: Climate changes can worsen allergens and certain outdoor pollutants, which can then make their way indoors, and can also increase the frequency and severity of heavy rainfall. More humidity and moisture can lead to increases in mold, bacteria, and pests, which can worsen asthma and other respiratory effects in damp environments. Source: US Environmental Protection Agency

Image: US Embassy in the Philippines

- Avoiding outdoor exercise activity on high pollution days.
- Use of N95 or fine particulate matter (PM2.5) masks.
- Use of indoor air purifiers.
- Installation of heating, ventilation and air conditioning units with a high-efficiency particulate air filter.
- Vulnerable patients should avoid using gas stoves, fireplaces and incense, which can all exacerbate indoor air pollution.

Co-Benefits for Patients with Respiratory Disease: Sustainable food choices, such as diets with less meat (especially beef), vegetarian or purely plant-based diets. Active transport (cycling, walking and using public transport) reduces greenhouse gas emissions, air pollution and increases physical activity. Connecting with nature improves physical and mental health.

Metabolic Disorders

Diabetes, obesity, and metabolic syndrome can be negatively impacted by climate change.

Diabetes

Possible Impact of Climate Change on Diabetes

- For every degree Celsius rise in global temperature the diabetes incidence increases by 0.31%.

- Diabetes increases sensitivity to heat stress/heightens the risk (reach of 56%) for hospitalization and the risk of morbidity at extremely high temperatures or during exposure to heatwaves.
- Older people with autonomic neuropathy are at higher risk of hypothermia.
- Diabetes increases the negative cardiovascular effects of air pollution.

How Diabetes and Heat Interact

- Certain diabetes complications, such as damage to blood vessels and nerves, can affect your sweat glands so your **body can't cool as effectively**. That can lead to heat exhaustion and heat stroke, which is a **medical emergency.**
- People with diabetes **get dehydrated** (lose too much water from their bodies) more quickly. Not drinking enough liquids can raise blood sugar, and high blood sugar can lead to more frequent urination, causing dehydration.
- High temperatures can affect how the body uses insulin. Patients should monitor their blood sugar levels more frequently during hot weather and adjust their insulin dosage as well as their diet and hydration accordingly.

Prolonged exposure to extreme heat or a heatwave increases the risk for life-threatening exacerbations of disease.

Extreme Heat Vulnerability in Older People with Diabetes

Older adults are particularly vulnerable to heat exposure, especially those with common age-associated chronic health conditions (e.g., CV disease, hypertension, obesity, chronic kidney disease).

- Obese older adults were **twice as likely** to die during the 2003 European heatwave.
- Older adults with T2D **stored 1.5 times more heat** due to diabetes-related issues with heat loss.

Management of hyperglycemia, microvascular and macrovascular complications contribute to polypharmacy among older adults with diabetes. **Source:** Gildner and Levy (2021); Meade et al., (2020); Peron, Ogbonna and Donohoe, (2015); Vallianou et al., (2021)

[Case Study*:* How to Prepare for the Management of Diabetes in Extreme Weather Events at the national level, clinical level, advanced and patient level]

Obesity

Possible Impact of CC on Obesity

- Obesity increases sensitivity to heat stress and risk of heat-related illness or injury
- Heatstroke occurs much more frequently in obese or overweight people
- Elevated air pollution is linked to reduced physical activity and hence increasing rate of obesity

How Obesity and Heat Interact

Cold weather can slow blood flow around the body, which can increase the risk of heart attacks and stroke. Cold weather can raise blood pressure and if it's too high, it puts extra strain on the body. It affects how the blood flows around the body and circulation to your hands and feet can slow down, which could make neuropathy more painful in these areas. Cold temperatures can place stress on the body. In response, body releases stress hormones such as cortisol to provide an energy boost. These hormones reduce insulin production.

Because insulin helps the body's cells absorb blood sugar, having less insulin means that more sugar remains in the blood. Stress hormones also stimulate the liver to make and release more blood sugar, and the blood sugar levels go up.

Extreme cold exposure contributes to a higher risk of morbidity and mortality in diabetes patients. More hospitalization due to hypothermia, particularly older women with diabetes. **Source:** Kenny et al., (2010); Gildner and Levy (2020)

How CC Can Increase the Risk of Obesity

Cold weather may contribute to the higher prevalence of obesity through several pathways:

1. **Hormonal Influence**: Cold temperatures can affect hormones related to hunger and appetite.
2. **Increased Energy Demand**: Cold conditions may raise energy expenditure, leading to increased appetite and overeating as the body seeks to preserve energy levels.
3. **Craving for Sweets**: Exposure to cold may enhance cravings for sweet, calorie-dense foods.

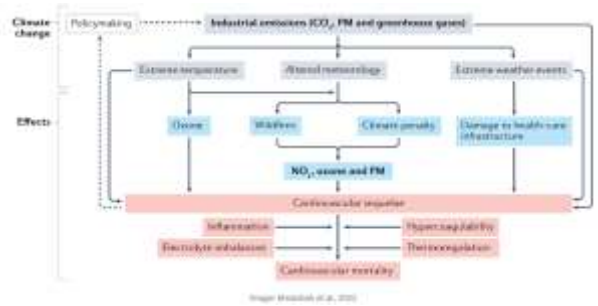
4. **Reduced Physical Activity**: Cold weather often encourages a more sedentary lifestyle- people tend to stay indoors in warm, cozy environments rather than engaging in outdoor activities.

Key Messages

- The climate crisis and diabetes/ obesity pandemics are interconnected health issues which have common predisposing vectors and magnify each other's impacts.
- The three shared common global vectors are increased urbanisation, increased reliance on mechanized transportation and increased production and consumption of meat and ultra-processed foods
- Both crises have shared common solutions - public health actions for lifestyle changes and sustainable urbanisation
- Healthcare professionals need to be prepared and to prepare people with diabetes for climate events
- Health professionals should guide any joint actions on tackling climate - health issues

Cardiovascular Diseases

CVD is the leading cause of death globally. In 2019, approximately 18.6 million people died from CVD worldwide. Direct exposure to extreme weather events, ambient temperatures, heat waves, cold spells and a wide array of pollutants have the potential to exacerbate/cause disease. The significant climate change impact factors on CVD are due to changes in the intensity, duration and frequency of extreme air temperature events, air pollution, wildfires, and desert dust.



Effect of Heatwaves on CVD
Heatwave intensity, frequency and duration are expected to increase due to climate change.

[**Air pollution and CVD**: Cardiovascular Risk Factors; Cardiovascular Mortality; Myocardial infarction (MI); Heart Failure; Stroke; Cardiac Arrhythmias]
[Wildfires and CVD] [Desert dust and CVD]

4. Focus on Older People

Vulnerability to Climate Change

Not everyone is equally vulnerable to climate change. Vulnerable People have a reduced ability to prepare for, and to cope with, climate change. Older people often have multiple vulnerabilities.

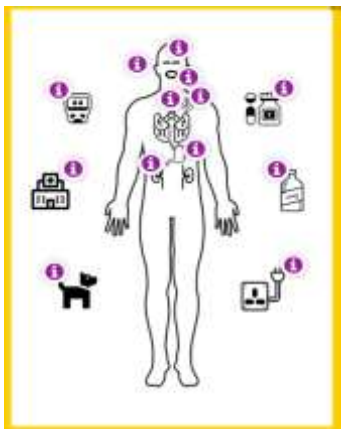
The Population of Older People is Forecasted to Grow Significantly

In 2020, there were 727 million people over 65 years of age living globally (UN, 2020). Between 2015-2030, the percentage of **people over 60 years of age is set to double** (from 12%-22%). WHO (2022),

An increase in the relative numbers of older people can lead to challenges in healthcare, as the service demands are more, but taxpayers and those of working age are fewer (WHO, 2022). It can also mean less able-bodied people to help older people in an emergency.

Older People are More Susceptible to Climate Change

Why? Older people are more susceptible to climate change both directly in terms of physiological changes within the body due to the ageing process, common illnesses of later life, and indirectly related to changes in support networks, ability to use technology, and socio-economic circumstances. Within the ageing population, there are particularly vulnerable sub-groups with underlying conditions such as frailty or dementia, and older people in lower socio-economic groups.



Examples of text:

Hearing Loss

Ageing causes hearing loss, so people may not hear or understand warnings on the radio, television or on loudspeakers.

Reduced Visual Acuity

Ageing causes reduced visual acuity and accommodation (ability to see at night). Many older people also have macular degeneration and cataracts. This can affect an older person's ability to read storm or flood warning messages, or directions to a place of safety, or to follow diversion signs, or to drive at night. This can leave them stranded in a dangerous situation. It can affect their ability to read medication instructions if a carer is not available to support medication administration.

Psychological Risk Factors

The mental health of older people can be significantly impacted due to unpredictable and more frequent adverse climate conditions. Fear of repeat events, anxiety, depression, and post-traumatic distress all lead to poorer cognitive and psychological health.

Carer Stress: Climate change adverse conditions and acute hazards create significant additional stress and burden on carers supporting the older person.

Socioeconomic Risk Factors*:* limited education and literacy, poverty and ethnic minorities.

Frailty

Frailty is applied to older people living with higher levels of functional dependency that impacts on day-to-day activities such as shopping, walking, preparing food, and being able to wash and dress independently. Frailty exists on a spectrum from mild, moderate, severe to very severe (BGS 2014).

Frailty can exist on its own with no other significant health issue, but it is more prevalent in people living with other long-term conditions such as heart failure or diabetes, described as co-morbidities.

Frail older people are more likely to experience worse outcomes such as death, sudden acute illness, injury, hospitalisation and institutionalisation directly or indirectly due to climate change.

Older people have the following issues that increase their risk for climate change:

Balance and Falls: A third of people over 65 fall each year, and 50% of those over 80 fall each year. This means they are at greater risk of falling on snow or ice, or wet surfaces. Many older people can't get up again if they fall, increasing the risk of hypothermia during storms, floods and cold weather.

Bone Density and Osteoporosis: With ageing, bone density decreases, leading to osteoporosis, especially in older women. This means they are more likely to break a bone if they fall, which can increase their exposure to heat or cold, as they may not be able to get up from the ground.

Muscle Strength and Arthritis: With ageing, there is an increase in aerobic and a decrease in anaerobic muscle fibres. This leads to reduced strength. In addition, arthritis is common. These may affect the ability of an older person to protect a house from a storm or flood, or to move an obstacle pinning them down or blocking their escape. It may prevent an older person from climbing to safety in a flood situation. Slow gait speed and reduced exercise tolerance also increase vulnerability.

Mobility and Accessibility: A person with restricted mobility can have problems in accessing food and drink if they live alone and carers cannot come to them. This may vary from needing extra food in the house before a storm, to needing someone to assist them in feeding. Older people living with a significant physical disability may have issues evacuating or accessing emergency transport.

Cognitive Risk Factors

Many older people can experience cognitive impairment, and this makes them more vulnerable to climate change impacts. **People with dementia** are particularly vulnerable to issues arising from climate change (Zuelsdorff et al, 2024). Dementia is a general term for loss of memory, language, problem-solving and other thinking abilities that are severe enough to interfere with daily life. Alzheimer's is the most common cause of dementia (Alzheimer's Association, 2024).

There are over 55 million people worldwide living with dementia in 2020 (ADI, 2024)

Communication: Communication and ability to process and understand information can be affected in dementia. This can impact ability to understand a complex weather warning (where severity is different for different areas at different times), or to follow an evacuation order, or to judge a genuine offer of help versus a person wanting to take advantage of them. Fast moving, complex information may be too much for an older person with dementia to process.

Decision making: This can be affected in some forms of dementia. This may make someone more likely to take a chance and ignore evacuation orders

Delirium: This can occur in a person with dementia during exposure to extreme heat, or dehydration, or a change in location (due to an evacuation). This can make them resist help, or refuse to leave their house, or to take risks during an extreme weather event (such as leaving their home).

Memory loss: This can affect ability to remember a notice about an impending weather event, or to remember to drink more during a heatwave, or take medications when a carer is not able to visit.

Paranoia and delusions: These are relatively common in dementia. This may make a person afraid to leave home or accept help from strangers. Emergency vehicles' flashing lights and sirens, army vehicles, loudspeakers, etc., can feed into delusions. Even without delusions, the noise and panic can make a person with dementia less able to think clearly, follow an instruction, or plan an escape.

Walking about: This is a common symptom in dementia. A person may struggle to stay indoors for long periods. Equally, a person with dementia may become lonely and may want to visit friends and neighbours and may struggle to understand why this is not safe at times.

How can People with Dementia be Supported to Adapt to Climate Change

- All information should be simple and easy to read. Short sentences with only one message are best, using simple words. Pictures and images can aid understanding. "Less is more" is the key thing.
- People with dementia living alone should be on a risk register. This should be shared with emergency response teams.
- People with dementia may like to walk outside and may struggle to remain indoors during an extreme weather event, or a hot or cold wave. Extra points of interest indoors for an indoor walking loop, or indoor gardening supplies, or arts and hobbies, may provide interest inside and reduce the desire to be outside.
- Healthcare workers need to consider ways to remind people to take medications, especially key medications. This may involve reducing doses to morning only or twice a day to facilitate reminders., and enlisting neighbours to support the person during extreme weather events.
- If families are not nearby, friends and neighbours need to be mobilised to support the person — calling into them regularly if safe to do so.
- Families should receive information on how to support the person during extreme weather events. This would include the need to provide and prompt fluids and food. And to provide back-ups like flashlights in case of power failures for a person at risk of leaving their house, this might include a tracking device or geofencing solution, or at a minimum a recent photo of the person and their favourite clothes in case they go missing. The family may need details of cooling centres or shelters near the person and to make a plan of who will bring the person to these in a heatwave or storm. Or the family may choose to bring the person to their house, or to stay with the person when an event is imminent.

[A Bidirectional Relationship between Climate Change and Dementia]

Carer Stress: Adverse conditions and acute hazards create significant additional stress on carers.

Socioeconomic Risk Factors*:* limited education and literacy, poverty and ethnic minorities are particularly vulnerable.

5. Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

List the main climate-related challenges in your region (bullet points or short sentences are sufficient; 5 marks).
In about 500-600 words, describe how these effects of climate change can affect:

- the health of the elderly people in your care (10 marks) AND
- your provision of care to these people (5 marks).

Resources & Materials

Podcasts	**Climate and Environment Change**	**United Nations and EU Webpages on Climate Change**	**Factsheet Resources**	**Governmental and Intergovernmental Websites and Policy Documents**
1. BBC World Service - The Climate Question - Downloads 2. Drilled Podcast — Apple Podcasts 3. How to Save a Planet | Gimlet 4. Climate Change Podcast | Outrage + Optimism 5. For What It's Earth | Emma Brisdion & Sophie Pavelle	1. International Monetary Fund (IMF): Climate Change Indicators Dashboard 2.World Bank Climate Change Data: https://data.world/worldbank/climate-change-data	1. United Nations Climate Change: UN Climate Change (UNFCCC Secretariat) 2. United Nations Climate Action 3. FACTS: Resources: UN MythBusters 4. UN Climate Change Dictionary 5. What Is Climate Change? | United Nations 6. Climate Change and Health | World Health Organisation 7. The Global Climate & Health Alliance 8. Health Care Without Harm | NoHarm.Org	6. IPCC Sixth Assessment Report, Working Group II: Fact Sheet-Europe, Climate Change Impacts and Risks 7. World Health Organization (WHO): Fact Sheet, Climate-Sensitive Health Risks	1. National Centers for Environmental Information 2. The Intergovernmental Panel on Climate Change 3. National Oceanic and Atmospheric Administration 4. The Intergovernmental Panel on Climate Change 5. IPCC Fact Sheets | Climate Change 2021: The Physical Science Basis (ipcc.ch) 8. IPCC Regional Fact Sheet 7. World Meteorological Organisation

NGO Websites Concerned with Climate Change	**Communicating about Climate Change Resources**	**Climate Related Policy Documents**	**Main References on healthcare**
1. The Elders 2. Climate Action Network 3. European Climate Foundation	World Health Organisation 'Communicating on climate change and health Toolkit for health professionals'	1. The European Green Deal - European Commission 2. THE 17 GOALS | Sustainable Development 3. Goal 13 (Climate Change) | Department of Economic and Social Affairs	1. Checklists to assess vulnerabilities in health care facilities in the context of climate change. Geneva: WHO, 2021, 2. WHO guidance for climate-resilient and environmentally sustainable health care facilities. Geneva: World Health Organization, 2020. 3. Compendium of WHO and other UN guidance on health and environment. Geneva: World Health Organization; 2024 4. Climate-Change-Toolkit-for-Health-Professionals-Full-Toolkit.pdf 5. The-Regional-Impact.pdf

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Population Ageing Trends

WHO Article on Aging and Health
UN Report: World Population Prospects 2022

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Understanding climate change and its effects on older persons' health MC1 EQF5&6

Microcredential Title	**Understanding climate change and its effects on older persons' health**
Short Code / ID	MC1
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, Portuguese, German, Finnish, Greek
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	University College Cork
Module Lead / Author	Prof. Suzanne Timmons, University College Cork

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Identify the key drivers of climate change on a global level and critically analyse the consequences of this for climate globally and locally.
LO 2	Differentiate between key direct and indirect effects of climate change on human health.
LO 3	Define the likely climate change impacts on the older person in their local region and the consequences for the health and social care service.
LO 4	Understand the difference between climate mitigation, adaptation and resilience as concepts.
LO 5	Discuss climate adaptation solutions for their own work context.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards climate change.
Alignment Notes	MC1 provides health and social care workers with basic knowledge of climate change and what causes it. The MC addresses the potential direct and indirect effects of climate change on older people's health. Direct effects include heat stress, hypothermia, water submersion, and injuries from extreme weather events. Indirect effects include diseases due to increased pollution, isolation, poverty, malnutrition, and healthcare system contraction.
Keywords	climate change, health, resilience, older adults, mitigation, adaptation

Learning Activities

E-Learning Format	Text, Interactive H5P content and Youtube videos. Note: [ ] brackets in this document refers to further content on Moodle.
Activities	Pre and post module quizzes, case studies and knowledge check questions.
Estimated Study Time	25 hours

Content & Topics

1. Overview of Climate Change and Its Effects on the World
2. Key Definitions: Climate Mitigation, Adaptation and Resilience
3. Direct and Indirect Effects of Climate Change on Health
4. Specific Vulnerability of Older People to Climate Change Effects
5. Assessment of Learning

1. Overview of Climate Change and Its Effects on the World

[Differentiation of climate versus weather]

Defining climate change:

"Climate change refers to **long-term shifts in temperatures and weather patterns.**" (United Nations).

Key Effects:

- The melting of polar ice sheets and rising sea levels.
- More common extreme weather events like storms and very heavy rainfall.
- More common droughts and heat waves.

Inequalities in effect: Climate change impacts are unevenly experienced, influenced by factors such as ethnicity, race, socioeconomic status, and gender. Vulnerability to climate change is shaped by **structural and socioeconomic inequalities.** For example, the effects of a severe storm or flood are worse if you live in an overcrowded city, in a poorly constructed house, and must attend work in person. [Optional learning: Gender inequalities in climate change vulnerability]

Causes of Climate Change Globally (Natural vs. Human-Made Climate Change):

Natural Climate Change: Volcanic emissions, changes in the sun's radiation, variations in the Earth's orbit, natural fluctuations in the Earth's carbon dioxide (CO2) levels. **Source:** British Geological Society.

Human-Induced Climate Change: Humans are the primary drivers of climate change globally. [Graph of relative effect of natural versus climate change]
The primary issue is **global warming**, which results from a vicious cycle centred around greenhouse gases, carbon dioxide, methane, ozone, nitrous oxide, chlorofluorocarbons, and water vapour.

The **greenhouse effect** is the process by which these gases trap heat near the Earth's surface, leading to rising temperatures. **Global warming** in turn **increases water vapor** in the atmosphere, which then **amplifies the greenhouse effect**. [Global warming and greenhouse gases explained in more detail]

In short, the burning of **fossil fuels, non-greenhouse gas pollutants**, deforestation, livestock farming, and nitrogen-based fertilizers contribute to climate change. **Source:** European Commission

Absorption of Sunlight

Apart from greenhouse gases and trapped water vapour, sunlight absorption by the earth's surface can increase the Earth's surface temperature. Human activities like farming, deforestation, and building roads can alter the Earth's reflectivity, leading to local warming or cooling. **Sources:** National Aeronautics and Space Administration (NASA); Environmental Protection Agency (EPA)

➔ **Students directed to watch** the video by National Geographic and consider the causes and effects of global warming. https://youtu.be/G4H1N_yXBiA

Relevant Regional and Local Climate Change Related Change consequences

Clickable 5HP graphic: Information presented below.

The Arctic
Temperature increases, decreased cover of sea ice during summer, permafrost thawing linked to infrastructure issues. Sources: Rantanen et al. (2022); European Commission (EC)
North America and Canada
Wildfire-induced loss of property, loss of ecosystem integrity, human morbidity, increased heat-related mortality risk and urban floods in river and coastal areas. Source: (www.climatemed.eu)
Cities and Urban Areas
Temperatures in urban areas can often be higher than rural areas, due to a high concentration of buildings and low amounts of green areas. Source: US Environmental Protection Agency (EPA).
Central and South America
Decreased water availability in semi-arid and glacier-melt dependent regions, decreased food production and food quality and spread of vector-borne diseases in higher altitudes and latitudes, spreading further from the equator. Source: (www.climatemed.eu)
Northern Europe
Less ice cover on rivers, lakes and snow which can affect fresh water supply. River flows decrease in some areas and increase in others. Increased damage from storms and extreme weather events will be more often and more intense. Sources: Sharma et al. (2020) European Commission.
North-Western Europe
Increased risk of coastal flooding and a greater risk of storms resulting in river flooding.
Central and Eastern Europe
More extreme temperatures and a reduction in summer rain leads to drought and increased demand for energy. Winter/springtime river flooding due to increased snow, rain and sleet in winter and a growth in forest fires and variability in crop-yields. Source: European Commission
Mediterranean Regions
Sea temperature increase, ocean acidity, coastal threats, sea level rise, increased air temperature, rainfall changes and fire risk: longer fire seasons, more heatwaves, and droughts increase the risk of wildfires. Source: State of the Environment and Development in the Mediterranean
African Continent
Stress on water resources, reduced crop productivity, livelihoods and food security. More widespread vector- and water-borne diseases. Source: (www.climatemed.eu)
Mountain Areas
• **Direct impact:** Precipitation changes (e.g. dried up springs, erratic rainfall); more wildfire weather. • **Indirect impact:** Decreasing pollinator diversity and climate induced hazards (e.g., landslides) • **Altering habitat conditions:** Shortage of food, declining livestock, decreasing regeneration potential and threatening native and endemic species. • Decreasing quality and quality of ecosystem products.
Asia
Increased river, coastal, and urban flooding, increased heat-related mortality risk and increased risk of drought-related water and food shortages. Source: (www.climatemed.eu)
Small Island States
Loss of livelihoods, coastal settlements, infrastructure, ecosystem services, and economic stability due to rising global sea levels and flooding events due to high-water levels.
Australasia
Degradation of coral reef systems, increased frequency and intensity of flood damage to infrastructure and settlements and increased risks to coastal infrastructure and low-lying ecosystems. Source: (www.climatemed.eu)

Key Environmental Effects of Climate Change: Biodiversity loss, wildfires, drought and floods.

Key Socioeconomic Effects of Climate Change: Changing energy requirements and energy poverty; challenges to agriculture; food insecurity and migration.

[Content for all subheadings provided; migration given as an example].

Emerging Health Risks of International Climate Migration

Climate change-driven migration is becoming an urgent issue, and with it comes a range of serious health risks. As more people are displaced due to extreme weather, rising sea levels, and droughts, their health becomes increasingly vulnerable. Many displaced populations face **food and water insecurity**, leading to malnutrition and the **spread of waterborne diseases** like cholera.

Another major concern is **limited access to healthcare**. Migrants and displaced communities often struggle to get medical attention, either due to financial barriers, lack of infrastructure, or legal status in the places they move to. This makes pre-existing conditions worse and increases the likelihood of disease outbreaks, particularly in overcrowded settlements. **Mental health** is another overlooked issue—forced displacement can cause extreme stress, anxiety, and trauma, especially for those who lose their homes, communities, and ways of life.

Heat-related illnesses are also expected to rise as global temperatures increase. **Vulnerable groups**, like the elderly, children, and outdoor workers, face higher risks of dehydration, heat stroke, and cardiovascular diseases. Climate change is also expanding the range of **vector-borne diseases** like malaria and dengue, exposing migrants to new health threats.

Urban migration creates further challenges. Many climate migrants end up in cities, putting additional pressure on already strained public health systems. Overcrowded informal settlements with poor sanitation can become hotspots for disease outbreaks.

Addressing these health risks requires proactive policies. Governments and international organizations must strengthen healthcare systems, ensure access to clean water and sanitation, and incorporate mental health support. Planned migration strategies, rather than reactive crisis responses, will be essential in minimizing health consequences of climate-driven displacement.

The UNESCO Policy Lab on Climate Change 2022 Report highlighted the following as key points of concern when discussing climate migration:

- Climate migration is complex – influenced by population growth, adaptive capacity, socioeconomic development, and policies.
- Increased displacement risk – more frequent/severe floods, storms, and droughts.
- Some areas will become uninhabitable – forcing either autonomous or planned migration.
- Policies and governance matter – future migration depends on climate impact and government planning at all levels.
- Climate change and poverty – By 2030, an additional 122 million people may face extreme poverty, limiting their ability to migrate.
- Mobility as a coping strategy – Severe climate impacts can both force displacement and reduce people's ability to move, worsening exposure to risks.
- Immobility is a key issue – Some people stay due to vulnerability, lack of agency, or deliberate cultural/livelihood choices.
- Planned relocation is rare but necessary – not common yet but will likely grow in need.

2. Key Terminology in Climate Change:

Climate Mitigation: This means preventing or reducing the emission of greenhouse gases into the atmosphere to make the impacts of climate change less severe such as using renewable energy and carbon free transportation. [Examples of reducing greenhouse emissions/enhancing carbon absorption].

Climate Adaptation: *Adaptation* means anticipating the adverse effects of climate change and taking appropriate action to prevent or minimise the damage they can cause or taking advantage of opportunities that may arise. **Adaptation Strategies:** Infrastructure investments (flood barriers),

efficient resource management (water conservation programs), social protection measures (disaster relief funds) and preventive actions (early warning systems and urban planning). **Watch** the video describing the difference between mitigation and adaptation. https://youtu.be/J3IXx9A7-m4 [Mitigation versus adaptation examples and video].

Climate Resilience: The capacity of a community or environment to anticipate and manage climate impacts, minimize their damage, and recover and transform as needed after the initial shock. United Nations Development Dictionary (2023, p.75)

3. Direct and Indirect Effects of Climate Change:

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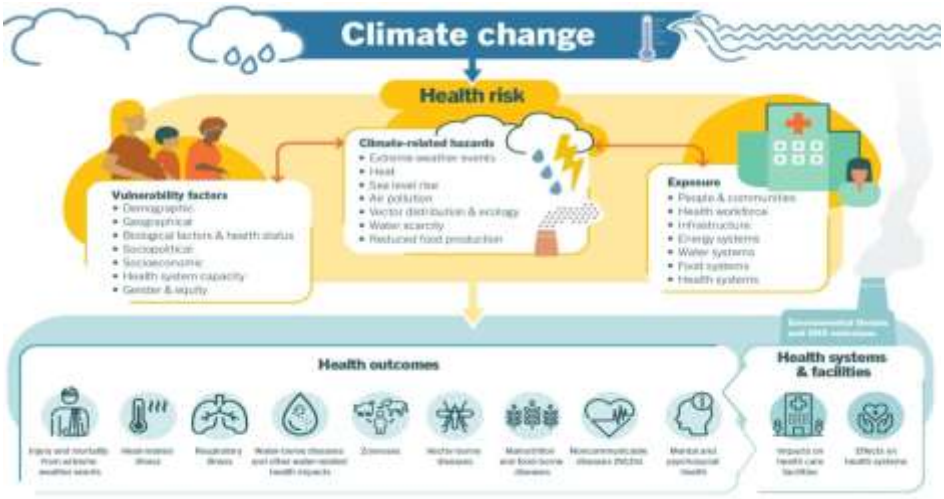
Climate change is already impacting health in many ways see image below and is expected to cause approximately 250,000 additional deaths per year between 2030-2050.



Source and Image: World Health Organization (WHO)

Direct Effects: Heat; Cold exposure; floods and storms can cause damage to health services, spread infectious diseases and have negative impacts on mental health.

Indirect Effects:

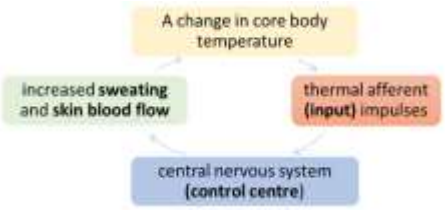
Air pollution *(*premature deaths and increased airborne allergens levels); **Wildfires** (acute deaths, emergent evacuation of healthcare structures and PTSD); **UV Radiation** (unknown impact on skin cancers and eye diseases); increased food, water and vector borne **infectious diseases**; **livelihoods and poverty** (infections, injuries, mortality and harms to financial security) and lastly **sustained conflict** for nations dependent on agriculture.

Additionally, to the health care system there can be financial losses, exacerbating existing inequities negatively impacting service quality.
[Can we reduce health risks from climate change?] [Effects on healthcare systems: cost, access, quality]

Health Care Workers: Climate change also impacts healthcare workers experiencing climate change's physical and mental health risks more acutely impacting travel, burnout and increasing challenges.

Temperature effects: hyperthermia and hypothermia

Heat Regulation in the Body:
Heat production in the body is largely out of our direct control, and it occurs constantly through: Cell respiration, Physical activity and Digestion of food.
Heat Loss occurs in two main ways: dry heat exchange (touching a solid surface, heating air and infrared heat rays from our body) and evaporative (wet) heat exchange (sweating).



[Heat Exchange Inside the Body- mainly due to circulating blood]

[Heat balance- thermoregulation]

Hyperthermia

Effects of Heat on the Human Body: Heat illnesses occur when the body is exposed to high temperatures and cannot cool itself effectively.

Secondary Risks (due to heat fatigue): Reduced alertness can lead to accidents or injuries.

Dehydration and Heat Stress: These conditions can exacerbate existing health issues, increasing the risk of medication toxicity as well as cardiac and respiratory complications.

[Vulnerable Subpopulations for Heat Illnesses]

Why Are Older Adults More Vulnerable to Heat? Several **physiological changes** in older adults make them more susceptible to overheating:

- **Delayed Sweating Response**: It takes longer for sweating to begin at a given body temperature, delaying the body's natural cooling mechanism.
- **Reduced Sweat Rate**: Less sweat made per sweat gland, resulting in lower evaporation.
- **Decreased Skin Blood Flow**: There is less blood flow to the skin for a given rise in core temperature, limiting the body's ability to cool through radiation, conduction, convection, or evaporation.
- **Lower Cardiac Output During Heat Stress**: The heart pumps less blood to the limbs and skin, further reducing heat dissipation.
- **Diminished Thirst Sensation**: Older adults may not feel as thirsty despite being dehydrated from heat or sweating, increasing the risk of dehydration.
- **Impaired Sodium and Water Conservation**: Reduced kidney function in conserving sodium and water makes it harder for the body to retain necessary fluids during heat stress.

How else are Older People More at Risk from heat? ***Living alone*** (less able to escape heat or access to water); ***living in a care home*** (frailty); ***Chronic illness***; ***Mental illness*** and ***cognitive impairment*** (inability to adapt behaviour to keep cool); ***Addiction*** (dehydration resulting in a reduced response to danger and risk for heatstroke); ***Medications*** and ***Environmental factors*** (living on top floors or outdoor activities may involve high levels of physical exertion). Source: Intergovernmental Panel on Climate Change

Simple Ways to Prevent Heat Illnesses in Older Patients:

Keep the **inside cool**, **check the temperature** of the room and the person's body, **supply fluids**, and **electrolytes** if the person has been sweating, and **restrict physical activity**.

Review the person regularly. **Teach families/neighbours** what to look out for (confusion/fatigue).

[OPTIONAL: How We Can Build Heat Resilience in Older People]

[Details on: Heat syncope; Heat cramps; Heat rash; Heat oedema; Heat exhaustion]

Heatstroke is the most severe heat illness and can impact the brain through cognitive impairment, disrupted sleep, alterations in oxygen delivery, increased blood-brain barrier permeability, hormonal changes and in severe cases neurological damage. Source: Löhmus (2018). It can be differentiated into exertion related (physical activity on a hot day → rhabdomyolysis) or non-exertion related. [Details]

[Optional learning: **1** Difference Between Heat Exhaustion and Heat Stroke **2** Difference Between Hyperthermia or Infection if Febrile Patient **3** How to Treat a Collapsed Patient with Heat Stroke **4** Initial Management of Life-Threatening Heatstroke **5** In-hospital Treatment of Life-Threatening Heatstroke]

➔ ***What should you do about Heat Illness?***

Mild: Hydrate and get out of heat. **Severe (Heat Exhaustion)**: Hydrate, cool, move to a cooler location. **Heat Stroke**: Follow the guidelines of special emergency care.

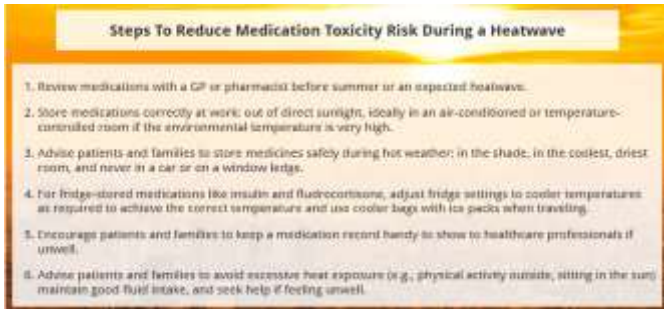
[How Medication Affects the Body's Cooling Mechanisms- general effects]

- Antipsychotics (for schizophrenia or non-cognitive symptoms of dementia (BPSD)
- Antidepressants (for low mood)
- Anxiolytics and muscle relaxants (for anxiety); hypnotics (sleeping tablets)
- Anti-parkinson agents (e.g. levodopa, dopamine agonists)
- Antiepileptics (used for seizures but also for mood stabilization)
- Anti-cholinergics-significant culprit medication (used in Parkinson's disease for tremor and drooling; used for urge incontinence)
- Antiadrenergics (alpha-blockers, beta-blockers (for hypertension and prostatic hypertrophy)
- Nitrates and calcium channel blockers (for heart disease and hypertension)
- Diuretics - significant culprits in worsening heat effects

Medications affect the body's cooling mechanisms such as impaired thermoregulation, reduced cognitive alertness and changes in blood pressure. (WHO Regional Office for Europe, 2009). There are changes in the body's medication handling due to heat stress.

[Details for each medication class]

Drug Toxicity in Heat: Dehydration, along with reduced liver metabolism and renal clearance, can lead to drug toxicity, even with medications normally well-tolerated. Healthcare professionals should be vigilant about older individuals taking multiple medications during heatwaves.



[Effect of heat on medication stability; optional learning section on vaccine stability.]

Key Messages on heat-related illness

- **Heat-Related Deaths:** During heatwaves, most deaths in older adults are due to heart disease, lung disease, or ischemic cerebral infarcts. Dehydration and heat stress can exacerbate existing cardiovascular conditions, making even moderate excess heat a serious risk.
- **Hyperthermia and Heatstroke:** Older adults are at higher risk of hyperthermia and heatstroke. Heatstroke is a form of encephalopathy caused by severe hyperthermia.
- **Medication Risks:** Healthcare professionals should be vigilant about older individuals taking multiple medications during heatwaves, particularly high-risk drugs such as:
  - Antipsychotics, anticholinergics, antihistamines, and tricyclic antidepressants (which reduce sweating), and diuretics (which increase dehydration risk).
- **Drug Toxicity in Heat:**
  - Dehydration, along with reduced liver metabolism and renal clearance, can lead to drug toxicity, even with medications normally well-tolerated.
  - Transdermal and subcutaneous medications may have increased absorption during heatwaves, further increasing toxicity risks.
- **Delirium as a Warning Sign:** Older adults, especially those with existing cognitive impairment, may present with delirium (confusion) due to excessive heat exposure even without heatstroke. These patients are at high risk of progressing to heatstroke in the following hours or days, requiring immediate preventative measures. Source: Cimons (2019): Nexus Media News

Hypothermia and water submersion

[Polar vortex explained] [Heat loss from the body detailed; heat loss in moving air or water highlighted]

Climate Change and Cold Waves/Snaps can increase the likelihood of hypothermia.

Hypothermia is a serious condition in which the body loses heat faster than it can produce it, leading to dangerously low body temperatures. Without treatment, hypothermia can cause the heart and respiratory system to fail, ultimately resulting in death.

Symptoms:
Shivering; Slurred speech
Shallow breathing; Weak pulse;
Reduced coordination/balance;
Drowsiness ; Confusion
Loss of consciousness *(Mayo clinic)*

What To Do to help: Follow the 7 Steps of DRSABCD First Aid, then:

- Move the person to a warm, dry place
- Help the patient to lie down
- Remove wet clothing and place the person in a blanket
- Cover the head to retain body heat
- Give the patient warm drinks
- Use hot water bottles and heat packs

Source: St John Ambulance Australia

[Medical Treatment of Hypothermia] [Preventing Hypothermia]

Older People are More Vulnerable to Hypothermia due to various factors: 1) environmental (housing issues, falls and water exposure), 2) physiological (reduced temperature regulation and communication barriers) and 3) medical factors (underlying health conditions and medications). [Details of each]

Water Immersion, frostbite, and cold shock are additional impacts from cold snaps.

[Cold water immersion effects: details on frostbite; hypothermia; cold shock; Treatment of a person taken out of the water; older person vulnerability to harm from water immersion]

[Optional learning on: 1. Case Study European 2003 Heatwave; 2. Case Study: Mortality Risk Related to Heatwaves in Finland; 3. How to Treat Mild and Moderate Heat Illnesses; 4. Difference Between Heat Exhaustion and Heat Stroke; 5. Difference Between Hyperthermia or Infection in a Febrile Patient; 6. How to Treat a Collapsed Patient Who May Have Heat Stroke; 7. Initial Management of Life-Threatening Heatstroke; 8. In-hospital Treatment of Life-Threatening Heatstroke; 9. Vaccine Stability]

Food and Drought

Drought causes water and food shortages, which may impact the affected population's life chances and increase the risk of disease and death. Drought may have acute and chronic health effects, including:

- Malnutrition, including micronutrient deficiency, such as iron-deficiency anaemia.
- Increased risk of infectious diseases, such as cholera, diarrhoea, and pneumonia, due to acute malnutrition, lack of water and sanitation, and displacement.
- Psycho-social stress and mental health disorders.
- Disruption of local health services due to a lack of water supplies, loss of buying power, migration and/or health workers being forced to leave local areas.

Severe drought can also affect air quality by making wildfires and dust storms more likely. Source: WHO

Reproduced from: Beltrame et al. ludovica.beltrame@bristol.ac.uk

Examples of content: Meteo Drought
Pathway/control: Atmospheric pollution. **Interventions:** Use of relationships between atmospheric patterns and weather extremes for prediction and early warning.
Agri Drought
Pathway/control: Occurrence of wildfires. **Interventions:** Land use control including soil water content monitoring.

Altered infectious diseases

5. Infectious Diseases Overview
6. Vectorborne Diseases
7. Waterborne Diseases
8. Climate Change and Fungi

Stressors Influencing Disease Emergence and Spread

Over the past few decades, the global infectious disease risk has been altered by several factors:

- **Climatic**: Caused by the activities of mankind (mainly global warming).
- **Demographic**: Increased urbanization, population growth, land-use change, migration, ageing populations.
- **Technological**: Cheaper, faster global travel, increased international trade, versus improved health care and vaccination.

These affect infectious diseases in three main ways: [details on all]

1. New Pathogens; 2. Disease Dynamics (transmission; host susceptibility); **3. Global Spread**

Optional Learning on specific diseases:

Vectorborne Diseases

The World Health Organisation states that approximately one sixth of worldwide disability and illness is due to vector-borne diseases (VBDs). VBDs are infections transmitted by the bite of an infected arthropod species (the vector). Examples are insects, spiders, and crustaceans.

[Worked examples of effects of:
Higher CO2 Concentration
Temperature Increase (Regional/Temporal Variation)
Rainfall; Urbanisation; Irrigation and Water Storage
Intensification of Agriculture; Chemical Pollution
Increased Trade; Increased Travel]

➔ Content on specific diseases, spread by ticks, mosquitos, and other vectors.

Tick-Borne Diseases: Babesiosis, Lyme disease, tick borne encephalitis.

Mosquito-Borne Diseases: Malaria, Japanese encephalitis, Zika Virus disease, Yellow Fever, Aedes (Stegomyia) Albopictus, Chikungunya Virus (CHIKV), Dengue fever, West Nile virus, Lymphatic Filariasis and Rift Valley Fever (RVF).

Flea-Borne Diseases: Plague, Tungiasis, Typhus.

Snail Diseases: Schistosomiasis, Hookworm Infection.

Biting Flies and Bugs: Leishmaniasis and Sand Fly Fever/Toscana Virus Infection, Trypanosomiasis (African sleeping sickness) and Chagas disease (American trypanosomiasis).

Current State of Knowledge of CC Effects on VBDs

Disease	Change in Geographical Range/Occurence Frequency/Seasonal Duration?	Main Mechanism(s) of Disease Spread Over Large Distances	Areas Affected

[Table with details for each disease]

Current status of VBD Vaccine Development

Disease	Vaccine Availability	Vaccine Under Development

[Table with details for each disease]

Possible Prevention and Mitigation Methods: [details given for each sub-heading; summarised here]

Methods for avoiding or ameliorating these effects can be grouped in three broad categories:

- **Environmental** (good land management, minimization of habitat destruction and avoidance of contact between wild and domestic animals and humans).
- **Societal** (VBD surveillance and educational programs and public access to medical treatment).
- **Technological** (vector elimination/containment, development of tests and vaccines).

Key Messages on VBD:

- Three groups of complex, interlinked and often poorly understood stressors influence the emergence and propagation of VBDs: climatic, demographic, and technological changes.
- Major climate hazards for disease aggravation are warming, rain, floods, drought and storms.
- Vector Borne Diseases (VBDs) constitute the largest single climate-affected group, especially mosquitoes (39%), followed by ticks (22%), fleas (13%), snails (9%), and sand flies (9%).
- 22 out of 23 of the major VBDs examined have been shown to or are predicted to show changes in geographical range, disease occurrence, and/or frequency/seasonal duration, from climate change.
- 18 of the 23 VBDs (78%) considered have been shown to or are predicted to affect areas of Europe.
- Prevention and mitigation of climate change-aggravated VBDs revolves around environmental, societal, and technological control methods, including:
  - Improved VBD surveillance of the human and domestic animal reservoir host populations.
  - Enhanced public awareness of VBD threats; Development of effective VBD vaccines.

Waterborne Diseases

Waterborne diseases are caused by drinking or coming into contact with **contaminated water** caused by man-made or natural pollutants, or faeces from an infected person or animal. Cholera and typhoid are a leading cause of human morbidity and mortality worldwide. As climate change impacts global temperatures and weather events, the risk of these infectious diseases will only worsen.

[Detailed learning on Cholera and Typhoid]
[Optional learning on **1** Harmful Algal Blooms and Health **2** Cyanobacteria]

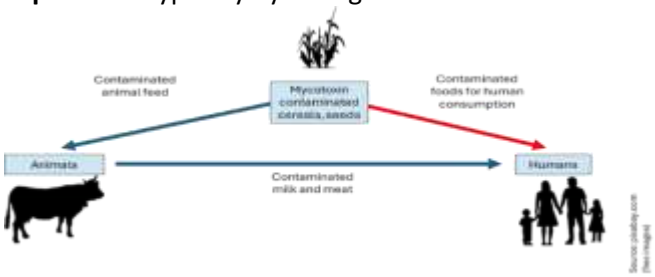
How to Reduce the Risk of Waterborne Diseases

- Provide universal access to care and disease management; improve disease surveillance
- Develop and invest in early warning systems to monitor changes in climatic conditions
- Upgrade water catchment, storage, treatment and distribution systems
- Protect critical infrastructure from floods, storms and sea level rise
- Limit water overuse; Use household water purification systems

Fungal Diseases

Impact of Climate Change on Fungal Diseases: Climate changes may significantly impact fungal colonization of crops — changes in the fungal biodiversity and emergence of new diseases.

Exposure is typically by eating contaminated foods or eating animals fed contaminated foods.



Risk is reduced by: Timely planting, providing plant nutrition, controlling weeds, crop rotation, drying; storing properly and use non-toxic fungi or bacteria to replace the toxic strains.

Source: Kumar et al, (2017); Awasthi et al., (2012)

Smoke Inhalation and Burns

The most common injury caused by wildfires is burns, usually second- or third-degree burns.

Due to the extraordinary circumstances of the injury, patients with wildfire burns may need psychological services and support groups in addition to professional care for their burns.

The other frequent injuries in addition to the burns are:

- Eye, nose, throat and lung irritation
- Decreased lung function, including coughing and wheezing
- Pulmonary inflammation, bronchitis, exacerbations of asthma, and other lung diseases
- Exacerbation of cardiovascular diseases, such as heart failure

Wildfires

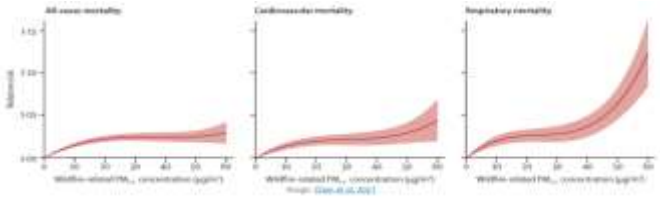
The size and frequency of wildfires are growing due to climate change.

Direct Effects: Burning Damages and Other Injuries*:* The most common injury caused by wildfires is burns. Other injuries include eye, nose, throat and lung irritation. Wildfires also release significant amounts of mercury into the air, which can lead to impairment of speech, hearing and walking, muscle weakness and vision problems for people of all ages.

Indirect Effects: Impact on Mental Health: People may experience depression, anxiety, post-traumatic stress disorder, and other mental health issues including difficulty sleeping, flashbacks, intrusive thoughts and hypervigilance. The fear of future wildfires and their potential destruction can be a source of ongoing distress. → video on link between wildfires and mental health. https://youtu.be/ACnxzmFlO8s

Smoke Pollution: Wildfire smoke is a complex mixture of particulate matter (PM) and gaseous pollutants. Chen et al. 2021 analysed mortality data for 750 cities in 43 countries in 2021 and found that wildfire smoke pollution increases all-cause, cardiovascular and respiratory mortality. Thus, wildfire smoke exposure can be interpreted as a complex mortality factor.

Source: Акутагава - Own work, CC BY-SA 3.0



Chen et al. 2021

Climate Change Effects on Specific Body Systems

This topic is divided into six parts:

2. Cancer
2. Renal diseases
3. Allergy and dermal diseases
4. Respiratory illnesses
5. Metabolic disorders
6. Cardiovascular diseases

Cancer

Impact of Climate Change on Cancer: Lung cancer is the top cause of cancer deaths worldwide, with lung, bronchus, and tracheal cancers causing 1.9 million deaths in 2017 globally. Tobacco consumption is still the first cause of cancer mortality, but pollution causes 43% of lung-cancer deaths. Particulate air pollution causes 15% of all lung cancer deaths. This is a 20% increase during the last three decades.

Ultraviolet Radiation & Skin Cancers: Skin cancer is the most common cancer worldwide. Extensive data links increased UV radiation exposure to increased incidence of melanoma, squamous cell and basal cell cancers. This is increasing due to ozone depletion and increased UV radiation exposure.

Scandinavia	Nonmelanoma skin carcinoma incidence has **doubled since 1960**	
Australia	Nonmelanoma skin carcinoma incidence has **increased 4-fold**	

Why is skin cancer increasing?

Stratospheric ozone (O3) plays a major part in protection from UV radiation. The use of aerosols contributed to increasing UV radiation exposure and skin cancer. In Australia, UV radiation levels have increased by 2-6% each year since 1990. In 2011, a large hole in the ozone layer appeared over the Arctic resulting in a 60% increase in UV radiation exposure at the ground level in the area.

But this can be improved again. The Montreal Protocol (1987), an international environmental policy, mandated the incremental phasing out of ozone-depleting substances. Ratified by every nation, it:

- Reduced ozone layer depletion; prevented millions of skin cancers worldwide

Increases in skin cancer incidence are still expected before the full recovery of the stratospheric ozone layer.

Cancer-Related to Disruptions in Food and Water Supply:

Diet: a healthy diet with whole grains, fruits, and vegetables is protective for colorectal and breast cancer. Climate change has an impact on the quality and quantity of this food production.

Air pollution: Particles penetrate the epidermis and may pass via follicular and eccrine structures.

Contaminated drinking water: Exposure to arsenic and its compounds, as a result of flooding or drought. Sources: Hiatt and Beyeler (2020) ; Springmann et al., (2016)

Renal Disease [Overview of the function of the kidneys]

Climate Change and Heat Stress Nephropathy:

One consequence of climate-related extreme heat exposure is dehydration and volume loss. This can directly lead to acute kidney injury (AKI; a rapid (hours to days) decrease in kidney function), manifesting as reduced urine output and often confusion. Every 1°C increase in night-time temperature during a heatwave is associated with an increased incidence of AKI (incidence rate ratio 1.037, 95%CI: 1.026–1.048). Source: Borg et al., 2017.

Older people have reduced renal function due to **ageing** (reduced blood supply, **reduced filtration ability**, and **reduced drug clearance**).

In addition, they often have diseases which can further affect the kidney:

- Diabetes High blood pressure Heart failure
- Vascular disease (e.g., prior myocardial infarction, stroke or peripheral vascular disease)
- Obesity Smoking History of acute kidney injury

[Optional Learning: Diagram: Older Person's Kidneys Vulnerable to Heat-Related Injury]

Other Renal Complications of Heat

- Heat stress and dehydration lead to low-volume, concentrated urine → risk of **kidney stones**.
- **Urinary tract infections** are more common in heatwaves as lower levels of urine production can hamper the removal of pathogens; risk increases as temperature increases.
- Even rapid recovery (≤2 days) from one episode of Stage 1 AKI is associated with a **43% increased risk** of Stage 3 or higher **chronic kidney disease (CKD)** within one year.
- Recent studies have shown that recurrent heat exposure with physical exertion and inadequate hydration can lead to CKD that is distinct from that caused by diabetes, and hypertension.
- Epidemics of CKD consistent with heat stress nephropathy are now occurring across the world.

Take Home points:

- Older people are prone to heat-related acute kidney injury (AKI).
- The diagnosis of dehydration is challenging in primary care.
- Timely introduction of anticipatory measures to reduce heat exposure and increase fluid intake in this group will help reduce heat-related AKI.
- At risk groups should monitor their urinary output and have blood tests during heat waves.
- Health service providers should be prepared for increased presentations of kidney diseases such as AKI and kidney stones during warm seasons.
- Clinicians may need to be particularly cautious in prescribing **potential nephrotoxins** to older patients with pre-existing kidney disease during heat waves.

Allergy and Skin Diseases

Allergies affect up to 30-40% of the population worldwide. The severity and complexity of these diseases continue to increase due to lifestyle and diet changes, climate change, pollution, urbanisation, and reduced biodiversity.

Dermal (skin) diseases were the 4th leading cause of non-fatal disease burden worldwide (in 2013). Climate change is expected to exacerbate the distribution and frequency of these, particularly those associated with infectious etiologies, sun exposure, environmental irritants, and aquatic transmission.

There are more than 40 allergy and dermal diseases that can be affected by one or more of 10 climate change stressors via many different disease causes or triggers.

[Lists of allergy diseases; Chronic Inflammatory Skin Diseases; and Infectious Skin Diseases affected by climate change]

Climate Change Hazard	Disease Causes/Triggers	Disease Categories
• Warming • Drought • Heatwaves • Fires • Precipitation • Floods • Storms • Sea level rise • Ocean climate change • Natural land cover change	• **Airborne insects:** dust mites • **Airborne pathogens:** viruses, bacteria, fungi, animal hair/fur/dander • **Biological airborne particles:** pollen, spores • **Contact** allergens, pathogens, food, chemicals, irritants • **Contact insects:** venom, larvae, mites, parasites • **Gaseous air pollution** • **Human migration** • **Human physical environment:** sun, heat, cold • **Human physiology:** genetic predisposition, hormonal change • **Lifestyle:** exercise, diet, smoking • **Non-biological airborne particles:** sand, dust, smoke, PM • **Psychological effects:** stress, psychodermal factors	• Allergy • Chronic inflammatory dermal • Infectious dermal • Malignancies

Environmental Changes	Health Outcomes
More frequent extreme climate events	—
Heatwaves, wildfires, higher temperatures, etc.	Amplification of exacerbation rate, morbidity, and mortality of respiratory diseases
Intense rain and flooding	Dampness in affected households with subsequent proliferation of molds and cockroaches
Thunderstorms	Increase in asthma exacerbations and hospitalizations following thunderstorm-related asthma episodes
More intense and more prolonged pollen seasons. Possibly similar changes for other allergens (e.g. fungi)	Increase in the severity and alteration of the seasonality of symptoms of allergic rhinitis and asthma
Alteration of the local vegetation patterns with changes in the geographical spread and migration of plants. Colonization of geographical areas by new species with alteration of the species dominating distinct ecological niches. Possibly, similar changes for fungi.	Increased prevalence and severity of allergic rhinitis and asthma due to both de novo sensitizations and cross-reactivity with pre-existing species.
Possibly changes in the growth pattern and distribution of pathogenic microorganisms	Possibly changes in the pattern of respiratory tract infections.
Reproduced from: Reinmuth-Selzle et al. (2017)	Reproduced from: Eguiluz-Gracia et al., (2019)

Atopic Dermatitis (Eczema)

Atopic dermatitis (eczema) has been found to result from both genetic predisposition and environmental factors, like diet, stress, heat, sweating, dampness, pollen exposure, air pollutants, construction materials and dust mites.

Climate change-related flooding events are anticipated to increase the prevalence of atopic dermatitis, amongst other chronic inflammatory skin diseases. Prolonged submergence in inundated floodwater is also known to be one of the risk factors for keratinocytes damage, conducive to inflammation and irritation without activation of the immune cascade.

Stress, caused as a result of uncontrollable environmental conditions such as flooding, have been shown to aggravate primarily underlying diseases including atopic dermatitis, alopecia, prurigo nodularis, psoriasis and vitiligo. Source: Chen et al. (2021) and Tempark et al., (2013)

[Optional learning: Transmission by Contact with Pathogens; Airborne Pathogens; and Insects]

Prevention and Mitigation Methods

4) Environmental Control Methods:

Pollen allergies: Use plants that rely on insect pollination to produce smaller pollen quantities, prune hedges and mow lawns before flowering and eliminate allergenic plant species from public spaces. **Air pollution**: Strict controls on exhaust gases from vehicles etc., elimination of cars from highly populated environments, rapid response systems to wildfires. **Flooding**: Identification of areas most at risk from major flooding; adoption of appropriate plans for prompt evacuations prior to flooding.

5) Societal Control Methods:

Public awareness: education programmes, public information campaigns and improved access to medical treatment and vaccines.

Allergic and chronic inflammatory dermal diseases: Develop better understanding of the psychological, social, and environmental effects of migration on these diseases.

Infectious dermal diseases: Effective travel and controls on people migrating/travelling from infected areas, with appropriate medical treatment.

Skin cancer: Publication of up-to-date information on lifestyle actions for risk minimisation and better access to UVR skin protection methods.

6) Technological Control Methods*:*
Implementation of automated pollen and spore monitoring networks, development of allergen-specific immunotherapies (AITs) and bacteriotherapies for chronic inflammatory dermal diseases and lastly vaccine development for dermal diseases.

Key Take Home Messages:

- All of the 10 main climate change hazards (global warming, heatwaves, fires, floods, storms, precipitation, sea level rise, natural land cover change, drought, and ocean climate change) cause aggravation of these diseases to a greater or lesser extent, and often in combination.
- Climate change effects have been shown to or are predicted to show changes in disease incidence, severity, frequency/seasonal duration, and/or geographical range.
- For allergy diseases, the major climate change-originating aggravating factors are air pollution, biological aeroallergens (pollen, etc.), and temperature and humidity increases.
- For chronic inflammatory dermal diseases, the major aggravating factors are increases in temperature, humidity, UVR exposure; flooding; storms; psychological effects of natural disasters.
- For infectious dermal diseases, the major climate change-originating aggravating factors are temperature and humidity increases, flooding, and human migration caused by climate change.
- For skin malignancies, the major climate change-originating aggravating factors are excess UVR exposure and nano-particulate air pollution.

Respiratory Illness

Heat and Respiratory Illness:
High temperatures are associated with increased risks of hospitalisations and mortality in people with respiratory disease (Baccini et al., 2008). Patients may need rescue medication (like salbutamol) (Royé et al, 2021). High humidity can worsen asthma, as hot and humid air is harder to breathe, causing coughing in patients with allergic rhinitis (Khosravi et al., 2014) and asthma (Hayes et al., 2012).

The following all affect respiratory illness: [more details provided for some]

Air Quality: Climate change impacts air quality - some outdoor air pollutants (ozone and particulate matter) are expected to increase. This can lead to respiratory illnesses, including asthma.

Ground (tropospheric) ozone (O_3): Major secondary pollutant. Its formation is promoted by burning of fossil fuels in industrial processes, homes and motor vehicles, in a sunlit atmosphere. Ozone irritates the respiratory system, causing shortness of breath and inflammation and increasing susceptibility to other triggers of inflammation, such as pollen and mould spores. Spikes in ground-level ozone are linked with increased hospitalizations for chronic obstructive pulmonary disease (COPD), pneumonia, asthma, allergies, and other lung problems. Long-term exposure is particularly linked with COPD. Globally, 11% of deaths from COPD in 2019 were associated with ozone exposure.

Particulate Matter (PM): This is a mixture of solid and liquid substances that arise from natural sources (e.g. sand and salt), **agricultural sources** (e.g. ammonia-based fertilizer) **and anthropogenic sources** (burning of fossil fuels). **PM** can be categorized according to **size**:

- PM 10 are inhalable particles with an aerodynamic diameter of <10 micrometres
- PM 2.5 are fine particles <2.5 µm PM 0.1 are ultrafine particles <0.1 µm

PM size determines mode of transport of particles and where they settle within the respiratory tract. The WHO air quality guidelines have lowered their recommended levels (<5 µg/m3 for annual levels and <15 µg/m3 for daily levels).

Pollen: Earlier spring warming, precipitation changes, and rising temperatures and carbon dioxide concentrations can increase the length and severity of the pollen season. Older people spending time outdoors may face more exposure to pollen and other allergens that cause hay fever or asthma.

Wildfires: These cause lung inflammation and decreased lung function.

Desert Dust: This can worsen asthma and bronchitis, and cause respiratory tract infections (from carried pathogens, including fungi). As sand and dust storms affect >150 countries worldwide,

billions of people are at risk from these storms. A warming climate, the El Niño phenomenon and larger differences in temperature between land and sea, create strong winds, a reduction in rainfall, loss of soil moisture and deforestation. The main component of sand and dust storms is PM 10, but substantial amounts of coarse PM (PM2.5–10) and PM2.5 are also present.

Indoor Environments: Climate changes can worsen allergens and certain outdoor pollutants, which can then make their way indoors, and can also increase the frequency and severity of heavy rainfall. More humidity and moisture can lead to increases in mold, bacteria, and pests, which can worsen asthma and other respiratory effects in damp environments. Source: US Environmental Protection Agency

Image: US Embassy in the Philippines

- Avoiding outdoor exercise activity on high pollution days.
- Use of N95 or fine particulate matter (PM2.5) masks.
- Use of indoor air purifiers.
- Installation of heating, ventilation and air conditioning units with a high-efficiency particulate air filter.
- Vulnerable patients should avoid using gas stoves, fireplaces and incense, which can all exacerbate indoor air pollution.

Co-Benefits for Patients with Respiratory Disease: Sustainable food choices, such as diets with less meat (especially beef), vegetarian or purely plant-based diets. Active transport (cycling, walking and using public transport) reduces greenhouse gas emissions, air pollution and increases physical activity. Connecting with nature improves physical and mental health.

For Clinicians*:* Sustainable drug prescribing, to reduce greenhouse gases from pressurised metered-dose inhalers). Promote respiratory disease prevention activities (e.g. smoking) to reduce the future carbon footprint burden of healthcare systems. Source: World Org. of Family Doctors (WONCA)

Metabolic Disorders

Diabetes, obesity, and metabolic syndrome can be negatively impacted by climate change.

Diabetes

Possible Impact of Climate Change on Diabetes

- For every degree Celsius rise in global temperature the diabetes incidence increases by 0.31%.
- Diabetes increases sensitivity to heat stress/heightens the risk (reach of 56%) for hospitalization and the risk of morbidity at extremely high temperatures or during exposure to heatwaves.
- Older people with autonomic neuropathy are at higher risk of hypothermia.
- Diabetes increases the negative cardiovascular effects of air pollution.

How Diabetes and Heat Interact

- Microvascular complications → reduced skin blood flow → decreased vasodilatation ability → **reduced capacity for dry heat exchange**
- Peripheral neuropathy and autonomic dysfunction, and poor glycemic control → disrupts the sweating response → **reduced capacity for evaporative heat loss**

Prolonged exposure to extreme heat or a heatwave increases the risk for life-threatening exacerbations of disease: effects on glucose tolerance and dehydration predispose T1D patients to diabetic ketoacidosis (DKA) state and T2D patients to hyperosmolar hyperglycemic (HHS) state.

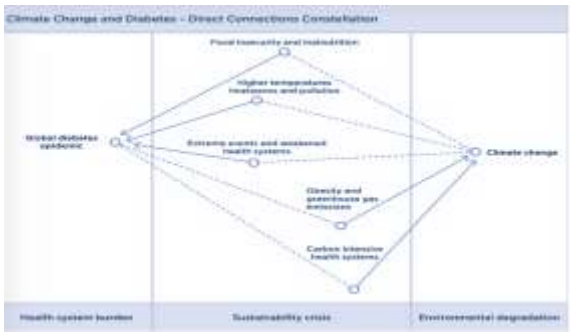
- Prolonged heat exposure → dehydration → hyperthermia
- Increased insulin absorption → hypoglycemia
- Hyperglycemia → worse dehydration → cardiovascular (CV) events, acute kidney injury (AKI)
- Polypharmacy → exaggerated renal impairment → AKI

Extreme Heat Vulnerability in Older People with Diabetes

Older adults are particularly vulnerable to heat exposure, especially those with common age-associated chronic health conditions (e.g., CV disease, hypertension, obesity, chronic kidney disease).

- Obese older adults were **twice as likely** to die during the 2003 European heatwave.
- Older adults with T2D **stored 1.5 times more heat** due to diabetes-related issues with heat loss.

Management of hyperglycemia, microvascular and macrovascular complications contribute to polypharmacy among older adults with diabetes. Diuretics and SGLT2 inhibitors can make them particularly prone to dehydration. **Source:** Gildner and Levy (2021); Meade et al., (2020); Peron, Ogbonna and Donohoe, (2015); Vallianou et al., (2021)



[Case Study: How to Prepare for the Management of Diabetes in Extreme Weather Events at the national level, clinical level, advanced and patient level]

Obesity

Possible Impact of CC on Obesity

- Obesity increases sensitivity to heat stress and risk of heat-related illness or injury
- Heatstroke occurs much more frequently in obese or overweight people
- Elevated air pollution is linked to reduced physical activity and hence increasing rate of obesity

How Obesity and Heat Interact

Overweight and obese adults suffer fatal heatstroke **3.5 times more frequently**.

Possible mechanisms

Reduced capacity for heat dissipation due to morphological configuration affecting heat loss: Higher body mass-to-surface area ratio; higher subcutaneous fat (lower thermal conductivity); Higher prevalence of dehydration; Sensory impairment to heat; Impaired skin blood flow in response to elevated core temperature. **Source:** Kenny et al., (2010); Gildner and Levy (2020)

How CC Can Increase the Risk of Obesity

Cold weather may contribute to the higher prevalence of obesity through several pathways:

5. **Hormonal Influence**: Cold temperatures can affect hormones related to hunger and appetite.
6. **Increased Energy Demand**: Cold conditions may raise energy expenditure, leading to increased appetite and overeating as the body seeks to preserve energy levels.
7. **Craving for Sweets**: Exposure to cold may enhance cravings for sweet, calorie-dense foods.
8. **Reduced Physical Activity**: Cold weather often encourages a more sedentary lifestyle- people tend to stay indoors in warm, cozy environments rather than engaging in outdoor activities.

Metabolic Syndrome (MetS)

- Components of MetS increase sensitivity to heat stress and risk of heat-related illness or injury.
- Exposure to air pollutants can potentially increase the risk of dyslipidemia.

Climate Change Impacts on Metabolic Disorders

- Exposure to ambient air pollution, particulate matter, nitrogen oxides and ozone is associated with higher prevalence and incidence of T2D, and excess mortality.
- Exposure to air pollution also worsens MetS. High levels of ozone, PM10 and CO2 can potentially increase the risk of dyslipidemia and the development of the MetS.
- Long-term exposure to ambient air pollution may increase the odds of metabolic dysfunction-associated fatty liver disease (MAFLD), especially with unhealthy lifestyle and central obesity.
- Developing countries, where burden of air pollution is emerging, are most threatened.
- Smoke exposure, short- and long-term, is known to exacerbate existing obesity and T2D.
- Catastrophic bushfires lead to worsening asthma outcomes, particularly in obese individuals.

Possible mechanisms

Increased oxidative stress, triggered adipose tissue inflammation, induced BAT dysfunction and insulin resistance, increased blood lipid level and risk of hypertension. [Other possible mechanisms]

According to one study, the prevalence of diabetes is 77.5% higher among people living in areas of high PM exposure compared to people living in less exposed areas. Source: Jacob et al., (2019)

Co-Benefits

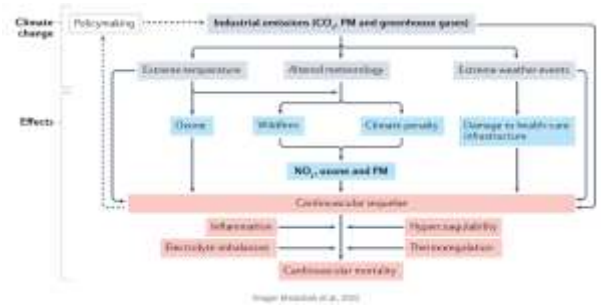
Active travel is a great example of how solutions can be found to mitigate climate change and reduce the risk of metabolic disorders- so-called co-benefits. Microcredential X will go through this in detail. Section X (food) goes into detail on food and food solutions.

Key Messages

- The climate crisis and diabetes/ obesity pandemics are interconnected health issues which have common predisposing vectors and magnify each other's impacts.
- The 3 shared common global vectors are: increased urbanisation; more reliance on mechanized transportation; increased production/consumption of meat and ultra-processed foods.
- Both crises have shared common solutions - lifestyle changes and sustainable urbanisation.
- Healthcare workers need to be prepared; and to prepare people with diabetes for climate events.

Cardiovascular Diseases

CVD is the leading cause of death globally. In 2019, approximately 18.6 million people died from CVD worldwide. Direct exposure to extreme weather events, ambient temperatures, heat waves, cold spells and a wide array of pollutants have the potential to exacerbate/cause disease. The significant climate change impact factors on CVD are due to changes in the intensity, duration and frequency of extreme air temperature events, air pollution, wildfires, and desert dust.



Effect of Heatwaves on CVD

Heatwave intensity, frequency and duration are expected to increase due to climate change.
In a meta-analysis of effects of heatwaves on all-cause and cardiorespiratory mortality using different heatwave definitions, **a heatwave of ≥35 °C for ≥3 days was associated with a 21% increased risk of cardiovascular death**.

Cold spells: Defined by a low-temperature threshold lasting for a specific duration (usually >2 consecutive days). Studies found that cold spells were associated with an 11% increase in cardiovascular mortality. According to data from the British Regional Heart Study, cold spells increased the risk of death related to coronary heart disease or stroke twofold.

[Details of specific effects of temperature on ischaemic heart disease, heart failure, arrythmias, stroke]

[**Air pollution and CVD**: Cardiovascular Risk Factors; Cardiovascular Mortality; Myocardial infarction (MI); Heart Failure; Stroke; Cardiac Arrhythmias]
[Wildfires and CVD] [Desert dust and CVD]

4. Focus on Older People

The Population of Older People is Forecasted to Grow Significantly

In 2020, there were 727 million people over 65 years of age living globally (UN, 2020). Between 2015-2030, the percentage of **people over 60 years of age is set to double** (from 12%-22%). WHO (2022),

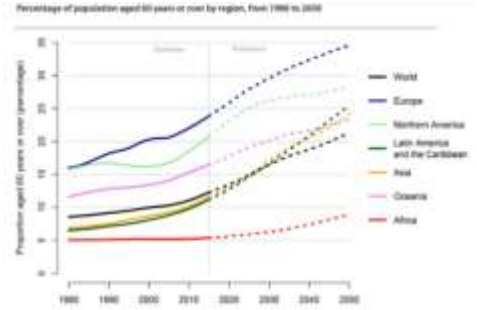


Image: UN. World Population Prospects. The 2017 Revision

The **absolute number** of older people in the world depends on:

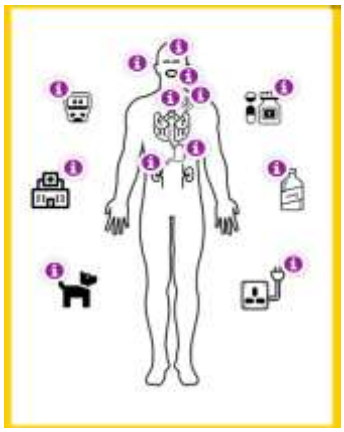
1. The number born 70/80/90/100 years ago in a country, region or globally- due to fertility norms at the time.
2. The number who survive to old age: increasing in most parts of the world due to advances in medicine, better nutrition/health, reduced working hours.

This determines climate adaptation capacity requirements (e.g. access a cooling centre, or need be evacuated).
The **relative** number is influenced by fertility rates in a country, region or globally. Rates globally are declining.

An increase in the relative numbers of older people can lead to challenges in healthcare, as the service demands are more, but taxpayers and those of working age are fewer (WHO, 2022). It can also mean less able-bodied people to help older people in an emergency.

Older People are More Susceptible to Climate Change

Why? Older people are more susceptible to climate change both directly in terms of physiological changes within the body due to the ageing process, common illnesses of later life, and indirectly related to changes in support networks, ability to use technology, and socio-economic circumstances. Within the ageing population, there are particularly vulnerable sub-groups with underlying conditions such as frailty or dementia, and older people in lower socio-economic groups.



Examples of text:

Hearing Loss

Ageing causes hearing loss, so people may not hear or understand warnings on the radio, television or on loudspeakers.

Reduced Visual Acuity

Ageing causes reduced visual acuity and accommodation (ability to see at night). Many older people also have macular degeneration and cataracts. This can affect an older person's ability to read storm or flood warning messages, or directions to a place of safety, or to follow diversion signs, or to drive at night. This can leave them stranded in a dangerous situation. It can affect their ability to read medication instructions if a carer is not available to support medication administration.

Psychological Risk Factors

The mental health of older people can be significantly impacted due to unpredictable and more frequent adverse climate conditions. Fear of repeat events, anxiety, depression, and post-traumatic distress all lead to poorer cognitive and psychological health.

Carer Stress: Climate change adverse conditions and acute hazards create significant additional stress and burden on carers supporting the older person.

Socioeconomic Risk Factors*:* limited education and literacy, poverty and ethnic minorities.

Frailty

Frailty is applied to older people living with higher levels of functional dependency that impacts on day-to-day activities such as shopping, walking, preparing food, and being able to wash and dress independently. Frailty exists on a spectrum from mild, moderate, severe to very severe (BGS 2014).

Frailty can exist on its own with no other significant health issue, but it is more prevalent in people living with other long-term conditions such as heart failure or diabetes, described as co-morbidities.

Frail older people are more likely to experience worse outcomes such as death, sudden acute illness, injury, hospitalisation and institutionalisation directly or indirectly due to climate change.

Older people have the following issues that increase their risk for climate change:

Balance and Falls: A third of people over 65 fall each year, and 50% of those over 80 fall each year. This means they are at greater risk of falling on snow or ice, or wet surfaces. Many older people can't get up again if they fall, increasing the risk of hypothermia during storms, floods and cold weather.

Bone Density and Osteoporosis: With ageing, bone density decreases, leading to osteoporosis, especially in older women. This means they are more likely to break a bone if they fall, which can increase their exposure to heat or cold, as they may not be able to get up from the ground.

Muscle Strength and Arthritis: With ageing, there is an increase in aerobic and a decrease in anaerobic muscle fibres. This leads to reduced strength. In addition, arthritis is common. These may affect the ability of an older person to protect a house from a storm or flood, or to move an obstacle pinning them down or blocking their escape. It may prevent an older person from climbing to safety in a flood situation. Slow gait speed and reduced exercise tolerance also increase vulnerability.

Mobility and Accessibility: A person with restricted mobility can have problems in accessing food and drink if they live alone and carers cannot come to them. This may vary from needing extra food in the house before a storm, to needing someone to assist them in feeding. Older people living with a significant physical disability may have issues evacuating or accessing emergency transport.

Cognitive Risk Factors

Many older people can experience cognitive impairment, and this makes them more vulnerable to climate change impacts. **People with dementia** are particularly vulnerable to issues arising from climate change (Zuelsdorff et al, 2024). Dementia is a general term for loss of memory, language, problem-solving and other thinking abilities that are severe enough to interfere with daily life. Alzheimer's is the most common cause of dementia (Alzheimer's Association, 2024).

There are over 55 million people worldwide living with dementia in 2020 (ADI, 2024)

Communication: Communication and ability to process and understand information can be affected in dementia. This can impact ability to understand a complex weather warning (where severity is different for different areas at different times), or to follow an evacuation order, or to judge a genuine offer of help versus a person wanting to take advantage of them. Fast moving, complex information may be too much for an older person with dementia to process.

Decision making: This can be affected in some forms of dementia, especially those that affect the frontal lobe, like frontotemporal dementia and Progressive Supranuclear Palsy, and Lewy body dementias. This may make someone more likely to take a chance and ignore evacuation orders

Delirium: This can occur in a person with dementia during exposure to extreme heat, or dehydration, or a change in location (due to an evacuation). This can make them resist help, or refuse to leave their house, or to take risks during an extreme weather event (such as leaving their home).

Memory loss: This can affect ability to remember a notice about an impending weather event, or to remember to drink more during a heatwave, or take medications when a carer is not able to visit.

Paranoia and delusions: These are relatively common in dementia. This may make a person afraid to leave home or accept help from strangers. Emergency vehicles' flashing lights and sirens, army vehicles, loudspeakers, etc., can feed into delusions. Even without delusions, the noise and panic can make a person with dementia less able to think clearly, follow an instruction, or plan an escape.

Walking about: This is a common symptom in dementia. A person may struggle to stay indoors for long periods. Equally, a person with dementia may become lonely and may want to visit friends and neighbours and may struggle to understand why this is not safe at times.

How can People with Dementia be Supported to Adapt to Climate Change

- All information should be simple and easy to read. Short sentences with only one message are best, using simple words. Pictures and images can aid understanding. "Less is more" is the key.
- People with dementia living alone should be on a risk register, shared with emergency services.
- People with dementia may struggle to remain indoors during an extreme weather event, or a hot or cold wave. Extra points of interest indoors for an indoor walking loop, or indoor gardening supplies, or arts and hobbies, may provide interest inside and reduce the desire to be outside.
- Healthcare workers need to consider ways to remind people to take medications, especially key medications. This may involve reducing doses to morning only or twice a day to facilitate reminders, and enlisting neighbours to support the person during extreme weather events.
- If families are not nearby, friends and neighbours need to be mobilised to support the person — calling into them regularly if safe to do so.
- Families should receive information on how to support the person during extreme weather events and to provide and prompt fluids and food, and flashlights in case of power failures.
  [Additional text] [A Bidirectional Relationship between Climte Change and Dementia]

Carer Stress: Adverse conditions and acute hazards create significant additional stress on carers.

Socioeconomic Risk Factors*:* limited education and literacy, poverty and ethnic minorities are particularly vulnerable.

5. Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

List the main climate-related challenges in your region (bullet points or short sentences; 5 marks).
In about 500-600 words, describe how these climate change effects can affect:

- the health of the elderly people in your care (10 marks) AND
- your provision of care to these people (5 marks).

Resources & Materials

Podcasts	**Climate and Environment Change**	**United Nations and EU Webpages on Climate Change**	**Governmental and Intergovernmental Websites and Policy Documents**
2. BBC World Service - The Climate Question - Downloads 3. Drilled Podcast — Apple Podcasts 4. How to Save a Planet | Gimlet 5. Climate Change Podcast | Outrage + Optimism 6. For What It's Earth | Emma Brisdion & Sophie Pavelle	1. International Monetary Fund (IMF): Climate Change Indicators Dashboard 2.World Bank Climate Change Data: https://data.world/worldbank/climate-change-data	2. United Nations Climate Change: UN Climate Change (UNFCCC Secretariat) 3. United Nations Climate Action 4. FACTS: Resources: UN MythBusters 5. UN Climate Change Dictionary 6. What Is Climate Change? | United Nations 7. Climate Change and Health | World Health Organisation 8. The Global Climate & Health Alliance 9. Health Care Without Harm | NoHarm.Org	2. National Centers for Environmental Information 3. The Intergovernmental Panel on Climate Change 4. National Oceanic and Atmospheric Administration 5. The Intergovernmental Panel on Climate Change 6. IPCC Fact Sheets | Climate Change 2021: The Physical Science Basis (ipcc.ch) 9. IPCC Regional Fact Sheet 8. World Meteorological Organisation

NGO Websites Concerned with Climate Change	**Communicating about Climate Change Resources**	**Climate Related Policy Documents**	**Main References on healthcare**
2. The Elders 3. Climate Action Network 4. European Climate Foundation	World Health Organisation 'Communicating on climate change and health Toolkit for health professionals'	2. The European Green Deal - European Commission 3. THE 17 GOALS | Sustainable Development 4. Goal 13 (Climate Change) | Department of Economic and Social Affairs	2. Checklists to assess vulnerabilities in health care facilities in the context of climate change. Geneva: WHO, 2021, 3. WHO guidance for climate-resilient and environmentally sustainable health care facilities. Geneva: World Health Organization, 2020. 4. Compendium of WHO and other UN guidance on health and environment. Geneva: World Health Organization; 2024 5. Climate-Change-Toolkit-for-Health-Professionals-Full-Toolkit.pdf 6. The-Regional-Impact.pdf

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- Savioli G, Zanza C, Longhitano Y, et al. Heat-Related Illness in Emergency and Critical Care: Recommendations for Recognition and Management with Medico-Legal Considerations. Biomedicines. 2022 Oct 12;10(10):2542.
- Šklebar T, Rudež KD, Rudež LK, Likić R. Global Warming and Prescribing: A Review on Medicines' Effects and Precautions. Psychiatr Danub. 2022 Dec;34(Suppl 10):5-12.

Essential Reading on Vector Borne Diseases:

- P.J. Hotez, "Southern Europe's Coming Plagues: Vector-Borne NeglectedTropical Diseases", PLoS Neglected Tropical Diseases, 2016, 10,(6), e0004243.
- J. Ma et al., "Climate Change Drives the Transmission and Spread of Vector-Borne Diseases: An Ecological Perspective", Biology, 2022, 11, 1628.
- J.N. Mills, "Potential Influence of Climate Change on Vector-Borne and Zoonotic Diseases: A Review and Proposed Research Plan", Environ. Health Perspectives, 2010, 118, 1507–1514.
- J. Rocklöv and R. Dubrow, "Climate Change: An Enduring Challenge for Vector-borne Disease Prevention and Control", Nature Immunology, May 2020, 21, 479–483.
- W.K. Reisen, in "Climate Change and Public Health", by B. Levy and J. Patz, July 2015, chapter 6, 129-156, Oxford University Press. Online ISBN: 9780190202484.

Essential Reading List on diseases impacted by climate change	Suggested Readings on obesity and diabetes	Suggested Readings on CVD	Population Ageing Trends
1. G. D'Amato and L. Cecchi, "Effects of climate change on environmental factors in respiratory allergic diseases", Clinical and Experimental Allergy, 2008, 38, 1264–1274 2. P.J. Beggs, "Adaptation to Impacts of Climate Change on Aeroallergens and Allergic Respiratory Diseases", Int. J. Environ. Res. Public Health, 2010, 7, 3006-3021 3. M.F. Isler et al., "Climate change, the cutaneous microbiome and skin disease: implications for a warming world", Int. J. Dermatology, 2023, 62, 337–345 4. E. Parker et al., "The dermatological manifestations of extreme weather events: A comprehensive review of skin disease and vulnerability", J. Climate Change and Health, 2022, 8, 10016	• Gildner TE, Levy SB. Intersecting vulnerabilities in human biology: Synergistic interactions between climate change and increasing obesity rates. Am J Hum Biol. 2021 Mar;33(2):e23460 • DOI:10.1002/9781119807216.ch1., Urban Ecology and Global Climate Change (pp.1-29), • McMacken M, Shah S. A plant-based diet for the prevention and treatment of type 2 diabetes. J Geriatr Cardiol. 2017 May;14(5):342-354.	• Khraishah, H., Alahmad, B., Ostergard, R.L et al 2022. Climate change and cardiovascular disease: implications for global health. Nature Reviews Cardiology, pp.1-15. • Khraishah H, Ganatra S, Al-Kindi S, et al. Climate Change, Environmental Pollution, and the Role of Cardiologists of the Future. J Am Coll Cardiol. 2023 Mar, 81 (11) 1127–1132. • Roth, G.A., Mensah, G.A., Johnson, C.O., et al. 2020. Global burden of cardiovascular diseases and risk factors, 1990–2019: update from the GBD 2019 study. Journal of the American College of Cardiology, 76(25), pp.2982-3021.	WHO Article on Aging and Health UN Report: World Population Prospects 2022

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Assessing and Prioritising Risk for Climate Adaptation in Healthcare MC2 EQF6

Microcredential Title	**Assessing and Prioritising Risk for Climate Adaptation in Healthcare**
Short Code / ID	MC2
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, Portuguese, German, Finnish, Greek
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	National and Kapodistrian University of Athens
Module Lead / Author	Prof. Panayota Sourtzi, National and Kapodistrian University of Athens

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Understand the social and environmental determinants of health and their relationship with climate-related vulnerability in older people.
LO 2	Be aware of climate change risks and risk prioritisation in health and social care settings.
LO 3	Recognise and assess health and social care services climate adaptation in supporting older people.
LO 4	Apply structured methods for assessing climate-related risks in health and social care services.
LO 5	Assess and discuss the risks older people face before, during and after climate-related crises.
LO6	Understand and discuss needs prioritisation for climate change adaptation for older people.

chAnGE Competence Area	Knowledge & analytical skills
Alignment Notes	MC2 provides health and social care professionals with analytical knowledge and practical tools to identify climate-related hazards, assess risk and prioritise adaptation measures for older people. The module links social and environmental determinants of health with risk assessment, organisational preparedness, staff training and the use of reliable European and international information sources.
Keywords	change, risk assessment, older adults, health and social care, climate adaptation, vulnerability, preparedness

Learning Activities

E-Learning Format	Text, interactive H5P content, PowerPoint-based video presentations, Moodle resources, external links and downloadable templates. Note: [ ] brackets refer to further content or visuals in Moodle.
Activities	Pre- and post-module quizzes, self-assessment questions, case studies, take-home assignments, risk assessment exercise, final quizzes and evaluation questionnaires.
Estimated Study Time	25 hours

Content & Topics	Subsections
1. Social and Environmental Determinants of Health	1.1 Social determinants of health; 1.2 Climate change and SDH; 1.3 Health indicators; 1.4 Environmental determinants; 1.5 Climate change and ageing; 1.6 Differential vulnerability among older people.
2. Assessment of the Risk for Older People in Need of Health and Social Care	2.1 Hazard recognition and assessment; 2.2 Risk prevention and management; 2.2.1 Climate change risk assessment and management; 2.2.2 Worked example; 2.2.3 Climate-ADAPT; 2.3 Risk communication.
3. HSC Services and Staff Adaptation in Supporting Older People	3.1 HSC service preparedness; 3.2 adaptation indicators; 3.3 HSC staff awareness and readiness; 3.3.1 extreme temperatures; 3.3.2 community care; 3.3.3 floods; 3.3.4 health problems; 3.3.5 community support.
4. HSC Staff Knowledge and Skills	4.1 staff training; 4.1.1 knowledge areas; 4.1.2 key skills; 4.2 adaptation interventions; 4.3 HSC staff wellbeing; 4.3.1 psychological effects; 4.3.2 personal and family safety; 4.3.3 resilience building; 4.3.4 self-care.
5. International Sources of Information	5.1 existing sources; 5.2 EU sources; 5.3 international sources of climate change information.
6. Conclusion and Summary	Summary of key learning and transition to final quizzes and post-module evaluation.

Pre-Module

Students complete a pre-module quiz consisting of 10 multiple-choice questions at the beginning of the module and again at the end. The quiz is designed to help learners and trainers track learning progress. It does not affect the grade and learners are asked not to use AI tools, search engines or outside resources while answering.

Important note for learners

This is an opportunity to see your own growth. After completing the quiz, learners receive feedback on their responses to reinforce key concepts.

1. Social and Environmental Determinants of Health

In this first topic, learners examine the connection between climate change and the social determinants of health, health indicators related to those determinants, environmental determinants of health, the relationship between climate change and ageing, and why some older people are more vulnerable to climate change than others.

Figure 1. Social determinants of health: introductory slide

1.1 Social Determinants of Health

Social determinants of health (SDH) are the conditions in the environments where people are born, live, learn, work, play, worship and age that affect a wide range of health, functioning and quality-of-life outcomes and risks. SDH contribute to health disparities and inequities. Health promotion focused only on individual choices cannot eliminate disparities when people live in environments with poor housing, food insecurity, low income, limited transport or restricted access to quality care.

A comprehensive understanding of SDH enables health and social care professionals to offer more effective interventions, improve social screening, refer to legal and social services and understand the mechanisms through which social conditions shape health.

Figure 2. Five domains of the social determinants of health.

Domains and examples of SDH

- Economic stability: employment, income, financial stability and access to affordable healthcare.
- Education access and quality: early childhood education, higher education, literacy and health literacy.
- Healthcare access and quality: availability of services, insurance coverage and culturally competent care.
- Neighbourhood and built environment: housing quality, transport, environmental hazards and recreational spaces.
- Social and community context: social support, community engagement, discrimination and violence.

Figure 3. Examples of social determinants used in the module.

Interactive activity - word search for social determinants of health:
https://thewordsearch.com/puzzle/7932623/social-determinants-of-health

1.2 Connection between Climate Change and the Social Determinants of Health

The connection between climate change and SDH is profound and multifaceted. Climate change exacerbates economic instability, housing insecurity, food and water insecurity, barriers to healthcare, environmental injustice and mental health stressors. Older people are not affected equally: exposure, health status, income, housing, mobility, social support and place determine whether a climate hazard becomes a serious risk.

Figure 4. Interactive Moodle infographic: climate change and social determinants of health.

Case study / self-assessment
Read the case study of an older patient from a developing country and recent war zone, hosted by adult children in the learner's country and discharged from hospital. Learners identify social determinants that favour and hinder health management after discharge. The activity is for self-assessment and does not contribute to the final grade.

1.3 Health Indicators and Social Determinants of Health

Health indicators, such as life expectancy, mortality, chronic disease prevalence and access to healthcare, are essential measures of population wellbeing. They are influenced not only by biological factors but also by SDH. Learners use indicator databases to connect health outcomes with sociodemographic, socioeconomic, area-characteristic and health-service-use categories.

Figure 5. Health indicators related to social determinants.

Students are directed to browse the Eurostat indicator database and search for health-related indicators: https://ec.europa.eu/eurostat/databrowser/

Self-assessment quiz

Learners classify indicators such as annual income, vaccination, marital status and urbanisation into appropriate SDH categories and answer short quiz questions on health-service use, sociodemographic, socioeconomic and area-characteristic indicators.

1.4 Environmental Determinants of Health

Environmental determinants of health include physical, chemical and biological factors external to a person and related behaviours. They include air quality, water quality, high temperatures, transport systems, food systems, biodiversity, the built environment and exposure to environmental hazards. Climate change is presented as a major health challenge because it affects health through air contamination, infectious disease spread, extreme weather, displacement, food shortages and mental health stressors.

Embedded Moodle videos

The Moodle section includes two embedded videos introducing environmental determinants of health and climate-related health impacts. Video 1 is an embedded Moodle video on Environmental Determinants of Health; no public URL was available in the exported source material. Video 2 URL: https://www.youtube.com/watch?v=zU8nGKp8NJ8&t=3s

Video transcript summary: The videos introduce environmental determinants of health as external physical, chemical, biological and built-environment conditions that shape population health. They connect climate change with air quality, temperature extremes, water and food systems, displacement, infectious disease risks and mental health stressors. Learners are asked to understand environmental determinants not as isolated exposures but as conditions that interact with social determinants and increase vulnerability among older people.

Mandatory reading - Paltriguera et al. (2024), Environmental determinants of health, including those caused by climate change: https://www.europarl.europa.eu/thinktank/en/document/IPOL_STU%282024%29754214

Main findings summary: This European Parliament report describes environmental determinants of health, including air pollution, chemicals, water quality, extreme temperatures, infectious diseases, floods, droughts and climate-related exposures. It highlights that environmental risks interact with social and economic inequalities and recommends integrated approaches such as One Health and Health in All Policies to reduce avoidable health harms.

1.5 The Relationship between Climate Change and Ageing

The impact of climate change on older people's health is explained through two related mechanisms: cumulative or early exposure to harmful factors across the life course, and exposure to damaging stressors in parallel with age-related physiological and social susceptibility. Early or long-term exposure to neurotoxins and air pollution can increase inflammatory responses and sensitivity to later-life health threats. Ageing itself may involve chronic conditions, multimorbidity, medication use, mobility limitations, social isolation and reduced connection to transport and services.

Figure 6. Climate change & ageing relationship algorithm

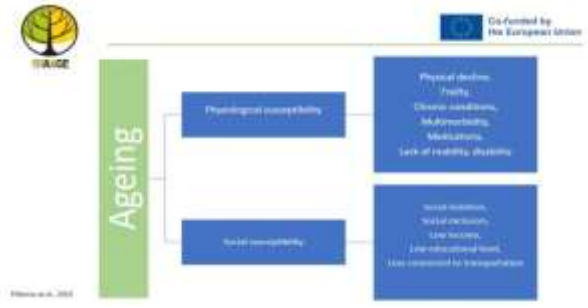


Figure 7. Physiological and social susceptibility in ageing.

1.6 Why are some older people more vulnerable to climate change than others?

Climate vulnerability is the degree to which people or communities are at risk of experiencing negative impacts from climate change. Vulnerability differs within the older population because some older

adults face limited income, disability, multimorbidity, poor housing, social isolation, low education, minority status, restricted access to health services, or residence in high-risk areas. Climate change amplifies existing inequities, making assessment of social and environmental determinants essential before prioritising action.

Figure 8. Vulnerability among older people.

Question for self-assessment

Learners consider a local municipality assessment of an older couple with very low income, mobility problems, social isolation and low health literacy. They identify the main heatwave risk and choose interventions such as daily home-care visits, liquid supply, strengthened social contacts, transport to air-conditioned municipal facilities and provision of fans.

Transition to the next chapter

After identifying the impact of social and environmental determinants on the health of older people, the next step towards increasing their resilience is structured risk assessment.

2. Risk Assessment

This topic addresses recognition of hazards and risk prevention, preparedness for recognising older people's needs in climate crisis situations, prevention of consequences from specific climate-related hazards, assessment of risk for heat, flood and fire, and risk communication within services.

2.1 Hazard Recognition and Assessment of the Risk

Embedded Moodle video-presentation

Learners discuss what a hazard is, how it differs from risk, and what risk assessment means for older people in need of health and social care. Video URL: https://www.youtube.com/watch?v=SznxxTCbhT0&t=5s

Video transcript summary: The video explains that a climate-related hazard is a potential source of harm, while risk depends on exposure, vulnerability and adaptive capacity. It presents common hazards affecting older people, including heatwaves, floods, wildfires, storms, air pollution and climate-sensitive diseases. It also explains the relationship between risk assessment, risk management and risk communication, emphasising that HSC professionals need to identify exposed older people and plan preventive measures before harm occurs.

Figure 9. Hazard recognition: definition of a climate-related hazard.

A hazard is a potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, other health impacts, damage to property and infrastructure, disruption to livelihoods or service provision, and environmental degradation. In climate change, hazards include extreme temperatures, wildfires, drought, extreme precipitation, coastal or river flooding, storms and extreme winds, sea or river level rise, poor air quality, climate-sensitive infectious diseases, food and water insecurity, health and social care system displacement, migration and relocation.

Additional: Heat vulnerability factors among population groups.

Figure 10. Climate change hazards relevant to older people.

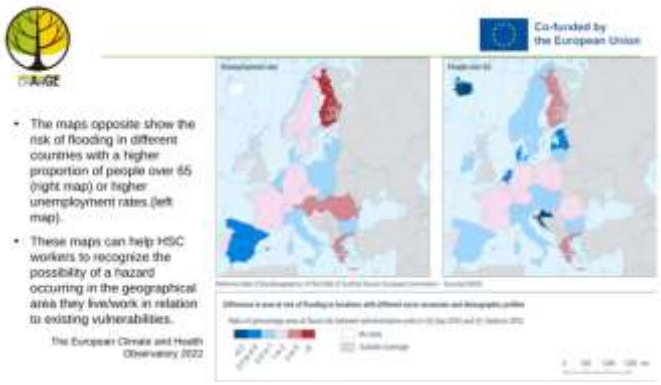
Figure 11. Risk assessment, risk management and risk communication.

2.2 Risk Prevention and Management

Climate change hazards are increasingly present in everyday life. Older people, due to chronic health problems and social vulnerability, require support from HSC services and professionals. Risk prevention and management includes primary prevention and mitigation, adaptation of services and populations, preparedness of healthcare organisations, and expansion of the knowledge base to support proactive risk management.

- Detailed risk analysis.
- Estimation of exposure among older people at risk.
- Description of the estimated risk for the most vulnerable within the older population.
- Listing of appropriate control measures already in place.
- Consideration of additional control measures to be implemented.

Exposure means the presence of older people in places such as health and social care services or community dwellings that could be affected by a climate hazard. Vulnerability refers to the sensitivity of the older person to be affected by a hazard, shaped by adaptive capacity, health status, mobility, housing, support and access to services.



Additional visual. Flood-prone areas and social vulnerability indicators.

2.2.1 Climate Change Risk Assessment and Management

The module uses a structured risk assessment form adapted from occupational health and safety risk assessment. HSC organisations and professionals should use such forms to describe the current situation, estimate risk, document existing measures and plan additional interventions before the hazard occurs. Other professionals and older people who benefit from these plans need to be trained ahead of time.

CC Hazard	Possible effects/harm	Risk rating	Existing measures	Additional measures	Reassess risk
Heatwave predicted by meteorological service	Older patient treated at home for high blood pressure may experience dehydration, low blood pressure, fall risk or worsening cardiovascular condition	M	Patient takes antihypertensives; health professional reviews medication and reassesses condition	BP measurements; hydration and nutrition advice; falls prevention advice; assessment of home cooling; information on healthcare and community services	M

2.2.2 Example of how to assess a specific climate change risk in an older person

Figure 12. Worked example of the risk assessment table.

Compulsory reading – The following guide explains how to carry out a climate risk assessment. It contains relevant definitions and can be used in different situations, such as health-related hazards.

DIY Manual on Climate Risk Assessment: https://climate-adapt.eea.europa.eu/en/mission/external-content/pdfs/guide-to-climate-risk-assessment-291123-005-vfinal-2.pdf/@@download/file

Main findings summary: The manual provides a practical step-by-step approach to climate risk assessment. It guides users to define the context, identify hazards, assess exposure and vulnerability, evaluate risks, prioritise action and plan adaptation measures. In MC2, it supports the learner's assignment by showing how generic climate-risk methods can be applied to older people and HSC settings.

Optional reading - WHO Fact Sheet on Health Emergency and Disaster Risk Management: Safe Hospitals: https://cdn.who.int/media/docs/default-source/disaster-mngmt/risk-management-safe-hospitals-december2017bc5b1106-594d-46a8-9d86-248e69342150.pdf?sfvrsn=3a422e1d_1&download=true

2.2.3 Climate-Adapt

The EU Climate-ADAPT tool provides a six-step process for climate adaptation. It is useful for generic climate change risk assessment and management and can be adapted for HSC environments, professionals and older people as end users.

Students are directed to visit the Climate-ADAPT Regional Adaptation Support Tool: https://climate-adapt.eea.europa.eu/en/mission/knowledge-and-data/regional-adaptation-support-tool

2.3 Risk Communication within the Services

Figure 13. Core elements of risk communication within services.

Communication and awareness
Effective communication about climate change and the need for climate adaptation is vital within and outside the organisation to maintain political relevance, raise awareness, gain acceptance and inspire action. All stakeholders - professionals, older people, families and the community - should be involved through a participatory process.

Climate-ADAPT guidance on communicating adaptation and raising awareness: https://climate-adapt.eea.europa.eu/en/mission/knowledge-and-data/regional-adaptation-support-tool/step-1-preparing-the-ground-for-adaptation/step-1-5

Risk assessment exercise / assignment	**Transition to the next chapter**	**Evaluation Questionnaire - during the training**
After completing Chapter 2, learners identify a climate change hazard relevant to their geographical area or workplace, select an older person or group of older people they serve, complete the risk assessment form and submit the completed assessment as a PDF.	This chapter introduced hazards, risk assessment, prevention and adaptation measures that HSC professionals can use to support older people. The next chapter turns to HSC organisations and workforce adaptation.	Learners are invited to complete a mid-training evaluation questionnaire. The questionnaire evaluates progress towards the goals of the training halfway through attendance.

3. HSC Services and Staff Adaptation in Supporting Older People

This topic addresses HSC service preparedness to respond to the climate change crisis, service adaptation indicators and HSC staff awareness and readiness to recognise different needs of older people and prioritise accordingly.

3.1 HSC Services Preparedness to Respond to the Climate Change Crisis

3.1.1 Understanding Climate Hazards

Climate change is a major global challenge. Exposure to heatwaves, extreme weather events and poor air quality can worsen several health conditions among older people with pre-existing conditions, leading to increased morbidity, mortality and healthcare costs. Hurricanes, cyclones, floods and wildfires pose risks including displacement, injury and mental health impacts. Poor air quality from pollution or wildfires has respiratory implications for older people.

3.1.2 Understanding Climate Hazards Impact on Older People

Ageing involves physiological changes that may combine with comorbidities to decrease functional reserve and increase vulnerability. Social vulnerabilities also matter: poverty and social isolation negatively affect older people. When communities experience a climate emergency, routine care is disrupted. During heatwaves, much of the care required involves primary care and management of chronic health conditions such as diabetes, high blood pressure, cancer and kidney disease.

3.1.3 Challenges in Hospital Care for Older People

- Risk of healthcare disruption: power outages or infrastructure damage may impede timely treatment.
- Capacity strain: patient surge can strain staff, space, supplies and specialised care pathways.
- Healthcare resource allocation: prioritising care for older adults with complex needs can become difficult under scarcity.

3.1.4 Factors Affecting Preparedness of Healthcare Organisations

Common barriers include system breakdown due to unclear staff roles, electrical outages, inadequate processes, unsafe working conditions, PPE or air quality concerns, building damage, infectious disease risks, reduced sanitation, psychological impact on staff and staff absenteeism due to transport problems, illness or personal disaster responsibilities.

Students are directed to read the following review article on health systems response to climate change adaptation: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-024-19459-w **Main findings summary:** Ansah et al. map global evidence on health-system adaptation to climate change. The review reports progress in climate-resilient infrastructure, health policy integration, service delivery, technologies and capacity building. It also identifies barriers including weak policy implementation, financial constraints, inadequate data, weak health systems and insufficient integration of mental health and healthcare-worker safety into climate adaptation.	**Literature reading (obligatory)** Zurynski Y, Fisher G, Wijekulasuriya S, et al. Bolstering health systems to cope with the impacts of climate change events: a review of the evidence on workforce planning, upskilling, and capacity building. International Journal of Health Planning and Management. 2024;39(3):781-805. After reading the article, learners answer the literature reading quiz. Main findings summary: The review emphasises that health systems require workforce planning, upskilling and capacity building to cope with climate-related events. Key priorities include role clarity, surge capacity, staff training, interprofessional coordination, wellbeing support and organisational preparedness. The article is used in MC2 to connect climate adaptation with HSC workforce resilience and continuity of care for vulnerable populations.

3.1.5 Hospital Preparedness Strategies

- Communication systems to coordinate care, track patients and ensure timely interventions.
- Emergency plans tailored for older patients, including evacuation protocols, medical supplies and staff training.
- Specialised care to address mobility aids, medications and psychological wellbeing.

3.1.6 HSC Services Adaptation

Climate change risk assessment enables HSC services to establish a framework, analyse risks and develop strategies to address them. Health systems have responsibility for building climate resilience through climate-resistant infrastructure, early warning systems, staff and older-adult education and culturally appropriate communication.

Additional visual. Risk assessment and management in hospital and community settings.

Students are directed to read Enhancing Health Care Resilience for a Changing Climate - case studies and lessons learned: https://toolkit.climate.gov/sites/default/files/SCRHCFI%20Best%20Practices%20Report%20final2%202014%20Web.pdf **Resource summary:** This best-practice document illustrates how healthcare infrastructure can become more resilient to climate impacts. The case studies and lessons learned focus on preparedness, facility resilience, continuity of operations and organisational planning. In MC2, the resource helps learners connect service adaptation with infrastructure, emergency planning and care continuity for older patients.	Students are directed to watch video: Early Warning Systems EWS is an integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities that enables timely action before hazardous events. Video URL: https://www.youtube.com/watch?v=ptDZGYyY30s&t=4s Video transcript summary: The video presents early warning systems as a practical mechanism for protecting communities from hazardous weather and climate-related events. It emphasises timely monitoring, forecasting, communication and preparedness, and shows why warnings must reach vulnerable groups in a usable form. In MC2, this is linked to older people because alerts must be translated into concrete actions such as check-ins, transport, cooling, sheltering, medication continuity and service coordination.

3.1.7 HSC Staff Training Strategies

Training on climate change provides knowledge and skills for HSC workers and older adults living in the community. Continuing education encourages ongoing professional development, simulation exercises improve decision-making and coordination, and interprofessional collaboration is fundamental during evacuation, sheltering and continuity-of-care procedures.

3.2 HSC Services Key Indicators Regarding Adaptation

Health system resilience is needed for acute shocks such as climate events and for chronic stressors such as evolving population needs, infrastructure pressures and staff shortages. The WHO health system resilience indicators support measurement and monitoring of resilience in countries. MC2 uses indicators relevant to tertiary and primary/community care to demonstrate organisational and staff adaptation.

Figure 14. Key indicators for HSC service adaptation and organisational resilience.

Organisation indicators	Community indicators
Existence of early warning system for all risks; emergency and evacuation plan; rapid response teams; percentage of staff trained; percentage of drills conducted.	Community heatwave plan; existence of home health care services; proportion of urban population living in inadequate housing; outreach and support capacity.

3.3 HSC Staff Awareness and Readiness

Designing HSC services around the needs of older people during climate change is an urgent public health priority. Staff must understand older people's care needs and the contexts in which they live. Barriers include language differences, hearing impairment, cognitive decline, cultural differences, multimorbidity and the interactions between chronic conditions, medications, social circumstances and climate hazards.

3.3.1 Older People and Health-Related Considerations in Extreme Temperatures

Extreme temperatures can exacerbate existing health conditions, reduce comfort and increase risk of heat stress or dehydration. Hospitals and community services need adequate staffing and monitoring. Medication categories of concern include beta-blockers, major tranquilisers and diuretics.

Optional reading - Alho et al. (2024), Effect of heatwaves on daily hospital admissions in Portugal: https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196%2824%2900046-4/fulltext

Optional reading - Gong, Part & Hajat (2022), heat-related dementia hospital admissions in England: https://doi.org/10.1016/j.envint.2021.107027

Further information - Climate-ADAPT indicator: exposure of vulnerable populations to heatwaves: https://climate-adapt.eea.europa.eu/en/metadata/indicators/exposure-of-vulnerable-populations-to-heatwaves

EM-DAT disaster database: https://www.emdat.be

Take Home Assignment - extreme temperatures and health impacts	**Literature reading (obligatory)**
Learners use data on heatwaves from platforms such as EM-DAT. They identify temperature extremes in their country	Cheshire WP Jr. Thermoregulatory disorders and illness related to heat and cold stress. Autonomic Neuroscience: Basic and Clinical. 2016;196:91-104. Schols et al. Preventing and treating dehydration in the elderly during periods of illness and warm weather. Journal of Nutrition, Health & Aging. 2009;13(2):150-157. Main findings summary: Cheshire explains the physiology of thermoregulation and shows how autonomic dysfunction, chronic disease, medication use and ageing can increase susceptibility to heat- and cold-related illness. Schols et al.

and describe observed health impacts among older people, then upload written notes as a PDF.	focus on dehydration prevention and treatment in older adults during illness and warm weather, emphasising adequate fluid intake, early recognition, monitoring and prevention strategies. Together, these readings support clinical prioritisation during extreme temperatures.

3.3.2 Community Care Concerns during Extreme Temperatures

Older people in the community may face social isolation, lack of access to cooling centres and limited mobility. Accessibility to cooling shelters, public transport and community resources is essential. Community networks can provide check-ins, transport, social engagement and links to services.

Figure 15. Risk assessment and management: hospital settings versus community settings.

Take Home Assignment - Annunziata's story

Learners read the case study and identify factors associated with increased vulnerability. They also describe mitigation measures adopted in their country to minimise heatwave risks for older people. Approximate length: 1000 words.

3.3.3 Challenges Faced by Older People in Flood Situations

Physical limitations may impede evacuation or the ability to seek safety. Chronic illness and mobility problems may worsen during flooding and require specialised care. Many older people live alone and may not have a support network, making evacuation and access to assistance more difficult.

3.3.4 Health Problems Related to Floods

- Direct physical health effects include drowning, injuries from objects in floodwater, hypothermia, electrical injuries and infectious disease risks from viruses, parasites and bacteria.
- Indirect effects include disruption of medical treatments, shortages of medical aid, electricity or safe water, property damage, displacement, overcrowding and pulmonary or systemic fungal infections.
- Flooding can also cause mental health problems, including trauma, distress, PTSD, anxiety, insomnia, psychosis and depression.

Students are directed to visit Climate-ADAPT: health issues related to floods: https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/flooding#fatalities-associated-with-floods-1980-2023

3.3.5 Community Support and Outreach Programs

- Neighbourhood networks check on older residents, provide shelter options and ensure access to essential services.
- Volunteer assistance supports evacuation, transport and emotional support.
- Educational initiatives raise awareness of flood risks, evacuation routes and emergency contacts.

Levels of Care in Different Climate Hazards

Climate Hazard	Level of Care Required	Specific Actions
Heatwaves	High	Limit outdoor exposure, Ensure hydration, provide cooling centers, monitor vital signs
Air Pollution	Moderate	Limit outdoor exposure, use air purifiers, respiratory assessments
Natural Disasters caused by extreme weather	Critical	Evacuation plans, medical supply stockpiling, shelter coordination

Figure 16. Levels of care in different climate hazards.

Transition to the next chapter

This chapter covered HSC organisational preparedness, adaptation indicators and the recognition of older people's needs during climate emergencies. The next chapter focuses on staff knowledge, skills and self-care.

4. HSC Services and Staff Adaptation in Supporting Older People

This topic covers HSC staff training in supporting older people with regard to distinct hazards and levels of care, adaptation intervention examples and supports for HSC staff wellbeing.

4.1 HSC Staff Training in Supporting Older People

The HSC workforce is central to building climate resilience and supporting the healthcare needs of older people. Competencies can be developed through pre-service education, lifelong learning and mentoring. Skills include understanding climate information, using climate data for health decision-making, engaging in cross-sectoral action, conducting assessments and managing climate-related risks to health and health system performance.

4.1.1 Knowledge Areas to Support Older People

- Climate-related hazards and risk assessment for older adults.
- Environmental health.
- Heat-related illnesses in older people.
- Emergency response protocols.
- Disaster management for seniors.
- Psychological impacts of climate change on older adults.
- Strategies for promoting physical and mental health in vulnerable populations.

4.1.2 Key Skills for HSC Staff

- Risk assessment: identifying vulnerabilities and potential hazards to enable targeted care planning.
- Emergency response: quick decision-making, coordination and implementation of response plans.
- Geriatric care skills: managing specific needs of older people in extreme weather conditions.
- Communication skills: conveying critical information and collaborating with older people, families and care providers.

Literature reading (obligatory) - Maznieda et al. (2022), soft skills emergency management: https://doi.org/10.1016/j.ijdrr.2022.102916	**Literature reading (obligatory) - Westman et al. (2024), Non-technical skills needed by medical**

Main findings summary: This study highlights the importance of soft skills during emergency management, including communication, teamwork, adaptability, empathy, leadership and problem-solving. It supports the MC2 emphasis that technical knowledge alone is insufficient during climate-related emergencies; HSC professionals also need non-technical competencies to coordinate safe care under pressure.	**disaster responders:** https://doi.org/10.1186/s13049-024-01197-y **Main findings summary:** Westman et al. identify non-technical skills required by medical disaster responders, including situational awareness, decision-making, teamwork, communication, leadership and task management. These findings are relevant to MC2 because climate-related emergencies require coordinated professional behaviour, rapid prioritisation and clear communication across services and agencies.

4.2 Adaptation Intervention Strategies

WHO guidance for climate-resilient and environmentally sustainable health care facilities provides suggested interventions for safe and quality care in the context of climate change. MC2 directs learners to interventions related to capacity development, training, information and knowledge management targeted to health care workers who respond to climate risks and environmental threats.

Students are directed to read WHO suggested interventions for climate-resilient health workforce and facilities: https://cdn.who.int/media/docs/default-source/climate-change/interventionstable-climateresilience-healthworkforce-hcf.pdf?sfvrsn=1c804fc4_5 **Main findings summary:** WHO guidance identifies interventions for climate-resilient and environmentally sustainable healthcare facilities, including health workforce training, information and knowledge management, emergency preparedness, infrastructure adaptation and service continuity. In MC2, learners use these interventions to evaluate their own workplace and propose a realistic training or adaptation intervention for older people.	**Take Home Assignment** Learners read the suggested interventions from WHO Guidance for Climate-Resilient and Environmentally Sustainable Health Care Facilities, complete the template and indicate the status of training interventions in their workplace. They then propose a training intervention that could be implemented in their workplace or community for older people. Approximate length: 300 words.	**Literature reading (obligatory)** Pesiridis Th, Sourtzi P, Galanis P, Kalokairinou P. Development, implementation and evaluation of a disaster training programme for nurses: A Switching Replications randomized controlled trial. Nurse Education in Practice. 2015;15(1):63-67. Main findings summary: This switching replications randomised trial developed, implemented and evaluated a disaster training programme for nurses. The study showed that structured disaster education is feasible and can improve nurses' knowledge about disaster response. MC2 uses this article as an example of how to design and evaluate training interventions for HSC workers in preparedness and adaptation contexts.

Students visit links on interventions across EU countries, including the Austrian Heat Protection Plan, mental health support for flooded populations in Emilia-Romagna, Italy, and Heat Hotline Parasol in the Kassel region, Germany.

Additional visual. HSC staff self-care, resilience-building tools and coping mechanisms.

4.3 Supports for HSC Staff Wellbeing

HSC workers experience climate change impacts on population health and on their own wellbeing. Work-related stress is magnified during disasters through increased workload, multiple roles, time constraints, traumatic situations, fear, uncertainty and concern about family and home. Psychological effects may include stress, anxiety, burnout, emotional exhaustion, compassion fatigue, PTSD, depression and feelings of helplessness.

Optional reading - Domingo et al. (2024), community health workers amid extreme weather events: https://doi.org/10.1016/j.puhe.2024.07.023

4.3.1 Impact of Climate Change Emergencies and Challenges Faced by HSC Staff

- Psychological effects: stress, anxiety, burnout, emotional exhaustion and compassion fatigue.
- Mental health challenges: PTSD, depression, helplessness and exacerbation of existing conditions.
- Role shifting: staff may be called to clinical, command or auxiliary tasks for which they were not trained.

4.3.2 Anxiety about Personal and Family Safety

HSC professionals may be asked to attend work during extreme weather at personal risk. In emergencies, they may be unable to return home for days and may sleep in hospital dormitories. The situation becomes more complex when communication systems fail.

4.3.3 Psychological Resilience Building

- Coping mechanisms: stress management, positive thinking and emotional regulation.
- Training programmes: tools and knowledge to navigate stressful situations.
- Supportive leadership: open communication, empathy and prioritisation of staff wellbeing.

Students are directed to watch videos and read resources on emergency preparedness kits

Emergency preparedness video: https://www.youtube.com/watch?v=KKN7Ewht1DQ

Summary: This video explains the basic logic of preparing an emergency kit before a crisis occurs. It directs learners to think in advance about essential supplies, family communication, evacuation readiness and items that can support safety during the first hours or days of an emergency.

Ready.gov emergency kit: https://www.ready.gov/kit

Summary: This resource provides a practical checklist for building an emergency supply kit. It highlights water, non-perishable food, radio, flashlight, batteries, first-aid supplies, medicines, hygiene items, important documents and supplies for household members with specific needs.

Disaster preparedness for seniors: https://aging.com/disaster-preparedness-for-seniors/

Summary: This resource focuses specifically on older adults. It explains why seniors may need extra preparation due to mobility limitations, chronic disease, medicines, social isolation, evacuation difficulties and dependence on carers or local services. It also stresses support networks, planning, emergency contacts and senior-specific kit items.

4.3.4 Self-Care Strategies

Self-care strategies tailored to healthcare professionals are necessary for sustained performance. Work-life balance, regular breaks, adequate rest, mindfulness practices and peer support networks can help prevent burnout and improve emotional resilience during climate emergencies.

Figure 17. Comprehensive toolkit for HSC staff self-care, resilience and coping.

Transition to the next chapter

This chapter discussed staff knowledge, skills, training, adaptation interventions and wellbeing. The following chapter presents European and international sources of information about climate change and older people.

5. International Sources of Information

5.1 Existing sources of information

The United Nations, WHO and the European Union provide information on climate change that HSC professionals can use to stay informed and adapt their care for older people. Scientific organisations also provide current information and organise events where professionals can exchange knowledge, experiences and practical solutions.

United Nations - Climate Action: https://www.un.org/en/climatechange

WHO - Climate change and health: https://www.who.int/health-topics/climate-change#tab=tab_1

European Commission - Climate change: https://commission.europa.eu/energy-climate-change-environment/topics/climate-change_en

Students are directed to watch video:
Students watch a video introducing the European Union's strategy on climate adaptation. Video URL: https://www.youtube.com/watch?v=Q7TfO1WDzY4
Video transcript summary: The video explains that climate impacts are already occurring and that adaptation is needed even while mitigation continues. It introduces the EU climate adaptation strategy as a framework for preparing societies, sectors and services for unavoidable climate impacts. In MC2, this supports the need for HSC professionals to use European information sources and translate adaptation policy into local risk assessment and service planning for older people.

5.2 EU Sources of Information

EU Law - Official Journal, EU legislation and policy resources: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52024DC0091

Climate-ADAPT is a partnership between the European Commission and the European Environment Agency. It supports Europe in adapting to climate change by providing information on expected climate change, current and future vulnerability, adaptation strategies, case studies, potential adaptation options and tools for adaptation planning.

Climate-ADAPT: https://climate-adapt.eea.europa.eu/en

European Environment Agency - European Climate Risk Assessment: https://www.eea.europa.eu/en/about/who-we-are/projects-and-cooperation-agreements/european-climate-risk-assessment

EEA report - responding to climate change impacts on human health in Europe: https://www.eea.europa.eu/publications/responding-to-climate-change-impacts/

European Centre for Disease Prevention and Control: https://www.ecdc.europa.eu/en

Copernicus Climate Change Service: https://climate.copernicus.eu/copernicus-2023-hottest-year-record

Centre for Research on the Epidemiology of Disasters / EM-DAT: https://www.emdat.be

Figure 18. HSC staff training pathway for using sources of information to assess and prioritise risk.

5.3 International Sources of Information

The module includes international professional and advocacy sources that can support climate-informed practice with older people and professional training. Learners are encouraged to evaluate whether each source is relevant, accessible, usable and applicable to their own health or social care context.

International Council of Nurses - climate change and planetary health: https://www.icn.ch/news/cop27-november-2022-how-icn-addressing-climate-change-and-planetary-health

HelpAge - older people in disasters and humanitarian crises: guidelines for best practice: https://www.helpage.org/silo/files/older-people-in-disasters-and-humanitairan-crises-guidelines-for-best-practice.pdf

Disaster Preparedness: A Complete Guide for Seniors: https://aging.com/disaster-preparedness-for-seniors/

WHO Toolkit for health professionals: communicating on climate change and health: https://www.who.int/publications/i/item/9789240090224

Sources of information assignment

Learners choose one source of information appropriate for the older population they serve and describe whether the information increases HSC awareness of climate hazards, whether it is accessible and useful in everyday practice, how it could support adaptation planning, and whether it could train colleagues to become more resilient and better able to support older people.

6. Conclusion and Summary

- MC2 presented the vulnerability of older people due to climate change hazards.
- Climate change hazards were examined as causes of harm in older populations, especially among those most in need because of vulnerability.
- Risk assessment, prevention, management and communication were discussed as practical professional tasks.
- The role of health and social care services in becoming resilient to support older people was addressed in detail.
- Training needs of health and social care professionals were discussed, including staff knowledge, skills and wellbeing.
- The need for HSC professionals to remain informed through European and international sources was emphasised.

Assessment of Learning

Assessment Type	Description
Pre-module Quiz	A 10-question multiple-choice quiz taken at the beginning of the module and repeated at the end. It supports learning and reflection and does not affect the grade.
Risk Assessment Exercise	Learners choose a climate change hazard, select an older person or group, complete the risk assessment form and submit the assessment as PDF.
Take-home Assignments	Assignments include extreme temperatures and health impacts in older adults, Annunziata's story, training interventions based on WHO guidance and evaluation of
Final Quiz 1	Assesses Chapters 1 and 2: social and environmental determinants of health and risk assessment for older people in need of health and social care. The quiz includes 20 items and carries 10 marks.
Final Quiz 2	Assesses Chapters 3-5: HSC services and staff adaptation, HSC staff knowledge and skills, and international sources of climate change information. The quiz includes 20 items and carries 10 marks.
Post-module Quiz	The same 10-question quiz is repeated to demonstrate learning progress. It does not affect the grade.
Evaluation Questionnaires	Students complete evaluation questionnaires during and after the training, including overall impression of the training programme.

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Final video and resource URL checklist

Environmental determinants of health video 2: https://www.youtube.com/watch?v=zU8nGKp8NJ8&t=3s - Introduces environmental determinants and their relationship with climate-related health effects.

Hazard recognition and risk assessment video: https://www.youtube.com/watch?v=SznxxTCbhT0&t=5s - Explains the distinction between hazard and risk and links risk assessment with prevention, management and communication.

Early Warning Systems video: https://www.youtube.com/watch?v=ptDZGYyY30s&t=4s - Explains how monitoring, forecasting, communication and preparedness support timely action before hazardous events.

Emergency preparedness video: https://www.youtube.com/watch?v=KKN7Ewht1DQ - Introduces practical emergency kit preparedness and the need to plan supplies and communication in advance.

Ready.gov emergency kit: https://www.ready.gov/kit - Provides a concise checklist of essential emergency supplies for households.

Disaster preparedness for seniors: https://aging.com/disaster-preparedness-for-seniors/ - Provides senior-specific preparedness guidance, including support networks, medicines, mobility needs and evacuation planning.

EU Climate Adaptation Strategy video: https://www.youtube.com/watch?v=Q7TfO1WDzY4 - Introduces EU climate adaptation and the need to prepare societies and services for unavoidable climate impacts.

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Climate mitigation and health co-benefits in relation to older persons MC3 EQF4

Microcredential Title	**Climate mitigation and health co-benefits in relation to older persons**
Short Code / ID	MC3
EQF Level	4
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, German, Finnish, Portuguese and Greek
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Carinthia University of Applied Sciences
Module Lead / Author	Andrea Stitzel

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Explain the importance of climate mitigation in the context of climate resilient health systems.
LO 2	Critically analyze own work environment for climate mitigation opportunities.
LO 3	Develop strategies for reducing carbon footprint within the own work environment.
LO 4	Describe the near-term health co-benefits for older persons that arise due to climate mitigation.
LO 5	Apply knowledge of climate mitigation and health co-benefits.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards climate mitigation, sustainable healthcare and health co-benefits for older persons.
Alignment Notes	Health systems are on the frontlines of climate change, bearing the financial and operational burdens of increasingly frequent extreme weather events (e.g., heatwaves, floods, droughts, storms, wildfires) and the growing prevalence of climate-related diseases. Simultaneously, the healthcare sector itself contributes to environmental and climate-related challenges. In this MC, we focus on strategies to minimize the environmental footprint of healthcare at both individual and systemic levels, while recognizing climate mitigation as a key component of the broader transformation needed to build climate-resilient health systems. The course progressively builds learners' understanding of: • climate mitigation in health care • the carbon footprint of health systems • greenhouse gas emissions across scopes 1, 2 and 3 • practical mitigation strategies in health and social care settings • health co-benefits of climate action for older persons

	The content integrates: • key concepts and definitions • evidence-based background information • practical examples • case studies • videos • interactive H5P activities • reflection tasks • knowledge check questions The microcredential also promotes critical reflection on learners' own work environments, identification of climate mitigation opportunities, development of carbon reduction strategies, and awareness of how climate action can improve health, well-being, mobility, nutrition, housing, and social participation among older persons.
Keywords	climate change, health, resilience, older adults, climate mitigation

Learning Activities

E-Learning Format	online self-paced learning with text-based content, interactive H5P elements, YouTube videos, additional literature, case studies, quizzes, and reflective learning activities.
Activities	pre- and post-module quizzes, case studies, knowledge check questions, reflection tasks, video-based learning, interactive H5P activities, reading assignments, practical analysis of the own work environment, and application-oriented strategy development.
Estimated Study Time	25 hours

Content & Topics

1. Overview of climate mitigation in health care
2. Implementing climate mitigation in health care
3. Climate-health co-benefits for and with older persons

1. Overview of Climate Mitigation in Healthcare

1.1 Key Definitions

according to the IPCC (2014)

- **Climate mitigation** "is a human intervention to reduce the sources or enhance the sinks of greenhouse gases."
- **Climate adaptation** "is the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects."
- **Climate resilience** "is the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation." (IPCC, 2014).

Climate Mitigation

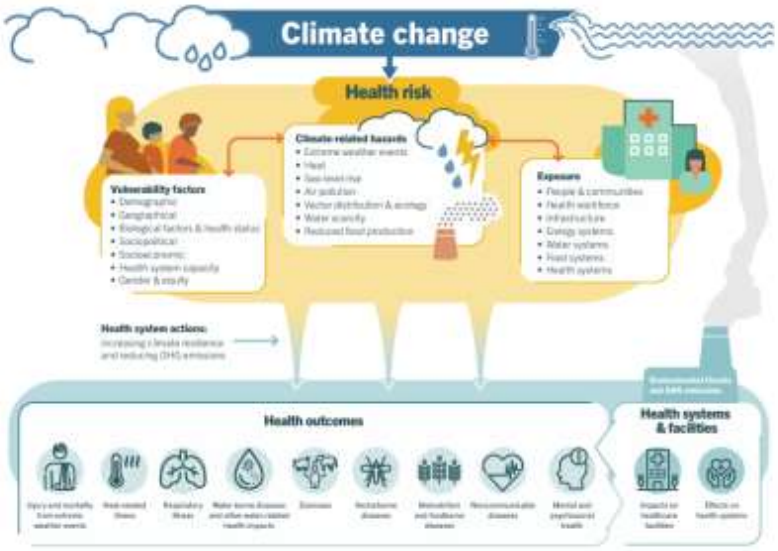
Current literature uses terms such as **low-carbon health system**, **net-zero carbon health system**, **healthcare decarbonization**, and **environmentally sustainable healthcare facilities**. All focus on reducing **greenhouse gas emissions** in healthcare, but differ slightly in scope.

Healthcare decarbonization broadly refers to reducing **CO_2 and other GHG emissions** from healthcare activities, facilities, and services. This includes lowering **energy consumption**, switching to **renewable energy**, improving efficiency, and reducing waste (Health Care Without Harm, 2019).

Video: Healthier Planet, healthier people
According to WHO (2023), **low-carbon health systems** implement transformative strategies to reduce emissions and environmental harm. The **NHS net-zero approach** goes further by aiming to offset remaining emissions through measures such as **carbon removal**, more **green spaces and trees**, and **green energy generation** (NHS, 2020).

Look at the video from the NHS to get an idea about how comprehensive health care decarbonization is targeted in the UK. In this video, decarbonization is also brought in context with questions of quality of care. You find this focus also in the WHO (2020) definition of **environmentally sustainable health care facilities** as "those that improve, maintain or restore health, *while* minimizing negative impacts on the environment and leveraging opportunities to restore and improve it".

Climate-smart Health Care
Recent publications increasingly combine **climate mitigation** with **climate resilience**, for example in the WHO framework on **climate-resilient and low-carbon health systems** (WHO (2023). Healthcare Without Harm refers to this broader approach as **climate-smart healthcare**.
The COP26 Special Report (2021) emphasizes that climate mitigation cannot be considered separately from resilience: health systems are affected by **climate-related health risks**, while also contributing to the climate crisis through their own **GHG emissions**. Therefore, countries need **low-carbon, sustainable, and climate-resilient health systems and facilities**.
WHO (2023) describes this as a **vicious circle**: climate change increases pressure on health systems through direct and indirect health impacts, while healthcare activities further contribute to climate change through emissions. This pressure is also intensified by **vulnerability factors**, especially the **ageing population**, and by exposure risks that increase healthcare demand and emissions.

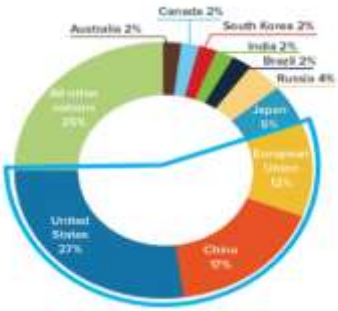


1.2 Carbon Footprint of Health Care
As you just heard in the last video, the carbon footprint of health care lies globally at approx. 5% of total greenhouse gas (GHG) emissions. Depending on the source, this number varies. According to an article in Harvard Medicine (2023), the **global healthcare sector** is responsible for emitting between **4.4% and 5.2%** of total greenhouse gas (GHG) emissions. When considering that the healthcare sector globally spends about $8 trillion per year and employs about 170 million workers, this is not even so surprising.
To better grasp what this means, people often make the following comparison: if healthcare were a country, it would be the fifth largest emitter worldwide, only smaller than China, the USA, India, and Russia. Maybe even more impressive is that the emission level of healthcare globally is equivalent to the annual GHG emissions from at least **514 coal-fired power plants** and is approximately twice the amount of yearly GHG emissions produced by the **aviation sector**, which accounts for around **2.5%** (Health Care Without Harm, 2019).

Video: Do No Harm

Please watch the video from Health Care Without Harm. While watching you might want to **reflect on the ethical, medical and financial implications** of health sector-related GHG emissions.

Global Distribution of GHG Emissions in Health Care



The distribution of GHG emissions in health care varies significantly across different regions and countries. The largest emitters in absolute numbers are the USA, China and the EU. Together they make up more than 50% of global GHG health care emission (see next figure from Health Care Without Harm, 2019).

More interesting than an evaluation based on absolute numbers is, though, to take per capita emissions as a metric into consideration. In addition, as you can see in the following table, it is important to distinguish between the different EU countries as they fit into quite different broad emission categories with some below, some above the EU average.

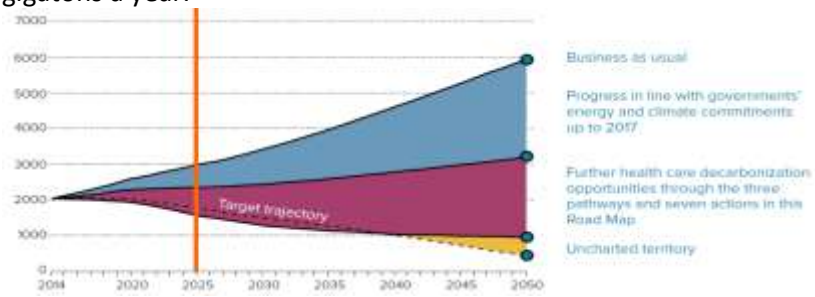
Health care emissions per capita by country

Top emitters:	Major emitters	Higher than average emitters	Lower than average emitters	Unknown
Australia	Austria	Bulgaria	Brazil	Rest of World (ROW)
Canada	Belgium	Cyprus	China	
Switzerland	Denmark	Czech Republic	Croatia	
United States	Estonia	France	Hungary	
	Finland	Greece	India	
	Germany	Italy	Indonesia	
	Iceland	Malta	Latvia	
	Japan	Poland	Lithuania	
	Korea	Portugal	Mexico	
	Luxembourg	Slovenia	Romania	
	Netherlands	Spain	Slovak Republic	
	Norway	Sweden	Turkey	
	Russia	European Union		
	Taiwan			
	United Kingdom			

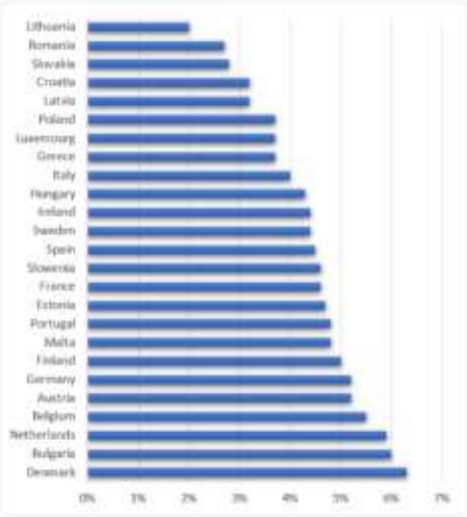
Look at China's position change when it comes to absolute numbers of healthcare GHG emissions (place 2 after the USA) vs. per capita (lower than average emitter). This is important to keep in mind when making comparisons between countries.

Future Projections of GHG Emissions in Health Care

Look at the following graphic from Health Care Without Harm (n.d.). You can see that in the last 10 years, the GHG emissions of health care have already increased by about 50% from 2000 to 3000 gigatons a year and will further increase under a "business as usual" scenario. Over the whole period from 2014 to 2050 it is projected that the carbon footprint of health care will triple to about six gigatons a year.



EU Distribution of GHG Emissions in Health Care



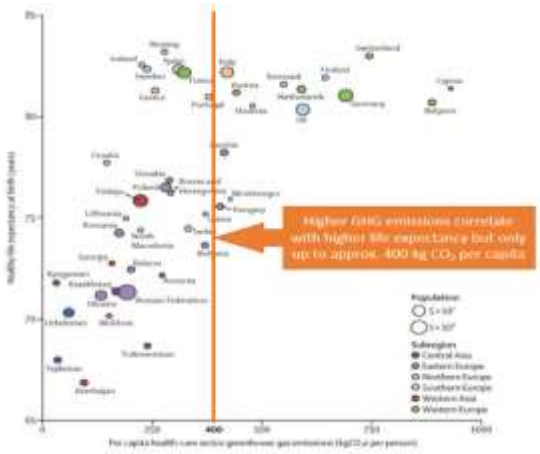
The differences between EU countries becomes even more apparent when comparing their healthcare footprint as a percentage of national GHG emissions. The following table, adapted from Health Care Without Harm (2019), shows a range from 2.0% in Lithuania to 6.3% in Denmark. Unsurprisingly, most of the newer EU member states have a lower healthcare footprint in line with their overall lower national footprint, although there are exceptions to this trend.

GHG Emissions and Quality of Health Care

Important to realize is that, though quality healthcare cannot be achieved without emitting greenhouse gases, it seems to be possible to have similar outputs with quite different emission levels. On a global scale, there surely are many countries in need to emit higher GHG levels in order to achieve better healthcare and healthcare coverage, but for most EU countries the opposite is true. The 2024 report of the Lancet Countdown on health and climate change (Romanello et al., 2024) has calculated that healthy life expectancy at birth (y-axis) increases with health care-related GHG emissions (x-axis) only up to approximately 400 kg CO2 per capita.

As you can see in the following graphic above 400kg CO2 per capita, this correlation levels out.

Here you can see the healthy life expectancy at birth in relation to GHG emissions in the European Region (adapted from van Dalen et al., 2024)



These results are a clear call for all European Union member states with healthcare emissions above 400 kg CO2 per capita to evaluate possibilities for GHG emission reductions and to strive for low-carbon or even net zero health care systems. When comparing the developments since 2020, GHG emissions of healthcare in the EU have already decreased, however with the exception of "Cyprus, Estonia, Luxembourg, and Malta, with increases ranging from 54.0% to 586.6%" (Chen-Xu et al., 2024).

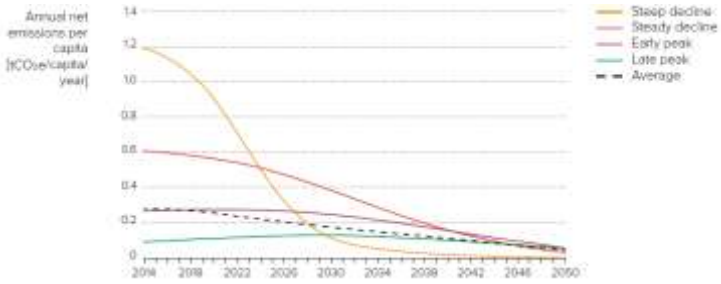
Taking into consideration that in the EU an estimated **365,047 DALYs*** *[= Disability-Adjusted Life Years: measure used to quantify the burden of disease; DALYs represent the total number of years lost due to ill-health, disability, or early death]* can be attributed to health sector's GHG emissions (Chen-Xu et al., 2024) this matter becomes even more pressing.

GHG emissions in the health sector also have a large economic impact. Chen-Xu et al., 2024 have calculated "that health costs associated with health sector's GHG emissions can amount to **25.6 billion euros**" - a number important to keep in mind when talking to decision makers about the importance of implementing mitigation strategies in health care.

Decarbonization Trajectories

Depending on the level of annual per capita emissions, Health Care Without Harm proposes four different decarbonization trajectories for healthcare systems:

1. For the highest emitters and most wealthy countries a "steep decline" (orange line) is urgently needed; this requires nations to immediately put strict decarbonization strategies into action.
2. For high emitters a "steady decline" (red line) has to be targeted with immediate action setting the health system on its track.
3. For many middle income countries the soft decline with a so-called "early peak" (purple) before steadily declining is proposed.
4. For low emitting countries a so-called "late peak" (green) with a slight increase until the end of this decade is seen as possible before also decreasing until 2050.



2. Implementing Climate Mitigation in Health Care

2.1 Framework for GHG emissions in Health Care

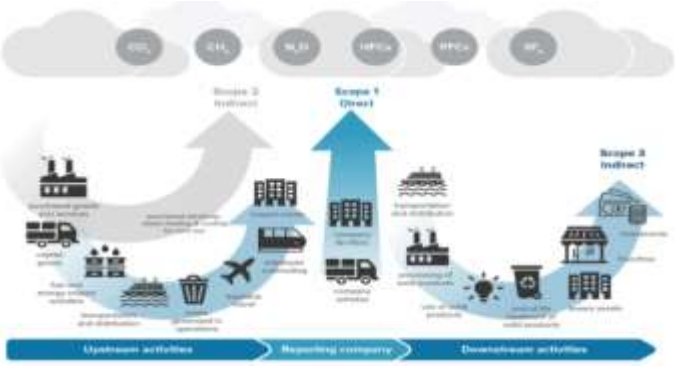
To understand and manage GHG emissions - these can be your own personal or the emissions of the health facility you are working at - it is important to think about how much control one has over them. Therefore, in the Greenhouse Gas Protocol a distinction is made between so-called direct vs. indirect emissions.

- **Direct GHG emissions** are from sources owned or controlled, whereas
- **Indirect GHG emissions** are a consequence of own activities, but occur at sources owned by someone else.

Overview: Scope 1,2,3

Being able to pin-down your own emissions has a lot to do with **availability** of but also **access** to **DATA**. In addition, the question arises which emissions belong to you and which belong to others (although you might have something to do with them as you are "using" certain "products").

For organizations/institutions the same is true as direct vs. indirect emissions are defined by each organization's specific boundaries. To improve transparency and comparability, the Greenhouse Gas Protocol defines three so-called "**scopes**". Another word for "scope" would be "category" or "area". The following figure (Health Care Without Harm, 2019) gives you a general overview over the three scopes. As you can see, only scope 1 includes direct GHG emissions. All indirect GHG emissions are included in scope 2 and scope 3.



As a note: it is always beneficial to **explore your country's own strategies**! Maybe you want to search for documents related to climate mitigation or decarbonization in health systems or facilities. It could be that they even provide an explanation for their choice of definition.

Scope 1 in Healthcare Facilities

Scope 1 encompasses emissions that originate directly at a healthcare facility. This comprises, for instance, the combustion of fossil fuels to produce heat (e.g., gas or oil heating systems), emissions from the facility's own vehicle fleet (e.g., ambulance journeys, patient transport), and fugitive emissions (e.g., anaesthetic gases escaping into the atmosphere). These emissions are under the direct control of the healthcare facility.

Scope 2 in Healthcare Facilities

Scope 2 encompasses only emissions resulting from purchased energy which the healthcare facility consumes (e.g., electricity, district heating, district cooling). These emissions are physically produced outside the healthcare facility and brought into the own institutional boundaries. They are so-called "upstream activities" - a term which will be explained under scope 3.

Scope 3 in Healthcare Facilities

This scope is the hardest to pin down as it encompasses all activities along the value chain which occur from sources not owned or controlled by a healthcare facility. Two types of emissions are distinguished in scope 3:

- **Upstream emissions** refer to the greenhouse gas emissions that occur **before** a product or service reaches the point of use or consumption. These emissions are generated during the various stages of production, processing, and transportation. In the context of a healthcare facility, upstream emissions include:
    - **Production:** Emissions from the manufacturing of medical products, pharmaceuticals, and other supplies.
    - **Transportation:** Emissions from the transport of these products to the healthcare facility as well as mobility of patients and employees.
    - **Extraction and Processing:** Emissions from the extraction and processing of raw materials used in the production of goods.
    - **Construction:** Emissions from the construction of buildings and infrastructure.

- **Downstream emissions** arise from various activities associated with the use and disposal of products (= **after** having used them). In the context of a healthcare facility, downstream emissions include for instance:
    - **Disposal of medical waste:** when medical waste is properly disposed of, emissions may be generated during the treatment and processing of this waste; this includes emissions from incineration, autoclaving, or other waste management practices that ensure the safe handling of medical materials.
    - **Use of metered dose inhalers (MDIs):** MDIs are commonly used in the treatment of respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD); these inhalers often contain hydrofluoroalkane (HFA) propellants, which contribute to GHG emissions when released into the atmosphere during use.

2.2 Decarbonizing Health Care Systems & Facilities

The Global Road Map for Health Care Decarbonization (Health Care Without Harm, n.d.) outlines **three interrelated and overlapping decarbonization pathways** that the healthcare sector must address to reduce its emissions:

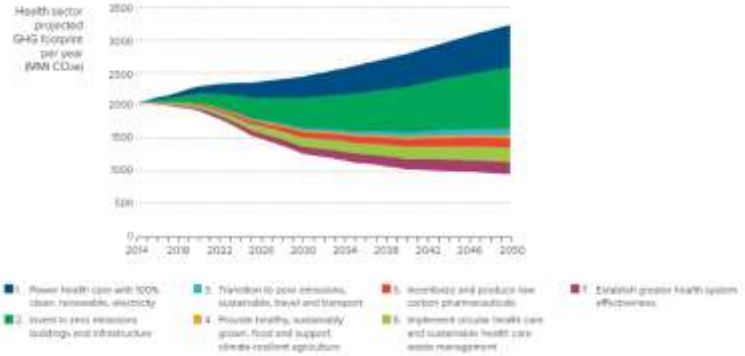
1. **Healthcare facilities, operations and healthcare delivery:** This includes the direct emissions from healthcare services and facilities.
2. **Healthcare supply chains:** This encompasses the production, packaging, and transport of products. Although challenging to influence, the healthcare sector can exert pressure on supply chains through joint procurement, even across national boundaries.
3. **Wider economy and society at large:** The healthcare supply chain and delivery are heavily reliant on other sectors and societal actors. As members of one of the most trusted professions, healthcare workers can influence and lead the society-wide decarbonization process.

These pathways highlight that achieving low-carbon or net-zero healthcare is a societal challenge that the health sector cannot tackle alone. Intersectoral cooperation and top-down macro-level support are crucial for success.

Seven High Impact Action Areas for Health Care Decarbonization

Spanning these three pathways are seven high impact action areas for health system decarbonization (Health Care Without Harm, n.d.).

The following graphic shows that in the action **area building and infrastructure** the largest amount of cumulative emissions could be saved by 2050 (approx. 17.8 Gt CO2e), followed by the **renewable energy** (12.7 Gt CO2e). The remaining five areas each come up to approx. between 1-5 Gt CO2e *[comment: if you have been wondering already about what the "e" stands for in CO2e, it means "equivalent" and comprises all other greenhouse gases apart from carbon dioxide]*



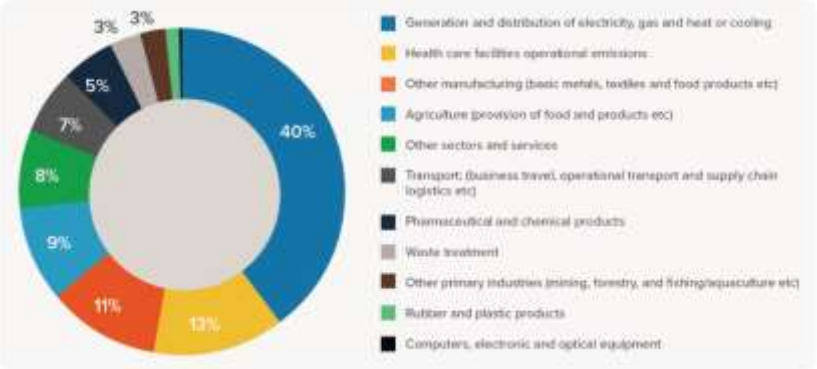
Action Area 1: Energy

Healthcare requires the use of energy. This is true for all healthcare facilities from the smallest to the largest and is influenced not only by the size of the facility but also by the type of healthcare services provided, the medical equipment and appliances used, the energy efficiency of the buildings, and the intensity of their use.

Video: Fossil Fuels – Global Weirding

Watch the video on energy and fossil fuel from Katharine Hayhoe to understand why especially from a healthcare sector point of view talking about where energy comes from and how much we use is so important.

Health Care Without Harm (2019) has calculated that globally "40% of health care's climate footprint comes from electricity and thermal power supply attributed to healthcare-related activities" (see blue area in the following figure). This number includes a) all scope 2 energy healthcare facilities purchase for their own operations and b) scope 3 energy used by manufacturers and suppliers, such as those producing pharmaceuticals and medical supplies. This percentage increases to **more than 50%** when accounting for the 13% of CO2e footprint resulting from scope 1 operational emissions of healthcare facilities (yellow area in the figure below).



Given these figures, healthcare facilities need a combined strategy to reduce energy-related carbon emissions. Key measures include switching to **zero-emission electricity across scopes 1, 2 and 3**, replacing fossil-fueled equipment and vehicles, investing in **renewable energy systems**, purchasing

renewable electricity and heating/cooling, and encouraging **suppliers and external service providers** to use renewable energy as well (Health Care Without Harm (n.d.); Lichtenecker et al., 2024).
At the same time, healthcare facilities must reduce their **overall energy consumption** through more efficient buildings, lighting, appliances, and medical equipment. The **human factor** is also essential: staff and patients need to be informed and motivated to support energy-saving measures. Another important step is improving **space utilisation**, since medical spaces are currently used only around **30–40% of the time** (Lichtenecker et al., 2024).
Larger healthcare facilities should therefore develop a **central energy management strategy**. This should combine technical measures, such as **digital energy monitoring** and optimized heating, ventilation, cooling, and lighting systems, with organisational measures, including **staff training**, efficient appliance use, **space management**, and clear communication with all stakeholders.

Case Study

For a case study describing the "technical" vs. "human" challenges when implementing an energy reduction plan at a large healthcare facility, please read the following summary from Khoo Teck Puat Hospital, Singapore.

Action Area 2: Building & Infrastructure

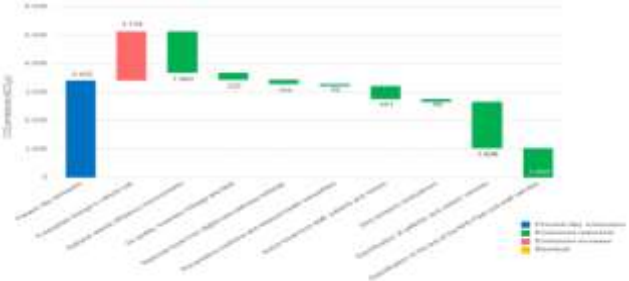
As outlined above, **buildings and infrastructure** are key leverage points for reducing energy consumption in healthcare. Since buildings account for around **40% of energy use in the EU**, healthcare buildings should promote **energy efficiency, zero emissions, and climate resilience** (European Commission, 2024; Health Care Without Harm, n.d.). However, many measures are **cost-intensive**, especially for smaller facilities or rented spaces.
Lichtenecker et al. (2024) (2024) identify **three main action areas**:

1. **Thermal renovation of existing buildings**
   Existing buildings should be renovated to reduce energy use for **heating, cooling, and hot water**. This includes improving **insulation**, replacing windows, and switching from **oil or gas** to **climate-neutral heating systems**.
2. **Zero-emission standards for new buildings**
   New healthcare buildings should follow the EU Energy Performance of Buildings Directive, which aims for **zero-emission buildings by 2050**. These standards will apply to **new buildings from 2030** and **public buildings from 2028**.
3. **Sustainable and circular construction**

Building strategies should follow a **circular economy approach**, focusing on durable, recyclable, and low-carbon materials. Using ecological materials such as **wood, recycled concrete, low-CO_2 concrete, or cement alternatives** can reduce indirect CO_2 emissions over a building's life cycle.
In addition, **nature-based solutions** such as trees, shrubs, green outdoor areas, and indoor plants can support **cooling, CO_2 retention, biodiversity**, and the **mental health of staff and patients**.

Action Area 3: Travel & Transport

Compared to the first two action areas, travel and transport contribute a smaller portion to the overall greenhouse gas (GHG) emissions budget of the health sector. Nonetheless, the NHS (2022) estimates that "approximately 3.5% of all road travel in England relates to patients, visitors, staff and suppliers to the NHS, contributing around 14% of the system's total emissions." The following figure illustrates potential interventions to reduce transport and travel emissions. As shown, an increase in vehicle use (red bar) is anticipated, but this is expected to be partially offset by improvements in vehicle efficiency.



When reducing the carbon footprint of **travel and transport** in healthcare, facilities should address several areas:

1. **Patient/client and visitor travel** to the healthcare facility
2. **Staff commuting** to the workplace
3. **Staff travel to patients/clients**, for example in mobile home care
4. **Rescue and ambulance services**
5. **Transport of goods and services** to the facility
6. **Waste transport and disposal** from the facility
7. **Internal logistics** within the facility

The most impactful measure is converting the facility's **vehicle fleet to climate-friendly technologies**, although this is cost-intensive and requires infrastructure. For ambulances and mobile care services, healthcare provision must remain the priority. First steps can include route optimization, better patient flow control, and cooperation with nearby providers.

Another important area is the **supply chain**. Facilities can work with logistics and procurement partners that apply sustainability criteria, especially by improving delivery efficiency and reducing transport distances for pharmaceutical products and medical devices.

To reduce individual car use, facilities need good public transport connections. Measures include better stops, schedules, frequency, and accessibility, as well as public transport subsidies, bicycle support, secure bike parking, and higher parking costs.

Overall, healthcare facilities should develop a green travel plan, co-developed with staff and supported by a clear communication strategy, highlighting the health benefits of active mobility.

Case Study

For an ambitious case study, consider how the Galician Health Service, Spain introduced electric ambulances at Ourense hospitals.

Action Area 4: Food

The NHS (2022) estimates that around 6% of total healthcare emissions come from food and catering services. Health Care Without Harm (n.d.) therefore promotes healthy, local, sustainable, fresh, and seasonal food with zero food waste.

Food choices have a major impact on GHG emissions. In European diets, meat, dairy, and eggs account for 83% of dietary emissions, with meat responsible for almost 60% (Hannah Ritchie (2020). The EAT-Lancet Commission (n.d.) identifies food as a key lever for improving both human health and environmental sustainability.

A central approach is the **Planetary Health Diet**, which is rich in plant-based foods and low in animal-source foods. This can reduce emissions directly and indirectly, as healthier people may require fewer healthcare services, pharmaceuticals, and less patient mobility (EAT-Lancet Commission, n.d.).

Video: Can healthy food save the planet?

Watch the video for a brief introduction to the Planetary Health Diet.

Healthcare facilities can influence the **dietary choices of staff and patients/clients** through **climate-sensitive health counselling** and **health-promoting, environmentally friendly catering**.

However, sustainable catering is shaped by several factors, especially **economic constraints**, patient **dietary and nutritional requirements**, stakeholder expectations, and the need for **well-trained kitchen staff** able to implement more **vegetarian-based menus**.

According to Lichtenecker et al., 2024, a key problem is the lack of **binding specifications and quality standards** for **health-promoting and climate-friendly food procurement** in hospitals.

Case Study

Please read the following case study from University of California San Diego Health, United States to get a feeling of how plant-based meals can be introduced in a medical centre.

Action Area 5: Pharmaceutical, Inhalers & Anesthetic Gases

"Pharmaceutical pollution poses a global threat to humans and the environment. Residues from pharmaceuticals can enter the environment at every stage of their life cycle, posing risks to ecosystems and impacting human health."

Since these products are designed to interact with living systems, they have an impact on ecosystems, contributing to biodiversity loss and accelerating antimicrobial resistance (AMR). Furthermore, the production of pharmaceuticals accounts for around ¼ of the carbon emissions of the healthcare sector." (Health Care Without Harm)

Assessing the environmental impact of pharmaceuticals is very complex and often lacks transparency. To increase efficiency and climate-friendliness, a combination of measures along the entire value chain is required. Health Care Without Harm (n.d.) focuses in this high impact action area on:

1. **reducing** unnecessary pharmaceutical use
2. **substituting** high emissions products with more climate-friendly alternatives
3. **incentivizing the production** of affordable green, climate-smart medicine.

According to OECD (2023), **pharmaceutical consumption has increased for decades**, mainly due to ageing populations, chronic diseases, and changes in clinical practice. Reducing unnecessary consumption is difficult, but essential. This requires a stronger focus on **prevention, health promotion**, and avoiding inefficient treatment, such as repeated examinations, unnecessary admissions, or overuse of pharmaceuticals. Where possible, **conservative and non-medical therapies** should be prioritized over invasive treatments.

A key area for substitution is **high-emission products**, especially **anaesthetic gases**, which account for around **2% of the NHS carbon footprint** and more than half of emissions from surgical services (Anderson et al., 2024). **Inhalers** also differ in their carbon footprint; **dry powder inhalers (DPIs)** are the more climate-friendly option. The NHS (2022)therefore aims to increase DPI use and improve inhaler disposal, while ensuring high standards of care through education for prescribers and patients.

Healthcare facilities should also develop **sustainable procurement criteria for pharmaceuticals**. Larger networks or consortia can increase pressure on suppliers to reduce emissions. The NHS supplier engagement programme and Austria's DekarbPharm project show how the production of **affordable, green, climate-smart medicine** can be supported. Implementing these mitigation measures requires well-trained staff. Due to the importance of the topic, specialized networks like Pharmacists for Greener Healthcare have been established, targeting pharmacists as key agents of change in this action area.

Case Study

For further reading and European Case Studies, see the publication from Health Care Without Harm (n.d.): Addressing Pharmaceutical Pollution in Europe.

Action Area 6: Pharmaceutical, Inhalers & Anasthetic Gases

The healthcare sector generates large amounts of **waste**, especially in hospitals, nursing homes, laboratories, and research centres. According to the WHO, around **15% of healthcare waste is hazardous**, while **85% is general waste** comparable to household waste. Since waste treatment methods differ greatly in their **GHG emissions**, careful **waste separation and sustainable waste management** are essential (Rizan et al. (2021); Lichtenecker et al. 2024).

This action area focuses on **minimizing waste**, reducing the **toxicity of healthcare waste**, and applying **circular economy principles** in procurement and waste management (Health Care Without Harm, n.d.).

Examples for concrete strategies include (Lichtenecker et al., 2024):

Reuse and reprocessing	Prioritise reusable products, packaging, and suitable medical devices to reduce waste and extend product life cycles.
Recycling and circular procurement	Recycle medical products where safe and feasible, and consider material composition already during procurement.
Reducing single-use materials	Minimize disposable laundry, unnecessary packaging, paper use, and pharmaceutical waste.
Optimising laundry and cleaning processes	Reduce laundry volumes and improve cleaning processes to lower energy, water, and detergent use.
Waste separation system	Introduce clear, multilingual labels, illustrations, and colour coding for staff, patients, and visitors.
Staff awareness and responsibility	Provide training and information, involve staff early, and appoint a waste officer to improve implementation.

Action Area 7: Health System Effectiveness

Health system effectiveness is the most comprehensive of the seven action areas and requires a **whole-system approach**, not only action by individual healthcare facilities. Its goal is to reduce emissions by eliminating **inefficient and unnecessary practices**, linking **carbon reduction** with **quality of care**, and strengthening **resilience** (Health Care Without Harm, n.d.).

In the context of climate change, effective health systems must integrate **mitigation, adaptation, and resilience strategies**, while protecting **high-risk populations** such as older people, pregnant women, newborns, children, homeless people, and migrants.

The WHO (2023) framework outlines key components for building **climate-resilient and low-carbon health systems**. Mosadeghrad et al. (2023)identified **87 actions**, with current priorities focusing mainly on **national health and climate adaptation plans** and **backup systems for essential services**. Less attention is given to **adequate financing**, **primary healthcare-based approaches**, and **mental health service access**.

In a further scoping review study, Ansah et al. (2024) give a detailed list of strategies for building climate resilient health systems.

Lichtenecker et al. (2024) further suggest the following action points for countries as well as on EU level:

- Regular national survey of the GHG emissions of the healthcare sector (every 1-3 years)
- Development of a database on the emissions levels of pharmaceuticals and medical products and processes (on EU level)
- Legal requirement for large healthcare facilities to report GHG consumption data
- Development of climate-relevant reporting indicators for the healthcare sector

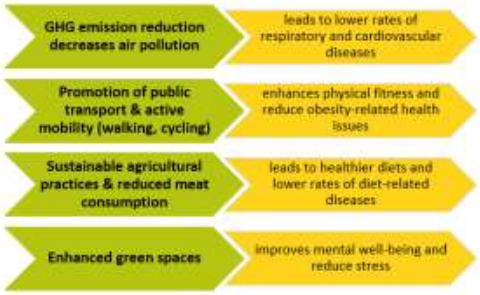
3. Climate Health Co-Benefits for and with Older People

In 2009, the Lancet Commission declared that "*climate change is the biggest global health threat of the 21st century*", emphasizing in 2015 that "*tackling climate change could be the greatest global health opportunity of the 21st century*".

These statements underscore the deep connection between environmental sustainability and public health, highlighting both the negative impacts and the positive potential (co-benefits). They illustrate how actions addressing climate change and health can work in tandem, creating opportunities to tackle both challenges simultaneously.

Defining Climate-Health Co-benefits
The concept of climate-health co-benefits can be approached from two perspectives:

A) From climate to health: health co-benefits of climate action refer to the positive health outcomes that result from measures taken to mitigate or adapt to climate change (Haines et al., 2019). These benefits often stem from actions that reduce GHG emissions improve environmental conditions, ultimately enhancing public health. Examples of such climate actions include:



B) From health to climate: climate co-benefits of health action refer to the positive environmental outcomes that arise from public health interventions. These co-benefits occur when measures aimed at improving health also contribute to climate change mitigation or adaptation. Examples of such public health interventions include:

Active Mobility for Older Persons
Physical inactivity is a major risk factor for **noncommunicable diseases** and contributes to around **4–5 million premature deaths worldwide** each year (Moutet et al., 2025; Whitmee et al., 2024). **Active mobility**, including walking, cycling, and public transport use, is considered a cost-effective way to increase physical activity and also helps reduce **traffic injuries, noise pollution, and emissions**.

For older adults, however, active mobility can be challenging. Lampel et al. (2023) identify three main barriers:

1. **Physical environment**

Poor cycling infrastructure, narrow sidewalks, unsafe crossings, long distances, bad weather, and digital barriers can discourage active mobility.

2. **Own competences**

Limited fitness, coordination difficulties, physical impairments, or lack of knowledge about traffic rules and public transport use can create insecurity.

3. **Attribution of meaning**

Some older adults may perceive active mobility as **dangerous**, unsuitable, or culturally inappropriate.

To support older adults, measures should include **safe and wide footpaths and cycle paths**, seating and shelters, **barrier-free and affordable public transport**, and mobility services for rural areas. Free

exercise therapy, such as physiotherapy or occupational therapy, could also improve fitness and confidence.
The Austrian research project **"KliMate"** developed **climate-adapted exercise recommendations for older adults**. These address challenges such as **heat, air pollution, and allergen exposure** and are embedded in a **buddy system** to promote social support and motivation. The recommendations encourage older adults to remain physically active even in hot weather, while adapting timing, location, intensity, clothing, sun protection, hydration, and precautions for pre-existing conditions.

Planetary Health Diet for Older Persons
The EAT-Lancet Commission (2019) estimates that a global shift to the **Planetary Health Diet** could prevent around **10–11 million premature deaths** from non-communicable diseases each year by 2040.
However, changing dietary habits among **older adults** can be difficult. Lampel et al. (2023) identify three main barriers:

1. **Physical environment**

Healthy and climate-friendly food is often less available or affordable than highly processed ready meals, which are cheap, convenient, and heavily advertised.

2. **Own competences**

Older adults may lack knowledge about **nutrition**, healthy meal preparation, or food waste reduction. In care homes, kitchen staff may also need training to prepare **vegetarian or vegan meals**.

3. **Attribution of meaning**

Meat and high-calorie foods may be linked to **status, tradition, masculinity, security, or memories of poverty and hunger**. Meat may also be seen as essential for a balanced diet.
The Planetary Health Diet must also consider older adults' specific needs, such as **food tolerances** and **protein requirements** for healthy aging (Leydon et al., 2021).
To support healthier and more sustainable diets, measures should include **affordable fruit and vegetables**, better access to **organic food**, taxes on unhealthy products, restrictions on unhealthy food advertising, and **mandatory planetary health dietary guidelines** for communal catering. In addition, **clear food labelling**, emotional and social messaging, target-group participation, and **peer support** can help improve dietary competencies and encourage behaviour change.

Healthy and Climate-friendly Living for Older Persons
"Housing has been identified as one of the key social determinants of health shaping the way people live and age. Ensuring adequate housing should therefore be a priority concern in our ageing society" (AGE platform)

Age-friendly living environments should combine **public health measures** with **climate change strategies**. In housing, this includes construction methods, land use, legal aspects, social factors, and the type of energy used for **heating, cooling, hot water, and electricity**. **Single-family homes** generally cause higher **GHG emissions** than multi-story or shared residential buildings.

Older adults face several barriers to healthy and climate-friendly housing (Lampel et al. (2023)):

1. **Physical environment**

Many older adults live alone in densely populated areas with poor indoor conditions, limited access to clean energy, open spaces, or infrastructure. Tenants often cannot make structural changes, while renovations may increase rents and cause **gentrification**.

2. **Own competences**

Barriers include limited knowledge of **tenant rights**, support measures, energy-efficient heating and ventilation, appliances, and climate-friendly technologies.

3. **Societal barriers**

Older adults may experience **ageism**, limited access to **barrier-free housing**, insufficient financial support, and economic pressure from rising energy costs. Older women are especially vulnerable due to the **gender pension gap**.

As the older population grows, climate-resilient housing can improve **well-being and mental health**, reduce **GHG emissions**, and lower climate risks. ICMA, 2023 recommends three key strategies: **smaller attached homes**, **resilient multifamily housing**, and **mapping and reducing housing risks**. Healthy living environments should also include **safe green spaces** near homes. They provide **shade**, regulate temperatures, support **active mobility**, encourage social interaction, and improve physical and mental health.

Additional Areas for Climate-health Co-benefits

1. **Green and blue spaces & mental health**

Green spaces such as parks and forests, and **blue spaces** such as rivers, lakes, and oceans, support **mental health**, relaxation, active recreation, and stress reduction. They also help mitigate **climate change impacts** and disaster risks. SDG 11 highlights the importance of universal access to **safe, inclusive, and accessible public green spaces**, especially for vulnerable groups such as older persons, women, children, and persons with disabilities.

2. **Social prescribing**

Social prescribing is a holistic healthcare approach that connects people with community-based support instead of relying only on medical treatment. It may include **mental health support**, social activities, financial or housing advice, physical activity, and creative activities. This can reduce demand for **GHG-intensive healthcare services** while promoting **active mobility, social inclusion, and nature-connectedness**.

3. **Joint actions for the environment**

Climate action requires both reducing one's **carbon footprint** and increasing one's **handprint**, meaning positive actions that influence others, communities, workplaces, or political structures. Acting together with others can reduce feelings of helplessness and strengthen **self-efficacy, empowerment, and social participation**. Older adults can also become **change agents** and contribute meaningfully to a climate-friendly society.

Summary of the Contents Covered

This course introduced the key concepts of **climate mitigation, climate-resilient health systems, and health co-benefits** in the context of healthcare and ageing.
Climate mitigation in healthcare showed that health systems are both affected by the climate crisis and contributors to **GHG emissions** through energy use, transport, food, pharmaceuticals, waste, and infrastructure.
Climate mitigation actions focused on practical strategies to reduce emissions, including renewable energy, sustainable buildings, green travel, climate-friendly catering, sustainable procurement, waste reduction, and improved health system effectiveness.
Co-benefits for older persons highlighted how climate action can support health and well-being in later life, for example through active mobility, sustainable diets, climate-resilient housing, green and blue spaces, and social prescribing.
Overall, the course helped learners connect climate action with healthcare practice and develop tools to reduce emissions and contribute to **sustainable, climate-resilient health systems** that benefit both people and the planet.

Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

Please complete the following written assignment (max. 20 points) in order to pass this micro-credential:
Please read the mandatory literature, especially from Health Care Without Harm the Kick-Start Your Decarbonisation Journey

Choose one of the seven high impact action areas for climate mitigation (see Topic 2 "Opportunities for Climate Mitigation") which could best be implemented in your own workplace.

- In about 500-600 words, outline:
    - How you would implement this mitigation action area in your own work environment; include opportunities and barriers
    - The health co-benefits for the older persons in your care; include opportunities for active engagement

Mandatory Literature: Health Care Without Harm (2025). Kick-Start Your Decarbonisation Journey with our new Pocket Guide for Healthcare Professionals. Practical insights and actionable steps to help you get on the path to net zero.

Optional Literature: Health Care Without Harm (2024). Global Road Map for Health Care Decarbonization. A navigational tool for achieving zero emissions with climate resilience and health equity. Executive Summary.

Resources & Materials

1 Overview of Climate Mitigation in Health Care	
Literature / Documents / Projects	Videos
IPCC (2014) Health Care Without Harm (2019) WHO (2023) NHS (2020) WHO (2020) Harvard Medicine (2023) Health Care Without Harm (n.d.) Romanello et al. (2024) van Dalen et al. (2024) Chen-Xu et al. (2024)	Healthier Planet, healthier people Do No Harm

2 Implementing Climate Mitigation in Health Care		
Literature / Documents / Projects	Videos	Case Studies
Greenhouse Gas Protocol Health Care Without Harm (2019) Health Care Without Harm (n.d.) Lichtenecker et al. (2024) EU Energy Performance of Buildings Directive NHS (2022) Hannah Ritchie (2020). EAT-Lancet Commission (n.d.) OECD (2023) Anderson et al. (2024) DekarbPharm Pharmacists for Greener Healthcare Rizan et al. (2021) WHO (2023) framework Mosadeghrad et al. (2023) Ansah et al. (2024)	Fossil Fuels – Global Weirding Can healthy food save the planet?	Khoo Teck Puat Hospital, Singapore Galician Health Service, Spain University of California San Diego Health, United States Health Care Without Harm (n.d.): Addressing Pharmaceutical Pollution in Europe

3 Climate mitigation co-benefits for older persons
Literature / Documents / Projects
Haines et al. (2019) Moutet et al. (2025) Whitmee et al. (2024) Lampel et al. (2023) EAT-Lancet Commission (2019) AGE platform ICMA (2023)

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Climate mitigation and health co-benefits in relation to older persons MC3 EQF6

Microcredential Title	**Climate mitigation and health co-benefits in relation to older persons**
Short Code / ID	MC3
EQF Level	5/6
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, German and Greek
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Carinthia University of Applied Sciences
Module Lead / Author	Andrea Stitzel

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Explain the importance of climate mitigation in the context of climate resilient health systems.
LO 2	Critically analyze own work environment for climate mitigation opportunities.
LO 3	Develop strategies for reducing carbon footprint within the own work environment.
LO 4	Describe the near-term health co-benefits for older persons that arise due to climate mitigation.
LO 5	Apply knowledge of climate mitigation and health co-benefits.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards climate mitigation, sustainable healthcare and health co-benefits for older persons.
Alignment Notes	Health systems are on the frontlines of climate change, bearing the financial and operational burdens of increasingly frequent extreme weather events (e.g., heatwaves, floods, droughts, storms, wildfires) and the growing prevalence of climate-related diseases. Simultaneously, the healthcare sector itself contributes to environmental and climate-related challenges. In this Microcredential, we focus on strategies to minimize the environmental footprint of healthcare at both individual and systemic levels, while recognizing climate mitigation as a key component of the broader transformation needed to build climate-resilient health systems. The course progressively builds learners' understanding of: • climate mitigation in health care • the carbon footprint of health systems • greenhouse gas emissions across scopes 1, 2 and 3 • practical mitigation strategies in health and social care settings • health co-benefits of climate action for older persons The content integrates: • key concepts and definitions

	• evidence-based background information • practical examples • case studies • videos • interactive H5P activities • reflection tasks • knowledge check questions The microcredential also promotes critical reflection on learners' own work environments, identification of climate mitigation opportunities, development of carbon reduction strategies, and awareness of how climate action can improve health, well-being, mobility, nutrition, housing, and social participation among older persons.
Keywords	climate change, health, resilience, older adults, climate mitigation

Learning Activities

E-Learning Format	online self-paced learning with text-based content, interactive H5P elements, YouTube videos, additional literature, case studies, quizzes, and reflective learning activities.
Activities	pre- and post-module quizzes, case studies, knowledge check questions, reflection tasks, video-based learning, interactive H5P activities, reading assignments, practical analysis of the own work environment, and application-oriented strategy development.
Estimated Study Time	25 hours

Content & Topics

1. Overview of climate mitigation in health care
2. Implementing climate mitigation in health care
3. Climate-health co-benefits for and with older persons

1. Overview of Climate Mitigation in Healthcare

1.1 Key Definitions

according to the IPCC (2014)

- **Climate mitigation** "is a human intervention to reduce the sources or enhance the sinks of greenhouse gases."
- **Climate adaptation** "is the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects."
- **Climate resilience** "is the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation." (IPCC, 2014).

Climate Mitigation

Current literature uses terms such as **low-carbon health system**, **net-zero carbon health system**, **healthcare decarbonization**, and **environmentally sustainable healthcare facilities**. All focus on reducing **greenhouse gas emissions** in healthcare, but differ slightly in scope.

Healthcare decarbonization broadly refers to reducing **CO_2 and other GHG emissions** from healthcare activities, facilities, and services. This includes lowering **energy consumption**, switching to **renewable energy**, improving efficiency, and reducing waste (Health Care Without Harm, 2019). According to WHO (2023), **low-carbon health systems** implement transformative strategies to reduce emissions and environmental harm. The **NHS net-zero approach** goes further by aiming to

offset remaining emissions through measures such as **carbon removal**, more **green spaces and trees**, and **green energy generation** (NHS, 2020).

Video: Healthier Planet, healthier people

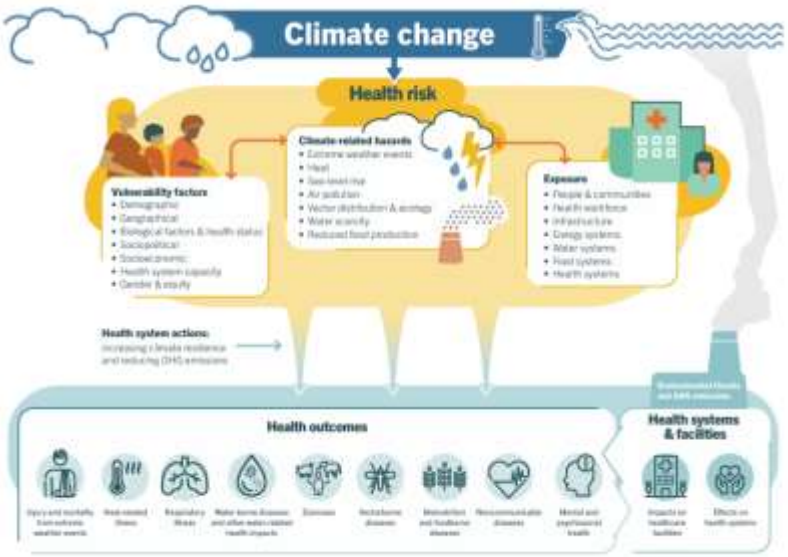
Look at the video from the NHS to get an idea about how comprehensive health care decarbonization is targeted in the UK. In this video, decarbonization is also brought in context with questions of quality of care. You find this focus also in the WHO (2020) definition of **environmentally sustainable health care facilities** as "those that improve, maintain or restore health, *while* minimizing negative impacts on the environment and leveraging opportunities to restore and improve it".

Climate-smart Health Care

Recent publications increasingly combine **climate mitigation** with **climate resilience**, for example in the WHO framework on **climate-resilient and low-carbon health systems** (WHO (2023). Healthcare Without Harm refers to this broader approach as **climate-smart healthcare**.

The COP26 Special Report (2021) emphasizes that climate mitigation cannot be considered separately from resilience: health systems are affected by **climate-related health risks**, while also contributing to the climate crisis through their own **GHG emissions**. Therefore, countries need **low-carbon, sustainable, and climate-resilient health systems and facilities**.

WHO (2023) describes this as a **vicious circle**: climate change increases pressure on health systems through direct and indirect health impacts, while healthcare activities further contribute to climate change through emissions. This pressure is also intensified by **vulnerability factors**, especially the **ageing population**, and by exposure risks that increase healthcare demand and emissions.



Climate Resilience & Adaptation

Video: Climate Resilience: a brief introduction

The term climate resilience is not easy to pin down. Definitions and perspectives on it vary. Look at the video to get an idea what it could all be about.

WHO (2023) defines **climate resilient health systems** as “those that are capable of **anticipating**, **responding** to, **coping** with, **recovering** from, and **adapting** to climate-related shocks and stress, to bring about sustained improvements in population health, despite an unstable climate”. It is further elaborated that “health systems can also learn from previous experiences and put in place interventions to recover, which can be at the pre-event state or better, achieve a **transformation**”.

Climate resilience can therefore be understood as activities in different interlinked phases, whereby the aim is to be able to respond adequately to both short-term shocks (such as extreme heat,

storms, etc.) and chronic stressors (such as onset of seasons, average increase in numbers of hot days and nights over decades, etc.).
The six phases can be depicted in a continuous circle as follows:

You can see, that **climate adaptation** is only one of six steps needed to build climate-resilient health systems. **Adaptation** "seeks to moderate harm or exploit beneficial opportunities" whereas resilience is a broader process ideally transforming the health system in such a way that it is "able to anticipate, and promptly respond to increasing and more diverse threats posed by climate change" (WHO, 2023).

Dimensions of Climate Resilient and Low Carbon Health Systems
To support capacity building in the face of climate change, WHO (2023) defines 10 dimensions of climate resilient and low carbon health systems. Keeping this framework in mind, helps to develop comprehensive strategies and interventions also when implementing climate mitigation measures [*for comprehensive strategies see in topic 2 the Action area 7: Health system effectiveness*].
In the following figure you can see in the left wheel for **health systems as a whole ten components structured in six building blocks** and in the right wheel for **health care facilities** a reduction to only **four dimensions**.

The WHO (2023)describes **ten components of climate-resilient health systems**, mainly at a **macro-political level**. However, these dimensions can also guide efforts to strengthen **climate resilience and decarbonization** within health care facilities.
Key aspects include **strong leadership and governance**, **cross-sector collaboration**, and a **climate-literate health workforce**. Facilities need to assess **local climate and health risks** as well as **greenhouse gas emission hotspots**, monitor **climate-related hazards and emissions**, and use existing **research and good-practice models** to inform action. Important areas for implementation include **low-carbon infrastructure**, **sustainable technologies**, **procurement and supply chains**, and **sustainable health care operations**. Health care facilities should also address **environmental determinants of health**, integrate **climate information into planning**, strengthen **emergency preparedness**, and develop **sustainable financing strategies**.

From these ten components, WHO identifies **four practical priority areas** for health care facilities:

1. **A climate-literate health workforce** able to address climate-related challenges
2. **Sustainable and safe management of water, sanitation, and health care waste**
3. **Sustainable energy services**
4. **Appropriate infrastructure, technologies, products, and processes** to ensure efficient facility operations

Video: Towards climate resilient and low-carbon healthcare systems in the Western Pacific

Although from the Western Pacific Region the video gives you a first idea how the Operational Framework of WHO (2023) can be used to implement integrated climate mitigation, adaptation and resilience strategies.

1.2 Carbon Footprint of Health Care

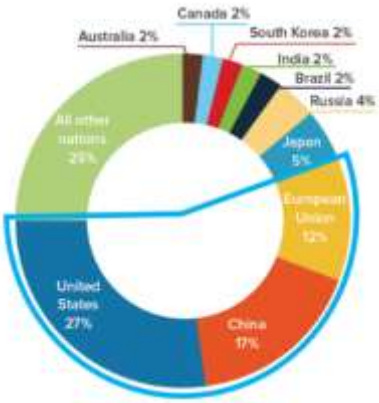
As you just heard in the last video, the carbon footprint of health care lies globally at approx. 5% of total greenhouse gas (GHG) emissions. Depending on the source, this number varies. According to an article in Harvard Medicine (2023), the **global healthcare sector** is responsible for emitting between **4.4% and 5.2%** of total greenhouse gas (GHG) emissions. When considering that the healthcare sector globally spends about $8 trillion per year and employs about 170 million workers, this is not even so surprising.

To better grasp what this means, people often make the following comparison: if healthcare were a country it would be the fifth largest emitter worldwide, only smaller than China, the USA, India, and Russia. Maybe even more impressive is that the emission level of healthcare globally is equivalent to the annual GHG emissions from at least **514 coal-fired power plants** and is approximately twice the amount of yearly GHG emissions produced by the **aviation sector**, which accounts for around **2.5%** (Health Care Without Harm, 2019).

Video: Do No Harm

Please watch the video from Health Care Without Harm. While watching you might want to **reflect on the ethical, medical and financial implications** of health sector-related GHG emissions.

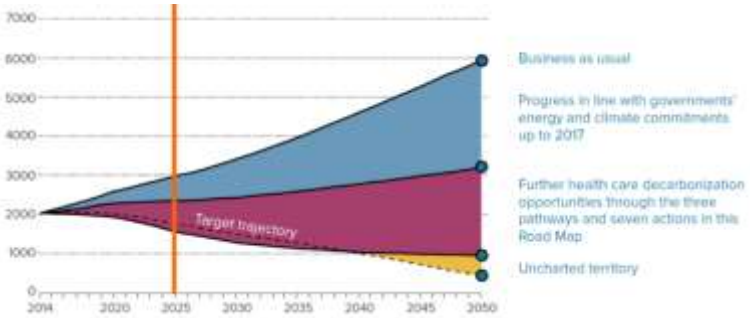
Global Distribution of GHG Emissions in Health Care



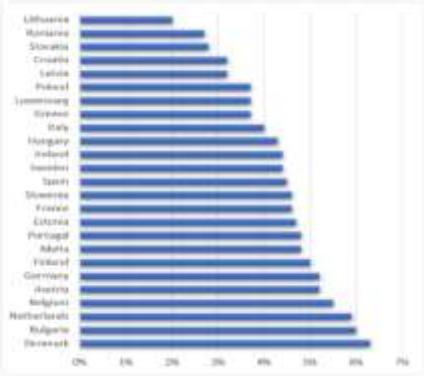
The distribution of GHG emissions in health care varies significantly across different regions and countries. The largest emitters in absolute numbers are the USA, China and the EU. Together they make up more than 50% of global GHG health care emission (see next figure from Health Care Without Harm, 2019).

Future Projections of GHG Emissions in Health Care

Look at the following graphic from Health Care Without Harm (n.d.). You can see that in the last 10 years, the GHG emissions of health care have already increased by about 50% from 2000 to 3000 gigatons a year and will further increase under a "business as usual" scenario. Over the whole period from 2014 to 2050 it is projected that the carbon footprint of health care will triple to about six gigatons a year.



EU Distribution of GHG Emissions in Health Care

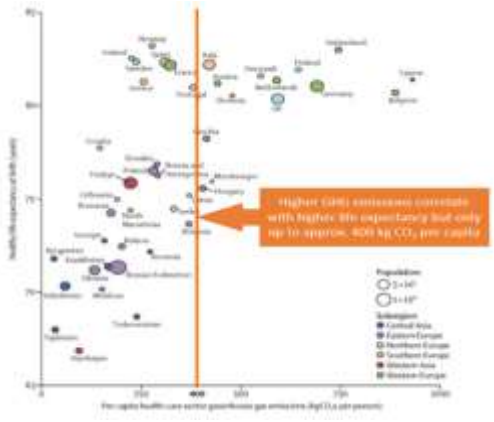


The differences between EU countries becomes even more apparent when comparing their healthcare footprint as a percentage of national GHG emissions. The following table, adapted from Health Care Without Harm (2019), shows a range from 2.0% in Lithuania to 6.3% in Denmark. Unsurprisingly, most of the newer EU member states have a lower healthcare footprint in line with their overall lower national footprint, although there are exceptions to this trend.

GHG Emissions and Quality of Health Care

Important to realize is that, though quality healthcare cannot be achieved without emitting greenhouse gases, it seems to be possible to have similar outputs with quite different emission levels. On a global scale, there surely are many countries in need to emit higher GHG levels in order to achieve better healthcare and healthcare coverage, but for most EU countries the opposite is true. The 2024 report of the Lancet Countdown on health and climate change (Romanello et al., 2024) has calculated that healthy life expectancy at birth (y-axis) increases with health care-related GHG emissions (x-axis) only up to approximately 400 kg CO2 per capita. As you can see in the following graphic above 400kg CO2 per capita, this correlation levels out.

Here you can see the healthy life expectancy at birth in relation to GHG emissions in the European Region (adapted from van Dalen et al., 2024).



These results are a clear call for all European Union member states with healthcare emissions above 400 kg CO2 per capita to evaluate possibilities for GHG emission reductions and to strive for low-carbon or even net zero health care systems. When comparing the developments since 2020, GHG emissions of healthcare in the EU have already decreased, however with the exception of "Cyprus, Estonia, Luxembourg, and Malta, with increases ranging from 54.0% to 586.6%" (Chen-Xu et al., 2024).

Taking into consideration that in the EU an estimated **365,047 DALYs*** *[= Disability-Adjusted Life Years: measure used to quantify the burden of disease; DALYs represent the total number of years lost due to ill-health, disability, or early death]* can be attributed to health sector's GHG emissions (Chen-Xu et al., 2024) this matter becomes even more pressing.

GHG emissions in the health sector also have a large economic impact. Chen-Xu et al., 2024 have calculated "that health costs associated with health sector's GHG emissions can amount to **25.6 billion euros**" - a number important to keep in mind when talking to decision makers about the importance of implementing mitigation strategies in health care.

Decarbonization Trajectories

Depending on the level of annual per capita emissions, Health Care Without Harm proposes four different decarbonization trajectories for healthcare systems:

1. For the highest emitters and most wealthy countries a "steep decline" (orange line) is urgently needed; this requires nations to immediately put strict decarbonization strategies into action.
2. For high emitters a "steady decline" (red line) has to be targeted with immediate action setting the health system on its track.
3. For many middle income countries the soft decline with a so-called "early peak" (purple) before steadily declining is proposed.
4. For low emitting countries a so-called "late peak" (green) with a slight increase until the end of this decade is seen as possible before also decreasing until 2050.

2. Implementing Climate Mitigation in Health Care

2.1 Framework for GHG emissions in Health Care

To understand and manage GHG emissions - these can be your own personal or the emissions of the health facility you are working at - it is important to think about how much control one has over them. Therefore, in the Greenhouse Gas Protocol a distinction is made between so-called direct vs. indirect emissions.

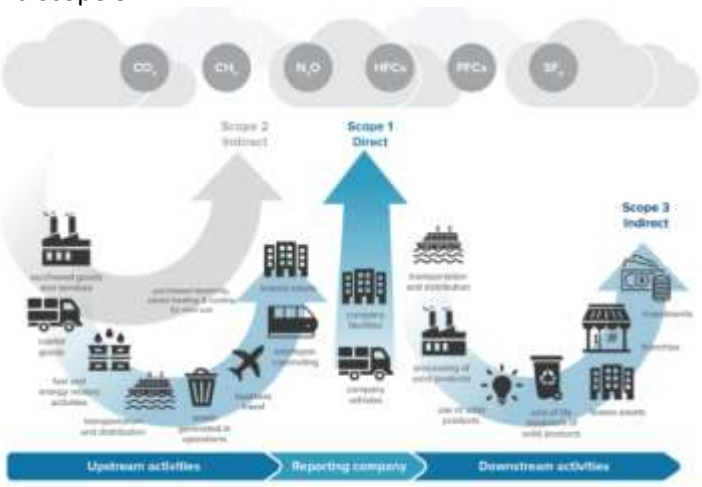
- **Direct GHG emissions** are from sources owned or controlled, whereas
- **Indirect GHG emissions** are a consequence of own activities, but occur at sources owned by someone else.

Overview: Scope 1,2,3

Being able to pin-down your own emissions has a lot to do with **availability** of but also **access** to **DATA**. In addition, the question arises which emissions belong to you and which belong to others (although you might have something to do with them as you are "using" certain "products").

For organizations/institutions the same is true as direct vs. indirect emissions are defined by each organization's specific boundaries. To improve transparency and comparability, the Greenhouse Gas Protocol therefore defines three so-called "**scopes**". Another word for "scope" would be "category" or "area".

The following figure (Health Care Without Harm, 2019) gives you a general overview over the three scopes. As you can see, only scope 1 includes direct GHG emissions. All indirect GHG emissions are included in scope 2 and scope 3.



As a note: it is always beneficial to **explore your country's own strategies**! Maybe you want to search for documents related to climate mitigation or decarbonization in health systems or facilities. It could be that they even provide an explanation for their choice of definition.

Scope 1 in Healthcare Facilities

Scope 1 encompasses emissions that originate directly at a healthcare facility. This comprises, for instance, the combustion of fossil fuels to produce heat (e.g., gas or oil heating systems), emissions from the facility's own vehicle fleet (e.g., ambulance journeys, patient transport), and fugitive emissions (e.g., anesthetic gases escaping into the atmosphere). These emissions are under the direct control of the healthcare facility.

Scope 2 in Healthcare Facilities

Scope 2 encompasses only emissions resulting from purchased energy which the healthcare facility consumes (e.g., electricity, district heating, district cooling). These emissions are physically produced outside the healthcare facility and brought into the own institutional boundaries. They are so-called "upstream activities" - a term which will be explained under scope 3.

Scope 3 in Healthcare Facilities

This scope is the hardest to pin down as it encompasses all activities along the value chain which occur from sources not owned or controlled by a healthcare facility. Two types of emissions are distinguished in scope 3:

- **Upstream emissions** refer to the greenhouse gas emissions that occur **before** a product or service reaches the point of use or consumption. These emissions are generated during the various stages of production, processing, and transportation. In the context of a healthcare facility, upstream emissions include:
  - **Production:** Emissions from the manufacturing of medical products, pharmaceuticals, and other supplies.
  - **Transportation:** Emissions from the transport of these products to the healthcare facility as well as mobility of patients and employees.
  - **Extraction and Processing:** Emissions from the extraction and processing of raw materials used in the production of goods.
  - **Construction:** Emissions from the construction of buildings and infrastructure.

- **Downstream emissions** arise from various activities associated with the use and disposal of products (= **after** having used them). In the context of a healthcare facility, downstream emissions include for instance:
  - **Disposal of medical waste:** when medical waste is properly disposed of, emissions may be generated during the treatment and processing of this waste; this includes emissions from incineration, autoclaving, or other waste management practices that ensure the safe handling of medical materials.
  - **Use of metered dose inhalers (MDIs):** MDIs are commonly used in the treatment of respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD); these inhalers often contain hydrofluoroalkane (HFA) propellants, which contribute to GHG emissions when released into the atmosphere during use.

GHG Emission Calculation

To implement **effective mitigation measures**, health care facilities need to **measure or estimate their GHG emissions** and **monitor changes over time**.
Usually, a **hybrid approach** is used, combining **bottom-up** and **top-down calculations**:
Bottom-up calculations are detailed and process-based. They allow for **precise monitoring** but are **time-consuming** because many products and processes need to be assessed individually. This approach is mainly used for **scope 1 emissions** such as energy sources, anesthetic gases, refrigerants, laboratory gases, and other gases, as well as **scope 2 emissions** such as electricity, heating, and cooling.
Top-down calculations are based on **overall financial flows** and average GHG emissions across the health sector. They are **easier to produce** and provide a useful overview, but they do not allow for detailed monitoring of individual products. This method is often used for **scope 3 emissions**, especially where specific data, for example on supply chains, is difficult to obtain.
The **KliMeG Calculator** **in Germany** applies such a **hybrid calculation approach** for scope 3 emissions, adapted from Quitmann et al., (2025).

Bottom-up	Top-down
• Fresh water • Waste & waste water • Patient and employee food • Employee commuting • Business travel • Patient mobility • Fuel and energy-related activities not included in scope 1 or scope 2	• Pharmaceuticals • Medical equipment • Maintenance of technical facilities, buildings, IT systems, equipment • Constrction and buildings • Furniture • Technical devices and IT systems

GHG reporting in health care facilities is still limited but increasing through new sector-specific calculators. However, comparisons are difficult due to different definitions, methods, and data quality. Calculators are useful tools but depend on accurate local data and stakeholder support.
A German university hospital emitted **231,102 t CO_2e in 2022**: **3% scope 1**, **26% scope 2**, and **71% scope 3**. This shows that emission calculation is complex and requires training, management support, and good communication.

Corporate Sustainability Reporting Directive (CSRD)
The Corporate Sustainability Reporting Directive (CSRD) is an EU regulation that standardizes **sustainability reporting** on **environmental, social, and governance (ESG)** impacts. It mainly applies to **large companies** and may also affect large health care facilities, making **GHG emission reporting** relevant.
However, proposed **CSRD simplifications in 2025** may change which organizations must report. **Publicly funded hospitals are not automatically required** to report under the CSRD, but national rules may differ. Even without obligation, **voluntary reporting** can improve transparency and support sustainability goals. Green Hospital or Health Care Facility Networks can help with implementation.

2.2 Decarbonizing Health Care Systems & Facilities
The Global Road Map for Health Care Decarbonization (Health Care Without Harm, n.d.) outlines **three interrelated and overlapping decarbonization pathways** that the healthcare sector must address to reduce its emissions:

1. **Healthcare facilities, operations and healthcare delivery:** This includes the direct emissions from healthcare services and facilities.
2. **Healthcare supply chains:** This encompasses the production, packaging, and transport of products. Although challenging to influence, the healthcare sector can exert pressure on supply chains through joint procurement, even across national boundaries.
3. **Wider economy and society at large:** The healthcare supply chain and delivery are heavily reliant on other sectors and societal actors. As members of one of the most trusted professions, healthcare workers can influence and lead the society-wide decarbonization process.

These pathways highlight that achieving low-carbon or net-zero healthcare is a societal challenge that the health sector cannot tackle alone. Intersectoral cooperation and top-down macro-level support are crucial for success.

Seven High Impact Action Areas for Health Care Decarbonization
Spanning these three pathways are seven high impact action areas for health system decarbonization (Health Care Without Harm, n.d.).

Action Area 1: Energy

Healthcare requires the use of energy. This is true for all healthcare facilities from the smallest to the largest and is influenced not only by the size of the facility but also by the type of healthcare services provided, the medical equipment and appliances used, the energy efficiency of the buildings, and the intensity of their use.

Video: Fossil Fuels – Global Weirding
Watch the video on energy and fossil fuel from Katharine Hayhoe to understand why especially from a healthcare sector point of view talking about where energy comes from and how much we use is so important.

Health Care Without Harm (2019) has calculated that globally "40% of health care's climate footprint comes from electricity and thermal power supply attributed to healthcare-related activities". This number includes a) all scope 2 energy healthcare facilities purchase for their own operations and b) scope 3 energy used by manufacturers and suppliers, such as those producing pharmaceuticals and medical supplies. This percentage increases to **more than 50%** when accounting for the 13% of CO2e footprint resulting from scope 1 operational emissions of healthcare facilities.

Healthcare facilities need a combined strategy to reduce energy-related carbon emissions. Key measures include switching to **zero-emission electricity across scopes 1, 2 and 3**, replacing fossil-fuelled equipment and vehicles, investing in **renewable energy systems**, purchasing renewable electricity and heating/cooling, and encouraging **suppliers and external service providers** to use renewable energy as well (Health Care Without Harm (n.d.); Lichtenecker et al., 2024).

At the same time, healthcare facilities must reduce their **overall energy consumption** through more efficient buildings, lighting, appliances, and medical equipment. The **human factor** is also essential: staff and patients need to be informed and motivated to support energy-saving measures. Another important step is improving **space utilisation**, since medical spaces are currently used only around **30–40% of the time** (Lichtenecker et al., 2024).

Larger healthcare facilities should therefore develop a **central energy management strategy**. This should combine technical measures, such as **digital energy monitoring** and optimized heating, ventilation, cooling, and lighting systems, with organisational measures, including **staff training**, efficient appliance use, **space management**, and clear communication with all stakeholders.

Case Study
For a case study describing the "technical" vs. "human" challenges when implementing an energy reduction plan at a large healthcare facility, please read the following summary from Khoo Teck Puat Hospital, Singapore.

Action Area 2: Building & Infrastructure

As outlined above, **buildings and infrastructure** are key leverage points for reducing energy consumption in healthcare. Since buildings account for around **40% of energy use in the EU**, healthcare buildings should promote **energy efficiency, zero emissions, and climate resilience** (European Commission, 2024; Health Care Without Harm, n.d.). However, many measures are **cost-intensive**, especially for smaller facilities or rented spaces.
Lichtenecker et al. (2024) (2024) identify **three main action areas**:

1. **Thermal renovation of existing buildings**

Existing buildings should be renovated to reduce energy use for **heating, cooling, and hot water**. This includes improving **insulation**, replacing windows, and switching from **oil or gas** to **climate-neutral heating systems**.

2. **Zero-emission standards for new buildings**

New healthcare buildings should follow the EU Energy Performance of Buildings Directive, which aims for **zero-emission buildings by 2050**. These standards will apply to **new buildings from 2030** and **public buildings from 2028**.

3. **Sustainable and circular construction**

Building strategies should follow a **circular economy approach**, focusing on durable, recyclable, and low-carbon materials. Using ecological materials such as **wood, recycled concrete, low-CO_2 concrete, or cement alternatives** can reduce indirect CO_2 emissions over a building's life cycle.
In addition, **nature-based solutions** such as trees, shrubs, green outdoor areas, and indoor plants can support **cooling, CO_2 retention, biodiversity**, and the **mental health of staff and patients**.

Action Area 3: Travel & Transport

Compared to the first two action areas, travel and transport contribute a smaller portion to the overall greenhouse gas (GHG) emissions budget of the health sector. Nonetheless, the NHS (2022) estimates that "approximately 3.5% of all road travel in England relates to patients, visitors, staff and suppliers to the NHS, contributing around 14% of the system's total emissions."
When reducing the carbon footprint of **travel and transport** in healthcare, facilities should address several areas:

1. **Patient/client and visitor travel** to the healthcare facility

2. **Staff commuting** to the workplace
3. **Staff travel to patients/clients**, for example in mobile home care
4. **Rescue and ambulance services**
5. **Transport of goods and services** to the facility
6. **Waste transport and disposal** from the facility
7. **Internal logistics** within the facility

The most impactful measure is converting the facility's **vehicle fleet to climate-friendly technologies**, although this is cost-intensive and requires infrastructure. For ambulances and mobile care services, healthcare provision must remain the priority. First steps can include route optimization, better patient flow control, and cooperation with nearby providers.

Another important area is the **supply chain**. Facilities can work with logistics and procurement partners that apply sustainability criteria, especially by improving delivery efficiency and reducing transport distances for pharmaceutical products and medical devices.

To reduce individual car use, facilities need good public transport connections. Measures include better stops, schedules, frequency, and accessibility, as well as public transport subsidies, bicycle support, secure bike parking, and higher parking costs.

Overall, healthcare facilities should develop a green travel plan, co-developed with staff and supported by a clear communication strategy, highlighting the health benefits of active mobility.

Case Study
For an ambitious case study, consider how the Galician Health Service, Spain introduced electric ambulances at Ourense hospitals.

Action Area 4: Food

The NHS (2022) estimates that around 6% of total healthcare emissions come from food and catering services. Health Care Without Harm (n.d.) therefore promotes healthy, local, sustainable, fresh, and seasonal food with zero food waste.

Food choices have a major impact on GHG emissions. In European diets, meat, dairy, and eggs account for 83% of dietary emissions, with meat responsible for almost 60% (Hannah Ritchie (2020). The EAT-Lancet Commission (n.d.) identifies food as a key lever for improving both human health and environmental sustainability.

A central approach is the **Planetary Health Diet**, which is rich in plant-based foods and low in animal-source foods. This can reduce emissions directly and indirectly, as healthier people may require fewer healthcare services, pharmaceuticals, and less patient mobility (EAT-Lancet Commission, n.d.).

Video: Can healthy food save the planet?
Watch the video for a brief introduction to the Planetary Health Diet.

Healthcare facilities can influence the **dietary choices of staff and patients/clients** through **climate-sensitive health counselling** and **health-promoting, environmentally friendly catering**.
However, sustainable catering is shaped by several factors, especially **economic constraints**, patient **dietary and nutritional requirements**, stakeholder expectations, and the need for **well-trained kitchen staff** able to implement more **vegetarian-based menus**.
According to Lichtenecker et al., 2024, a key problem is the lack of **binding specifications and quality standards** for **health-promoting and climate-friendly food procurement** in hospitals.

Case Study
Please read the following case study from University of California San Diego Health, United States to get a feeling of how plant-based meals can be introduced in a medical centre.

Action Area 5: Pharmaceutical, Inhalers & Anasthetic Gases

"Pharmaceutical pollution poses a global threat to humans and the environment.
Residues from pharmaceuticals can enter the environment at every stage of their life cycle, posing risks to ecosystems and impacting human health."
Since these products are designed to interact with living systems, they have an impact on ecosystems, contributing to biodiversity loss and accelerating antimicrobial resistance (AMR). Furthermore, the production of pharmaceuticals accounts for around ¼ of the carbon emissions of the healthcare sector." (Health Care Without Harm)

Assessing the environmental impact of pharmaceuticals is very complex and often lacks transparency. To increase efficiency and climate-friendliness, a combination of measures along the entire value chain is required. Health Care Without Harm (n.d.) focuses in this high impact action area on:

1. **reducing** unnecessary pharmaceutical use
2. **substituting** high emissions products with more climate-friendly alternatives
3. **incentivizing the production** of affordable green, climate-smart medicine.

According to OECD (2023), **pharmaceutical consumption has increased for decades**, mainly due to ageing populations, chronic diseases, and changes in clinical practice. Reducing unnecessary consumption is difficult, but essential. This requires a stronger focus on **prevention, health promotion**, and avoiding inefficient treatment, such as repeated examinations, unnecessary admissions, or overuse of pharmaceuticals. Where possible, **conservative and non-medical therapies** should be prioritized over invasive treatments.

A key area for substitution is **high-emission products**, especially **anesthetic gases**, which account for around **2% of the NHS carbon footprint** and more than half of emissions from surgical services (Anderson et al., 2024). **Inhalers** also differ in their carbon footprint; **dry powder inhalers (DPIs)** are the more climate-friendly option. The NHS (2022)therefore aims to increase DPI use and improve inhaler disposal, while ensuring high standards of care through education for prescribers and patients.

Healthcare facilities should also develop **sustainable procurement criteria for pharmaceuticals**. Larger networks or consortia can increase pressure on suppliers to reduce emissions. The NHS supplier engagement programme and Austria's DekarbPharm project show how the production of **affordable, green, climate-smart medicine** can be supported. Implementing these mitigation measures requires well-trained staff. Due to the importance of the topic, specialized networks like Pharmacists for Greener Healthcare have been established, targeting pharmacists as key agents of change in this action area.

Case Study
For further reading and European Case Studies, see the publication from Health Care Without Harm (n.d.): Addressing Pharmaceutical Pollution in Europe.

Action Area 6: Pharmaceutical, Inhalers & Anesthetic Gases

The healthcare sector generates large amounts of **waste**, especially in hospitals, nursing homes, laboratories, and research centres. According to the WHO, around **15% of healthcare waste is hazardous**, while **85% is general waste** comparable to household waste. Since waste treatment methods differ greatly in their **GHG emissions**, careful **waste separation and sustainable waste management** are essential (Rizan et al. (2021); Lichtenecker et al. 2024).
This action area focuses on **minimizing waste**, reducing the **toxicity of healthcare waste**, and applying **circular economy principles** in procurement and waste management (Health Care Without Harm, n.d.).
Examples for concrete strategies include (Lichtenecker et al., 2024):

Reuse and reprocessing	Prioritise reusable products, packaging, and suitable medical devices to reduce waste and extend product life cycles.
Recycling and circular procurement	Recycle medical products where safe and feasible and consider material composition already during procurement.
Reducing single-use materials	Minimize disposable laundry, unnecessary packaging, paper use, and pharmaceutical waste.
Optimising laundry and cleaning processes	Reduce laundry volumes and improve cleaning processes to lower energy, water, and detergent use.
Waste separation system	Introduce clear, multilingual labels, illustrations, and colour coding for staff, patients, and visitors.
Staff awareness and responsibility	Provide training and information, involve staff early, and appoint a waste officer to improve implementation.

Action Area 7: Health System Effectiveness

Health system effectiveness is the most comprehensive of the seven action areas and requires a **whole-system approach**, not only action by individual healthcare facilities. Its goal is to reduce emissions by eliminating **inefficient and unnecessary practices**, linking **carbon reduction** with **quality of care**, and strengthening **resilience** (Health Care Without Harm, n.d.).
In the context of climate change, effective health systems must integrate **mitigation, adaptation, and resilience strategies**, while protecting **high-risk populations** such as older people, pregnant women, newborns, children, homeless people, and migrants.

The WHO (2023) framework outlines key components for building **climate-resilient and low-carbon health systems**. Mosadeghrad et al. (2023)identified **87 actions**, with current priorities focusing mainly on **national health and climate adaptation plans** and **backup systems for essential services**. Less attention is given to **adequate financing**, **primary healthcare-based approaches**, and **mental health service access**.
In a further scoping review study, Ansah et al. (2024) give a detailed list of strategies for building climate resilient health systems.
Lichtenecker et al. (2024) further suggest the following action points for countries as well as on EU level:

- Regular national survey of the GHG emissions of the healthcare sector (every 1-3 years)
- Development of a database on the emissions levels of pharmaceuticals and medical products and processes (on EU level)
- Legal requirement for large healthcare facilities to report GHG consumption data
- Development of climate-relevant reporting indicators for the healthcare sector

3. Climate health co-benefits for and with older persons

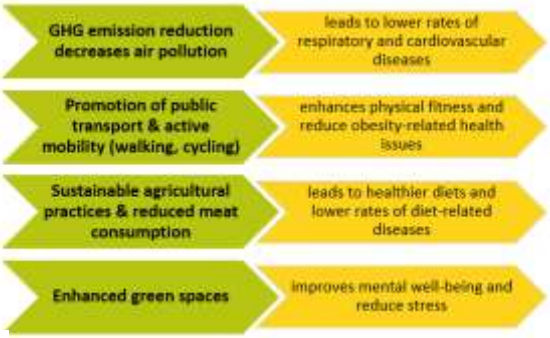
In 2009, the Lancet Commission declared that "*climate change is the biggest global health threat of the 21st century*", emphasizing in 2015 that "*tackling climate change could be the greatest global health opportunity of the 21st century*".

These statements underscore the deep connection between environmental sustainability and public health, highlighting both the negative impacts and the positive potential (co-benefits). They illustrate how actions addressing climate change and health can work in tandem, creating opportunities to tackle both challenges simultaneously.

Defining Climate-Health Co-benefits

The concept of climate-health co-benefits can be approached from two perspectives:

A) From climate to health: health co-benefits of climate action refer to the positive health outcomes that result from measures taken to mitigate or adapt to climate change (Haines et al., 2019). These benefits often stem from actions that reduce GHG emissions improve environmental conditions, ultimately enhancing public health. Examples of such climate actions are shown on the right side.



B) From health to climate: climate co-benefits of health action refer to the positive environmental outcomes that arise from public health interventions. These co-benefits occur when measures aimed at improving health also contribute to climate change mitigation or adaptation. Examples of such public health interventions are shown on the left side.

Active Mobility for Older Persons

Physical inactivity is a major risk factor for **noncommunicable diseases** and contributes to around **4–5 million premature deaths worldwide** each year (Moutet et al., 2025; Whitmee et al., 2024). **Active mobility**, including walking, cycling, and public transport use, is considered a cost-effective way to increase physical activity and also helps reduce **traffic injuries, noise pollution, and emissions**.

For older adults, however, active mobility can be challenging. Lampel et al. (2023) identify three main barriers:

1. **Physical environment**

Poor cycling infrastructure, narrow sidewalks, unsafe crossings, long distances, bad weather, and digital barriers can discourage active mobility.

2. **Own competences**

Limited fitness, coordination difficulties, physical impairments, or lack of knowledge about traffic rules and public transport use can create insecurity.

3. **Attribution of meaning**

Some older adults may perceive active mobility as **dangerous**, unsuitable, or culturally inappropriate.

To support older adults, measures should include **safe and wide footpaths and cycle paths**, seating and shelters, **barrier-free and affordable public transport**, and mobility services for rural areas. Free exercise therapy, such as physiotherapy or occupational therapy, could also improve fitness and confidence.

The Austrian research project **"KliMate"** developed **climate-adapted exercise recommendations for older adults**. These address challenges such as **heat, air pollution, and allergen exposure** and are embedded in a **buddy system** to promote social support and motivation. The recommendations encourage older adults to remain physically active even in hot weather, while adapting timing, location, intensity, clothing, sun protection, hydration, and precautions for pre-existing conditions.

Planetary Health Diet for Older Persons

The EAT-Lancet Commission (2019) estimates that a global shift to the **Planetary Health Diet** could prevent around **10–11 million premature deaths** from non-communicable diseases each year by 2040.

However, changing dietary habits among **older adults** can be difficult. Lampel et al. (2023) identify three main barriers:

1. **Physical environment**

Healthy and climate-friendly food is often less available or affordable than highly processed ready meals, which are cheap, convenient, and heavily advertised.

2. **Own competences**

Older adults may lack knowledge about **nutrition**, healthy meal preparation, or food waste reduction. In care homes, kitchen staff may also need training to prepare **vegetarian or vegan meals**.

3. **Attribution of meaning**

Meat and high-calorie foods may be linked to **status, tradition, masculinity, security, or memories of poverty and hunger**. Meat may also be seen as essential for a balanced diet.
The Planetary Health Diet must also consider older adults' specific needs, such as **food tolerances** and **protein requirements** for healthy aging (Leydon et al., 2021).

To support healthier and more sustainable diets, measures should include **affordable fruit and vegetables**, better access to **organic food**, taxes on unhealthy products, restrictions on unhealthy food advertising, and **mandatory planetary health dietary guidelines** for communal catering. In addition, **clear food labelling**, emotional and social messaging, target-group participation, and **peer support** can help improve dietary competencies and encourage behaviour change.

Healthy and Climate-friendly Living for Older Persons

"Housing has been identified as one of the key social determinants of health shaping the way people live and age. Ensuring adequate housing should therefore be a priority concern in our ageing society" (AGE platform)

Age-friendly living environments should combine **public health measures** with **climate change strategies**. In housing, this includes construction methods, land use, legal aspects, social factors, and the type of energy used for **heating, cooling, hot water, and electricity**. **Single-family homes** generally cause higher **GHG emissions** than multi-story or shared residential buildings.
Older adults face several barriers to healthy and climate-friendly housing (Lampel et al. (2023):

1. **Physical environment**

Many older adults live alone in densely populated areas with poor indoor conditions, limited access to clean energy, open spaces, or infrastructure. Tenants often cannot make structural changes, while renovations may increase rents and cause **gentrification**.

2. **Own competences**

Barriers include limited knowledge of **tenant rights**, support measures, energy-efficient heating and ventilation, appliances, and climate-friendly technologies.

3. **Societal barriers**

Older adults may experience **ageism**, limited access to **barrier-free housing**, insufficient financial support, and economic pressure from rising energy costs. Older women are especially vulnerable due to the **gender pension gap**.

As the older population grows, climate-resilient housing can improve **well-being and mental health**, reduce **GHG emissions**, and lower climate risks. ICMA, 2023 recommends three key strategies: **smaller attached homes**, **resilient multifamily housing**, and **mapping and reducing housing risks**.
Healthy living environments should also include **safe green spaces** near homes. They provide **shade**, regulate temperatures, support **active mobility**, encourage social interaction, and improve physical and mental health.

Additional Areas for Climate-health Co-benefits

1. **Green and blue spaces & mental health**

Green spaces such as parks and forests, and **blue spaces** such as rivers, lakes, and oceans, support **mental health**, relaxation, active recreation, and stress reduction. They also help mitigate **climate change impacts** and disaster risks. SDG 11 highlights the importance of universal access to **safe,**

inclusive, and accessible public green spaces, especially for vulnerable groups such as older persons, women, children, and persons with disabilities.

2. **Social prescribing**

Social prescribing is a holistic healthcare approach that connects people with community-based support instead of relying only on medical treatment. It may include **mental health support**, social activities, financial or housing advice, physical activity, and creative activities. This can reduce demand for **GHG-intensive healthcare services** while promoting **active mobility, social inclusion, and nature-connectedness**.

3. **Joint actions for the environment**

Climate action requires both reducing one's **carbon footprint** and increasing one's **handprint**, meaning positive actions that influence others, communities, workplaces, or political structures. Acting together with others can reduce feelings of helplessness and strengthen **self-efficacy, empowerment, and social participation**. Older adults can also become **change agents** and contribute meaningfully to a climate-friendly society.

Summary of the Contents Covered

This course introduced the key concepts of **climate mitigation, climate-resilient health systems, and health co-benefits** in the context of healthcare and ageing.

Climate mitigation in healthcare showed that health systems are both affected by the climate crisis and contributors to **GHG emissions** through energy use, transport, food, pharmaceuticals, waste, and infrastructure.

Climate mitigation actions focused on practical strategies to reduce emissions, including renewable energy, sustainable buildings, green travel, climate-friendly catering, sustainable procurement, waste reduction, and improved health system effectiveness.

Co-benefits for older persons highlighted how climate action can support health and well-being in later life, for example through active mobility, sustainable diets, climate-resilient housing, green and blue spaces, and social prescribing.

Overall, the course helped learners connect climate action with healthcare practice and develop tools to reduce emissions and contribute to **sustainable, climate-resilient health systems** that benefit both people and the planet.

Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

Please complete the following written assignment in order to pass this micro-credential:

Please read the mandatory literature, especially from Health Care Without Harm the Kick-Start Your Decarbonisation Journey

Choose one of the seven high impact action areas for climate mitigation (see Topic 2 "Opportunities for Climate Mitigation") which could best be implemented in your own workplace.

- In about 800-1000 words outline:
    - How you would implement this mitigation action area in your own work environment; include opportunities and barriers
    - The health co-benefits for the older persons in your care; include opportunities for active engagement
    - How this measure impacts overall climate resilience of health systems

Mandatory Literature: Health Care Without Harm (2025). Kick-Start Your Decarbonisation Journey with our new Pocket Guide for Healthcare Professionals. Practical insights and actionable steps to help you get on the path to net zero.

Optional Literature: Health Care Without Harm (2024). Global Road Map for Health Care Decarbonization. A navigational tool for achieving zero emissions with climate resilience and health equity. Executive Summary.

Resources & Materials

1 Ovierview of Climate Mitigation in Helath Care	
Literature / Documents / Projects	**Videos**
IPCC (2014) Health Care Without Harm (2019) WHO (2023) NHS (2020) WHO (2020) Harvard Medicine (2023) Health Care Without Harm (n.d.) Romanello et al. (2024) van Dalen et al. (2024) Chen-Xu et al. (2024)	Healthier Planet, healthier people Do No Harm Climate Resilience: a brief introduction

2 Implementing Climate Mitigation in Health Care		
Literature / Documents / Projects	Videos	Case Studies
Greenhouse Gas Protocol KliMeG Calculator Quitmann et al., (2025) Health Care Without Harm (2019) Health Care Without Harm (n.d.) Lichtenecker et al. (2024) Corporate Sustainability Reporting Directive (CSRD) EU Energy Performance of Buildings Directive NHS (2022) Hannah Ritchie (2020). EAT-Lancet Commission (n.d.) OECD (2023) Anderson et al. (2024) DekarbPharm Pharmacists for Greener Healthcare Rizan et al. (2021) WHO (2023) framework Mosadeghrad et al. (2023) Ansah et al. (2024)	Fossil Fuels – Global Weirding Can healthy food save the planet?	Khoo Teck Puat Hospital, Singapore Galician Health Service, Spain University of California San Diego Health, United States Health Care Without Harm (n.d.): Addressing Pharmaceutical Pollution in Europe

3 Climate mitigation co-benefits for older persons
Literature / Documents / Projects
Haines et al. (2019) Moutet et al. (2025) Whitmee et al. (2024) Lampel et al. (2023) EAT-Lancet Commission (2019) AGE platform ICMA (2023) KliMate

Co-funded by the European Union

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Coping with uncertainty and building mental resilience in older people MC4 EQF4

Microcredential Title	**Coping with uncertainty and building mental resilience in older people**
Short Code / ID	MC4
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, Portuguese, German, Finnish, Greek
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	University College Cork
Module Lead / Author	Dr. Annalisa Setti, University College Cork

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Define mental resilience in the context of climate change from the point of view of the older person.
LO 2	Provide examples of direct and indirect effects of climate change on mental health and wellbeing.
LO 3	Describe the main factors contributing to resilience related to climate change in older people.
LO 4	Identify opportunities to promote resilience and mental wellbeing based on nature contact and connectedness for older persons and Health and Social Care professionals.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards climate change.
Alignment Notes	MC4 provides health and social care workers with knowledge about the challenges of climate resilience for older people and how to support their psychological strength in response to acute climate-related shocks and long-term, chronic stress. The module will also provide effective strategies to support their own resilience.
Keywords	climate change, health, resilience, older adults, mental resilience, adaptation

Learning Activities

E-Learning Format	Text, Interactive H5P content and Youtube videos. Note: [ ] brackets in this document refers to further content on Moodle.
Activities	Pre and post module quizzes, case studies and reflective corners.
Estimated Study Time	25 hours

Content & Topics

1. Mental Resilience
2. Factors influencing Climate Resilience
3. Nature Connectedness as source of Resilience

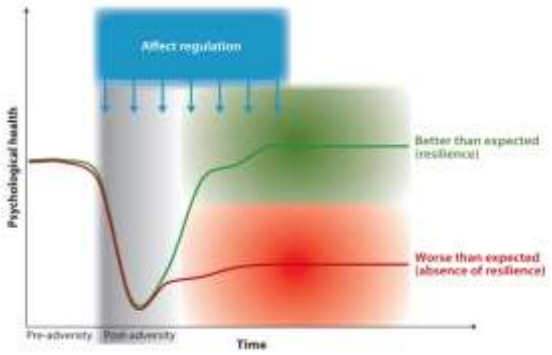
1. Mental Resilience

Defining Mental Resilience

[Why is mental resilience important?]

The American Psychological Association (APA) defines resilience as: *The process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioural flexibility and adjustment to external and internal demands.* They add that: *A number of factors contribute to how well people adapt to adversities, predominant among them (a) the ways in which individuals view and engage with the world, (b) the availability and quality of social resources, and (c) specific coping strategies. Furthermore, psychological research demonstrates that the resources and skills associated with more positive adaptation (i.e., greater resilience) can be cultivated and practiced also known as psychological resilience.*

In research there is, though, no unified definition of mental resilience (also sometimes called "psychological resilience"; please note that for the purpose of this module, we treat psychological resilience and mental resilience as equivalent terms and use them interchangeably). Definitions can vary due to factors such as strong objective versus subjective views, type, intensity and duration of events. Sisto et al. (2019) summarize the common mental/psychological resilience defining factors found in current research: **ability to recover, dynamic process evolving over time, individual's habitual way of functioning, capacity to bounce back and positive adaptation to life conditions**. See the resilience continuum below of pre and post adversity (Troy et al., 2023).



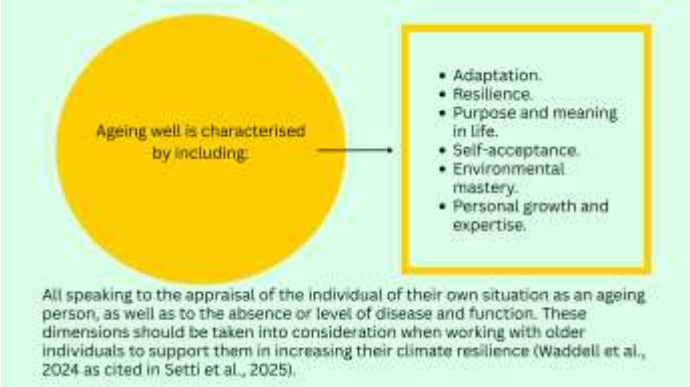
Mental Resilience in Older Adults

The European Environment Agency on urban adaptation conducted a review of local climate action plans across Europe where vulnerable groups impacted by climate change have been identified by local authorities with older persons have been identified as one of the most impacted groups by climate change (Reckien et al., 2022 as cited in European Environment Agency, 2024).

Many factors overlap between climate resilience and healthy ageing as well as ageing well, for example maintaining physically active is both positive for ageing and for being able to respond to adverse climate events.

Merchant et al. (2022) highlight how resilience and healthy ageing combine psychological, clinical and public health concepts. A multiplicity of factors impact both resilience and ageing, which include genetics, environment, exposure to toxins/micro-organisms across the lifespan, obesity, nutrition, exercise, polypharmacy, cellular level effects, smoking and stress. A lot of work in older people has

focused on frailty and vulnerabilities instead of resilience, often highlighting disability rather than empowerment. Therefore, it is important to be aware of the factors that enhance ageing well to adopt a positive approach to climate resilience in ageing. Positive factors in psychological resilience in ageing: In their literature review Macleod et al. (2016) established that higher levels of resilience are found with increasing age. Particularly strong beneficial factors may include adaptive coping styles, optimism, hopefulness, positive emotions, social support and community involvement, activities of daily living (ADL), independence and being physically active. All key characteristics of resilience of older adults are seen below.



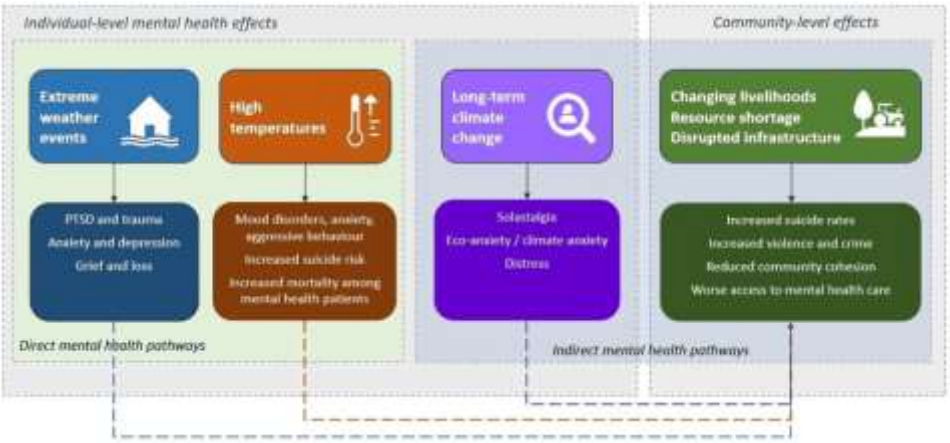
[Mental health and gender resilience differences]

<u>Interventions strengthening resilience in older adults:</u> optimizing daily schedules, learning coping strategies and focusing on emotion regulation after the loss of a spouse. Other effective interventions may emphasize older people's strengths such as the **ability to establish and maintain social connections, willingness to help others, and desire to engage in the community**.
Volunteering and other social or community involvement, e.g. through organized senior centre activities (such as day trips, meals, cooking classes, and exercise classes) may be particularly effective with older adults who experience loneliness to connect those with similar interests.
[Individual Resilience and Resilient Systems – Bronfenbrenner]

Mental Health Implications of Climate Change

[Climate Emotion Wheel and definitions of anxiety, PTSD, depression, solastalgia and eco-anxiety]

The mental health pathways are outlined below at the individual and community level of a climate change event both **directly** and **indirectly** as well as in the **short and long-term**. Please note that direct and indirect effects are not clearly defined and can occur across a continuum: direct impacts can imply being caught in a wildfire or flood leading to direct trauma, loss and distress; indirect impacts may involve observing or hearing people escape wildfires or floods (awareness of changes).



How climate change events can **impact on both physical and mental health.**

- Climate change can cause a rise in temperatures, more extreme weather events, higher sea levels, increases in CO2 and pollutants leading to food and water insecurity, storms and floods, communicable disease spread, air pollution and allergens, social and economic instability and heat, heatwaves and wildfires.
- Subsequently as a result, the physical health of an individual can be affected in the following ways: through malnutrition and water borne infections, injuries and fatalities, malaria and dengue, asthma and heart disease, violence, poverty and migration, heat stress and heart failure.
- The physical damage from climate change can be measured easily through direct observation and reporting of events. However, what is less obvious are the mental health implications which as you can see from the diagram can include the physical damages, the economic impact and the physical health outcomes. Whilst not only being less obvious they are also the most widely encompassing. Click the direct and indirect mental health effects from climate change.
- Direct effects:
    - Suicide: for every 1 degree increase in temperature the suicide rate can rise by approximately 1%.
    - PTSD and Trauma: experiences of flashbacks, nightmares, anxiety, thought processing and attention difficulties.
    - Anxiety and depression: generalised worries, fears and persistent low mood.
    - Grief and loss: of loved ones, outdoor activities, housing instability.
    - Worsened community mental health: the predicted expectations of individuals mental health is to be negatively impacted worldwide, this along with the impacts to local economies will negatively impact the community resilience.
- The indirect effects may include
    - Solastalgia: the feeling of homesickness whilst at home due to changes in the environment.
    - Eco-anxiety: fear(s) of environmental doom.
    - Climate grief: the sense of loss from environmental destruction due to climate change e.g. loss of biodiversity, changes to ecosystems and change to meaningful landscapes.

[Older person example scenarios; Did You Know Facts on mental health effects from climate change and Optional Youtube video on solastalgia]

Reflective Corner I:

Think about **how climate change is either directly or indirectly affecting your mental health**. The questions below will help you in your reflection:

- Do you worry about climate change? If so, what are your worries?
- What support systems (family, friends and community support) do you have?
- Is there anything you do to mitigate climate change? Does that make you feel better?

Climate Change Resilience

Climate change resilience is defined by the IPCC AR6 as cited in Zovko et al. (2025) as *"the capacity of interconnected human and natural systems to cope with climate hazard, trend or disturbance to respond or reorganise their essential function, identity and structure"*. In addition, WHO (2023) defines **climate resilient health systems** as "those that are capable of **anticipating**, **responding** to, **coping** with, **recovering** from, and **adapting** to climate-related shocks and stress, to bring about sustained improvements in population health, despite an unstable climate". It is further elaborated that "health systems can also learn from previous experiences and put in place interventions to recover, which can be at the pre-event state or better, achieve a **transformation**". We can conclude that climate resilience can be understood as **activities in different interlinked phases**, whereby the aim is to be able to **respond adequately to both short-term shocks** (such as extreme heat, storms, etc.) and **chronic stressors** (such as onset of seasons, average increase in numbers of hot days and nights over decades, etc.).
[Discussion of protective and predictive factors of resilience of a review conducted by Chen et al. (2020)].

Climate change resilience in the community is defined by the United Nations Development Dictionary as the capacity of the community or environment to anticipate and manage climate impacts, minimise their damage and recover and transform as needed after the initial shock.
[Examples of European climate change resilient initiatives and optional Youtube videos on the Cool Neighbourhoods Project and TEDx Talk from Kari Nadeau – Enhancing climate resilience].

Checklist: Climate Change Resilience based on Ecological Systems
Take a look at this pdf document of climate change resilience based on ecological systems checklist.

Ageing and Climate Change Resilience

- **Individual Mental Resilience:** the way in which an individual can effectively adapt mentally, emotionally and behaviourally to experiential adversities (APA, 2024).
- **Climate change resilience**: Resilience in the context of climate change involves the ability to anticipate, respond to, cope with, recover from, adapt to and transform in the face of acute shocks and chronic stressors (WHO, 2023). Community anticipation and management of climate impacts to minimise damage and recover and transform as needed after the initial shock through adaptation and disaster preparedness are part of resilience (WHO, 2024).

Beneficial Coping Strategies
The beneficial coping strategies through negative impacts provoked by climate change:
Creating/maintaining meaningful relationships with people (Adams, Pascal and Dickson-Swift, 2014), nature (Dennis and Stock, 2024 and Khalil et al., 2025, pets (Thompson et al., 2024) and pro-environmental action (Khalil et al., 2025). Additionally, on a personal level self-care and emotion regulation strategies are also beneficial (Elzohairy, Fatah and Khedr, 2024).

[**Example scenarios** and reflect on whether the 'personas' (i.e. representations of people) are more or less climate resilient and consider **different theories on ageing** and how they inform how to evaluate and support psychological climate resilience. Each theory below are further discussed].

Interventions fostering climate resilience
Interventions should be person-centred and empower the older person, considering their values, and the timeframe of the effects one aims to obtain to maintain their right to autonomy and agency over the way they aim to age and live (Dennis et al., 2023 as cited in Setti et al., 2025) [Harvard Chan's School a Climate Toolkit].

Policy Implications
Local communities should actively involve older people when co-designing climate resilience strategies and interventions to improve social ties, increasing a sense of belonging and personal value, enhancing resilience such as incorporating spaces for older adults to participate in environmental action, activities may include small individual and collective intergenerational actions, with volunteering opportunities and nature connectedness.

Reflective Corner II:
Please look at the following disaster preparedness toolkit from Cornell University. Choose one of the three steps (either "Assess your Risk", "Prepare for Disaster" or "Recover from Disaster") and make a proposal on where and what to add to include mental resilience which makes sense in your own context (e.g. Ireland, coastal medium-sized town).

2. Factors Influencing Climate Resilience

Older persons climate resilience factors
There are a range of factors that **limit climate resilience** in an older person. These include **loneliness, lack of sense of belonging** (Ericson-Lidman, 2019; Joint Research Centre, 2023; Kim et al., 2020 and Leyva et al., 2017), **mental illness** (Cianconi et al., 2020), **low economic status**, **reduced social support**, and **reduced physical strength** (Haq & Gutman, 2020). You can dive into these factors through the given references. [Definition and prevalence of loneliness].

Social relations and emotional support
Social support is defined by the APA (2018) "*as the provision of assistance or comfort to others, typically to help them cope with biological, psychological, and social stressors.*" At the individual level, social support can be from family members and friends. At the community level social support can come from peer groups, neighbours, voluntary and local organisations, but also religious or work organizations and at the institutional level it usually refers to governmental support (local, regional or national level) in times of crises.
We summarized the findings from each of the research studies from UCC and Carinthia University's results from the systematic review on climate change and mental resilience of older adults.

[In focus: Loneliness – effects of loneliness on older adults and the impact of climate change]

Reflective Corner III:
Take some time to reflect on your own work with older persons

- The UCLA loneliness scale is an example of a 20-item self-report scale used to assess loneliness. The scores range from 20 to 80 with higher scores representing higher loneliness. Typically a score of 43+ would be the cut-off score to indicate loneliness (Gosling et al., 2024). Try to fill out the UCLA loneliness scale for one specific older person you are working with.
- What supports do they have during an extreme weather event that is likely to occur in your area e.g. flooding, heatwaves?
- Where are they located in terms of accessing supports or supports needing to get to them?

2. Financial Security as a Resilience Factor

Low socio-economic status

With regard to the impact of climate change, low economic status significantly impacts an individual's or community's ability to adapt to and recover due to several interrelated factors (Leichenka and Silva, 2014). These include limited access to resources for example inadequate infrastructure (Khine and Langkulsen, 2023), poor drainage systems or unreliable access to utilities i.e. water and electricity affording insulation or flood prevention measures (EEA, 2022). Additionally, there are fewer opportunities for preventative measures due to financial insecurity of lower funds and lack of insurance, and the greater vulnerability of disadvantaged groups e.g. those who are chronically ill, socially isolated from the community and lack of education and access to information during climate-related events (EEA, 2022).

Financial Security

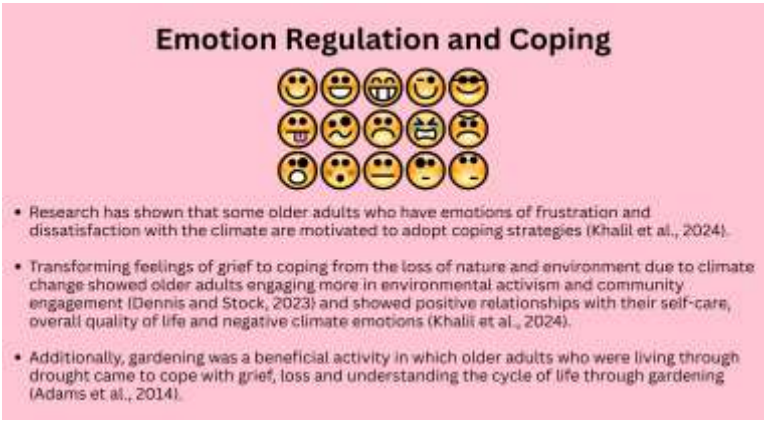
From our systematic review we found three studies which noted financial security as an impactful factor on psychological resilience for older people. Take a look at our findings.

3. Physical Resilience Factors

Physical activity throughout an individual's lifespan ensures greater ability to maintain high functioning in older age (Manini and Pahor, 2009). The authors stress that resistance and aerobic exercises show big impacts on both muscle strength and endurance; important for sit to stand, stair climbing and walking for older adults. Take a look at the WHO (2020) recommended activity guidelines on physical and sedentary behaviour. For older adults aged 65+ these recommendations at 150-300 minutes of aerobic moderate intensity or 75-100 minutes of vigorous aerobic intensity.

4. Emotional Resilience Factors

Emotion regulation is an important skill in coping with many daily life experiences (Compas et al., 2014). Climate change events also impact an individual's ability to emotionally regulate (Ogunbode et al., 2021).



5. Behavioural Resilience Factors

Maintaining routines and engaging in meaningful activities has shown in the literature to be important factors influencing the mental resilience of older adults.

6. Cognitive Resilience Factors

For older adults, two cognitive strategies seem to be important when facing climate-related events: on the one hand, they can learn from past experiences and on the other hand controlling ones own reactions and modifying their own thinking about what has happened are accessible coping strategies for the target group.

Learning from Past Experiences

For older persons, one of the cognitive resilience factors found in research studies was the ability to learn from past experiences.

Cognitive attributions

Additionally, research implies that cognitive attributions to inform meaning and understanding of the climate events enhances older adults' resilience.

Reflective Corner IV:

In your forum post, please think about a **climate-related event typical for where you are living** and try to identify **three examples of resilience strategies** that you would recommend to an older person facing climate change.

Have a look at the Table below for an example of the negative impacts and resilience strategies of older people related to **flooding** - maybe this gives you some first ideas for your own situation.

Impacts of Flooding	Resilience Strategies
Most common mental health impact – Post traumatic stress disorder	Older people noted to be resilient after a flood, with a sense of commitment and belonging to their community, a newly found appreciation of life and belief in their own capabilities.
Post-flood – 17% of older people diagnosed with PTSD and 14% with depression.	One study found that older people felt they were not victims but survivors of floods and felt they have the social network to cope.
Similarly on the global population post-flood – 20% were diagnosed with depression, 28.3% with anxiety, 36% with PTSD.	Older people were also found to be more equipped than younger people. It was reported that they were just under 5 times more likely to have an evacuation plan and a 3-day supply of medications.

Strategies for Enhancing Mental Resilience of Older People

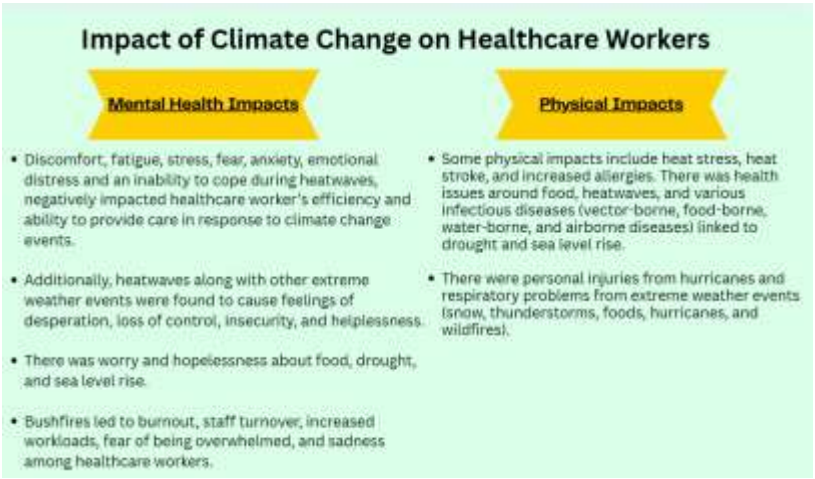
Have a look at the following resilience strategies.

- **Empowering Agency for Resilience:** Posch et al. (2020) proposed a model coined agency towards resilience (ATR) which focuses on the individual's ability, motivation and dedication to being proactive about their resilience in disaster risk management (Posch et al., 2020).
- **Positive reframing and humour** can enhance individual resilience to stress and unwanted change (Bei et al., 2013).
- Utilising and maintaining **Green spaces** are a resilient protective factor for older adults (Leyva et al., 2017).
- Using **spiritual** methods to cope can be a powerful coping tool for some older adults. These may include prayer and your religious practices, meditation and mindfulness (Bellamy et al., 2014).
- Encouraging **social interaction** with either family members or the community is vital to provide life's meaning to older people (Madsen et al., 2019).
- Identifying and promoting the **community facilities** and centres that facilitate social gatherings or events are extremely important in regard to providing a sense of meaning to life for older people and also to reduce the risk of isolation and loneliness (Madsen et al., 2019).

Professional's climate resilience factors

Resilience Strategies for Health and Social Care Professionals

A scoping review by Tesfaye et al. (2025) conducted the research and divided the results into the mental health, physical, occupational safety and capacity and resilience impacts as seen below in the infographics.



In addition to the above impacts of climate change on healthcare workers, they are also facing specific challenges in this context (Tesfaye et al., 2025).

Challenges faced by coworkers

- **Rural and Disaster Affected Areas:** Geographic isolation, limited resources, and the need to address the emotional and psychological impact on staff and patients. In addition, a lack of coordination and preparedness planning between health facilities and local authorities has led to delays and gaps in response to climate change-related disasters.
- **Limited Resources:** Time constraints, limited resources and lack of funding available to healthcare workers and healthcare organisations were barriers to carry out necessary climate measures.
- **Knowledge Gaps:** Lack of awareness with climate action plans, early warning systems and the data needed to assess the risk of climate change impacts. These limit healthcare workers ability to make informed decisions and apply adaptation and mitigation strategies.
- **Limitations in Vulnerability Assessment:** Healthcare organisations often focus on the medical factors and neglect the impact on social and psychological factors. Healthcare workers were unsure about how they and their organisation could address climate change. There is also limited use of monitoring data for policy purposes.
- **Infrastructure and Organisation Barriers:** Problems with design and insulation of healthcare facilities, politics, infection control policies, and lack of coordination between departments.

Interventions for healthcare workers in times of adversity

Pollock et al. (2020) conducted a mixed methods systematic review to look at interventions aimed at enhancing resilience and mental health of healthcare workers during disease outbreaks of SARS, Ebola, COVID-19 and MERS. They found three common interventions: workplace, psychological support and multifaceted interventions.

- **Workplace interventions** included strategies like workplace structure, routine interventions and training. Training courses were typically designed to prepare them for disease epidemic/pandemics and provided knowledge of disease. Only one intervention used psychological first aid for the knowledge and skills to support people impacted by Ebola, where burnout decreased for those in the experimental group. Other workplace interventions focused on improving social interaction in workplaces.
- **Psychological support interventions** included strategies like hotline services, online courses, group activities, debriefing groups and psychotherapy to relieve stress.
- **Multifaceted interventions** which are interventions that use two or more components together, were found in two studies. Both included digital learning packages. These packages included components relating to the workplace, basic daily needs and psychological support interventions. One intervention included pre and post deployment strategies, training and screening processes.

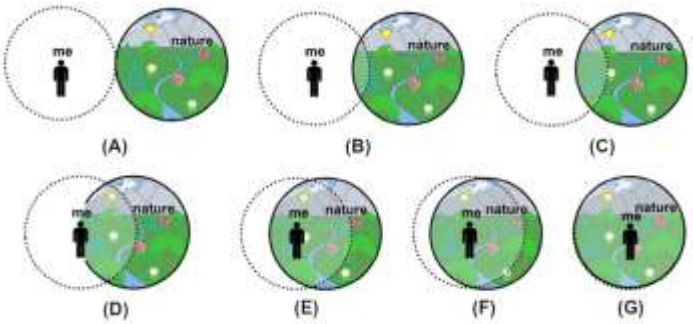
Reflective Corner V:

Please look at the image below. It showcases some recent review on mental health and psychosocial interventions in the context of climate change (Xue et al., 2024). There can be learning from the results of this research in developing **interventions for health and social care professionals**. Think about yourself in the context of a health and social care professional: from the resilience strategies mentioned in the image, what are some you are likely to use to enhance your own resilience to climate change? [Each intervention is discussed in more detail].

3. Nature Connectedness

Reflective Corner VI:

Please complete steps 1-3 as part of this reflective corner.
Step 1. Study the image below. One circle represents the self and one circle represents nature. The degree of overlap between the two circles displays the connectedness to nature. Please select the picture A-G which best describes your relationship with the natural environment. How interconnected are you with nature?



Step 2: Now, please complete the Connectedness to Nature scale in the next page and reflect if your results from the scale match the above images and your choice.
Step 3: Please share your insights in a forum post: write in the headline - your country and work environment.

[Complete the connectedness to nature scale]

Benefits of Nature Connectedness

Being connected to nature has significant benefits for mental resilience. The European Commission (2024) defines nature-based solutions as: *"Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions."*
Have a read of some of the benefits of being connected with nature below. Whilst you read through them, keep in mind the picture bubbles of the overlap between self and nature which you reviewed in the reflective corner above.

[Discussion on green spaces in Europe]

Nature contact can be indirect, incidental or intentional. We can interact with nature **indirectly** by watching a show on nature. **Incidental** interaction may come from seeing, smelling or hearing nature on your way to work for example, and **intentional** interaction can be through gardening or visiting woodlands, beaches, parks etc. Nature contact that is built up over time is beneficial for psychological resilience (White et al., 2023).

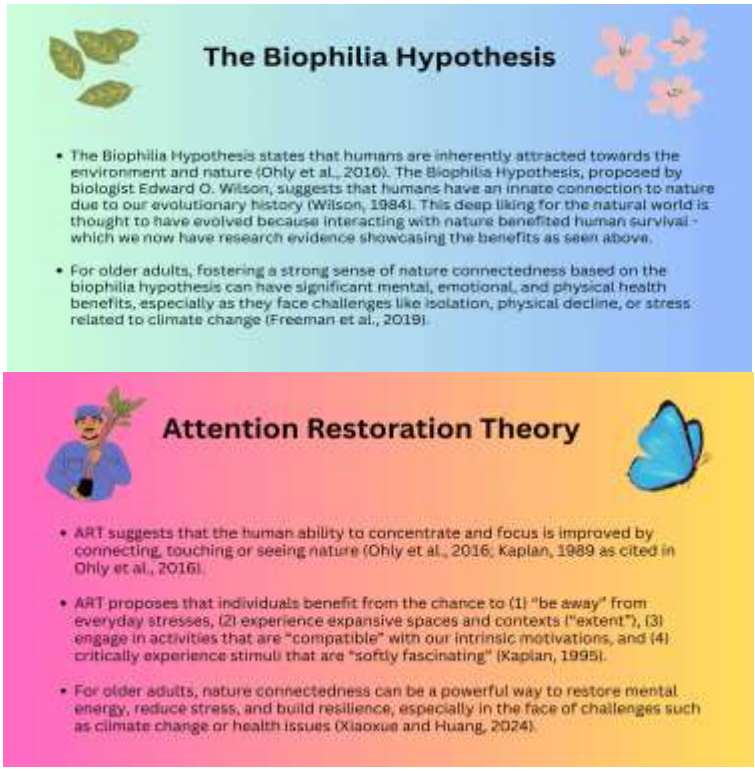
Cognitive benefits of nature contact (White et al., 2023):

- It can restore attentional capacity.
- It can improve self-esteem, memory and self-efficacy.
- Nature can positively influence threat and coping appraisals.

Have a look at the image below of the different levels of nature based interventions
Level 1: At level 1, interventions are designed to address the general population requiring physical/infrastructural changes. Interventions involve bringing nature to people - making nature more accessible (White et al., 2023).
Level 2: Level 2 interventions focus on at risk population groups who may be inactive or live in chronically stressful conditions such as deprivation. At this stage, interventions focus e.g. on increasing physical nature contact or promoting psychological connection with the natural environment through forest bathing, nature walks, community gardens and wilderness therapies (White et al., 2023).
Level 3: Level 3 interventions support those who suffer from physical or mental health concerns by incorporating nature into medical or psychological treatment typically enhancing willingness to engage with these treatments (White et al., 2023).

Nature Based Solutions Theories

Two theories behind nature-based solutions are the **Biophilia Hypothesis** and **Attention Restoration Theory (ART)**. Let's now look at these in more detail with examples. Read the following info graphics and interactive booklet.



Nature Based Solutions Theories

Part 1: The Biophilia Hypothesis & Part 2: Attention Restoration Theory – Booklet Read

Biophilia Hypothesis Application

Goal: Enhance mental and physical wellbeing in older adults through biophilic practices that foster a deeper connection to nature.

1. Nature as a Restorative Environment

Older adults, particularly those experiencing mental fatigue or stress, can greatly benefit from nature's restorative properties, which align with the **Biophilia Hypothesis**. Interacting with nature can help restore cognitive function, reduce anxiety, and promote overall wellbeing as noted above.

Actions in this stage:

- **Nature walks and outdoor meditation**: Encourage older adults to take regular walks in natural settings like parks or gardens. These activities can help reduce mental fatigue, improve mood, and foster a sense of peace, all of which are rooted in biophilic principles.
- **Creating biophilic spaces indoors**: If access to outdoor spaces is limited, create indoor environments that mimic nature, such as rooms with plants, natural light, water features, or nature-inspired decoration. This helps bring the benefits of nature indoors and fosters the sense of biophilia.

Example: A nursing home redesigns common areas to include more plants, natural lighting, and water features like small fountains. Residents are encouraged to spend time in these areas to relax, socialise, and connect with nature, even if they can't go outside.

2. Gardening and Horticultural Therapy

Gardening is a direct way to promote biophilic connections, as it allows older adults to physically interact with plants and nature. This practice is therapeutic and often associated with improving mental health, lowering stress, and promoting a sense of accomplishment.

Actions in this stage:

- **Community gardening projects**: Encourage older adults to participate in community or therapeutic gardening programs, where they can grow flowers, vegetables, or herbs. The process of nurturing plants and observing them grow can provide emotional satisfaction and foster a connection to nature.
- **Horticultural therapy**: Certified horticultural therapists can work with older adults to engage them in therapeutic gardening activities that are tailored to their needs, promoting both mental and physical health.

Example: A nursing home establishes a raised garden bed program where older adults can plant and care for a small garden. This not only gives them a direct connection to nature but also fosters social interaction with other participants, improving their overall well-being.

3. Animal-Assisted Activities and Nature Engagement
The **Biophilia Hypothesis** also extends to our liking for animals too. Animal-assisted activities and interacting with wildlife can provide comfort and companionship for older adults, reducing feelings of loneliness and promoting emotional well-being.

Actions in this stage:

- **Pet therapy**: Organise visits from trained therapy animals, such as dogs or cats, to senior living communities or nursing homes. The calming effect of animals can help reduce stress, lower blood pressure, and provide emotional support.
- **Wildlife observation**: Set up bird feeders or small wildlife habitats around living spaces to encourage older adults to observe and engage with local wildlife. This not only strengthens their connection to nature but also fosters a sense of wonder and engagement with the environment.

Example: A nursing home arranges for therapy dogs to visit once a week, providing residents with opportunities for emotional connection, physical interaction, and increased happiness. Additionally, staff sets up bird feeders outside common areas so residents can observe and interact with the birds.
Continued Biophilia Hypothesis Application

4. Creating Nature Immersion Experiences
Immersion in natural environments, naturally or virtually, can be restorative for older adults who may have mobility limitations or live in urban settings. This practice aligns with the **Biophilia Hypothesis** by exposing individuals to natural sights and sounds, fostering a connection to the wider world.

Actions in this stage:

- **Virtual nature experiences**: Use technology, such as VR (virtual reality), to bring natural environments into homes or care facilities. Older adults can virtually visit forests, beaches, or gardens, allowing them to experience the sights and sounds of nature.
- **Nature-based audio or video content**: Provide nature recordings (e.g., birdsong, rain sounds) or nature documentaries to engage older adults in nature from a distance.

Example: A nursing home offers weekly virtual reality sessions where older adults experience nature environments like walking through a forest or sitting by a beach. This provides a restorative experience for those who cannot physically visit these environments.

5. Social Connection Through Nature
Nature can serve as a shared experience that brings people together. By participating in nature-related activities, older adults can form deeper social connections and reduce feelings of isolation.

Actions in this stage:

- **Group outdoor activities**: Organise group walks, hikes, or nature outings that encourage older adults to socialise while being immersed in natural environments. The shared experience of being in nature can foster bonding and improve social connectedness.
- **Eco-volunteering opportunities**: Offer opportunities for older adults to participate in community-based environmental projects, such as tree planting, park clean-ups, or wildlife conservation efforts. These projects not only connect them to nature but also create a sense of purpose and community.

[Example of ART]

Nature Connectedness at Home

It is important to remember that there are people who cannot venture outside as much and therefore do not have a lot of access to nature due e.g., living in a predominantly urban area, being physically disabled or ill. However, there are a variety of ways to involve nature connectedness at home to bring the outdoors inside, enhance well-being, and foster a deeper connection with the environment. Here are some examples: **Indoor Plants**, **Natural Light**, **Nature-Inspired Decoration**, **Outdoor Spaces**, **Natural Sounds, Nature-inspired activities, Eco-Friendly Practices**, **Nature-Inspired Scents**. These simple and creative ways of bringing nature into your home can help foster a deeper sense of well-being and connection with the natural world.

Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

Final Assessment:

- Use the climate change resilience checklist and fill it out for yourself.
- Identify areas of strength for yourself.
- Identify at least one point that can be improved and explain how this positively impacts your clients.

Please develop a powerpoint presentation and make a video recorded slide show of about 5 mins where you elaborate on your bullet points.

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Coping with uncertainty and building mental resilience in older people MC4 EQF5&6

Microcredential Title	**Coping with uncertainty and building mental resilience in older people**
Short Code / ID	MC4
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, German and Greek
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	University College Cork
Module Lead / Author	Dr. Annalisa Setti, University College Cork

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Define mental resilience in the context of climate change from the point of view of the older person.
LO 2	Provide examples of direct and indirect effects of climate change on mental health and wellbeing.
LO 3	Describe the main factors contributing to resilience related to climate change in older people.
LO 4	Explain how change can be promoted at the individual and community level based on the main theories of behavioural change.
LO 5	Identify opportunities to promote resilience and mental wellbeing based on nature contact and connectedness for older persons and Health and Social Care professionals.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards climate change.
Alignment Notes	MC4 provides health and social care workers with knowledge about the challenges of climate resilience for older people and how to support their psychological strength in response to acute climate-related shocks and long-term, chronic stress. The module will also provide effective strategies to support their own resilience.
Keywords	climate change, health, resilience, older adults, mental resilience, adaptation

Learning Activities

E-Learning Format	Text, Interactive H5P content and Youtube videos. Note: [ ] brackets in this document refers to further content on Moodle.
Activities	Pre and post module quizzes, case studies and reflective corners.
Estimated Study Time	25 hours

Content & Topics

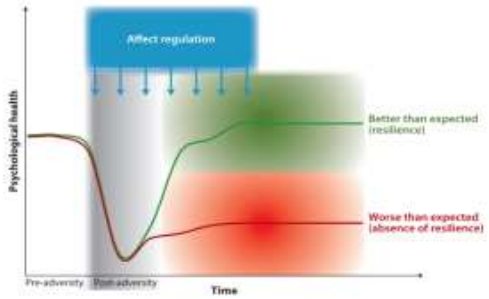
1. Mental Resilience
2. Factors influencing Climate Resilience
3. Behavioural Change to foster Resilience
4. Nature Connectedness as source of Resilience

1. Mental Resilience

Defining Mental Resilience

[Why is mental resilience important?]

The American Psychological Association (APA) defines resilience as: *The process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioural flexibility and adjustment to external and internal demands.* They add that: *A number of factors contribute to how well people adapt to adversities, predominant among them (a) the ways in which individuals view and engage with the world, (b) the availability and quality of social resources, and (c) specific coping strategies. Furthermore, psychological research demonstrates that the resources and skills associated with more positive adaptation (i.e., greater resilience) can be cultivated and practiced also known as psychological resilience.*
In research there is, though, no unified definition of mental resilience (also sometimes called "psychological resilience"; please note that for the purpose of this module, we treat psychological resilience and mental resilience as equivalent terms and use them interchangeably). Definitions can vary due to factors such as strong objective versus subjective views, type, intensity and duration of events. Sisto et al. (2019) summarize the common mental/psychological resilience defining factors found in current research: **ability to recover, dynamic process evolving over time, individual's habitual way of functioning, capacity to bounce back and positive adaptation to life conditions**.
See the resilience continuum below of pre and post adversity (Troy et al., 2023).

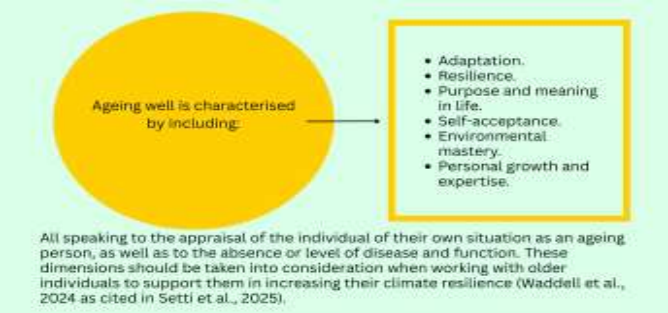


Mental Resilience in Older Adults

The European Environment Agency on urban adaptation conducted a review of local climate action plans across Europe where vulnerable groups impacted by climate change have been identified by local authorities with older persons have been identified as one of the most impacted groups by climate change (Reckien et al., 2022 as cited in European Environment Agency, 2024).

Many factors overlap between climate resilience and healthy ageing as well as ageing well, for example maintaining physically active is both positive for ageing and for being able to respond to adverse climate events.
Merchant et al. (2022) highlight how resilience and healthy ageing combine psychological, clinical and public health concepts. A multiplicity of factors impact both resilience and ageing, which include genetics, environment, exposure to toxins/micro-organisms across the lifespan, obesity, nutrition, exercise, polypharmacy, cellular level effects, smoking and stress. A lot of work in older people has focused on frailty and vulnerabilities instead of resilience, often highlighting disability rather than empowerment. Therefore, it is important to be aware of the factors that enhance ageing well to adopt a positive approach to climate resilience in ageing. Positive factors in psychological resilience

in ageing: In their literature review Macleod et al. (2016) established that higher levels of resilience are found with increasing age. Particularly strong beneficial factors may include adaptive coping styles, optimism, hopefulness, positive emotions, social support and community involvement, activities of daily living (ADL), independence and being physically active. All key characteristics of resilience of older adults are seen below.



[Mental health and gender resilience differences]

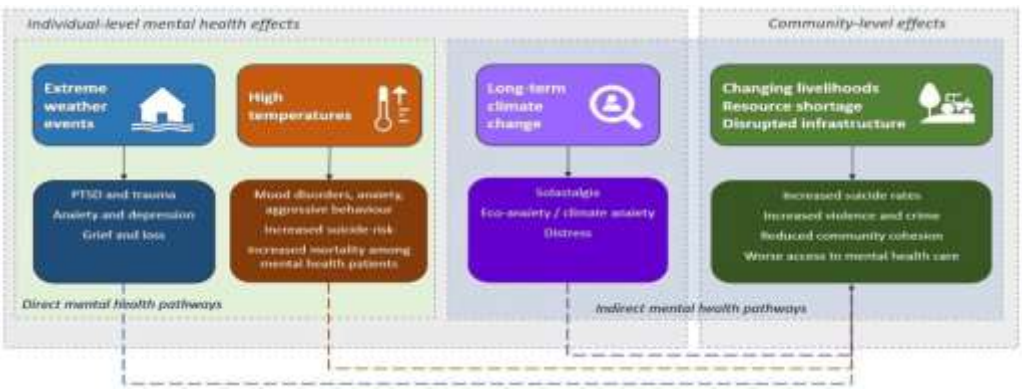
Interventions strengthening resilience in older adults: optimizing daily schedules, learning coping strategies and focusing on emotion regulation after the loss of a spouse. Other effective interventions may emphasize older people's strengths such as the **ability to establish and maintain social connections, willingness to help others, and desire to engage in the community**. Volunteering and other social or community involvement, e.g. through organized senior centre activities (such as day trips, meals, cooking classes, and exercise classes) may be particularly effective with older adults who experience loneliness to connect those with similar interests.

[Individual Resilience and Resilient Systems – Bronfenbrenner]

Mental Health Implications of Climate Change

[Climate Emotion Wheel and definitions of anxiety, PTSD, depression, solastalgia and eco-anxiety]

The mental health pathways are outlined below at the individual and community level of a climate change event both **directly** and **indirectly** as well as in the **short and long-term**. Please note that direct and indirect effects are not clearly defined and can occur across a continuum: direct impacts can imply being caught in a wildfire or flood leading to direct trauma, loss and distress; indirect impacts may involve observing or hearing people escape wildfires or floods (awareness of changes).



How climate change events can **impact on both physical and mental health.**

- Climate change can cause a rise in temperatures, more extreme weather events, higher sea levels, increases in CO2 and pollutants leading to food and water insecurity, storms and floods, communicable disease spread, air pollution and allergens, social and economic instability and heat, heatwaves and wildfires.
- Subsequently as a result, the physical health of an individual can be affected in the following ways: through malnutrition and water borne infections, injuries and fatalities, malaria and dengue, asthma and heart disease, violence, poverty and migration, heat stress and heart failure.
- The physical damage from climate change can be measured easily through direct observation and reporting of events. However, what is less obvious are the mental health implications which as you can see from the diagram can include the physical damages, the economic impact and the physical health outcomes. Whilst not only being less obvious they are also the most widely encompassing. Click the direct and indirect mental health effects from climate change.
- Direct effects:
    - Suicide: for every 1 degree increase in temperature the suicide rate can rise by approximately 1%.
    - PTSD and Trauma: experiences of flashbacks, nightmares, anxiety, thought processing and attention difficulties.
    - Anxiety and depression: generalised worries, fears and persistent low mood.
    - Grief and loss: of loved ones, outdoor activities, housing instability.
    - Worsened community mental health: the predicted expectations of individuals mental health is to be negatively impacted worldwide, this along with the impacts to local economies will negatively impact the community resilience.
- The indirect effects may include
    - Solastalgia: the feeling of homesickness whilst at home due to changes in the environment.
    - Eco-anxiety: fear(s) of environmental doom.
    - Climate grief: the sense of loss from environmental destruction due to climate change e.g. loss of biodiversity, changes to ecosystems and change to meaningful landscapes.

[Older person example scenarios; Did You Know Facts on mental health effects from climate change and Optional Youtube video on solastalgia]

Reflective Corner I:

Think about **how climate change is either directly or indirectly affecting your mental health**. The questions below will help you in your reflection:

- Do you worry about climate change? If so, what are your worries?
- What support systems (family, friends and community support) do you have?
- Is there anything you do to mitigate climate change? Does that make you feel better?

Climate Change Resilience

Climate change resilience is defined by the IPCC AR6 as cited in Zovko et al. (2025) as *"the capacity of interconnected human and natural systems to cope with climate hazard, trend or disturbance to respond or reorganise their essential function, identity and structure"*. In addition, WHO (2023) defines **climate resilient health systems** as "those that are capable of **anticipating**, **responding** to, **coping** with, **recovering** from, and **adapting** to climate-related shocks and stress, to bring about sustained improvements in population health, despite an unstable climate". It is further elaborated that "health systems can also learn from previous experiences and put in place interventions to recover, which can be at the pre-event state or better, achieve a **transformation**". We can conclude that climate resilience can be understood as **activities in different interlinked phases**, whereby the aim is to be able to **respond adequately to both short-term shocks** (such as extreme heat, storms, etc.) and **chronic stressors** (such as onset of seasons, average increase in numbers of hot days and nights over decades, etc.).

[Discussion of protective and predictive factors of resilience of a review conducted by Chen et al. (2020)].

Climate change resilience in the community is defined by the United Nations Development Dictionary as the capacity of the community or environment to anticipate and manage climate impacts, minimise their damage and recover and transform as needed after the initial shock. [Examples of European climate change resilient initiatives and optional Youtube videos on the Cool Neighbourhoods Project and TEDx Talk from Kari Nadeau – Enhancing climate resilience].

Checklist: Climate Change Resilience based on Ecological Systems
Take a look at this pdf document of climate change resilience based on ecological systems checklist.

Ageing and Climate Change Resilience

- **Individual Mental Resilience:** the way in which an individual can effectively adapt mentally, emotionally and behaviourally to experiential adversities (APA, 2024).
- **Climate change resilience**: Resilience in the context of climate change involves the ability to anticipate, respond to, cope with, recover from, adapt to and transform in the face of acute shocks and chronic stressors (WHO, 2023). Community anticipation and management of climate impacts to minimise damage and recover and transform as needed after the initial shock through adaptation and disaster preparedness are part of resilience (WHO, 2024).

Beneficial Coping Strategies

The beneficial coping strategies through negative impacts provoked by climate change:
Creating/maintaining meaningful relationships with people (Adams, Pascal and Dickson-Swift, 2014), nature (Dennis and Stock, 2024 and Khalil et al., 2025, pets (Thompson et al., 2024) and pro-environmental action (Khalil et al., 2025). Additionally, on a personal level self-care and emotion regulation strategies are also beneficial (Elzohairy, Fatah and Khedr, 2024).

[**Example scenarios** and reflect on whether the 'personas' (i.e. representations of people) are more or less climate resilient and consider **different theories on ageing** and how they inform how to evaluate and support psychological climate resilience. Each theory below are further discussed].

Interventions fostering climate resilience
Interventions should be person-centred and empower the older person, considering their values, and the timeframe of the effects one aims to obtain to maintain their right to autonomy and agency over the way they aim to age and live (Dennis et al., 2023 as cited in Setti et al., 2025) [Harvard Chan's School a Climate Toolkit].

Policy Implications
Local communities should actively involve older people when co-designing climate resilience strategies and interventions to improve social ties, increasing a sense of belonging and personal value, enhancing resilience such as incorporating spaces for older adults to participate in environmental action, activities may include small individual and collective intergenerational actions, with volunteering opportunities and nature connectedness.

Reflective Corner II:
Please look at the following disaster preparedness toolkit from Cornell University. Choose one of the three steps (either “Assess your Risk”, “Prepare for Disaster” or “Recover from Disaster”) and make a proposal on where and what to add to include mental resilience which makes sense in your own context (e.g. Ireland, coastal medium-sized town).

4. Factors Influencing Climate Resilience

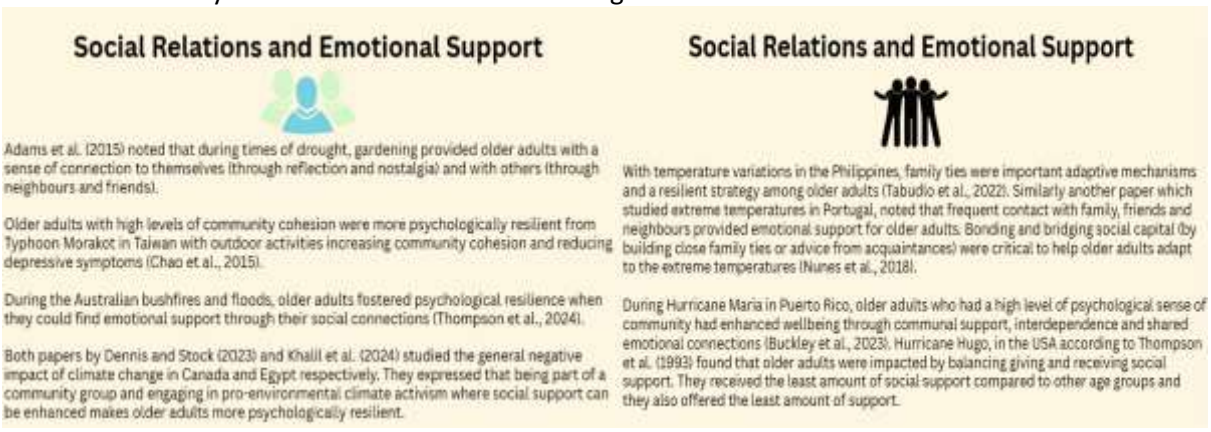
Older persons climate resilience factors

There are a range of factors that **limit climate resilience** in an older person. These include **loneliness, lack of sense of belonging** (Ericson-Lidman, 2019; Joint Research Centre, 2023; Kim et al., 2020 and Leyva et al., 2017), **mental illness** (Cianconi et al., 2020), **low economic status**, **reduced social support**, and **reduced physical strength** (Haq & Gutman, 2020). You can dive into these factors through the given references. [Definition and prevalence of loneliness].

Social relations and emotional support

Social support is defined by the APA (2018) "*as the provision of assistance or comfort to others, typically to help them cope with biological, psychological, and social stressors."* At the individual level, social support can be from family members and friends. At the community level social support can come from peer groups, neighbours, voluntary and local organisations, but also religious or work organizations and at the institutional level it usually refers to governmental support (local, regional or national level) in times of crises.

We summarized the findings from each of the research studies from UCC and Carinthia University's results from the systematic review on climate change and mental resilience of older adults.



[In focus: Loneliness – effects of loneliness on older adults and the impact of climate change]

Reflective Corner III:

Take some time to reflect on your own work with older persons

- The UCLA loneliness scale is an example of a 20-item self-report scale used to assess loneliness. The scores range from 20 to 80 with higher scores representing higher loneliness. Typically a score of 43+ would be the cut-off score to indicate loneliness (Gosling et al., 2024). Try to fill out the UCLA loneliness scale for one specific older person you are working with.
- What supports do they have during an extreme weather event that is likely to occur in your area e.g. flooding, heatwaves?
- Where are they located in terms of accessing supports or supports needing to get to them?

5. Financial Security as a Resilience Factor

Low socio-economic status

With regard to the impact of climate change, low economic status significantly impacts an individual's or community's ability to adapt to and recover due to several interrelated factors (Leichenka and Silva, 2014). These include limited access to resources for example inadequate infrastructure (Khine and Langkulsen, 2023), poor drainage systems or unreliable access to utilities i.e. water and electricity affording insulation or flood prevention measures (EEA, 2022). Additionally, there are fewer opportunities for preventative measures due to financial insecurity of lower funds and lack of insurance, and the greater vulnerability of disadvantaged groups e.g. those who are chronically ill, socially isolated from the community and lack of education and access to information during climate-related events (EEA, 2022).

Financial Security

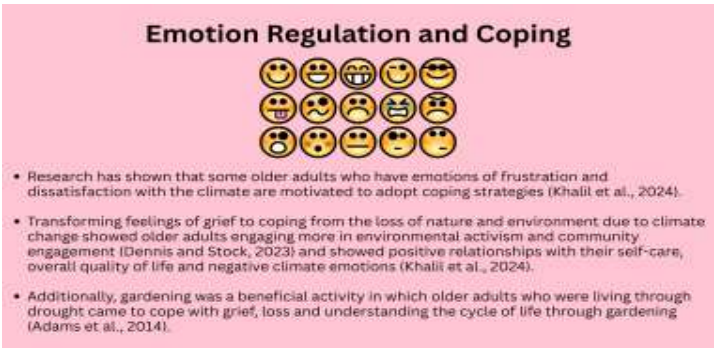
From our systematic review we found three studies which noted financial security as an impactful factor on psychological resilience for older people. Take a look at our findings.

6. Physical Resilience Factors

Physical activity throughout an individual's lifespan ensures greater ability to maintain high functioning in older age (Manini and Pahor, 2009). The authors stress that resistance and aerobic exercises show big impacts on both muscle strength and endurance; important for sit to stand, stair climbing and walking for older adults. Take a look at the WHO (2020) recommended activity guidelines on physical and sedentary behaviour. For older adults aged 65+ these recommendations at 150-300 minutes of aerobic moderate intensity or 75-100 minutes of vigorous aerobic intensity.

7. Emotional Resilience Factors

Emotion regulation is an important skill in coping with many daily life experiences (Compas et al., 2014). Climate change events also impact an individual's ability to emotionally regulate (Ogunbode et al., 2021).



8. Behavioural Resilience Factors

Maintaining routines and engaging in meaningful activities has shown in the literature to be important factors influencing the mental resilience of older adults.

9. Cognitive Resilience Factors

For older adults, two cognitive strategies seem to be important when facing climate-related events: on the one hand, they can learn from past experiences and on the other hand controlling ones own

reactions and modifying their own thinking about what has happened are accessible coping strategies for the target group.

Learning from Past Experiences

For older persons, one of the cognitive resilience factors found in research studies was the ability to learn from past experiences.

Cognitive attributions

Additionally, research implies that cognitive attributions to inform meaning and understanding of the climate events enhances older adults' resilience

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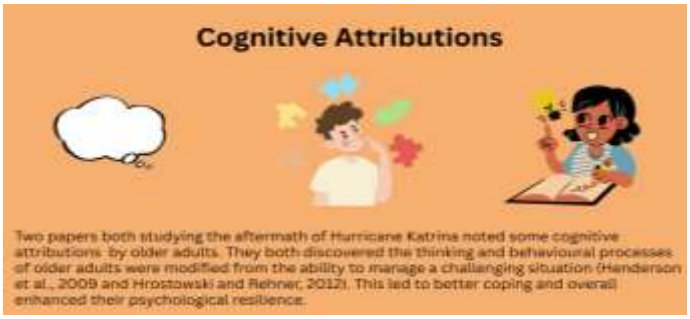


Reflective Corner IV:

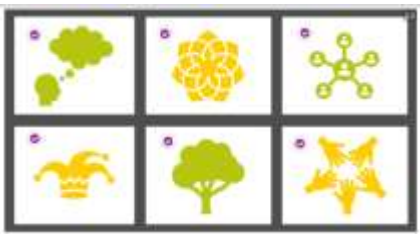
In your forum post, please think about a **climate-related event typical for where you are living** and try to identify **three examples of resilience strategies** that you would recommend to an older person facing climate change.

Have a look at the Table below for an example of the negative impacts and resilience strategies of older people related to **flooding** – maybe this gives you some first ideas for your own situation.

Impacts of Flooding	Resilience Strategies
Most common mental health impact – Post traumatic stress disorder	Older people noted to be resilient after a flood, with a sense of commitment and belonging to their community, a newly found appreciation of life and belief in their own capabilities.
Post-flood – 17% of older people diagnosed with PTSD and 14% with depression.	One study found that older people felt they were not victims but survivors of floods and felt they have the social network to cope.
Similarly on the global population post-flood – 20% were diagnosed with depression, 28.3% with anxiety, 36% with PTSD.	Older people were also found to be more equipped than younger people. It was reported that they were just under 5 times more likely to have an evacuation plan and a 3-day supply of medications.

Strategies for Enhancing Mental Resilience of Older People

Have a look at the following resilience strategies.



- **Empowering Agency for Resilience:** Posch et al. (2020) proposed a model coined agency towards resilience (ATR) which focuses on the individual's ability, motivation and dedication to being proactive about their resilience in disaster risk management (Posch et al., 2020).
- **Positive reframing and humour** can enhance individual resilience to stress and unwanted change (Bei et al., 2013).
- Utilising and maintaining **Green spaces** are a resilient protective factor for older adults (Leyva et al., 2017).
- Using **spiritual** methods to cope can be a powerful coping tool for some older adults. These may include prayer and religious practices, meditation and mindfulness (Bellamy et al., 2014).
- Encouraging **social interaction** with either family members or the community is vital to provide life's meaning to older people (Madsen et al., 2019).
- Identifying and promoting the **community facilities** and centres that facilitate social gatherings or events are extremely important in regard to providing a sense of meaning to life for older people and also to reduce the risk of isolation and loneliness (Madsen et al., 2019).

Professional's climate resilience factors

Resilience Strategies for Health and Social Care Professionals

A scoping review by Tesfaye et al. (2025) conducted research and divided the results into the mental health, physical, occupational safety and capacity and resilience impacts as seen below in the infographics.

In addition to the above impacts of climate change on healthcare workers, they are also facing specific challenges in this context (Tesfaye et al., 2025).

Challenges faced by coworkers

- **Rural and Disaster Affected Areas:** Geographic isolation, limited resources, and the need to address the emotional and psychological impact on staff and patients. In addition, a lack of coordination and preparedness planning between health facilities and local authorities has led to delays and gaps in response to climate change-related disasters.
- **Limited Resources:** Time constraints, limited resources and lack of funding available to healthcare workers and healthcare organisations were barriers to carry out necessary climate measures.
- **Knowledge Gaps:** Lack of awareness with climate action plans, early warning systems and the data needed to assess the risk of climate change impacts. These limit healthcare workers ability to make informed decisions and apply adaptation and mitigation strategies.
- **Limitations in Vulnerability Assessment:** Healthcare organisations often focus on the medical factors and neglect the impact on social and psychological factors. Healthcare workers were unsure about how they and their organisation could address climate change. There is also limited use of monitoring data for policy purposes.
- **Infrastructure and Organisation Barriers:** Problems with the design and insulation of healthcare facilities, politics, infection control policies, and lack of coordination between departments.

Interventions for healthcare workers in times of adversity

Pollock et al. (2020) conducted a mixed methods systematic review to look at interventions aimed at enhancing resilience and mental health of healthcare workers during disease outbreaks of SARS, Ebola, COVID-19 and MERS. They found three common interventions: workplace, psychological support and multifaceted interventions.

- **Workplace interventions** included strategies like workplace structure, routine interventions and training. Training courses were typically designed to prepare them for disease epidemic/pandemics and provided knowledge of disease. Only one intervention used psychological first aid for the knowledge and skills to support people impacted by Ebola, where burnout decreased for those in the experimental group. Other workplace interventions focused on improving social interaction in workplaces.
- **Psychological support interventions** included strategies like hotline services, online courses, group activities, debriefing groups and psychotherapy to relieve stress.
- **Multifaceted interventions** which are interventions that use two or more components together, were found in two studies. Both included digital learning packages. These packages included components relating to the workplace, basic daily needs and psychological support interventions. One intervention included pre and post deployment strategies, training and screening processes.

Reflective Corner V:

Please look at the image below. It showcases some recent review on mental health and psychosocial interventions in the context of climate change (Xue et al., 2024). There can be learning from the results of this research in developing **interventions for health and social care professionals**. Think about yourself in the context of a health and social care professional: from the resilience strategies mentioned in the image, what are some you are likely to use to enhance your own resilience to climate change? [Each intervention is discussed in more detail].

5. Behavioural Change

Building resilience and learning to cope with uncertain times may often require some small or even big changes to our behaviour. In this section we will explore different approaches and theories to promote change in people while considering the context that may constrain their ability to change.

Transtheoretical Model of Change (TTM)

The first of two theories we will look at is the Transtheoretical Model of Change (TTM). The TTM is a detailed time-based framework that involves six stages of change which include processes and principles from various intervention theories (Prochaska & Velicer, 1997).

Stages of the TTM (Prochaska & Velicer, 1997)

- **Precontemplation:** Precontemplation is the stage where a behaviour has not been identified as a problem and there is no intention to change. An individual in this stage may be unaware about the consequences of their behaviour or they have tried before with no success and as a result lose confidence in their ability to change. [further detail and examples in hotspot]
- **Contemplation:** Contemplation is the stage where there is an awareness of a problem and an individual may commit to a behaviour change in the future. Individuals become aware of both the pros and cons of changing their behaviour in this stage. [further detail and examples in hotspot]
- **Preparation:** The preparation stage involves identifying steps to taking action within 30 days. Typically individuals in this stage have an action plan and have participated in significant action within the past year e.g. attended counselling or enrolled in a health education class. [further detail and examples in hotspot]
- **Action:** The action stage involves making a change for 6 months. [further detail and examples in hotspot]
- **Maintenance:** involves executing a behaviour change for over 6 months to prevent relapse and contribute to their confidence to continue the changes. [further detail and examples in hotspot]
- **Termination:** Termination is the stage where an individual is not at risk of regressing to the prior behaviour. They are not tempted to revert back to their old ways of behaving even if they are emotionally distressed. [further detail and examples in hotspot]

By applying the **Transtheoretical Model**, we can help older adults gradually adopt mental resilience strategies to better cope with climate change, moving from awareness and contemplation to action and long-term maintenance.

Lewin's Change Theory

Let's now take a look at the second theory – Lewin's Change Theory. It is a three-step model to organizational change. It comprises of unfreezing, moving and freezing (Burnes, 2020).

- The **first step, unfreezing** involves identifying the need for change and destabilizing current habits, behaviours and attitudes. [further detail and examples in hotspot]
- The **second step, moving** involves planning and conducting behaviour change. This is where the motivation of changing the behaviour is larger than the motivation to resist the behaviour change. [further detail and examples in hotspot]
- The **third step is the freezing** stage. This involves behaviour changes to ensure that the change can be permanent and the changes do not regress (Burnes, 2020). [further detail and examples in hotspot]

By using Lewin's Change Theory, we can guide older adults through the process of **acknowledging the need for resilience**, **learning coping strategies**, and **embedding these practices into their routines**, ultimately enhancing their ability to cope with climate change-related stress and maintain good mental health.

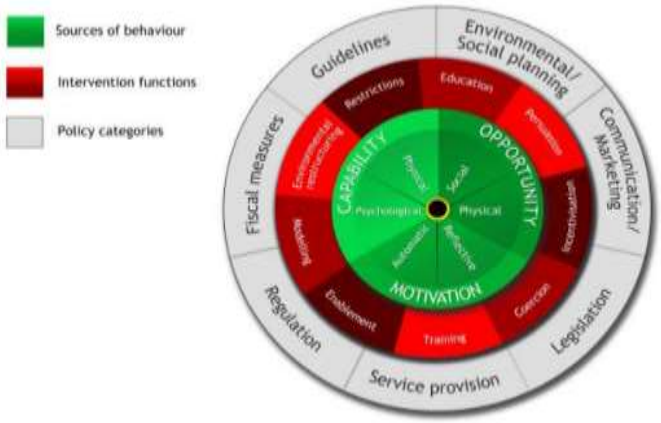
Behaviour Change Wheel

The theoretical frameworks that underpin how humans change their behaviour and habits in making decisions and look at some examples specific to climate change. The behaviour change wheel (BCW) consists of three layers. The centre of the wheel identifies the sources of the behaviour that could target intervention and uses the Capability, Opportunity and Motivation Behaviour continuum which is referred to as the COM-B for this. Using the COM-B method will help to promote positive climate behaviour changes in individuals. Have a read of the Table below on the COM-B model components with examples.

COM-B	**COM-B Model Component Definition**	**Example**
Capability	**Physical Capability:** Physical skills or abilities required to perform the behaviour.	An individual may need the physical ability to engage in climate-related mental health activities, such as attending a community support group or participating in outdoor activities to reduce eco-anxiety. For example, someone with limited mobility might struggle to access these resources.
	Psychological Capability: Mental or cognitive capacity to engage in the behaviour, including knowledge and understanding.	A person may need knowledge and understanding of how climate change impacts mental health. For instance, they might need to recognise that feelings of eco-anxiety or grief over environmental loss are valid and manageable with appropriate coping strategies.

Opportunity	**Physical Opportunity:** External environmental factors that make the behaviour possible such as resources, time or infrastructure.	Access to mental health services that address climate-related stress is crucial. For example, a person living in a rural area may lack access to therapists trained in eco-anxiety or climate grief counselling.
	Social Opportunity: Social influences, norms or cultural factors that encourage or discourage the behaviour.	Social support networks can influence mental health. For instance, being part of a community that openly discusses climate change, and its emotional impacts can help someone feel less isolated and more supported in managing their mental health.
Motivation	**Reflective Motivation:** Conscious, deliberate thought processes such as planning, intentions or evaluations that drive behaviour.	A person may consciously decide to take action to protect their mental health in the face of climate change, such as practicing mindfulness or joining advocacy groups to feel a sense of agency and purpose.
	Automatic Motivation: Unconscious, emotional or habitual processes such as desires, impulses or instincts that influence behaviour.	Emotional responses such as fear, guilt or hope can drive behaviour. For example, someone might feel a strong emotional urge to engage in climate activism as a way to cope with feelings of helplessness or despair about the future.

The behaviour change wheel identifies different intervention options that can be applied to changing each of the components. It also describes policies that can be used to deliver those intervention options. Lastly, the outer layer identifies seven types of policy that one can use to deliver the intervention functions (Michie et al., 2014). [further detail in hotspots of each intervention function]



COM-B Model Examples

Now let's look at some examples of using the COM-B Model – Booklet Read

Example 1: Let's see how to use the COM-B Model to encourage people to reduce their carbon footprint by using public transport instead of driving. Start with capability, opportunity and lastly, motivation.

10. **Capability**
    - **Physical Capability**: Do people have access to reliable public transportation or the physical ability to use it (e.g., proximity to bus/train stations, physical fitness etc.)
    - **Psychological Capability**: Do people understand how public transportation helps reduce carbon emissions and how to use the system effectively?

Intervention: Provide educational campaigns about the environmental benefits of using public transport and ensure that routes are well-marked and easy to navigate.

11. **Opportunity**
    - **Physical Opportunity**: Is public transportation available and accessible? Do people have time or resources to choose this over driving?
    - **Social Opportunity**: Are there social norms or peer pressures encouraging public transport use? Is there social support? (e.g., workplace incentives).

Intervention: Improve the availability and affordability of public transport (e.g., discounted fares, more routes, or more frequent services). Promote positive social messages about using public transport, such as community efforts to reduce car use.

12. **Motivation**
    - **Reflective Motivation**: Do people recognise the environmental impact of driving and the benefits of using public transport (e.g., reduced carbon emissions, less air pollution etc.)
    - **Automatic Motivation**: Are there immediate benefits that come with using public transport, like saving money on fuel or avoiding traffic?

Intervention: Highlight the long-term environmental benefits and the immediate rewards (e.g., financial savings, reduced stress) through targeted messaging. Provide positive reinforcement (e.g., reward systems for frequent users).

Desired Behaviour: People choose public transportation over driving, reducing their personal carbon footprint.

Summary of Interventions using the COM-B Model:

- **Capability**: Educate the public on the environmental impact of driving and how to navigate public transport.
- **Opportunity**: Make public transport more accessible and create social incentives to use it.
- **Motivation**: Reinforce the environmental and personal benefits of reducing driving and encourage consistent use of public transport.

[Second example discussed].

❋ **Students are directed to watch** a Q&A session on Youtube with Susan Michie who is a leading author and researcher in behaviour change.

Strategies for Change

A decision tree which may help you work through the strategies for changing a client's behaviour. You can also visit this link where you will find an interactive way to address behavioural change based on these models Behavioural change strategies tool.

Reflective Corner VI:

Think about an older adult who you support or have supported in the past through your work. Use the stages of change of the Transtheoretical Model to work through the **steps of how you would support an older adult** in changing their behaviour to improve resilience to climate change.
For guidance review the steps outlined in the following brief example on how to encourage an older adult to increase their social interaction within their community:

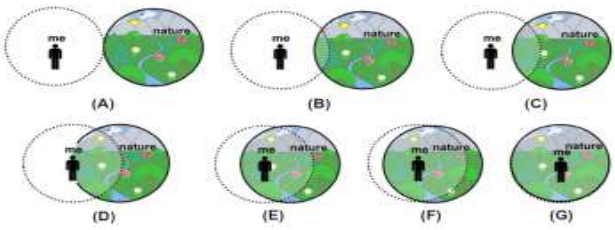
- Step 1 (precontemplation): provide general information through leaflets or news articles of the importance of community social ties from other older adults.
- Step 2 (contemplation): discuss with the client about their current social ties with their community and level of interest in earning more social connections.
- Step 3 (preparation): provide concrete leaflets and contact details of local community organisations which the client can access.
- Step 4 (action): monitor by checking in with the client as to whether they reached out or engaged with such organisations and if they find it beneficial.
- Step 5 (maintenance): be supportive in future discussions with the client around the benefits of having social connections close by and offer encouragement.
- Step 6 (termination): feeling confident with the client that they have formed social connections and have maintained them for a period of time and are enjoying it.

6. Nature Connectedness

Reflective Corner VII:

Please complete steps 1-3 as part of this reflective corner.

Step 1. Study the image below. One circle represents the self and one circle represents nature. The degree of overlap between the two circles displays the connectedness to nature. Please select the picture A-G which best describes your relationship with the natural environment. How interconnected are you with nature?



Step 2: Now, please complete the Connectedness to Nature scale in the next page and reflect if your results from the scale match the above images and your choice.

Step 3: Please share your insights in a forum post: write in the headline – your country and work environment.

[Complete the connectedness to nature scale]

Benefits of Nature Connectedness

Being connected to nature has significant benefits for mental resilience. The European Commission (2024) defines nature-based solutions as: *"Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions."*

Have a read of some of the benefits of being connected with nature below. Whilst you read through them, keep in mind the picture bubbles of the overlap between self and nature which you reviewed in the reflective corner above.

[Discussion on green spaces in Europe]

Nature contact can be indirect, incidental or intentional. We can interact with nature **indirectly** by watching a show on nature. **Incidental** interaction may come from seeing, smelling or hearing nature on your way to work for example, and **intentional** interaction can be through gardening or visiting woodlands, beaches, parks etc. Nature contact that is built up over time is beneficial for psychological resilience (White et al., 2023).

Cognitive benefits of nature contact (White et al., 2023):

- It can restore attentional capacity.
- It can improve self-esteem, memory and self-efficacy.
- Nature can positively influence threat and coping appraisals.

Have a look at the image below of the different levels of nature based interventions

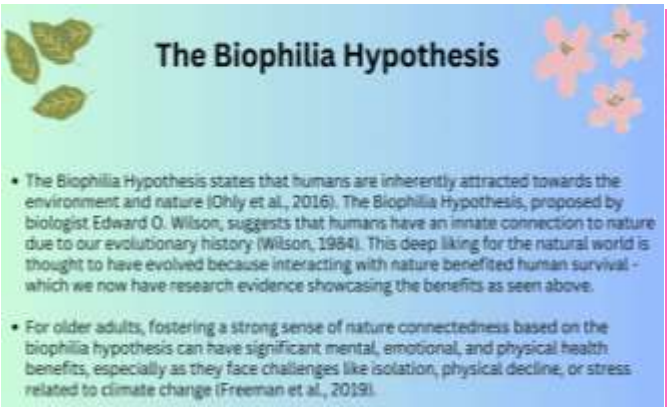
Level 1: Interventions are designed to address the general population requiring physical/ infrastructural changes. Interventions involve bringing nature to people – making it more accessible (White et al., 2023).

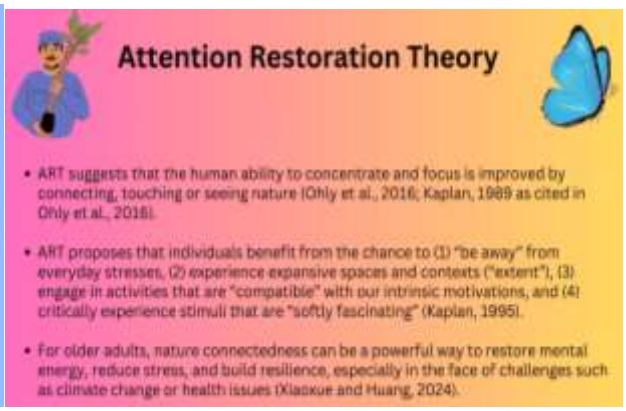
Level 2: Level 2 interventions focus on at risk population groups who may be inactive or live in chronically stressful conditions such as deprivation. At this stage, interventions focus e.g. on increasing physical nature contact or promoting psychological connection with the natural environment through forest bathing, nature walks, community gardens and wilderness therapies (White et al., 2023).

Level 3: Level 3 interventions support those who suffer from physical or mental health concerns by incorporating nature into medical or psychological treatment typically enhancing willingness to engage with these treatments (White et al., 2023).

Nature Based Solutions Theories

Two theories behind nature-based solutions are the **Biophilia Hypothesis** and **Attention Restoration Theory (ART)**. Let's now look at these in more detail with examples. Read the following info graphics and interactive booklet.





Nature Based Solutions Theories

Part 1: The Biophilia Hypothesis & Part 2: Attention Restoration Theory – Booklet Read

Biophilia Hypothesis Application

Goal: Enhance mental and physical wellbeing in older adults through biophilic practices that foster a deeper connection to nature.

13. **Nature as a Restorative Environment**

Older adults, particularly those experiencing mental fatigue or stress, can greatly benefit from nature's restorative properties, which align with the **Biophilia Hypothesis**. Interacting with nature can help restore cognitive function, reduce anxiety, and promote overall wellbeing as noted above.

Actions in this stage:

- **Nature walks and outdoor meditation**: Encourage older adults to take regular walks in natural settings like parks or gardens. These activities can help reduce mental fatigue, improve mood, and foster a sense of peace, all of which are rooted in biophilic principles.
- **Creating biophilic spaces indoors**: If access to outdoor spaces is limited, create indoor environments that mimic nature, such as rooms with plants, natural light, water features, or nature-inspired decoration. This helps bring the benefits of nature indoors and fosters the sense of biophilia.

Example: A nursing home redesigns common areas to include more plants, natural lighting, and water features like small fountains. Residents are encouraged to spend time in these areas to relax, socialise, and connect with nature, even if they can't go outside.

14. **Gardening and Horticultural Therapy**

Gardening is a direct way to promote biophilic connections, as it allows older adults to physically interact with plants and nature. This practice is therapeutic and often associated with improving mental health, lowering stress, and promoting a sense of accomplishment.

Actions in this stage:

- **Community gardening projects**: Encourage older adults to participate in community or therapeutic gardening programs, where they can grow flowers, vegetables, or herbs. The process of nurturing plants and observing them grow can provide emotional satisfaction and foster a connection to nature.
- **Horticultural therapy**: Certified therapists can engage older adults in therapeutic gardening activities, tailored to their needs, promoting both mental and physical health.

Example: A nursing home establishes a raised garden bed program where older adults can plant and care for a small garden. This not only gives them a direct connection to nature but also fosters social interaction with other participants, improving their overall well-being.

15. **Animal-Assisted Activities and Nature Engagement**

The **Biophilia Hypothesis** also extends to our liking for animals too. Animal-assisted activities and interacting with wildlife can provide comfort and companionship for older adults, reducing feelings of loneliness and promoting emotional well-being.

Actions in this stage:

- **Pet therapy**: Organise visits from trained therapy animals, such as dogs or cats, to senior living communities or nursing homes. The calming effect of animals can help reduce stress, lower blood pressure, and provide emotional support.
- **Wildlife observation**: Set up bird feeders or small wildlife habitats around living spaces to encourage older adults to observe and engage with local wildlife. This not only strengthens their connection to nature but also fosters a sense of wonder and engagement with the environment.

Example: A nursing home arranges for therapy dogs to visit once a week, providing residents with opportunities for emotional connection, physical interaction, and increased happiness. Additionally, staff sets up bird feeders outside common areas so residents can observe and interact with the birds.

Continued Biophilia Hypothesis Application

16. **Creating Nature Immersion Experiences**

Immersion in natural environments, naturally or virtually, can be restorative for older adults who may have mobility limitations or live in urban settings. This practice aligns with the **Biophilia Hypothesis** by exposing individuals to natural sights and sounds, fostering connection to the wider world.

Actions in this stage:

- **Virtual nature experiences**: Use technology, such as VR (virtual reality), to bring natural environments into homes or care facilities. Older adults can virtually visit forests, beaches, or gardens, allowing them to experience the sights and sounds of nature.
- **Nature-based audio or video content**: Provide nature recordings (e.g., birdsong, rain sounds) or nature documentaries to engage older adults in nature from a distance.

Example: A nursing home offers weekly virtual reality sessions where older adults experience nature environments like walking through a forest or sitting by a beach. This provides a restorative experience for those who cannot physically visit these environments.

17. **Social Connection Through Nature**

Nature can serve as a shared experience that brings people together. By participating in nature-related activities, older adults can form deeper social connections and reduce feelings of isolation.

Actions in this stage:

- **Group outdoor activities**: Organise group walks, hikes, or nature outings that encourage older adults to socialise while being immersed in natural environments. The shared experience of being in nature can foster bonding and improve social connectedness.
- **Eco-volunteering opportunities**: Offer opportunities for older adults to participate in community-based environmental projects, such as tree planting, park clean-ups, or wildlife conservation efforts. These projects connect them to nature and create a sense of purpose and community.

[Example of ART]

Nature Connectedness at Home

It is important to remember that there are people who cannot venture outside as much and therefore do not have a lot of access to nature due e.g., living in a predominantly urban area, being physically disabled or ill. However, there are a variety of ways to involve nature connectedness at home to bring the outdoors inside, enhance well-being, and foster a deeper connection with the environment. Here are some examples: **Indoor Plants**, **Natural Light**, **Nature-Inspired Decoration**, **Outdoor Spaces**, **Natural Sounds, Nature-inspired activities, Eco-Friendly Practices**, **Nature-Inspired Scents**. These simple and creative ways of bringing nature into your home can help foster a deeper sense of well-being and connection with the natural world.

Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

Final Assessment:

- Use the climate change resilience checklist and fill it out for a) yourself and b) a client you work with (please maintain anonymity; if you don't work with an older person, then think about someone you know in your family/friends/neighbourhood).
- Identify areas of strength for yourself and your client that can be maintained and fostered.
- Identify at least one point that can be improved.

- Use behavioural change models to identify an improvement strategy for yourself and your client (EQF6) / Identify an improvement strategy for yourself and your client (EQF5).

Please develop a powerpoint presentation and make a video recorded slide show of about (6-8 mins for EQF5) (8-10 mins for EQF6) where you elaborate on your bullet points.

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Project management relevant to climate adaption for older people MC5 EQF6

Microcredential Title	**Project management relevant to climate adaption for older people**
Short Code / ID	MC5
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, Finnish
Target Audience	Health and Social Care Professionals and students working with older people
Prerequisites	None
Awarding Institution	Karelia University of Applied Sciences
Module Lead / Author	Senior Lecturer Anne Ryhänen, Karelia University of applied Sciences

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Apply project management methods to adapt to the health impacts of climate change on the
LO 2	Engage the elderly in planning and implementing projects aimed at supporting their adaptation to
LO 3	Plan and implement projects together with other social and health sector workers and stakeholders to mitigate the health impacts of climate change on the elderly.

chAnGE Competence Area	Increased knowledge and skills about project management in the mitigation of health impacts of climate change on the elderly.
Alignment Notes	MC5 provides health and social care workers and students with basic knowledge of project management in the mitigation of health impacts of climate change on the elderly.
Keywords	climate change, project management and administration, participation methods, co-creation/co-production.

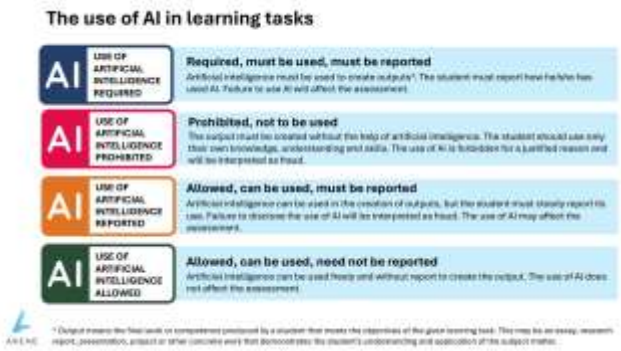
Learning Activities

E-Learning Format	Text, videos
Activities	Pre and post module quizzes, applied tasks and peer assessment.
Estimated Study Time	25 hours

Content & Topics

1. Project Management and Administration
2. Participation Methods
3. Co-production/co-creation methods
4. Evaluation and Implementation of Project Results
5. Assessment

Usage of AI
Each assignment includes instructions on how to use AI.



1. Project Management and Administration

Basics of Project Management

What is a Project?
The project is used to describe activities that are done to meet specific objectives for change. Changes that are managed in projects can be done to improve things that already exist or the introduction to new things. It might have to do with new products and services or improvement of existing ones. The principles of project management can be applied no matter what kind of a project is concerned.

Project work needs to be controlled to reach objectives that are set. However, when you work on a project with new things, outputs of the project can never be predicted with certainty.
The main way why projects are different from other work is that projects are *unique* processes with *defined start and finish points*, they are undertaken to achieve specific a*ctions for change,* and they are carried out within *defined time, cost and quality constraints*. (Simon and Murray-Webster, 2018)

It has also been said that projects require group-based work and commitment to it. The new elements or practices developed during the projects become part of routine practice. (Paasivaara, Suhonen & Virtanen, 2013)

Hartley (2020) describes essential characteristics of a project to be scope, cost, stakeholders, resources, time, and dependencies.

What is Project Management?
Why is it needed, and how does it differ from other forms of management?

Let's go through the basic concepts of project management: project, stakeholders, resources, schedule, and budget.

1. Watch the video below to learn more about the topic:

Transcript: *Welcome to the short version of what is project management. Project management involves both learned and natural skills you can learn how to manage projects, some people are naturally gifted in the areas of project management but you can learn project management. People use project management all over the world in different roles.* ***Projects*** *could be building a house, a bridge, a shopping complex, cooking dinner, almost anything that has a beginning and an end. That is the very important thing to note about project management.*

Projects have a definite ***beginning and an end*** *and the job of the project manager is to manage these short term endeavors. The end of the project could be when the goal has been accomplished or when the customer says I don't need that project anymore. Project management could be said to be a science and an art of accomplishing goals, completing tasks successfully, completing the project on time, scope and within budget.*

Project management is carried out by the ***application of methods, tactics, skills, leadership*** *and everything you've got making sure you're focused, rugged, dogged and any other valuable abilities. Project management is both a science and an art. It includes scope management, risk management, schedule management, budgeting and the art of communicating and leadership. There are 5 stages in project management initiating, planning, executing, monitoring and controlling and closing. These names speak for themselves but let's talk about these in a little bit more detail.*

Initiating *is starting off the project making sure that the project really fulfills a need and then authorizing that project. Usually, the project is authorised by the development of a project charter. That document called a* ***project charter*** *is the foundation stone of project management. This charter could be formally signed and authorised by someone known as a project sponsor or initiator. The charter authorises the project and it authorises the project manager to apply resources to the project. The project manager should lead, guide and serve the team to successfully carry out the identified work.*

After that's done the project manager should begin to identify people who could affect the project or people who would be affected by the projects outcome. These people should be plotted on a ***power interest grid*** *to identify the levels in which to engage these stakeholders throughout the project. Next the project manager and the team should develop a plan for how best to deliver the project's main objectives.*

That takes us to ***planning the project****. If you fail to plan you plan to fail so plan everything under the sun. Some areas in planning could include scheduling, cost management, scope, quality, HR, communication and risk management, to mention a few. There could be other areas not here on this slide that could be included as part of planning such as health and safety for example. Let's talk about these one by one.*

- ***Scope management*** *is all about defining in clear terms all that needs to be done to deliver the projects deliverable.*
- ***Scheduling*** *is all about developing a schedule but first you want to plan how to develop the schedule and then develop a schedule that fits the project.*
- ***Cost management*** *is next and this involves determining how much you need to get the project done making sure it's realistic and making sure you don't pad those costs.*
- *Next is* ***quality management****, determining the quality requirements and how to make sure that the deliverable is fit for use and conforms to requirements.*
- *Next is* ***human resource management*** *which involves planning how to acquire the team develop the team and manage the team.*
- *The next thing we plan is* ***communications****, what are we going to communicate, why, how and when. Next is* ***risk management****, this involves planning how to identify risks, analyse risks and respond to risks.*
- *Next is* ***procurement management****, this involves planning how to engage in any necessary contracts to procure items or resources to complete the project.*

- *Next is **stakeholder management**, planning how best to engage the identified stakeholders we talked about.*
- *Lastly, **change management**, planning how to manage change to any of those areas we talked about on the project.*

*Lastly, integrate all of those plans into what we call a **project management plan**. This master plan is a formal plan for driving the project. The project management plan is a formal documented plan usually approved by management, the sponsor and customer that should only change with their approval.*

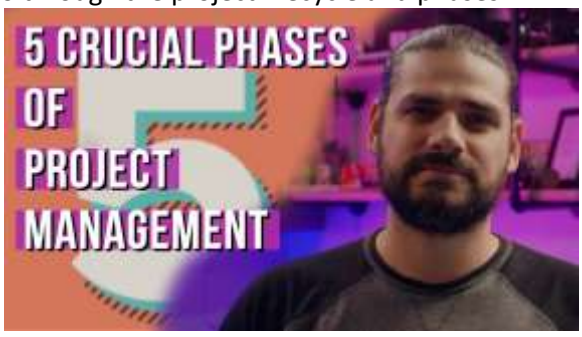
*Next we **execute the plan**. The project management plan should be executed through the implementation of identified actions in the plan. After all is said and done the project manager should be leading ensuring communication is transparent and ensuring that the team is coordinated to deliver incremental project results.*

*Another very important stage is **monitoring and controlling** and this should be done throughout the project. The moment the project is initiated, the project manager should be monitoring and controlling the project. It continues all the way to project end. A very important aspect of monitoring and controlling is known as **integrated change control**. Integrated change control is a process in project management where the project manager funnels all of those change requests that may come up to change one thing or another through a group of people known as the Change Control Board. This means that all change requests should be requested formally in an approved document.*

*Monitoring and controlling also involves that all aspects of the project management plan are working and if something isn't working then it needs to be updated or changed. As part of monitoring and controlling, the project manager and the team should seek **early feedback** from customers sponsor and end user. Early and often feedback should be solicited to ensure the project is on track and to avoid any surprises at the project end.*

*Lastly, closing, this is where we **close out the project** after all project deliverables have been approved by the customer and all requirements are met. Then the project team should transition the deliverable to the customer the project team should also take account for what went well and what didn't go so well and these are documented as lessons learned and used to improve on processes in other projects or the organisation as a whole. Typically project deliverables are transitioned over to the customers operations team and the project team moves on to yet another project.*

2. In this section, we will go through the project lifecycle and phases.



Transcript: *There are a lot of ways to run a project. But to run one successfully you have to consider all aspects of the project from scope and budget to the tasks and conversations that take place after the project is launched and executed.*
*Traditionally there are 5 stages of project management. These five stages create what is known as a **project lifecycle**. In this video I'll define the project management process and cover each phase of project management. The project management process is a series of phases that represent the evolution of a product from concept to delivery, maturity and finally retirement.*

It's made up of five essential steps:
initiation and conception,
planning,
execution,
monitoring and control
and closure.
In some ways these project management steps show what goes on behind the scenes before a project might come to a project manager's attention. Think of this as a road map to help you take a project from an idea to completion and if this process feels too rigid for you that's OK pick up the fundamentals, understand how these steps are formalized and make decisions on how the steps can apply to you, your team or your organisation. This is arguably the most critical phase of the project management process. The objective is to identify the why behind the project and the project goals and to do preliminary research on project feasibility. What happens here will set the tone and goals for what's to come.

A project usually arises from a business need or goal aimed at solving a problem or exploring new ways to do business. For instance, if a company is looking to cut down the number of customer service calls they receive they'll research and explore what's driving the number of calls. That research will then inform what can be done to reduce the number of calls. The best way to understand the challenges and goals is through a ***project brief*** *that outlines the purpose and needs of the project in conjunction with the business case. This kind of background is invaluable to a team when kicking off a project. It's also a great way to get all involved parties and stakeholders aligned on what's to come. While you can proceed without every detail documented, it's a good idea to be in agreement on goals and intended outcomes.*

The project ***planning*** *phase is where you lay out every detail of the plan from beginning to end. The plan you create here will lead your team through the execution, performance and closure phases of the project management process. Let's talk about the things you'll want to consider: first up* ***project scope*** *- it's generally good to start by defining your project scope. There are several ways to define a scope, just make sure you have a sense for how much time you want to spend on the overall project. Projects tend to go off the rails without some level of constraint or control. There's no problem with setting guardrails during the project planning phase and readjusting later if needed. When it comes to estimating you might want to use a* ***work breakdown structure*** *to help identify* ***tasks and effort****. A work breakdown structure is a visual layout that breaks out the scope of a project. Once you've made your time and effort estimates you can create a project plan that lays out phases, tasks, resources, responsibilities, milestones and deadlines. This is a critical step in managing your project so take your time and think through every step with your team.*

Because ***communications*** *can make or break a project, you'll want to think through and even document how you'll communicate as a team. Communication plans are particularly valuable when your team is large or if you have stakeholders who work outside of your organization. Your communication plan needs to set expectations for how you will communicate as a team and what information they'll receive or provide making sure to include dates check-ins status reports and other meetings.*

The last part of project planning is to make sure you got a ***risk management plan*** *in place. A risk management plan identifies foreseeable risks and how they can be avoided. It's the project manager's job to look out for risks and report them to the team. The best way to do this is to create a simple list that defines the risk, details the risk and why it exists, plans for how the risk can be avoided or solved, includes additional notes that might be important for the team and stakeholders to understand. Risk management is a conversation you want to keep going throughout the project. Keeping a list of risks on your status report helps keep them top of mind and allows the team to provide input. Having these plans in place will make the remaining stages of your project much easier.*

In this project phase the team is off and running the ***execution stage*** *is typically the longest in the project management process because it's when the actual work gets done. You'll find teams collaborating, reviewing work, presenting to stakeholders and revising. In the previous project planning phase a project manager does a lot of heavy lifting but during the execution phase a project manager guides the team and stakeholders through a series of milestones.*

In this project management step the manager is typically responsible for ***budget management, timeline management, resource planning, change management, risk management, quality management, internal deliverable reviews, communications and facilitation and meeting management*** *now that's a pretty long list, so how do project managers handle all of that? Well they stick to the plan. As we mentioned in the previous section a project brief scope and plan serve as their source of truth. Project managers use those documents to make their decisions. At the same time, a project manager needs to be in tune to what's happening with the team. This can be done through* ***regular team check-ins, conversations, status reports and timeline review and budget tracking****. Having a* ***single platform*** *to track your budget, timeline, resourcing and communications certainly makes managing projects easier.*

Stage 4 is all about making sure the project runs smoothly and making sure things go according to plan. As part of the ***project monitoring phase*** *you should keep an eye on budgets, timelines, project goals, quality of deliverables and team performance. Be sure you fully understand and embrace the project goals. Use these goals to help make decisions about design functionality and any new requests. Sometimes it's OK to stray a bit, just be sure to keep the lines of communication open with the stakeholders and bring new ideas to the table with enough time to rework them as needed.*

When it comes to quality you need to consult with leadership on company standards. As a best practice, review all deliverables before they're sent out or presented for review. First review them as a team, then individually as the project manager. Be the person who not only manages the process but also cares about the work your team and stakeholders will love you for. As a project manager you're not typically responsible for the management of people, your role is to look out for the project but the success of a project depends on the team working on it. If you see someone slacking or even unintentionally dropping the ball, it's your job to address it, just make sure you find the right avenues to address the problems and be empathetic when handling performance issues with team members. When your project is complete and everyone is happy with what's been delivered tested and released it's time to wrap up.

In the ***project closure*** *phase, the team will complete the steps needed to close tasks, hand off the project to stakeholders, finalize any reporting and celebrate the project. Many organisations move from one project to the next and don't take time to properly close down a project. It's a smart move to take a few hours to properly close, reflect and even celebrate a project. Here are a few steps you might consider:*

- *Organise a small party over lunch or after work to get the team and stakeholders together to acknowledge the hard work done and the great product produced.*
- *Conduct a retrospective meeting where you discuss what did and didn't go well, record the outcomes and share the notes within your company to improve your next project.*
- *Write a one page report on the project with details that might be useful for your organization. Information to include would be things like the project name, stated goals, date of initiation, stated deadline versus actual date of delivery, project budget versus actual budget, team members involved, stakeholders involved, project issues and pain points, project wins and just some general comments.*

Don't move on to the next thing too quickly, take the time to reflect on your work so you can continue to get better and never forget to celebrate. If there's no budget that's fine, a high 5 or a nice message to the team works really well when it comes to team morale. As the project manager the

more you can be a cheerleader for your team, the better experience you'll have working with them. Processes and frameworks are great to have in your back pocket but remember every organisation runs differently. You have to consider the people, institutional history, challenges and existing practices before you roll something out. Motivation and empathy are everything in project management so carry on, attack those projects and do what's right for everyone involved.

3. Read about healthcare project management, focus on chapters 1-3.

4. After studying the material, answer the questions below.

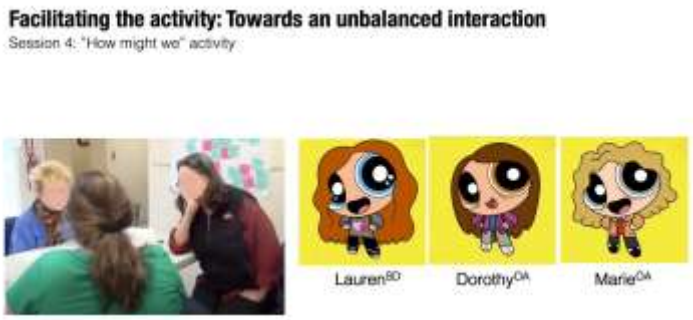
Quiz – Basics of Project Management

2. Participation Methods

Previously, users of health and social care were seen as passive recipients of services, but since then, the understanding of the client has evolved. Today, the client is viewed as an active agent, which has led to recognizing and utilizing clients' experiential knowledge as a central part of service development (Niskala, Kairala & Pohjola, 2019).

In this section, we will explore ways to encourage people to take part and commit. The goal of this section is to learn about different methods to enable participation and understand how older adults can be involved, particularly in the context of health risks and climate change. Theoretical insights and practical examples will provide the skills needed to design inclusive projects.

1. Follow the link to learn more about participation methods.
2. Watch a video on the topic:



Transcript: ***Our paper is entitled co-designing with older adults examining and reflecting on collaboration with aging communities.*** *Participatory design approaches and co-design methods have involved older adults in the design process to make sure that technologies meet the needs of older adults. These methods have also been used to challenge assumptions about older adults' abilities to contribute creative ideas to design. Prior research has provided ways to facilitate successful collaborations with older adults however understanding interactions remains an area of need to facilitate equal and equitable collaboration during design activities.*

Our study addressed that gap by ***understanding the interactions between older adults and younger adult student designers in a series of co-design activities****. Our research questions were:*
what types of interactions occur during co-design with older adults and student designers?
what types of activities lead toward balanced or unbalanced interactions?
and how might co-design sessions impact student designers' perceptions of designing with older adults?

*To understand the factors that contribute to equal collaborations between older adults and student designers we conducted **12 co-design sessions with 16 older adults and 11 student designers**. Our student designers participated in co-design sessions as well as weekly meetings where they engaged in reflection activities. We examined the team's interactions by adapting a framework. Initially aimed to understand the child-adult design partnership this framework was developed through cooperative inquiry an approach that has addressed power dynamics in intergenerational design through building a partnership.*

*The framework has four dimensions that describe **design, partnerships, facilitation, relationship building, design by doing and elaboration**. Each dimension can be described as balanced or towards unbalanced interactions. This is a list of our co-design sessions, there are 6 in total one for each week. Each session was 90 minutes long. The structure of the sessions followed the human centered design approach and the goal for each team was to create a low tech prototype of the health and well-being technology. These are the reflection activities that the student designers engaged in. The activities have students either reflect on a specific session or across several sessions to gain broader learnings.*

Our findings demonstrate that developing a co-design partnership is complex. The framework helped surface factors like sharing life experiences and role ownership that influence balanced or unbalanced interactions. We found that that we were able to adapt Yip et al.'s framework to teams of older adults and student designers to describe their interactions during design activities. We learned that the facilitation dimension was too broad. We found that there was a difference between facilitating the activity and facilitating the discussion.

I will walk us through one example. We saw the strongest impact on relationship building during the timeline activity when team members shared events in their lives that influenced their perceptions of health and well-being. This dimension which is facilitating the activity examines how the activity or task is carried out. There are several instances when student designers shared this role leading toward a balanced interaction.
This example happened in session one when the older adults started grouping when sharing their perceptions. This team has four members two student designers Jake and Lily and two older adults Michelle and Lena. When Jake shared his sticky notes about mental health insecurity, Michelle the older adult surveyed the table and suggested a grouping for the sticky note - security. Lily said, "well later in the session we're going to put all the sticky notes on the wall" however Michelle surveyed the table and suggested to Jake "I think your mental health sticky goes with this humor and balance fun and stuff" then Lena chimed in with a similar sticky thing "I got balanced" and passed it to Michelle. Jake said "I think we're doing grouping afterwards right?" Lily confirmed, however Lena and Michelle continued to group and so Lily and Jake went with it.
The sharing and grouping continued. Michelle and Lena handed Lily a succession of similar stickies. Lily accepted them and said "oh wow these are great". Michelle then said "we are doing our group thing over here". This example is towards balanced facilitating the activity because the older adults push for a different approach to the activity. The student designers tried to push back but ultimately decided to go with the older adults suggestion.

*Throughout the study we saw student designers take on the **facilitator role** by setting the direction of the activity. In session four teams were tasked to narrow down the design space and develop personas. A team with one student designer named Lauren and two older adults Dorothy and Marie sat at their table and worked on the "how might we" statement a design activity to help explore a design space and target user. Dorothy the order adult was quiet. Lauren asked "how do you feel about that?" indicating a draft of the "how might we" statement. Dorothy replied "well I'm just thinking I would approach this differently and so I'm just kind of.."*
Marie the other older adult wanted to learn more and so Dorothy continued "I mean it's just probably because of my background in writing and so forth, I would probably create the person and then think about sort of what we're doing I mean all of this is fine I'm just saying.." then Marie said "oh let's do the person I'd like that" Lauren starts to say something but Dorothy interrupted and said that this

approach that they're doing is "more incremental more logical" and then said "I'm random and abstract". Lauren mentioned that the order of activities could vary and that they could continue to iterate on the "how might we" statement and on the persona as they went along.
This is toward an unbalanced interaction because although Dorothy suggested an alternative approach there was no negotiation between the older adult team members and student designers.

In this section I'm going to highlight what older adult participants and student designers shared about their experiences and the co-design session. At the end of the last session we asked older adults questions about their overall experience of the study. Older adults expressed their surprise and enjoyment about their participation in the co-design session. So here we have a quote from Lena who says "this is much more fulfilling and fun" and I ask how is it more fulfilling "well you're actually planning for a new technology rather than sitting around and just evaluating old technology. I think to be in the process of design integrating into the whole idea of being involved in technology and the overall process of something or possibility of designing is really much more".
Through student designers reflections we've heard that the co-design study led students to acknowledge their assumptions about older adults. Here we have a quote from Jake who said "before attending my first session with the older adults I had this assumption going into it that I would have to do a lot of explaining talking slowly facilitating more etc. however working with these older adults was very different because older adults there is a huge age range where these people will have very different capabilities". Student designers identified balancing the role of a facilitator and co-designer as a challenge throughout the sessions. Jenny talks about wanting her adult team members to take more ownership of their work. She says "some things I wish I could have improved would be having my older adults present more of their work".

Here we provide some considerations for designers and researchers who are collaborating with older adults.

- *We observe power dynamics weighing more heavily toward designers to facilitate design activities. It seemed natural that student designers took the lead in facilitating the activity because of their design knowledge however in future co-design collaborations we can have expectations of each person's role on the design team and communicate that approach for the design activities can be negotiated to best meet the team's relationships and dynamics.*
- *We suggest co-design activities that support sharing life experiences because it can support relationship building like the timeline activity talked about earlier and while we worked with site coordinators and students to plan the study, getting feedback on the sessions length and the number of sessions, we learned from the older adults in our study that they wanted longer and more sessions because it took them time to get into the flow of activities.*
- *Engaging older adults in student planning can help better define session parameters, support ownership in the design process and promote balance interactions and facilitating the activity.*

After this complete the task: How to enable participation of older adults? Forum

Choose one method that you would use when you want to encourage older adults to take part and express their opinions. Study the method in more detail. Describe the key features and challenges of the method for this age group (200-300 words). Comment on one fellow student's introduction and evaluate how well the chosen method suits this group, providing justification for your opinion.

3. Co-production in social and Healthcare Projects

Co-creation, co-production, co-design, co-development, co-construction, and co-innovation are conceptions that are used in the context of social and health care (Gremyr et al. 2021). In this micro credential, the concept of co-production is mainly used. Engaging staff, clients, and other stakeholders in developmental activities is a modern approach to social and health care projects.

1. Watch the introductory lecture (about six minutes):

Transcript: ***Co-production*** *means to me is where we work together to improve something and in our social care sense that means working with people who work in services, people with lived experience and people that support them such as their carers and families and people come together to work together to create whether it's policies, services, solutions, ideas and to make things better. It's really important because people themselves understand their needs best they also understand what they want and they have that direct experience of the care and support and they can understand whether it's working, whether it's not working, how things are improving so that interaction between people that are offering the support and people that are receiving the support having that negotiation about how to make things better is so important because it makes it better for everybody in terms of outcomes.*

We're here in public service to try and do a really good job that's what we care about, that's what were passionate about, that's what were here for, it's about having that impact on people. We don't know that we're doing that in the right way unless we hear from somebody about that impact. It's understanding whether it's worked, whether it comes back to what I said about social care, what is there to do to improve somebody's life and well-being we don't know if we've achieved that unless we hear from the person themselves about whether that's their experience - so did they feel listened to, have we improved their lives after having a session in one of our services, has that delivered that improvement that we wanted.

Co-production is another way of listening but it's listening at the start. It's about trying to get that thing right at the start of that journey so trying to then negotiate whatever we do whether that's a policy, a service change or even develop a new approach we're trying to get it right from the start in the best way we can. I think one of my important bits of learning is that the process of co-production has benefits to all of us that are involved so there's a real feeling of mutual empowerment and it makes us feel good. That whole journey of being together, working together adds value back to our lives and the group has said to me that they felt so empowered and engaged.

2. Here You can study more about co-production in social and health care: A guide about co-production in social and health care Read at least pages 15-19.

3. Read an article about virtual co-production. Open the article from the link, and then right-click to bring up the option **"Translate to English".**

4. Read an article about the challenges of co-production in social and health care. Open the article from the link, and then right-click to bring up the option **"Translate to English".**

5. Finally, do the applied task: Plan a workshop Forum

Picture: AI

Design a workshop for home care/nursing home **staff** on the topic of mitigating the health impacts of climate change on the elderly. How do you take into account the challenges of the social and health care sector when planning a workshop?

- What are the objectives and methods of the workshop?
- What broader context is this workshop part of?
- How will you implement the workshop in practice? Platform (if virtual workshop), invitations, scheduling, etc.
- Who else besides the staff will you invite to the workshop?
- Working phase: How do you engage participants? What kinds of tasks are included in the workshop? (e.g., small group work, use of different platforms such as Miro, Jamboard, etc.)
- How do you summarize the results of the workshop, and how will they be utilized in future work?
- How will co-development progress?
- How will you collect feedback on the workshop?

Submit your plan to the discussion area as a new thread. Comment on at least three sections (1–7) of one peer plan.

Evaluation Questionnaire
Students' Evaluation Questionnaire (During the training)
Please try to answer these questions as honestly as possible.
The questionnaire aims to evaluate the goals achieved halfway through your attendance at this training.

4. Project Evaluation and Implementation of Results

Evaluating and embedding project results into practice are essential parts of a project. Project evaluation refers to assessing the project's activities, outcomes, impacts, and overall effectiveness. Evaluation can be conducted as an external review or as a self-assessment. It may serve as a tool for internal project development or for reporting results to stakeholders, funders, or the general public. Particularly important is the evaluation of whether the project's goals have been achieved. (Suopajärvi 2013, 9)
In addition to assessing goal achievement, evaluation can focus on various project processes such as administration, communication, collaboration, and networking. It may also include an assessment of

project workers' experiences regarding the project's implementation. Evaluation should be systematic and described as transparently as possible. Failures should also be reported. (Suopajärvi 2013, 10)

Quality management is an integral part of project work and closely linked to evaluation. Quality management often refers to continuous improvement based on the so-called Deming Cycle (see Figure 1). Quality management is planned in advance, during the project planning phase. The achievement of project goals is monitored throughout the project, and if any quality issues are identified, corrective actions must be taken. Project quality is managed throughout the entire lifecycle of the project. The term *quality assurance* is also used in this context. (Kymäläinen, Lakkala, Carver & Kamppari 2016, 55)

Figure 1: Deming`s Quality Cycle (adapted from Kymäläinen et al. 2016)

Evaluation is an important aspect of quality management throughout the entire duration of a project. Evaluation involves examining the "appropriateness and the ability to meet set requirements." Related terms include monitoring, supervision, and reviewing. The implementation of evaluation should be included in the project plan.

Familiarize yourself with the following materials:

1. Review the infographic on-quality assurance and project evaluation.
2. Listen to a podcast featuring the experiences of a university of applied sciences lecturer who has worked on social and healthcare sector projects and discusses embedding project results.

Transcript: Anne Ryhänen: *Welcome to this interview, which focuses on embedding project results. To start, could you tell us a bit about yourself?*
Anneli Muona: *Thank you, Anne. Yes, I'm Anneli Muona. I hold a Master's degree in Sport Sciences and I'm also a specialist physiotherapist. I worked at Karelia University of Applied Sciences as a senior lecturer for over 30 years. Toward the end of my career, I was also heavily involved in project work. I'm now retired and run my own company, CareCare, which I continue to manage in my day to-day life.*

Anne Ryhänen: *Great. Could you tell us about the kinds of health and social care projects you've worked on?*
Anneli Muona: *Sure. For example, there was the AVOT project—Valuing Aging by Supporting Independence— which was a key project under the Sipilä government. Then there was the*

"Partnerships for Impactful Services" VAPAA project, which aimed to promote networking among entrepreneurs in the welfare sector. Also, the Kaivonpuisto development project, where we created an age- and memory-friendly park environment in the city of Joensuu. And then various projects on aging expertise, like SEI Arena and Senior Yard, among many others over the years. Most recently, I've also been involved through my company in both product development and international (EU) projects.
Anne Ryhänen: *So you've certainly been involved in a lot. Could you give an example of a project where embedding results was particularly successful?*
Anneli Muona: *Definitely. The AVOT project—Valuing Aging by Supporting Independence—achieved significant results in developing home care for older adults.*

Anne Ryhänen: *What made that project especially successful?*
Anneli Muona: *There were likely several reasons, but one major factor was the multidisciplinary collaboration. The project brought together various actors: public health services, social services, educational institutions like the university of applied sciences and vocational colleges, with students from both, and third sector organizations, including disability associations and local churches. Another key factor was the strong commitment from leadership, starting from national government down to regional actors.*

Leadership within Siun sote's elderly services and local supervisors in the region actively embraced the project goals. Staff competence was supported through workshops, enabling the whole work community to develop practical shared practices. Lastly, a clear process description and monitoring system were developed. A client activation process was integrated into the home care model and included in the management system. Clear performance targets were set and monitored annually. This helped ensure continuity and long-term tracking of outcomes.

Anne Ryhänen: *Can you then give an example of a project where embedding results didn't go quite as expected?*
Anneli Muona: *Yes—the VAPAA project, which aimed to create networks among welfare sector entrepreneurs for developing new impactful services. The first challenge was the COVID-19 pandemic, which completely changed the operating environment. Planned seminars and workshops had to be rapidly moved online. For instance, our opening seminar was transformed into a remote event on the very day we received a nationwide ban on gatherings. The entire project took place during the pandemic, which really limited opportunities to build trust-based and impactful networks. And since networking was the project's core goal, it became clear that it's very hard for businesses to share sensitive business information and innovate solely through remote meetings—trust usually requires face-to-face contact. Another issue was the lack of skills for remote working. Project staff weren't prepared for online facilitation, and participants had no prior experience with such methods. So both implementation and embedding results were very challenging.*

Anne Ryhänen: *But I guess there were also lessons learned.*
Anneli Muona: *Yes. For example, we should have provided more training on remote work—for both project staff and participating entrepreneurs. That way we could have supported more effective facilitation and participation. Generally, developing alternative implementation models early on would've been crucial. Innovative responses like hybrid models or rescheduling events for in-person meetings could have helped. Simulated exercises or small group meetings might also have reduced trust-related barriers. We did try to get an extension from the funder, but unfortunately, the stance was that the project had to proceed as planned, though we were given a slight time extension.*

Anne Ryhänen: *Indeed. Resistance to change is pretty common whenever you're initiating new development efforts. How has this manifested in the projects you've been involved in?*
Anneli Muona: *Probably most visibly through low participation. Attendance at project events has sometimes been poor, often with "being too busy" as an excuse. This could suggest that the need for change is not fully understood or prioritized. It may also be that people feel their responsibilities*

increase, and that the new tasks brought by change raise concern or resistance. Especially if the changes don't seem personally meaningful or realistic.

Anne Ryhänen: *So how has this been addressed?*
Anneli Muona: *Clarifying the need for change is crucial—everyone must understand why the change is necessary. Concrete examples of the benefits and effects of change on employees, clients, and organizations help foster commitment. Project goals should be communicated clearly and linked to participants' own work to motivate engagement. The role of frontline management is essential. How they communicate, whether they foster open dialogue and transparency, makes a big difference. Information sessions must be held, proper documentation must be in place, and continuous support provided.*
Change is not a one-time event; it requires sustained support and leadership commitment. Clear operating models and support for adopting new processes are also key. Creating enthusiasm through real-world examples and showcasing positive outcomes helps motivate people. Managers also need concrete tools to support coaching and bringing up issues regularly in team meetings. Measurement and concreteness are important—change must be monitored so that potential issues can be identified early. With these practices, resistance can be transformed into acceptance or even enthusiasm when people see the change as useful and feasible.

Anne Ryhänen: *Exactly. To conclude, could you name three key elements that support successful embedding of project results?*
Anneli Muona: *Right timing and clarifying the significance of the change are crucial. There must be a clear need and the right moment when implementation is relevant to all stakeholders. Goals and benefits must be communicated clearly so participants understand the relevance to their own work and to the organization. Management commitment and participation are key. Management must respond to resistance and provide support, training, and resources. Institutionalization and monitoring. Established practices must be documented and integrated into organizational structures— such as management systems or process descriptions. Progress should be monitored and measured regularly to ensure real implementation. Metrics and evaluation tools help demonstrate impacts and allow for adjustments if needed.*

Anne Ryhänen: *So embedding actually begins before the project starts—and continues long after it ends.*
Anneli Muona: *Exactly, those are the conditions for a successful project.*
Anne Ryhänen: *And necessary actions. Thank you, Anneli.*

Read an article about evaluation and embedding results in social and healthcare projects.

After reviewing the materials, complete the short quiz below.
Quiz - basics on project evaluation

Answer the questions based on the materials mentioned above. One or many options can be right.

Assessment – Summative Poster Assignment

Assessment Type	Poster assignment

The final assignment for the course is a poster-format task where you can apply what you've learned about project management, co-creation, and engagement. ***You can find an example poster in the assignment submission area.***

1. Create a poster-format project plan on the topic: Mitigating the health impacts of climate change on the elderly. You can choose the environment and target group yourself. The implementation must be in poster format, for example, made with Canva or PowerPoint.
2. Peer review one fellow student's poster, considering at least the following aspects:
    - Were the project phases considered in the project plan?
    - Was the engagement of the elderly considered in the plan?
    - Was the plan feasible/realistic?
    - Is the poster visually clear and engaging?
3. After this, you should complete **the final test**, which will allow you to assess the development of your own knowledge and skills.

Poster presentation Forum

Submit your poster here. There is one example poster in the submission folder.

Postquiz

Check your knowledgeQuiz

References:Page

Students' Evaluation Questionnaire (After the training)URL

meCUE QuestionnaireURL

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Inclusive leadership in climate adaptation in health and social care setting MC6 EQF6

Microcredential Title	**Inclusive leadership in climate adaptation in health and social care setting**
Short Code / ID	MC6
ECTS Credits	2 ECTS
Duration	50 hours
Delivery Mode	Online
Language(s)	English, Finnish
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Karelia University of Applied Sciences
Module Lead / Author	Elina Turunen and Marika Lappalainen

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Analyze and apply inclusive leadership strategies that consider the diverse needs of clients, staff and communities within the context of climate adaptation in health and social care settings.
LO 2	Identify and implement sustainable strategies, incorporating innovative and environmentally conscious practices to mitigate the impact of climate change within these facilities.
LO 3	Design and implement resilience-building plans that address and respond effectively to climate-related challenges within health and social care facilities.

chAnGE Competence Area	Management skills.
Alignment Notes	MC6 provides advanced understanding and practical skills for leaders, health and social care professionals and students, equipping them with the knowledge needed to provide inclusive leadership in climate adaptation.
Keywords	inclusive leadership, climate change, health and social care.

Learning Activities

E-Learning Format	Text, Interactive Thinglink content and Youtube videos.
Activities	Pre and post module quizzes, self-assessment test, peer feedback assignment
Estimated Study Time	50 hours

Content & Topics

1. Leading inclusively in climate adaptation.
2. Identifying and assessing the needed level of adaptation to climate change within the own health and/or social care facility.
3. Building resilience in health and social care settings.

1. General info

Welcome to study inclusive leadership

If you need basic information on the health impacts of climate change, we recommend starting with the MC 1: Understanding Climate Change.

As the world grapples with the effects of climate change, health and social care settings must adapt to new challenges and prioritize sustainability and inclusivity.

This MC aims to foster advanced understanding and practical skills for leaders, health and social care professionals and students, equipping them with the knowledge needed to provide inclusive leadership in climate adaptation. This course is designed for professionals and students in the social and health care sector, as well as anyone interested in leadership. It is a level 6 course, aligning with the learning objectives of an undergraduate degree.

Learning outcomes:

After completing this course, you will be able to:

- Analyse and apply inclusive leadership strategies that consider the diverse needs of clients, staff and communities within the context of climate adaptation in health and social care settings.
- Identify and implement sustainable strategies, incorporating innovative and environmentally conscious practices to mitigate the impact of climate change within these facilities.
- Design and implement resilience-building plans that address and respond effectively to climate-related challenges within health and social care facilities.

Key content:

- Leading inclusively in climate adaptation
- Identifying and assessing the needed level of adaptation to climate change within the own health and/or social care facility
- Building resilience in health and social care settings

Completing the MC and evaluation

The MC is worth 2 ECTS credits, equivalent to 50 hours of learning. Student work includes time for in-depth learning.

Workload	Student work
Review of relevant literature and video content	30 hours
Preparation for the self-assessment test	10 hours
Peer feedback assignment	15 hours
Total	50 hours

Successful completion of the MC requires thorough engagement with the provided materials and the satisfactory completion of Self-assessment test and Peer feedback assignment. Successful completion of the assignments requires a minimum score of 40%.

Competence Criteria

Assessment is based on the learning outcomes defined for the course. You can find a more detailed description on the evaluation criteria in the course description.

Excellent 81–100 %	Good 61–80 %	Satisfactory 40–60 %	Fail
Performance/ implementation demonstrates a broad range of knowledge and skills related to the learning outcomes.	*Performance/execution demonstrates mastery and consistent use of basic knowledge and skills related to the learning outcome.*	*Performance/execution demonstrates mastery of the basic knowledge and skills related to the learning outcome.*	*Performance/implementation shows errors and/or significant gaps in basic knowledge and skills related to the learning outcome.*
Performance/execution demonstrates the ability to apply, integrate and develop knowledge and skills related to the learning outcomes. Discussion of the topic demonstrates the ability to evaluate, analyse and compare.	*The subject matter demonstrates the ability to apply and use the knowledge and skills related to the learning outcomes.*	*One-sided, limited and/or detached treatment of the subject.*	*There are errors and/or significant omissions in the treatment of the subject.*
In relation to the learning outcome, implementation meets all the requirements set for it.	*In relation to the learning outcome in concerned, the implementation meets the basic requirements.*	*In relation to the learning outcome, the implementation meets the minimum requirements set for it.*	*In relation to the learning outcome, the implementation does not meet the minimum requirements.*

The MC may be completed at your own pace, with a maximum duration of three months from the commencement date. Upon meeting all MC requirements, participants will be awarded a certificate of completion.

Pre and Post Quiz 10 Questions -

This quiz will **not affect your grade** in any way. It is purely for learning and reflection. After completing the quiz, you will receive **feedback** on your responses. This is an opportunity to see your own growth—so give it your best effort and enjoy the learning process!

2. Introduction to Inclusive Leadership

Inclusive leadership has been defined as a positive leadership approach that creates conditions fostering a sense of belonging among community members while valuing individuality and participation in shared processes and outcomes. Inclusivity can also be seen as an organizational culture where diversity is consciously appreciated, and community members ensure from their perspective that everyone feels welcome, noticed, and valued.

Inclusive leadership as an approach guides and supports people and organizations by considering environmental issues. It encompasses dimensions that promote effective operations and impact.

Inclusive leadership can positively influence work satisfaction, the integration of new employees into the workplace, and staff commitment to equality.

An inclusive leader is an ethical, moral, and value-based role model who can influence the formation of an environmentally responsible organizational culture. The changes and extreme conditions caused by climate change have holistic effects on individuals, especially elderly, so particularly in the social and healthcare sectors, these challenges must be acknowledged, identified, and addressed to promote the well-being and health equity of both staff and clients.

The dimensions of inclusive leadership can be categorized into personnel management and organizational culture, both grounded in environmental responsibility. The fundamental principles of inclusive leadership encompass humility, curiosity, openness, creating space for others, and an awareness of personal and organizational limitations. Inclusive leadership is built upon cultivating a sense of belonging and promoting collective learning.

An inclusive leader consciously aims to empower members of the work community and promote psychological safety through visible and genuine commitment to diversity and equality. Strong cohesion enhances organizational commitment and strengthens resilience in the face of changes and challenges. Understanding cultural intelligence, diverse thinking, and strong collaboration skills can promote individual and organizational innovation, creativity, and productivity.

Environmental responsibility and the promotion of sustainable development principles, across ecological, economic, social, and cultural dimensions, are central to inclusive leadership. Climate change-related extreme conditions such as storms, wildfires, floods, and extreme heat or cold, can impact individuals directly, indirectly, or through mental strain. An inclusive leader is aware of the effects of climate change, supports the work community and clients in adapting to it, and consciously makes responsible choices to mitigate its impacts.

Please examine inclusive leadership from multiple perspectives using the provided Thinglink-tool.

Begin with Knowledge Point 1, then proceed in any order you prefer. Each knowledge point contains relevant content and reflective questions.

Once you have completed reviewing the materials within the Thinglink-tool you can proceed to the Test and Assignment section.

1. Inclusive leadership

In this knowledge point 1, you will learn basic principles of inclusive leadership. The task includes three independent reflection exercises based on one short video clip and one short article.

Inclusive leadership is increasingly recognized as a vital skill for organizations. A key factor in fostering inclusiveness is a leader's visible awareness of bias, which is important trait for creating an inclusive environment. To fully leverage this awareness, leaders must demonstrate humility and empathy.

Watch the following video Workplace Inclusion and reflect on:

1. **How you can promote inclusivity in your own work community?**

Explore the following article The Key to Inclusive Leadership and consider:

2. What is the uniqueness of inclusive leadership compared to other leadership theories?

Based on the previous materials reflect:

What is the significance of inclusive leadership in delivering social and healthcare services for the elderly?

2. Equity

Equity lies at the heart of inclusive leadership. Leaders ensure that all individuals have equal access to opportunities, resources, and advancement, regardless of their background or identity. This involves tackling systemic obstacles and prejudices that might prevent certain groups from succeeding within the organization.

What does equity in the workplace mean and why is it important?

Read the following blog Understanding equity in the workplace: Key principles and importance and **reflect how the things presented there are implemented in your own workplace.**

3. Belongingness

In this knowledge point, you will learn about enhancing one's sense of belonging through inclusive leadership, you will review and reflect research findings.

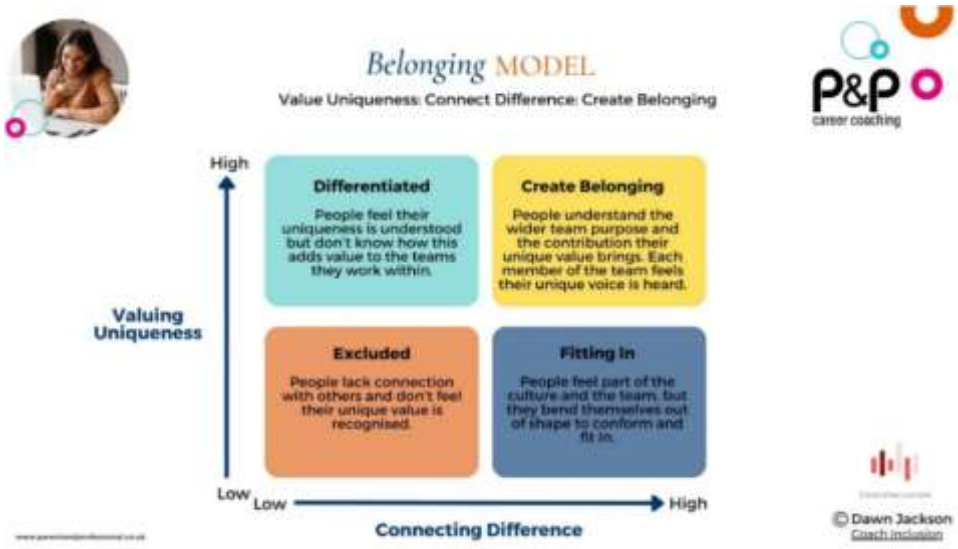
Belongingness is the fundamental human demand for forming and maintaining strong and stable relationships with other people. In addressing employees' need for belongingness, individual employees need their leaders' support for being a group member, ensuring jus-tice and fairness, and sharing decision-making.

Group belongingness does not mean assimilation into the dominant culture, employees from minority groups also need to be valued for their uniqueness and the potential this brings for creativity and innovation.

Valuing employee uniqueness requires organizational leaders to have policies and practices that encourage diverse voices and support group members to fully contribute to organizational processes. Individuals perceive full belongingness not only when their voices are included and they are treated equally, but also when their uniqueness including language, spirituality, and humor are encouraged and valued.

Refer to the article by Alang & Stanton (2022), Enhancing Employee Voice and Inclusion Through Inclusive Leadership in Public Sector Organizations, focusing particularly on the research findings on pages 321-322.

Reflect on how, according to the findings, an inclusive leader can enhance an individual's sense of belonging.



4. Valuing indigenous diversity

The workplace is a hub for diversity and inclusion. Modern organizations are increasingly dedicated to fostering an inclusive environment that accommodates all employees, including those from indigenous communities.

Empowering indigenous voices in the workplace can bring significant benefits for both employees and the organization. This approach not only enhances workforce diversity but also cultivates a more positive and inclusive organizational culture, ensuring that indigenous perspectives are acknowledged and valued.

Review the findings of the article Alang & Stanton (2022), Enhancing Employee Voice and Inclusion Through Inclusive Leadership in Public Sector Organizations, focusing particularly on pages 319-321.

Reflect on how, according to the findings, an inclusive leader can promote workplace diversity and why you think this is important?

5. Health equity

"Health equity is defined as the absence of unfair and avoidable or remediable differences in health among population groups defined socially, economically, demographically or geographically" (WHO 2024).

WHO Health equity

Inclusive leadership promotes health equity by galvanizing organizations in practices that give every person the opportunity to achieve their full health potential.

First, watch the following video Health Equity.

Then read the article "Inclusive leadership to guide nursing's response to improving health equity", specifically the recommendations for inclusive nurse leaders in Table 1 on page 15.

Reflect on how you can promote health equity in your work as well as the role of inclusive leadership?

6. Green inclusive leadership

In this knowledge point, you will learn what green inclusive leadership means and reflect on how you can contribute to its implementation.

Green inclusive leadership reflects an openness to employee suggestions for green ideas, a willingness to discuss with employees the organization's environmental goals, and an acceptance of employees' input regarding ecological challenges.

Green inclusive leadership influences employee green behaviours. Employees' perception of green inclusive leadership may positively affect on employee green behaviour and enhance employee awareness of environmental goals and green organization identification so that employees are more likely to behave environmentally. Green inclusive leadership can create a green psychological atmosphere and increase engagement with green work.

Policies and measures implemented by the human resource management (HRM) department can also influence and alter employees' working attitudes and behaviours. HRM measures in green management are called green HRM practices, specifically incorporating environmental protection and green sustainability concepts into various HRM modules. Employees will be more likely to engage in green behaviours if they know that a high-level green human resource management practices are being implemented in the organization.

Examine the following article Quan, Tian & Qui 2022, The Study on the Influence of Green Inclusive Leadership on Employee Green Behaviour **and reflect the questions:**

1. What were the research hypotheses (see section 2: Research Hypothesis)?

2. What were the research findings (see section 5.1: Research Conclusions)?

3. What recommendations for practice have been suggested based on the results (see section 5.2: Implications for Practices)?

4. How you can personally promote the principles of green inclusive leadership and consider its significance in the context of leadership in services for elderly.

7. Green Leadership

In this knowledge point, you will learn about green leadership from the organizational and individual perspectives.

Organizations must take action to reduce the negative impact of their activities on the environment. The social and healthcare sector can be considered a vital part of the service industry and a key focus area for organizations addressing environmental issues related to waste management. Especially the healthcare sector also encompasses the management of hazardous materials.

Managers play a pivotal role in ensuring that healthcare services are not only high-quality and cost-effective but also environmentally sustainable. By prioritizing initiatives such as sustainable mobility, green procurement, water conservation, recycling, and energy efficiency, they can effectively address environmental challenges while promoting the responsible use of natural resources.

Green human resource management aims to stimulate environmental consciousness among employees, fostering environmentally friendly behavior within the workplace.

Green transformational leadership inspires and empowers employees to participate in eco-friendly practices by providing guidance and resources. This approach fosters a psychological green climate,

promoting sustainability and environmental responsibility within the workplace, which in turn enhances overall organizational performance. At an individual level, green transformational leadership positively influences employees' personal green organizational identity, fostering a sense of alignment with the organization's environmental values and commitment to sustainability.

Green transformational leader empowers employees by encouraging them to acquire new knowledge, actively engage in green processes, and participate in environmentally responsible activities, thereby enhancing their environmental performance.

Organizations achieve long-term profitability by implementing green human resource management, which integrates sustainable practices that balance environmental, social, and economic objectives. Green human resource management supports green management by integrating environmental considerations into HR functions and incorporating sustainability-focused modules into organizational practices, which regulates employee green behavior at the institutional level.

When an organization acknowledges psychological green climate as a valuable resource for addressing environmental concerns, employees are more likely to engage actively in green initiatives and contribute to sustainable development.

Examine the following research article: Green Transformational Leadership: Bridging the gap between Green HRM Practices and Environmental Performance through Green Psychological Climate

1. Explore what practical recommendations are presented based on the research findings (5.2. Practical Contribution).
2. Examine what is the relationship between Green Human Resource Management (GHRM), Green Transformational Leadership (GTL), Psychological Green Climate (PGC), and Environmental Performance (EP) (Figure 1: Theoretical Framework)?
3. Consider the specific characteristics of elderly care that require environmental awareness from the organizational and employee perspectives.

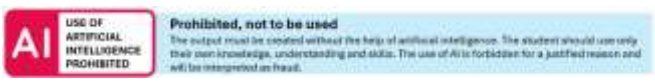
Assessment 1

Assessment Type	Multiple Choice Questions
Pass Mark / Criteria	Pass mark 40%

Self-assessment test. The basics of inclusive leadership

The self-assessment test consists of 15 multiple-choice questions, each with three answer options, of which one is correct. You have 30 minutes to complete the test. A passing score requires at least 40% of the answers to be correct. You can retake the test twice.

Attempts allowed: 3; Time limit: 30 mins; Grading method: First attempt; Grade to pass: 6.0 out of 15.0



Assessment 2

Assessment Type	Written Assignment
Pass Mark / Criteria	Pass mark 40%

3. Peer feedback assignment - Leading Climate Adaptation

Instructions:

Identify and evaluate the necessary level of adaptation and resilience-building your health or social care facility must undertake in response to climate change

Step 1. Assessment:

- Conduct an initial evaluation of your facility, identifying areas vulnerable to climate-related risks (e.g., flooding, heatwaves, storms, extreme cold).
- Gather relevant current climate data pertinent to your location. You can use different databases for example Google Scholar.

Step 2. Analysis:

- Identify specific risks climate change poses to your facility's operations, infrastructure, staff and elderly.
- Determine the potential impact and urgency of addressing each identified risk, paying particular attention to the elderly as a vulnerable group.

Step 3. Adaptation Planning:

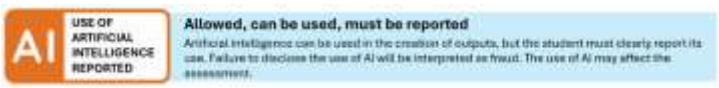
- Propose feasible and effective adaptation measures that your facility could implement to address climate-related risks and build long-term resilience.
- Prioritize these measures based on urgency, feasibility, and anticipated effectiveness in enhancing the facility's adaptive capacity and resilience.

Step 4. Report:

- Summarize your findings and recommendations in a concise report (max. 500 words)
- Clearly outline the rationale for each adaptation measure recommended, with special consideration for measures protecting elderly populations.
- Submit your report. Ensure all findings are supported by credible references and evidence.

Step 5. Review, give feedback and rate

- Review and comment on at least one report submitted by your peers.
- Provide constructive feedback highlighting strengths, suggesting improvements, and posing relevant questions.
- Assess the task according to the evaluation structure on a scale of 0–100%.



In addition, the teacher will assess and provide feedback on the assignment.

Passing threshold is 40 %.

Competence Criteria			
Assessment is based on the learning outcomes defined for the course. You can find a more detailed description on the evaluation criteria in the course description.			
Excellent 81–100 %	**Good 61–80 %**	**Satisfactory 40–60 %**	**Fail**
Performance/ implementation demonstrates a broad range of knowledge and skills related to the learning outcomes. *Performance/execution demonstrates the ability to apply, integrate and develop knowledge and skills related to the learning outcomes. Discussion of the topic demonstrates the ability to evaluate, analyse and compare.* *In relation to the learning outcome, implementation meets all the requirements set for it.*	*Performance/execution demonstrates mastery and consistent use of basic knowledge and skills related to the learning outcome.* *The subject matter demonstrates the ability to apply and use the knowledge and skills related to the learning outcomes.* *In relation to the learning outcome is concerned, the implementation meets the basic requirements.*	*Performance/execution demonstrates mastery of the basic knowledge and skills related to the learning outcome.* *One-sided, limited and/or detached treatment of the subject.* *In relation to the learning outcome, the implementation meets the minimum requirements set for it.*	*Performance/implementation shows errors and/or significant gaps in basic knowledge and skills related to the learning outcome.* *There are errors and/or significant omissions in the treatment of the subject.* *In relation to the learning outcome, the implementation does not meet the minimum requirements.*

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Applying crisis management MC7 EQF6

Microcredential Title	**Applying crisis management**
Short Code / ID	MC7
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, Greek
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Exelixi
Module Lead / Author	Akrivos Christos

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Analyse the reasons of crisis.
LO 2	Evaluate the importance of each type of crisis
LO 3	Simplify the sequence of activities taken when applying crisis management
LO 4	Determine which actions must be taken to evaluate a crisis
LO 5	Decide which communication tools must be used and by whom to eliminate the negative implications of a crisis on organization's brand.

chAnGE Competence Area	The aim of this course is to provide health and social care workers, particularly those who work with older populations, with the necessary skills and abilities needed in applying crisis management due to climate change.
Alignment Notes	The structure of the course will reflect the crisis management process: • Prevention • Preparation • Response and • Long-term planning Emphasis will be placed on practical application of crisis management tools and mechanisms for all health care professionals at all levels, with copious use of real-life examples in health and social care organizations.
Keywords	climate change, health education, health, resilience, education material, older adults, climate mitigation, solutions, e-learning

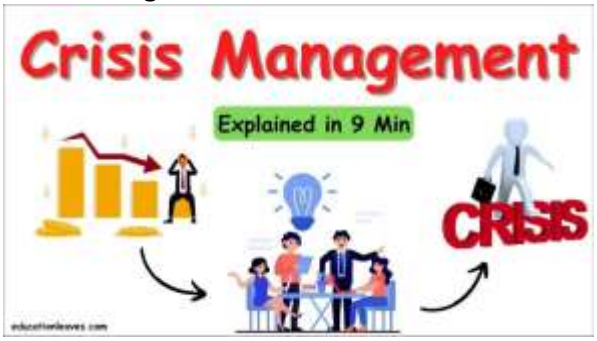
Learning Activities

E-Learning Format	YouTube videos, additional literature, case studies, quizzes, and reflective learning activities, online self-paced learning with text-based content,
Activities	Pre - and post-module quizzes, case studies, knowledge check questions, lectures, fieldwork, problem-based learning and videos.
Estimated Study Time	25 hours

Content & Topics

1. Definition of different types of crises
2. Activities health care organizations must undertake before during and after the crisis
3. Reducing crisis and its effects
4. Warning systems
5. Psychology during crisis
6. Media management and corporate image
7. Crisis evaluation and future activities plan

Crisis Management Introduction



Video: What is Crisis management? What is Crisis? Crisis Management Plans
This video introduces Crisis Management principles, its importance for organizations and professionals and its basic content and activities.

How Climate Change Creates Crisis in Healthcare Forum
How Climate change impacts health through several pathways? Let's look at a summary:

- More frequent, intense, and prolonged extreme weather events—heatwaves, storms, floods, and droughts—that cause direct injuries and deaths.
- Changes in natural systems that alter the distribution and incidence of infectious diseases (water-, food-, and vector-borne) and worsen air quality (higher ozone, particulate matter, dust, and allergens).
- Effects driven by human systems, such as occupational hazards, undernutrition, conflict, displacement, and mental stress.

To discuss this in greater detail climate-sensitive health outcomes include injuries, illnesses, and deaths from extreme events (e.g., floods, heatwaves), respiratory and cardiovascular problems from poorer air quality, and expanded or more intense transmission of infectious diseases (diarrheal diseases, vectorborne infections like Lyme disease, dengue, and malaria). Health consequences also arise from diffuse, delayed, or cascading impacts of climate change and from measures taken to respond to it.

Both changes in average conditions and in variability of weather influence these health burdens. For instance, higher mean temperatures can enable the spread of vectorborne diseases like malaria, while heavy rainfall may temporarily reduce mosquito populations in endemic areas yet create breeding sites and introduce mosquitoes into previously unaffected regions—raising illness and death where immunity is low. As climate shifts over the century and population health and health-system capacity change, tipping points may be reached that sharply increase or decrease climate-sensitive health outcomes.

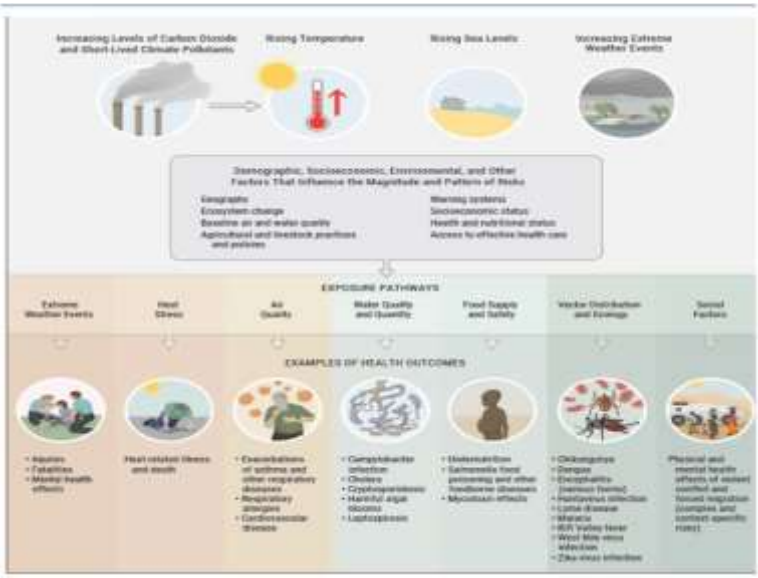
Some impacts are immediate (e.g., heatwave morbidity and mortality) others are delayed, such as post-event mental health effects, childhood undernutrition from crop failures after drought or flooding, and reduced food nutritional quality from elevated atmospheric CO2. Extreme events can also trigger cascading disruptions to health and social services.

1. Definition of Different Types of Crises

Category	Characteristics	Examples
Maturational (also known as Developmental crisis)	The result of normal processes of growth and development. Commonly occurs at specific developmental periods of life. It is predictable in nature and normally occurs as a part of life. An individual is vulnerable based on their equilibrium.	Birth Adolescence Marriage Death
Situational	An unexpected personal stressful event occurs with little advance warning. It is less predictable in nature. The event threatens an individual's equilibrium.	Accident Illness or serious injury of self or family member Loss of a job Bankruptcy Relocation/geographical move Divorce
Social (also known as Adventitious crisis)	An event that is uncommon or unanticipated. The event often involves multiple losses or extensive losses. It can occur due to a major natural or man-made event. It is unpredictable in nature. The event poses a severe threat to an individual's equilibrium.	Flood Fire Tornado Hurricane Earthquake War Riot Violent crime

File: Crisis typologies
File: Crisis intro and types

Video: Crisis Typologies - Crisis Management & Implications
This video explains what a crisis is, and what are the differences between crisis management and other serious situations in health care. Also, it describes the characteristics of each type of crisis and its content. Finaly, it analyses the implications of each type of crisis in order to take the right management decisions.



2. Activities Healthcare Organisations Must Undertake Before, During and After the Crisis

2.1 Activities before the crisis

Organizations can **help** maintain a healthy and efficient workforce to continue to meet social needs, by creating a plan to **provide** support during and after a crisis. These preparations should **include** plans to support physical, emotional and psychosocial needs of physicians and other health professionals.

Before: Establishing a plan

Creating a resilient organization before a **crisis happens** is key to the success of physicians and other health professionals. First, appoint a chief wellness officer (CWO) and **establish** a professional well-being program. As a **crisis event unravels**, the CWO and well-being program can quickly shift focus to meet the growing needs of physicians and other health professionals.

2.2 Activities During the Crisis

During: Providing support

Support physicians and other health professionals during a crisis. With a pre-existing plan in place, assess the **current situation and evaluate the adaptability** to the current circumstances. Even the best planned playbooks created before a crisis might not be enough to meet the current needs. These **plans can be adapted** by the CWO to meet the growing needs of the physicians and other

health professionals. If necessary, organizations should **develop** new support and resources that address the needs specific to the crisis.

Another **key factor** during a crisis is to emphasize and embody the importance of visible leadership. With a rapidly changing environment, uncertainty can lead to added stress and anxiety. However, good communications can help **reduce** stress and improve well-being.

During a crisis, organizations **should** also:

- Connect with other institutions, share and learn together.
- Assess the needs and stress level within the workforce at regular intervals.
- Adapt support plan to meet evolving needs.

After: Learning from a crisis

Change **continues** even after a crisis has ended. Learning from a crisis will help organizations become even more **resilient and effective** in the future. One way to **accomplish** this is to debrief unit by unit and by profession. These debriefs allow physicians and other health professionals to share their experiences, concerns and thoughts.

As difficult as it is to **consider** facing another crisis, it is important to learn from the current situation while it is still fresh. Make sure to catalogue what was learned and update the plan for the next crisis. It is also important to **deploy** an organization-wide approach for supporting everyone after the crisis has subsided. Remember to identify new needs to facilitate recovery and restoration.

Other steps after a crisis **include**:

- Honor the dedication, commitment and sacrifice of health care professionals.
- Memorialize health care professionals that have been lost.
- Resume efforts to attend to organizational and system factors that promote well- being and create a resilient organization.

File: Activities Before Crisis
File: The Main Phases of Crisis Management

3. Reducing Crisis and Its Effects

3.1 The Crisis Condition and How they Affect our Life

People **threatened** by crises face heightened risks to their health primarily as a result of common illness made more dangerous by crisis conditions. Those who are most **vulnerable** experience excessive suffering and high death rates.

Excessive suffering and death during crises can be **avoided** through:

- better preparation
- focused efforts at mitigation
- prompt prioritized and coordinated responses
- results-based repair and recovery efforts.

WHO is **developing** capacity within countries to coordinate preparation for, response to and recovery from the health aspects of crises. This capacity building reflects best practices, promotes health equity, contributes to the realisation of development goals and saves lives and preserves health by maintaining basic systems against crises.

WHO is **focusing** on the impact of crises on people's health.

WHO country teams **provide** services in ways that support national institutions, within the overall response by the international com- munity

WHO country teams **draw** on additional support, when needed, from Regional Offices and Headquarters, and other qualified groups. This involves the time-limited deployment of health crisis response and recovery teams.

WHO's key **functions** in a crisis are to:

- Promptly assess health needs of populations affected by crises and measure ill-health, identifying priority causes of ill-health and death.
- Support Member States in coordinating action for health.
- Ensure that critical gaps in health response are rapidly identified and filled.
- Support restoration of essential public health functions.
- Revitalize health systems and build up their capacity for preparedness and response.

3.2 National Authorities Actions

National Authorities undertake three actions:

- Identify natural or man-made vulnerabilities and threats to people's health that might develop into crises.
- Build scenarios for possible major incidents, epidemics, and bio- terrorism, and their health consequences.
- Convene stakeholders to agree on ways to help cope with and manage threats and establish and agree on criteria for implementing standard mitigation procedures.

Crisis **response** plans, exercises and training are vital. These focus on the impact of crises on people's health and health care systems. They as- sign **responsibilities, identify potential gaps and indicate fallback mechanisms.**

Public institutions and utilities—like hospitals and water systems—should be made resistant to the **effects** of hurricanes, earthquakes and other natural hazards. The challenge is to ensure that appropriate consideration is given to structural safety when installations are planned and built, as subsequent strengthening is costly. Responding **effectively** to the needs of people threatened by crises.

WHO helps ensure that a culture of—and a capacity for—mitigation and crisis preparedness exists in Ministries of Health, NGOs, UN agencies and other bodies concerned with health. In this regard, **WHO** works with national authorities and international organizations to take forward critical mitigation and preparedness actions.

RESPONDING EFFECTIVELY TO THE NEEDS OF PEOPLE THREATENED BY CRISES

Along with other international organizations and NGOs, **WHO** works with local authorities, civil society and international partners in responding to the health aspects of crises. We strive for optimal performance, by all concerned, in these key areas:

HEALTH INTELLIGENCE

- Understanding what is happening, where, and how different groups of people are affected.
- Concentrating on mortality and its causes; vital needs and systems; communicable diseases; the health of women, children and older people; nutritional status; mental health; and access to essential care, including care for chronic conditions.

BEST PRACTICES

- Establishing the minimal essential health actions that are immediately needed.
- Anticipating longer-term needs, and the conditions under which they should be met.
- Offering standardised tool kits and techniques for assessment, for the organisation and coordination of response, and for sup- porting the recovery of local systems.

REPAIRING SYSTEMS AFTER CRISES

Crises are **resolved** when essential systems have been repaired and re- built. Humanitarian action should concentrate on bringing essential life- lines to those in need. But relief should be supplemented, from the start, by well-informed efforts to **identify** key elements of former social, eco- nomic and **security systems**, and get them working again. For the health system, the priority is to **ensure** a secure and safe working environment for national and international personnel. Once this is achieved, it is then essential to repair fundamental services.

Case Study

The peace process in the South of Sudan brings **opportunity** for millions of people.
The challenge is to **repair** and **rebuild** social and economic systems quickly and in ways that promote peace and stability. This will **contribute** to health equity and the achievement of development goals.

Key to this process is the activation of partnerships through shared situation **assessments**, co-owned surveillance, functional communications, coordination by consent and decisions that reflect available **evidence**. Working with national authorities, UNICEF, UNFPA, and other international organizations and stakeholders, WHO helps **build** national capacity to:

- Establish a viable vision and strategy for the health of Sudan's people.
- Define a package of essential health actions.
- Secure agreement on its implementation.
- Design procedures for managing people, medicines, structures, services and finance.
- Implement and monitor progress.

Ongoing **conflict** in the Greater Darfur Region of Sudan—resulting in a large number of **Internally Displaced Persons (IDPs)** and refugees—continues to **extract** a heavy toll on the health and survival of affected communities. As part of the UN's Greater Darfur Special Initiative, **WHO** calls for heightened and renewed efforts to:

- Provide basic and essential primary health care services to the IDPs and their host communities.
- Prevent and control outbreaks of communicable diseases and epidemics.
- Improve the nutritional status of high-risk groups (i.e., older people, children younger than five years and pregnant women) by establishing nutritional surveillance systems for the enhanced targeting of resources.
- Strengthen the technical capacity of the Darfur State Ministry of Health to respond to the ongoing situation.

Video: Minimize negative implications of climate crisis
File: Reducing crisis and its effects in HC

4. Warning Systems

4.1 Public Warning Systems

Public warning systems gas primary goal to promptly alert and **inform** all citizens facing potential danger, **enabling** them to prepare and respond swiftly to mitigate the impact of the threat. To achieve this objective, public warning systems must not only alert the targeted population but also deliver comprehensive and understandable information.

The effectiveness of public warning systems in **accomplishing** this mission relies heavily on the communication channels employed, as each system has varying capabilities to meet diverse public warning requirements. **Utilizing** a range of communication methods is essential to reach the maximum number of people at risk effectively.

The European Electronic Communications Code (EECC) Article 110 requires all EU countries to **operate** a public warning system that is capable of **sending** geo-targeted emergency notifications to all mobile phone users in the affected area during a natural or man-made disaster. In order to **incorporate** new information and communication technologies, this legislation defines the concept of "emergency communications," which replaces "emergency calls."

4.2 Categories of Emergencies or Threats

A Public Warning System may **encompass** the following categories of emergencies or threats:

1. Natural disasters: Earthquakes, wildfires, hurricanes, tornadoes, floods, and tsunamis
2. Public health emergencies: Pandemics and outbreaks of infectious disease
3. Terrorism: Bomb threats and shootings
4. Industrial accidents: Explosions, harmful chemical spills, and structural failures
5. Civil emergencies: Evacuation orders, and civil unrest

The core functionality of purpose-built mass notification systems **revolves** around their capacity to **deliver** public warnings. These systems are meticulously designed to rapidly and securely reach the maximum number of affected individuals, **ensuring** swift dissemination of critical information.

Public Warning Systems are **developed** and utilized to protect, alert, and inform individuals by **delivering** emergency communication to the right people precisely when it is needed.

File: Early warning systems
File: Warning Systems Check List
File: Public Warning Systems
File: Early Warning Systems IMF

5. Psychology During Crisis

5.1 Climate Psychology and Climate Anxiety

Ursano and colleagues **describe** climate change as one of the top threats to global health in the 21st century, and psychology has begun to respond. The American Psychological Association's 2010 report into climate change **identified** six key areas for psychology, including risk perception, psychological and behavioural causes of climate change, psychosocial **impacts** of climate change, adaptation and coping strategies, psychosocial barriers to action and the role of psychologists. At the same time, psychotherapists and **clinical psychologists** are coming to terms with ecological loss, **anxiety** and guilt in their patients, and also among themselves, as they come to grips with the faltering biosphere.

This article **focuses** on climate anxiety and its role in climate psychology, while **recognizing** that anxiety interacts with a range of other emotions such as grief and rage. The **American Psychological Association**

refers to ecoanxiety as 'a chronic fear of environmental doom', ranging from mild stress to clinical disorders like depression, anxiety, post-traumatic stress disorder and suicide, and **maladaptive coping strategies** such as intimate partner violence and substance misuse. Cianconi et al. found complex types of climate anxiety and trauma, **including** intergenerational **effects**, especially where damage involves losing a way of life or culture.

It is essential to differentiate between **pathological and adaptive** forms. The Handbook of Climate Psychology defines climate anxiety as a 'heightened emotional, mental or somatic distress in **response** to dangerous changes in the climate system' but **suggests** that 'paying heed to what is happening…is a healthier response than turning away in denial or disavowal'. Climate anxiety can lead to symptoms such as **panic attacks**, loss of appetite, irritability, **weakness and sleeplessness**, yet given the **increasing** evidence about the impact of climate change on health, psychological professionals might ask if their patients feel too much anxiety, or whether they themselves feel too little. Climate anxiety is being felt much more **powerfully** among the young, by first **responders** to climate-related natural disasters and climate scientists and activists, who are exposed to information about the threat more than most and therefore may need psychological support.

When **considering** the effects of climate anxiety, it is necessary to focus on at-risk populations, **including** children, the elderly, the chronically ill, those with mental illnesses and those with mobility impairments. Those from lower **socioeconomic** groups are disproportionately **affected** by climate change because of disparities in infrastructure and health resources. Severe weather events can also **damage** social support systems and **mental health infrastructure**, further isolating the most vulnerable. Clayon reports that anxiety, fatalism, hopelessness and fear have been increasing globally, and **offers** a clinical approach to understanding, **measuring** and treating climate anxiety, while emphasizing the **distinction** between adaptive and maladaptive types, and the need to keep the society-level response required to combat climate change in mind.

Given our need to **effectively mobilize** in response to climate change, the Climate Psychology Alliance4 suggests that psychologists and psychotherapists should not **aim** to get rid of climate anxiety, but instead 'support individuals and communities to build strong containers that allow the expression and exploration of their **emotions** without collapsing under it or turning away'. Climate change is a **psychological problem** but that does not mean that it should be **individualized** or medicalized. As Lawton writes, if ecoanxiety is treated as pathology, 'the forces of denial will have won…what we are witnessing isn't a tsunami of mental illness, but a long-overdue outbreak of sanity'.

5.2 Why do we not act? Our Psychological Hypothesis

1. Faulty alarm hypothesis: cognitive bias in our evolved risk detection system

This explanation suggests humans have evolved the ability to respond to certain types of threats optimally, especially those that are immediate, visible, fast (something happens so slowly that it slips our notice), with historical **precedent**, simple causality, clear and direct personal impacts or caused by an 'enemy' tribe or group.

From this **perspective**, the problem with climate change is that we do not feel enough anxiety as it slips our notice by missing all of the **characteristics** above. The lack of effective risk perception leads to behaviors that worsen climate change. According to the 2018 American Psychological Association report, 'the perception of risk regarding climate change, belief in the **ability** to effect change, and the etiology **attributed** to extreme weather events are important factors **impacting** the decisions people make regarding climate change related behaviors'.

2. Social dilemma: bystander effect

Social dilemmas (or commons dilemmas) involve **conflict** between individual and collective self-interest. How do we escape from this 'rational-disaster' model of human **extinction**? Games **theory** studies such conflicts, most **famously** with the prisoners' dilemma. Anxiety here refers to not only the 'costs' of the game when played badly, but of **predicting** the **behavior** of others. How can I **trust** that you will do the right thing? The key is to focus on the structure of the game, to allow cooperative behavior to flourish.

3. Ecopsychology: the problem of disconnection from nature

Since the 1990s, **ecopsychology** has emerged as a particular response within psychology to environmental problems, emphasizing a holistic approach, **suggesting** that our modern lives are so **disconnected** from nature that we do not care enough to want to protect it, and fail to realize that we are threatened by **damage** to the natural world. Ecopsychologists **emphasize** that the anxiety, guilt, grief and anger we feel concerning collapsing ecosystems, our 'pain for the World', are **appropriate** and, although difficult, provides the starting point for action and a renewed relation to Earth.

4. Psychoanalysis: climate denial and apathy as a defense against anxiety

The psychoanalytic model of **environmental** problems focuses on the complex way humans deal with **anxiety**. In contrast to the faulty alarm hypothesis, the anxiety of climate change is seen as not too little, but too much, **defended** against through **individual** and socially **structured** defenses. However, merely amplifying messages of fear and guilt can backfire, by strengthening and rigidifying defenses. Climate anxiety is therefore, in part, a **realistic** but painful response to our situation, and difficult to hold onto, especially in a social context of generalized denial.

File: Mental Health & Psychological Support and older people in humanitarian crises.
File: Actions to manage psychology

6. Media Management and Corporate Crisis

Media and Crisis

The media in health care is **essential** for keeping the public informed during crises. Research shows that both traditional (TV, radio, print) and online media (social media, blogs) are powerful **tools** for crisis communication. Reaching a **broad audience** quickly is achieved through traditional media, while tailored messages and **real-time interaction** are best suited for online platforms. The ability to build **relationships** with the media before a crisis is crucial because transparency and a proactive approach reduce misunderstanding and misinformation. This study **confirms** that when communication teams have solid and trusting relations with journalists, outcomes are positive. The **qualitative approach** of this study provides unique experiences and insights and offer applicable tips for those in the Public relations and crisis communication field.

File: A Media Plan
File: The Role of Media
File: The role of media and PR in crisis management

7. Crisis Evaluation and Future Activities Plan

How to Conduct a Post - Crisis Evaluation

The coronavirus **pandemic** has put a strain on countless organizations, public and private, large and small. As a result, disruptions are happening faster and cutting deeper than any time in recent memory—and serving as the ultimate **"pressure test"** for an organization's crisis plans and protocols.

Ongoing regulatory actions, supply chain disruptions and devastating human consequences are challenging management teams as never before. Indeed, companies and **governments** alike are **discovering** in real time the effectiveness of—and gaps in—their crisis management plans. Such insight is invaluable for strengthening and guiding the enterprise's crisis **planning** and response going forward.

Today, most organizations spend the majority of their planning and preparation resources on addressing current and potential **operational** challenges. In doing so, they needlessly discard a valuable **resource** for continuous improvement. The days and weeks after a crisis abate can provide leaders with a unique opportunity to **identify** the organization's strengths that should be sustained or built upon and weaknesses that require improvement.

To be most **effective**, all participants must **contribute** insights, observations and questions without fear of critique or retaliation. The findings from a post-crisis review should not be used in **performance evaluations**, so participants should feel comfortable self-identifying the mistakes they made as well as those made by others across the organization. Ultimately, the **evaluation** should skew toward results-oriented solutions that **identify** options and conditions that the organization can successfully leverage in future crises.

Once the ground rules have been established, organizations should take the following **steps**:

1. Conduct a Baseline Analysis

At the outset, team members should individually answer a series of key questions before **reviewing** them as a group, including:

- Did we have a crisis plan in place? If not, why not? If yes, was it helpful or why was it not useful in this situation?
- Did we stick to the plan or did we improvise?
- What caused this variance?
- Did our response have the necessary flexibility to accommodate a crisis situation as it continued to evolve?
- If they were similarly affected, what did others in our industry do in response to the crisis, and what can we learn from their actions?
- What are the takeaways and lessons-learned that can help inform the company's crisis strategy and contingency planning for the future?

2. Honestly Assess Accountability

For the organization's long-term success, it is critical to **embrace** accountability during the debrief. Everyone, from the organization's senior leaders to junior staff, must be candid about their decisions and actions. Rather than **assigning** blame or punishment, the organization should foster a **constructive** environment in which the team seeks solutions to any issues it encountered.

Organizations should seek an **accurate** understanding of the events that occurred and focus on any issues or problems, while de-emphasizing individual personal performance. Since the desired result is to drive **improved** organizational performance during future crises, the focus needs to be on **finding** root causes for both **successes and failures**. The goal of this approach is to prevent mistakes from being repeated and to change the corporation's crisis **management** plan by incorporating lessons learned.

Each participant in the debrief must be prepared to accept praise and **criticism**, with equal interest in absorbing both. In the end, it is about organizational improvement and is not personal. The **goal** is to create and foster a **learning environment**, and not point fingers or make excuses. It should not be the venue for defensive behavior or after-the-fact justifications for poor performance.

Constructive feedback and **recommendations** for improved performance may be misread as finger-pointing if the individual whose performance is being discussed perceives that their superiors are **dissatisfied** or annoyed with their performance. If others sense tension in the room, it may discourage them from being forthcoming, **reducing** the ability to identify and solve problems and incorporate lessons learned.

3. Drive a Constructive Analysis

A well-executed retrospective **drills** down to identify specific opportunities to improve overall performance. Take the time to ensure that all events have been **reconstructed** and analyzed to address integration issues such as inter-departmental or inter-organizational coordination, enterprise-wide **leadership** and communication.

For example, it is useful to ask whether additional internal or external **resources** would have been helpful, evaluate (perhaps with a survey conducted by a third party) whether **stakeholders were satisfied** with the **content** and pace of the **communications** they received, assess whether opportunities for assistance were missed due to poor relationships with **government decision-makers** or financial institutions, and identify the specific stakeholders (investors, for instance) who may **require** additional attention to repair any bruised relationships.

Finally, it is important to preserve **confidentiality**. At the culmination of the debrief, ensure that whatever was covered during the session does not leave the room, aside from the **information** captured as part of the documented lessons learned.

4. Make the Evaluation Actionable

No part of an organization's performance during a crisis should be off-limits. Strike a balance and **simultaneously** cover big-picture strategic issues as well as specifics. If some facet of the crisis management **strategy** worked well, avoid simply patting each other on the back and moving on. Detail what worked well and why. Then, **examine** how to use those "wins" to further refine the overall crisis management plan and incorporate these practices in the future.

Even events that **transpired** out of sheer luck are worth analyzing to **ensure** that any learning points are appropriately captured. It is essential to **recognize** that significantly more lessons are learned from errors than from successes, so encountering problems is fantastic for **brainstorming** opportunities for improvement.

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Conclusion and Summary
Theoretical Introduction

Public sector crises pose unique **challenges** for government **agencies** and institutions. From natural disasters to terrorist attacks, these events can disrupt essential services and erode public trust. **Effective crisis management** requires careful planning, **coordination**, and communication. This unit

explores key concepts, **strategies**, and case studies in public sector crisis management. By examining real-world examples and practical **applications**, students gain insights into the **complexities** of managing crises that impact critical infrastructure and public welfare.

Key Concepts and Definitions:

- Crisis is an **unexpected event** or situation that threatens an organization's operations, reputation, or survival
- Public sector crises climate crises that affect **government agencies**, public institutions, or critical infrastructure
- **Crisis management** the process of preparing for, responding to, and recovering from crises
    - Involves developing **contingency** plans, coordinating resources, and communicating with stakeholders
- Stakeholders individuals or groups who are affected by or have an **interest** in the crisis and its resolution
    - Can **include** employees, customers, media, regulators, and the general public
- Risk **assessment** the process of identifying potential threats and **vulnerabilities** and evaluating their likelihood and impact
- **Business continuity planning (BCP)** the process of creating systems of prevention and recovery to deal with potential threats to an organization

Types of Public Sector Crises:

- Natural disasters (hurricanes, earthquakes, floods) that **damage** infrastructure and disrupt essential services
- Terrorist **attacks** deliberate acts of violence or sabotage that create fear and **uncertainty**
- Public health **emergencies** (pandemics, disease outbreaks) that strain **healthcare** systems and require coordinated response
- **Technological failures (power outages, data breaches)** that disrupt operations and compromise sensitive information
    - Can be caused by human error, system vulnerabilities, or malicious attacks
- **Economic crises (recessions, market crashes)** that impact public finances and social welfare programs
- Political scandals or **controversies** that erode public trust and damage the **credibility** of government institutions

Study the following examples of crisis management:

- Hurricane Katrina (2005) a **devastating** storm that exposed inadequate disaster **preparedness** and response in New Orleans
    - Resulted in **widespread** flooding, property damage, and loss of life
    - **Highlighted issues** with emergency communications, evacuation procedures, and aid distribution
- 9/11 terrorist attacks (2001) a series of **coordinated** attacks that shocked the nation and prompted **major changes** in national security policy
- **Flint water crisis** (2014-2019) a public health emergency caused by lead contamination in the city's water supply
    - Resulted from cost-cutting **measures and inadequate** water treatment
    - Led to criminal charges against government officials and a federal state of emergency declaration

- Equifax data breach (2017) a massive **cybersecurity** incident that exposed the personal information of 147 million consumers
  - Caused by a **vulnerability** in the company's web **application** framework
  - Resulted in **congressional hearings**, executive resignations, and a $700 million settlement

Answer the following questions:

1. What **strategies** would you follow to overcome crisis?
2. How would you manage **stakeholders**?
3. Discuss the **communication** under crisis.
4. How you would exploit the **experience** from this crisis?
5. Define some tools that you would use in order to **improve your effectiveness** in managing health care of older people due to climate change.

Stakeholder Analysis

- **Identify** all stakeholders who may be **affected** by or have an interest in the crisis
  - Prioritize stakeholders based on their level of influence and potential impact
- Assess **stakeholders'** needs, concerns, and expectations regarding the crisis response
- Develop targeted **communication strategies** for each stakeholder group
  - Tailor messages and communication **channels** to specific audiences
  - **Anticipate** and address potential questions or concerns
- Engage **stakeholders** in the crisis management process where appropriate
  - Seek input and **feedback** on response strategies and decision-making
  - Collaborate with stakeholders to **develop solutions** and rebuild trust

Practical Applications

- Establish relationships with local **emergency responders** and government agencies before a crisis occurs
  - **Participate** in community-wide disaster **preparedness** exercises and planning initiatives
- Develop a **crisis communication** toolkit with pre-approved templates, messaging, and media lists
- Create a mobile crisis management app for **employees** with real-time updates, resources, and emergency contacts
- Conduct regular **audits** of critical infrastructure and systems to identify potential vulnerabilities
  - Develop contingency plans for **system failures or disruptions**
  - Invest in redundant communication **channels** and backup power supplies
- Establish a **employee assistance program (EAP)** to provide support services during and after a crisis
  - Offer counseling, financial assistance, and other resources to help employees cope with stress and trauma
- **Incorporate crisis management training** into new employee **onboarding** and ongoing professional development programs
- **Develop** partnerships with industry peers or professional **associations** to share best practices and **resources** related to crisis management

Assessment

Assessment Type	Written assessment
Pass Mark / Criteria	Pass mark 50%

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Entrepreneurship Relevant to Climate Change MC8 EQF6

Microcredential Title	**Entrepreneurship Relevant to Climate Change**
Short Code / ID	MC8
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online (asynchronous e-learning)
Language(s)	English, Portuguese
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	University of Lisbon
Module Lead / Author	Prof. Filomena Carnide

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Identify health-related challenges emerging from climate change and define problems using structured innovation tools.
LO 2	Use entrepreneurial tools (e.g. Lean Startup, Design Thinking) to prototype and test climate-resilient healthcare models or services.
LO 3	Create compelling pitches for proposed solutions, showing value creation, implementation feasibility, and alignment with community needs.

chAnGE Competence Area	Action Skills competence area.
Alignment Notes	MC8 aims to provide healthcare and social workers, particularly those who work with older populations, with entrepreneurial skills to help them tackle the challenges of climate mitigation and adaptation. It explores the connection between entrepreneurship and sustainable solutions for seniors' care. Topics include identifying health-related climate challenges, developing innovative healthcare models, and fostering entrepreneurial initiatives within the healthcare sector. The module empowers healthcare workers to take a proactive role in building resilient and sustainable communities for older individuals.
Keywords	entrepreneurship, healthcare innovation, climate change, climate adaptation, climate mitigation, older adults, healthy ageing, sustainable healthcare, resilience.

Learning Activities

E-Learning Format	Text, Interactive H5P content and Youtube videos.
Activities	Pre and post module quizzes, case studies and knowledge check questions.
Estimated Study Time	25 hours

Content & Topics

1. Module 1: Climate Change and Healthcare – The Urgency of Innovation;
2. Module 2: Entrepreneurial Mindset in Healthcare;
3. Module 3: Identifying Problems and Opportunities;
4. Module 4: Designing and Prototyping Solutions;
5. Module 5: Building a business model;
6. Module 6: Communicating Innovation – Pitching Your Solution;
7. Assessment of Learning.

1. Module 1: Climate Change and Healthcare – The Urgency of Innovation

Overview

Module 1 establishes the evidence-based case for innovation in healthcare by documenting the direct and indirect impacts of climate change on public health systems and, in particular on older adult populations. The module draws extensively on the Lancet Countdown 2024 report and WHO data. It challenges health and social care professionals to recognise both the scale of the problem and their own professional responsibility to act. As the module concludes: 'Developing an entrepreneurial and forward-thinking mindset is essential to ensure that healthcare does not merely react to the climate crisis but actively contributes to building a healthier and more sustainable future for all.'

1.1 The Scale of the Climate-Health Challenge

Despite the initial hope inspired by the 2015 Paris Agreement, the world is now dangerously close to breaching its target of limiting global multiyear mean heating to 1.5°C. The annual mean surface temperature reached a record high of 1.45°C above the pre-industrial baseline in 2023, and new temperature highs were recorded throughout 2024. The Lancet Countdown 2024 assessment reports 'record-breaking' health risks tied to delayed climate action, confirming that rising temperatures and more frequent extremes are translating into measurable illness, deaths, and health-system disruption today.

Key WHO projections cited in the module include:

- 3.6 billion people already live in areas highly susceptible to climate change.
- Between 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths per year from undernutrition, malaria, diarrhoea and heat stress alone.
- Direct damage costs to health (excluding health-determining sectors such as agriculture and water) are estimated at US$2–4 billion per year by 2030.
- Reducing greenhouse gas emissions through better transport, food and energy choices can result in very large gains for health, particularly through reduced air pollution.

Climate change impacts health both directly and indirectly, mediated by environmental, social and public health determinants. The module uses the WHO framework of climate-sensitive health risks, exposure pathways and vulnerability factors as its organising structure.

1.2. The Scale of the Climate-Health Challenge

- **Heat and Mortality**
  - In 2019–23, people were exposed, on average, to 46 more days of health-threatening heat than would have been expected without climate change. In 2023, 31 countries experienced at least 100 more additional health-threatening heat days attributable to climate change.
  - Over 70,000 excess deaths occurred in Europe during the summer of 2003 — a landmark event that reshaped heat-health policy across the continent.
  - In 2022, 61,672 excess deaths in Europe were attributed to extreme heat. Older adults (80+) were the most severely affected group.

- Heat-related emergency department visits surged across US regions in 2023 (CDC), demonstrating the acute healthcare system burden of extreme heat events.

- **Desert Dust and Overexposure**
  - Globally, in 2018–22, 3.8 billion people were exposed to average annual concentrations of dust-PM10 exceeding WHO annual thresholds — up from 2.9 billion in 2003–07. The increase represents a 31% excess above safe levels.
  - Fine particulate matter from desert dust events exacerbates pre-existing respiratory and cardiovascular conditions, disproportionately affecting older adults with reduced pulmonary reserve.
- **Wildfire Smoke and Extreme Heat**
  - There are a significant correlation and interaction between long-term wildfire smoke (PM2.5) exposure and extreme heat days. Long-term wildfire PM2.5 exposure is linked to elevated all-cause mortality (PNAS).
  - Fire risk and population-weighted wildfire PM2.5 exposure have increased significantly across European subregions between 2003 and 2022.

Infectious Diseases

- Europe is becoming more suitable for West Nile virus and Dengue virus. Locally acquired dengue in EU/EEA reached 130 cases in 2023 — more than the total for 2010–2021 combined (ECDC).
- Climate suitability is increasing for dengue, chikungunya, West Nile virus and Vibrio (Lancet Countdown Europe 2024).
- Europe is also becoming more suitable for *Leishmania infantum* and *Ixodes ricinus* (which can transmit Lyme disease and tick-borne encephalitis agents).

Water and Food Safety

- Water and food safety pressures are emerging, particularly after extreme rainfall and flooding that mobilise pathogens. The EEA's 2024 bathing-water assessment highlights that heavier rainfall linked to climate change can degrade bathing-water quality, increasing short-term health risks.
- Climate-driven flooding and drought are fuelling cholera outbreaks globally (WHO 2024).

Healthcare System Strain

- Climate change increases diseases, injuries and mental stress from extreme weather events, placing greater pressure on healthcare services — which can themselves be disrupted or damaged by natural disasters, further intensifying strain.
- In England, around 90% of hospital buildings are vulnerable to overheating, with warm temperatures regularly exceeding recommended thresholds (BMJ Open research; NHS adaptation reporting). This stresses healthcare systems on two fronts simultaneously: increased demand for urgent and chronic care, while weakening system capacity — compromising patient safety, staff wellbeing, and equipment performance.

1.3. Specific vulnerabilities of older adults

Older adults bear a disproportionate share of the climate-health burden across all hazard types. Module 1 examines three intersecting domains of vulnerability:

Physiological vulnerability

- As people age, bodies are less able to compensate for the effects of environmental hazards such as air pollution, extreme temperatures and humidity.
- Older adults are more likely to have health conditions and/or compromised immune systems that increase sensitivity to climate hazards and worsen existing illnesses (cardiovascular, respiratory, renal, mental health conditions and physical injury risks).

- Many older adults have limited mobility, increasing their risks before, during and after an extreme weather event. They may depend on others for medical care and daily assistance, increasing vulnerability.

Social and economic vulnerability

- Social determinants such as isolation, dependency on caregivers, reduced mobility and financial limitations exacerbate risk and reduce resilience.
- Historical disasters confirm the pattern: during Hurricane Katrina (2005), people aged 60 and older accounted for 75% of deaths. During the Pacific Northwest heatwave of 2021, most of the nearly 1,000 people who died were older adults. During the 2023 Lahaina (Hawaii) wildfires — one of the deadliest US wildfires in a century — more than two-thirds of the approximately 100 fatality victims were aged 60 and older.

Mental health and future projections

- Exposure to extreme heat events is significantly associated with decreased mental health scores among older adults. This negative impact is mediated through increased incidence of chronic diseases, reduced physical activity, and decreased contact with family and community — and can be moderated by social, medical and digital support services.
- By 2050, more than 23% of the global population aged 69+ will inhabit climates where the 95th percentile of daily maximum temperature exceeds the critical threshold of 37.5°C, compared with 14% today. This means an additional 177–246 million older adults will be exposed to dangerous acute heat (Nature Communications, 2024).

1.4. The role of healthcare professionals

The module concludes by repositioning participants as active agents in the climate-health response. Three dimensions of professional responsibility are highlighted:

- Healthcare's carbon footprint: the healthcare sector is responsible for around 5% of greenhouse gas emissions worldwide and can play a key role in reducing global warming. Clinicians are uniquely trusted within their communities and can leverage this status to communicate risks and inspire sustainable action.
- Adaptation and system resilience: healthcare professionals play a pivotal role in preparing systems to withstand climate shocks. Adaptation strategies identified in global health systems reviews include building climate-resilient infrastructure, early warning systems, climate-informed health policies, and training climate specialists.
- Protecting health workers: exposure to extreme weather, poor air quality and heavy workload during climate emergencies can lead to heat stress, respiratory symptoms, burnout, psychological distress, absenteeism and staff turnover. Strengthening health worker resilience requires targeted training, upgraded work environments, infrastructure improvements, mental health support, and cross-agency coordination.

2. Module 2: Entrepreneurial Mindset in Healthcare

Overview

Module 2 introduces the conceptual and psychological foundations of entrepreneurship and innovation, contextualised for health and social care professionals. The module challenges the common misconception that entrepreneurship and innovation are only about starting a business or developing new technologies — reframing them as broader concepts connected to identifying opportunities, solving problems creatively, and generating value in any context, including healthcare. 'Recognizing and challenging these misconceptions is the first step toward developing a genuine entrepreneurial mindset.'

2.1. Defining Entrepreneurship

Entrepreneurship is formally defined in the module as 'the pursuit of opportunity beyond the resources one currently has under control' (Berkley, 2006). Critically, the module emphasises that entrepreneurship is a management process, not an individual characteristic — it is a way of thinking and operating that can be learned and applied by anyone, regardless of personality type or professional background.

The entrepreneurial mindset is characterised by four core qualities:

- Being opportunity-oriented: actively scanning the environment for unmet needs and possibilities for improvement;
- Resilience in the face of failure: treating setbacks as data and learning opportunities rather than as definitive outcomes;
- Willingness to take calculated risks: making evidence-informed bets rather than either reckless gambles or paralysing caution;
- Commitment to continuous learning and value creation: iterating toward solutions that generate real impact for patients and communities.

For healthcare professionals specifically, an entrepreneurial mindset does not necessarily mean starting a business. It might mean: questioning 'how things have always been done'; innovating within systems (intrapreneurship); seeking better outcomes for patients and communities; and using limited resources creatively and effectively.

Figure 1: Six characteristics of the entrepreneurial mindset — seeing opportunities, taking action, leading, using resources, managing risk, and collaborating (UIIN, 2022).

2.2. Types of Entrepreneurship

The module distinguishes between different forms of entrepreneurship relevant to healthcare, emphasising that 'every innovation, every change, begins with individuals who think differently and act with purpose.'

- Intrapreneurship: the practice of an employee behaving like an entrepreneur within an established organisation, developing new products, services or processes using the organisation's own resources and framework. This is the most immediately accessible mode for most healthcare professionals.
- Social entrepreneurship: entrepreneurs develop businesses, products or services to solve social, cultural or environmental issues, aiming for positive social impact rather than (solely) profit. Particularly relevant in climate-health contexts where the goal is community resilience.
- Commercial entrepreneurship: the creation of new companies, products or services in the healthcare market. While introduced for completeness, this pathway is not the primary focus of MC8.

2.3. Innovation: Definitions and Types

The module makes an explicit and important point: innovation is not technology-based. 'Innovation is fundamentally about people — about creating value by turning new ideas into meaningful action.' It is not simply having creative thoughts or doing something that has never been done before. Innovation involves a continuous process of exploration — searching, experimenting, developing, adapting and adopting solutions that respond to emerging needs. Ultimately, it is the conversion of knowledge and ideas into tangible benefits, serving either commercial goals or the public good.

Two key distinctions about innovation types are introduced:

Incremental Innovation	Seeks to improve systems that already exist — making them better, faster, cheaper. Often referred to as 'market pull' innovation, driven by user needs and market demands. Example: progressive improvements in prosthetic limb design over decades.
Radical Innovation	Focuses on new technologies, business models, and disruptive ideas that can transform entire industries — 'technology push' innovation. Example: bionic neuro-controlled prostheses that directly interface with the nervous system.
Closed Innovation	Ideas are created and developed exclusively within the organisation, using internal R&D. Ensures control but limits collaboration and adaptability.
Open Innovation	Accepts that valuable ideas can come from anywhere — inside or outside the organisation — and can reach the market through shared efforts. In healthcare, openness encourages partnerships and accelerates discovery.

The module notes that innovation cycles are becoming shorter: society is taking fewer years to discover and deploy breakthrough technologies. This acceleration intensifies both the opportunity and the imperative for healthcare professionals to engage proactively with innovation.

2.4. The Lean Startup Approach

The Lean Startup methodology (Eric Ries, 2011) is introduced as a practical framework for experimentation and iterative development, particularly suited to healthcare where time, resources and patient safety are critical. The module integrates it with the broader discussion of innovation types, noting that understanding how innovation emerges — whether through closed or open models — provides a strong foundation for applying more agile methods.

- Core principle: instead of investing heavily in a fully developed product from the start, begin with a Minimum Viable Product (MVP) to test key assumptions and gather real-world feedback.
- MVP definition (as stated in Module 2): 'the maximum amount of learning from validation that takes the least effort to perform.'
- Build-Measure-Learn loop: insights from early users guide decisions on whether to pivot (change direction) or persevere (refine and scale the idea).
- Healthcare application: by promoting fast learning and adaptation, the Lean Startup approach reduces risk and resource waste — making it particularly valuable where efficiency, safety and user relevance are essential.

Figure 2: The Lean Startup Methodology — Build-Measure-Learn cycle, MVP principles, and strategic pivoting (Eric Ries, 2011).

2.5. Blue Ocean Strategy

Blue Ocean Strategy (Kim & Mauborgne, 2005) is presented as a complementary strategic framework that challenges organisations to move beyond competition in overcrowded markets ('red oceans') and instead create uncontested market space ('blue oceans') through value innovation.

Red Ocean Strategy	Compete in existing market space; beat the competition; choose between differentiation or low cost; exploit existing demand; segment existing customers.
Blue Ocean Strategy	Create uncontested market space; make competition irrelevant; pursue differentiation AND low cost simultaneously (value innovation); create and capture new demand; attract non-customers.

The practical tool for Blue Ocean Strategy is the ERRC Framework:

- Eliminate: which factors that the industry takes for granted should be eliminated entirely?
- Reduce: which factors should be reduced well below the industry's standard?
- Raise: which factors should be raised well above the industry's standard?
- Create: which factors should be created that the industry has never offered?

When the Lean Startup and Blue Ocean Strategy are combined, they challenge professionals and organisations to innovate both efficiently and strategically: the Lean Startup minimises waste and risk through agile learning, while Blue Ocean Strategy opens the perspective, inspiring the creation of new, transformative solutions.

3. Module 3: Identifying Problems and Opportunities

Overview

Module 3 focuses on one of the most critical stages of innovation in healthcare: understanding and defining the problems that truly matter. Participants learn how to map and frame challenges, recognising their complexity and interconnection with social and environmental factors. Emphasis is placed on validating assumptions early in the process, ensuring that proposed solutions are grounded in real needs rather than perceptions. The module also introduces practical techniques for identifying opportunities, from systems thinking and stakeholder analysis to data-driven insights.

3.1. Why Problem Framing Matters

Identifying problems and opportunities is the cornerstone of meaningful innovation in healthcare. In the context of climate change, this requires mapping and framing health challenges caused or intensified by environmental shifts — such as heat-related illnesses or disruptions to care delivery. Adopting a systems perspective helps reveal root causes rather than symptoms, enabling healthcare innovators to design adaptive, resilient, and patient-centred solutions.

The module highlights that climate change is not just an environmental issue — it is a public health crisis. Vulnerable populations (older adults, children, low-income communities) are disproportionately affected, and healthcare professionals need structured tools to identify, understand and respond to emerging risks.

3.2. Five-Step Problem-Mapping Process

- **Step 1 - Start with Observation**
  - Track what is happening: when? Connected to specific events or seasons?
  - What new or worsening health patterns are visible? Are certain events (floods, heatwaves) followed by spikes in patient symptoms?
  - Tools: field notes, hospital records, public health surveillance reports. The goal is to gather the largest amount of data possible before drawing conclusions.
- **Step 2 – Identify Who Can Feel Different Perspectives of the Topic**
  - Who is being affected now? Patients, caregivers, healthcare workers, local communities?
  - Who can be affected in the future?
  - Who can influence change? Local governments, NGOs, hospital administrators?
  - Note: at this point it is completely possible to have multiple problems that affect different people in different moments.
- **Step 3 – Frame the Problem**
  - From all aspects collected in Steps 1 and 2, identify the 'angle' that is most impactful: the single event or condition that causes the most damage.
  - That is the Main Problem to address. Problem framing means translating observations and stakeholder insights into a clear, bounded problem statement.
- **Step 4 – Use Mapping Tools: Problem Tree Analysis**
  - The Problem Tree is a visual method that maps the causes and effects of a specific issue, encouraging movement beyond initial assumptions to uncover root causes.
  - Structure: the central problem (trunk) is supported by roots (underlying causes) and leads to branches (downstream effects). In a climate-health context, the trunk might be 'heat-related hospitalisations among older adults'; roots might include inadequate housing insulation, insufficient caregiver training, and poor community cooling infrastructure; branches might include increased A&E demand, excess mortality, and caregiver burnout.

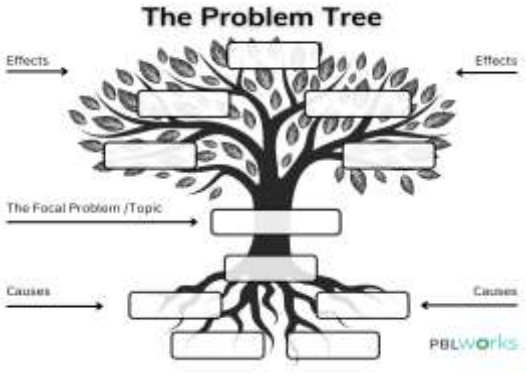

Figure 3: The Problem Tree — causes (roots), focal problem (trunk) and downstream effects (branches) (PBLWorks).

- **Step 5 – Validate the Problem**
  - Identification alone is not enough. Validation is a crucial step that ensures the problem being addressed is real, relevant, and significant to those affected.
  - By validating the problem before designing solutions, the risk of misalignment between what innovators create and what users need is substantially reduced**.**

3.3 The Validation Challenge

The module introduces a key insight that reshapes how participants approach validation: 'We've learned a little, inconvenient, but impactful fact: people lie. Not always intentionally, but often to protect expectations, appear consistent, or simply because they are unaware of their real behaviors and needs.' True validation therefore involves systematically testing whether the identified problem exists, matters to the target users, and is worth solving — going far beyond online forms or a few interviews.

One powerful source of honest behavioural data: 'People lie to others — but not to Google. What we search online (anonymously) reflects our true fears, desires, prejudices and interests.' The module presents digital trace data as a form of social microscope, noting that platforms like Google generate massive, anonymised datasets that expose patterns impossible to detect through traditional methods. Applications include predicting flu outbreaks, mental health trends, or identifying emerging public health concerns. However, the module also stresses caution: analysing depersonalised internet data requires combining quantitative insights with context, validation and ethical awareness. AI-generated insights carry similar caveats — algorithms often lack transparency and may reinforce inequalities if trained on biased data.

3.4. Digital Validation Tools

- **Google Trends**
  - A free online tool that analyses the popularity of search terms over time and across different regions. By revealing real behavioural patterns rather than self-reported opinions, it helps innovators validate assumptions, identify emerging issues, and detect new opportunities.
  - Relevance to climate-health: tracking spikes in searches such as 'heat stroke symptoms', 'air quality asthma', or 'climate anxiety' can provide early signals of public health concerns in specific populations and regions.
- **AnswerThePublic (Search Listening Tool)**
  - Collects and visualises the questions, comparisons and phrases people are typing into search engines. Categories include: Questions ('Why does climate change cause asthma?'), Prepositions ('Climate change for seniors'), Comparisons ('Climate change vs air pollution'), and Alphabetical variations.
  - Helps validate assumptions by revealing what people are really asking; surfaces emotional and practical needs that traditional interviews may miss; supports empathy and persona development. Example: typing 'heatwaves elderly' may reveal that people search for 'how to keep grandparents safe during extreme heat' — providing direct insight into lived pain points.
  - Practical exercise suggested in the module: go to AnswerThePublic, type 'heat stroke elderly', and discover real-world questions such as: 'Can elderly people get heat stroke indoors?', 'How to prevent dehydration in seniors?', 'Is heat stroke fatal in old age?'

3.5. Functional Thinking and Jobs-to-Be-Done

Functional Thinking is a method for analysing what a user is trying to achieve — the 'job they want done' — regardless of the tool or solution they currently use. A function is the ability of a technology or service to perform a certain action that generates a benefit, independent of its original form or application.

Example from the module: the same infrared technology used to measure a patient's fever can also measure the temperature of a steak. The context changes, but the function — accurately detecting temperature — remains the same. This shift from product to function encourages creativity and cross-sector innovation.

The four-step process for finding new applications through Functional Thinking:

- Discovery: define what the technology does, no matter the context — identify its core functions and value parameters.
- Search: explore what the technology can do in different contexts, using the subject | action | object triad.
- Synthesis and Selection: identify which new applications are most promising.
- Validation: test whether there is a real market or user need for those secondary applications.

Applied to healthcare innovation, the Jobs-to-Be-Done formula is: 'When [situation], I want to [action], so I can [outcome].' This reframing helps innovators design solutions that address the real underlying goal — such as 'feeling confident and in control of my health on a hot day' — rather than surface-level preferences.

3.6. Techniques for Opportunity Identification

Opportunity identification is the process of spotting unmet needs, inefficiencies, or emerging trends that can be addressed through new solutions. In healthcare, this means looking critically at systems, behaviours and technologies to uncover gaps where innovation can improve outcomes, enhance patient experiences, or increase efficiency.

- Problem Observation and Immersion: spend time in the environment (clinical settings, communities); look for inefficiencies, frustrations, workarounds; ask 'What are people doing that shouldn't be necessary?'
- Patient/User Journey Mapping: visualise the full experience of a patient or professional; identify pain points, delays, or stressors across touchpoints. Tools: Problem Tree, Journey Maps.
- Data Mining from Digital Tools: use Google Trends, AnswerThePublic, or social media to listen and track rising concerns or unmet needs; observe how people express their problems and what solutions they seek.
- Functional Thinking / Jobs-to-Be-Done: ask 'What job is the person trying to get done?'; reframe symptoms into core functions or goals using the 'When / I want / So I can' formula.

4. Module 4: Designing and Prototyping Solutions

Overview

Building on the problem-identification work of Module 3, Module 4 shifts the focus from understanding problems to creating and testing innovative responses. The module explores the Design Thinking methodology, emphasising human-centric innovation to ensure that solutions reply to real user needs. It then guides participants through defining clear problem statements, prototyping potential solutions, and testing them through iterative feedback loops — encouraging a mindset of continuous learning and adaptation.

4.1. Creativity as a Foundation

Scientifically, creativity is a physiological response — the brain's way of forming new connections between ideas, emotions and experiences. It operates through three key mechanisms: copy existing models; transform them through reinterpretation; and combine elements in novel ways. These mechanisms are learnable and practicable — not reserved for 'creative types'.

The module identifies and challenges three prevalent creativity myths:

- Myth 1 — Ideas emerge in a sudden 'Eureka!' moment: in fact, ideas evolve through iteration and connection with existing knowledge and experience.
- Myth 2 — Creativity is an individual pursuit: collaboration and diverse perspectives most often drive the richest innovation outcomes.
- Myth 3 — Innovation is only about technology: the crucial role of human insight and social creativity in designing truly impactful solutions is consistently underestimated.

'We are all born creative — creativity is a natural response of the brain, an inherent capacity to make sense of the world through curiosity, pattern recognition and imagination. What often limits us is not the presence of creativity, but our ability to guide and apply it intentionally.' The answer proposed by Module 4 is a structured methodology: Design Thinking.

4.2. Design Thinking Methodology

Design Thinking is introduced as a framework that 'makes the Design Process intellectually stimulating and a joyous collaborative experience, giving more focus on those facing the problem (human centricity) than the problem itself.' It is chosen for three reasons:

- It encourages collaboration and shared expertise, bringing together diverse perspectives to enrich creativity and strengthen outcomes;
- It enables teams to design solutions focused on direct impact, addressing tangible problems rather than abstract ideas;
- It is an interactive and cyclical methodology where each phase can be revisited, refined and repeated as new insights emerge.

The six stages of the Design Thinking cycle are:

1. Empathise	Develop deep understanding of the users (patients, caregivers, clinicians) and their needs, experiences and contexts through observation, interviews, and immersive engagement. Human-centric innovation begins with a simple but powerful principle: it is about the user, not about ourselves.
2. Define	Synthesise insights from the empathy phase into a clear, actionable 'How might we...?' problem statement that focuses the innovation effort. The goal is to identify the single most impactful angle to address.
3. Ideate	Generate as many ideas as possible without premature judgement (divergent thinking), then evaluate, cluster and prioritise the most promising candidates (convergent thinking).
4. Prototype	Build low-cost, low-fidelity representations of selected ideas — paper mock-ups, service blueprints, wireframes — sufficient to test core assumptions without significant resource investment.
5. Test	Expose prototypes to real users, gather structured feedback, and use findings to refine the prototype or reframe the problem.
6. Implement	Develop the refined solution toward a viable, deployable form. Implementation itself generates further learning and iteration.

The module emphasises that Design Thinking is explicitly non-linear. 'Addressing complex issues such as climate change and healthy ageing, iteration and feedback loops foster resilience, adaptability, and long-term impact in innovation.'

Figure 4: Design Thinking 101 — six stages of the iterative, human-centred innovation cycle (NNGroup).

4.3. Value Proposition Canvas

'Tools like the Value Proposition Canvas help structure this process, allowing us to clearly map how our ideas align with user needs, pains and gains.' The Canvas has two sides:

- **The User/Customer Profile (right side)**
  - Jobs: things users are trying to get done in their work or life — tasks, problems to solve, needs to satisfy. Key guiding question: 'What is the one thing your customer couldn't live without accomplishing?'
  - Gains: outcomes and benefits customers want — functional utility, social gains, positive emotions, cost savings. Some gains are required, expected, or desired; some would surprise them.
  - Pains: anything that annoys customers before, during and after trying to get a job done, or that prevents them from doing so — including risks and potential bad outcomes.
- **The Value Map (left side)**
  - Products and Services: a description of what is being created that adds value, with focus on innovation topics.
  - Gain Creators: describe how products and services create customer gains — savings in time/money, outcomes that exceed expectations, positive social consequences, solutions to aspirational goals.
  - Pain Relievers: describe how products and services alleviate specific customer pains — producing savings, making customers feel better, fixing under-performing solutions, eliminating difficulties.

The Canvas works through a prioritisation process: from all identified Jobs, Pains and Gains, which are essential and which are merely 'nice to have'? The same ranking is applied to Products, Pain Relievers and Gain Creators. Fit is achieved when Products reply to major Jobs; Gain Creators are aligned with essential user Gains; and Pain Relievers address the most extreme user pains. 'If they are, this model is on a good path to solve meaningful problems. If they aren't, reconsider priorities and go back to validation steps — something is not matching.'

4.5. Prototyping, Testing and the Validation Board

Prototyping allows teams to visualise and experience potential solutions early, uncovering hidden challenges and opportunities before significant resources are invested. Module 4 distinguishes three phases of testing:

- Testing Interest and Relevance: do potential customers show interest in your ideas? Are they relevant? Are they interested enough to perform an action? Tools: forms, interviews, ad tracking, landing pages, website analytics, email campaigns.
- Testing Willingness and Ability to Use and Pay: are potential customers interested enough in the features of the value proposition to act on it? Will they 'put their money where their mouth is'? Tools: 'fake' sales, pre-sales campaigns, crowdfunding, minimum viable products.
- Testing Preferences and Priorities: which features of the value proposition do potential customers prefer? What do they really value? What do they prioritise? This reveals which aspects of the solution resonate most.

The Validation Board is a practical tool designed to help teams systematically record their assumptions, design experiments, capture feedback and assess results. By visually organising what has been tested, what remains uncertain, and what evidence supports or challenges each hypothesis, it transforms experimentation into a transparent, continuous learning process — enabling teams to make informed pivot-or-persevere decisions.

5. Module 5: Designing and Prototyping Solutions

Overview

Module 5 moves from designing innovative solutions to shaping how they can create real-world value and sustainability. The Business Model Canvas is introduced as a strategic tool to structure and visualise how ideas can evolve into viable ventures. Participants learn to identify customer segments, channels and revenue models; validate assumptions through experimentation; build competitive advantage; and design effective implementation plans.

5.1. What is a Business and a Business Model?

'At its core, a business is a system designed to create and capture value efficiently. Fundamentally, the goal of a business is to take cash, turn it into assets, and then convert those assets back into cash as effectively as possible — ideally generating more value in the process.' These assets can take many forms: products, technologies, relationships, knowledge or brand trust.

'A company's business model is intricately tied to the amount of cash that is tied up in assets, influencing its efficiency, flexibility and growth potential.' Choosing the right model shapes everything from customer relationships to operational strategy. The question every innovator must answer is: what model will be used, and how will it remain financially viable and sustainable over time?

5.2. Business Model Canvas — Nine Building Blocks

The Business Model Canvas (Osterwalder & Pigneur, 2009) is a powerful visual tool used to describe, design, challenge and innovate business models. It turns abstract ideas into a structure connecting key elements such as customers, value propositions, resources and revenue streams.

1. Value Proposition	Benefits generated for customers/users from the service or product — material or immaterial. Key questions: What problem/pain are we trying to solve? What solution are we offering? What is the value in our solution? (Rule: 10 words are more than enough — 'If you can't sum it up in 10 words or less, chances are you won't be able to execute it either.')

2. Customer Segments	Who are our most important clients and users? Who influences? Who decides? Note: Client ≠ User — parents (clients) buy their children's clothing (users); hospital management (clients) pays for medical devices for patients (users).
3. Channels	How will the value proposition be communicated and delivered? Covers marketing, sales, distribution and post-sale connections. What channels do clients prefer? Two types: free channels (the organisation's own platforms) and paid channels (TV, SMS, radio, telemarketing, digital ads).
4. Customer Relationships	How will we obtain clients? How will we maintain them? How will we grow them? Why will they trust us?
5. Revenue Streams	What types of income flows can be identified? This includes transaction revenues, recurring revenues, licensing, commissions and other models.
6. Key Activities	What are the critical activities demanded by the business model? What must the organisation do extremely well to deliver its value proposition?
7. Key Resources	What are the critical resources demanded by the business model — physical, intellectual, human, financial?
8. Key Partners	Who are the critical partners and suppliers? Which key activities and resources are obtained from partners?
9. Cost Structure	What is the resulting cost structure? What costs are most inherent to the business model?

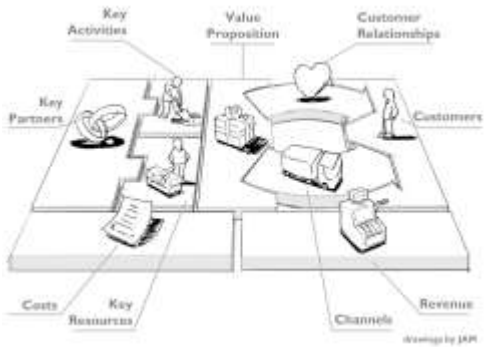

Figure 5: Business Model Canvas — nine building blocks for describing and innovating business models (Osterwalder & Pigneur, 2009).

5.3 Business Model Types

Over the years, several tested business model patterns have been identified, offering reference points that innovators can adapt to their specific context:

- Brokerage: bring together and facilitate transactions between buyers and sellers, charging a fee for each successful transaction.
- Crowdsourcing: outsource tasks to a broad group who contribute content for free in exchange for access to other users' content.

- Freemium: offer basic services for free but charge for upgraded or premium features.
- Leasing: make high-margin, high-cost products affordable by having the customer rent rather than buy them.
- Low-Touch: offer a low-price, low-service version of a traditionally high-end offering.
- Pay-as-you-go: charge the customer for metered services based on actual usage metrics.
- Hook & Bait: offer the higher-margin 'razors' for low or no cost to make profits by selling high-volume, low-margin 'blades'.
- Reverse Hook & Bait: offer the low-margin 'blades' for low or no cost to encourage sales of the higher-margin 'razors'.
- Subscription: charge a subscription fee to gain access to a product or service.

5.4. Creating Value: The 10 Types of Innovation

After studying more than 2,000 companies, Doblin (an innovation-focused company, part of Deloitte) found that most major advances don't necessarily originate from engineering breakthroughs or rare discoveries. Instead, innovation can occur across ten distinct dimensions:

- Configuration innovations: Profit Model, Network, Structure, Process;
- Offering innovations: Product Performance, Product System;
- Experience innovations: Service, Channel, Brand, Customer Engagement.

Healthcare innovators often focus narrowly on product performance, but may achieve greater differentiation through service design, channel innovation or customer engagement approaches — areas where new thinking can have immediate, scalable impact.

5.5. Competitive Advantage and Strategy Canvas

The Strategy Canvas is a tool that represents a business configuration in relation to those of its competitors. It shows where a business chooses to invest and where it does not, defining how competitors are currently competing and where there is room for innovation.

The Canvas has two axes: the horizontal axis lists the key factors of competition (the main elements companies invest in and compete on); the vertical axis shows the level of offering customers receive for each factor (higher position = greater value delivered). By plotting and connecting these points, each competitor's strategic profile or 'value curve' becomes visible.

How to create a Strategy Canvas (five steps):

- Step 1: Define two competitors to compare against.
- Step 2: List the main competitive factors — on what characteristics do these companies compete?
- Step 3: Rate your offering for each factor on a 5-point scale (low to high).
- Step 4: Plot and connect your scores to form your current value curve.
- Step 5: Compare with a key competitor or market leader by repeating the process.

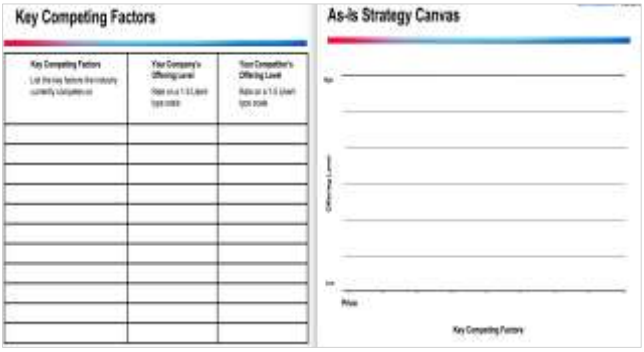

Figure 6: Strategy Canvas template — Key Competing Factors table and As-Is Value Curve (Blue Ocean Shift exercise)

Market segmentation also informs strategic positioning: effective segmentation considers demographic (age, gender), geographic (region, urban/rural), psychographic (health literacy, attitudes to technology) and behavioural (care utilisation patterns, adoption behaviour) criteria.

6. Module 6: Communicating Innovation: Pitching Your Solution

Overview

The final module addresses the critical but often underestimated dimension of the entrepreneurial process: communicating an innovation with clarity, credibility and persuasive force. 'Great innovations only achieve their full potential when they are clearly shared with others.' The module explores the power of storytelling in innovation, the structure and delivery of an effective pitch, and how to build a compelling pitch deck — transforming innovative ideas into persuasive, memorable presentations that drive action and support.

6.1 The Science Communication Problem

Module 6 opens by situating healthcare innovation communication within the broader context of science communication, which has two major components: 'the doing' (research using the scientific method) and 'the dissemination' (communication of that knowledge) — each with its own serious narrative problems.

- The 'doing' problems:
  - Null results bias: null studies are not invalid results, but they are systematically less likely to be published or publicised. Analysis of 250 peer-reviewed social science proposals (2014) demonstrated the scale of this bias.
  - Exaggeration and false positives: analysis of 460 press releases on biomedical and health science by 20 leading UK universities (2014) found widespread overstating of research significance.
  - Perverse incentives: 'scientists are pushed for big headlines, while scientific journals are less interested in publishing research that doesn't produce headlines.'
- The 'dissemination' problems:
  - 'Numbed down' communication: from bored students in classrooms to the inability of the scientific community to deal with growing anti-science movements, the sector has systematically underinvested in making knowledge accessible and engaging.

The module makes three foundational distinctions:

Knowledge ≠ Wisdom	While knowledge is the accumulation of information and facts, wisdom lies in knowing how to apply that knowledge thoughtfully and responsibly to create positive impact.
Hearing ≠ Listening	Hearing is the physical act of perceiving sound, while listening requires attention, empathy and understanding — truly engaging with what others are saying.
Speaking ≠ Communicating	Speaking is simply expressing words, while communicating means ensuring that your message is understood, resonates with your audience and creates connection or action.

6.2. Foundations of Effective Communication

True communication happens when both the sender and receiver engage in a meaningful exchange, creating mutual understanding and connection. In the context of innovation and science, effective communication is what transforms complex knowledge into accessible, impactful messages that inspire action and change. Three foundations are presented:

- Storytelling: some of the most important figures in history were gifted storytellers. The module asks: 'Are scientists good storytellers?' and proposes the AND-BUT-THEREFORE (ABT) framework as a universally applicable narrative structure for communicating innovation.
  - AND establishes context and background: sets up the world as it currently exists;
  - BUT introduces tension, problem or challenge: the moment of conflict that makes the story matter;
  - THEREFORE presents the proposed solution and its consequences: what follows from the problem, and what your innovation does about it;
  - This structure mirrors the logic of scientific argument and clinical case-making — making it particularly natural for healthcare professionals to adopt.
- Body language: 'body language plays a vital role in effective communication, as gestures, posture and facial expressions often convey more meaning than words — reinforcing trust, clarity and emotional connection with the audience.' In a live pitch, how something is said carries as much weight as what is said.
- Preparation: effective communicators do not only rehearse what they plan to say — they rehearse responses to the hardest questions they might face. Anticipating challenges on evidence quality, feasibility, cost and scalability strengthens both the pitch and the presenter's confidence.

6.3. Pitch vs Presentation — and the 10+1 Step Structure

'Unlike a traditional presentation (which primarily aims to inform or educate), a pitch is designed to persuade and inspire action. A presentation shares knowledge; a pitch sells potential.' In a pitch, every word, image and gesture must serve a clear purpose: to capture attention, build trust, and show the value of the idea.

Module 6 adopts the 10+1 step pitch framework (adapted from Guy Kawasaki, The Art of the Start 2.0):

1 – Title	Name the innovation and who you are. Grab attention immediately. Establish why the audience should care.
2 – Problem & Opportunity	State the climate-health problem clearly and compellingly. Quantify its scale and impact on older adults. Explain why current solutions are inadequate.
3 – Value Proposition	Articulate in one or two sentences what the innovation does and why it is uniquely valuable. Every word must count.
4 – Underlying Magic	Describe the key mechanism, technology, insight or method that makes the innovation work. Demonstrate expertise — concisely.
5 – Competition & Differentiation	Acknowledge existing approaches honestly, then explain how the innovation is different and better.
6 – Business Model	Explain how the innovation will be sustained. Who pays, how much, through what model?
7 – Go-to-Market Plan	Describe how the innovation will reach its target users — through which channels, partnerships and adoption strategy.

8 – Money, Money, Money	Present realistic cost estimates and funding requirements; project impact metrics (lives affected, costs avoided, carbon saved).
9 – Where Are You Right Now?	Be transparent about current status — concept, prototype, pilot or scaled. Share evidence from testing to date and next key milestones.
10 – Team	Introduce the people behind the innovation. Demonstrate that the team has the expertise, lived experience and backing to deliver.
+1 – Call to Action	End with a specific, concrete ask. Always close with a clear and actionable next step.

6.4. Building a Pitch Deck — Design Principles

Module 6 uses a case study on prostate cancer communication to illustrate the difference between ineffective and effective pitch deck design:

What NOT to do	• Slides full of text: dense paragraphs of clinical information are difficult to read and compete with the speaker for audience attention. • Information overload: listing all statistics without narrative context (e.g. '7,529 new cases of prostate cancer in Portugal in 2022') fails to convey impact. • Pictures with too much detail and sources that cannot be easily traced back.
What TO do	• More pictures, less text: images and visuals support rather than replace the spoken message. • Create a narrative connection: 'Everyone knows several men they care about — what if the situation was about them?' • Translate data into human terms: replace '7,529 cases' with '1 out of 6 men'; replace abstract annual figures with '3 minutes = 1 new case; 15 minutes = 1 new death'. Data becomes impactful when made relatable. • Write enough information to give context, but no complete sentences: what you say has more impact than the slides — they exist to complement your speech. • Use recognised logos and trusted sources to build credibility without cluttering the slide. • Reply to your own question and finish the story: 'Remember the audience that this can be about making the difference to several people — including the ones they love.'

The module closes the full MC8 learning journey: 'Throughout the modules, you have explored how to understand complex problems, design meaningful solutions, build sustainable business models, and communicate your vision with clarity and confidence. You are now equipped not only with tools and methods but with the mindset needed to drive change in your community and beyond. Remember: every word, every idea, and every action have the power to inspire transformation.'

Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

Task: Develop a fully elaborated entrepreneurial project proposal addressing a climate-health challenge relevant to older adults in your region. The proposal must include: (a) a rigorous problem analysis using Module 3 mapping tools; (b) a documented Design Thinking or prototyping process summarising your design choices; (c) a completed Business Model Canvas or Value Proposition Canvas with critical evaluation of assumptions and risks; and (d) a structured pitch outline using the Pitch Canvas or the 10+1 Kawasaki framework. Critically evaluate feasibility, scalability, and potential impact, addressing ethical and equity dimensions. **Word count: 1,500–2,000 words (excluding appendices).**

Resources & Materials

MODULE 1 — Climate Change and Healthcare in the Context of Ageing

Academic Papers, books and websites

- Romanello, M. et al. (2024). The 2024 report of the Lancet Countdown on health and climate change. The Lancet. https://doi.org/10.1016/S0140-6736(24)01822-1
- Ballester, J. et al. (2023). Heat-related mortality in Europe during 2003–2022. Nature Medicine. https://doi.org/10.1038/s41591-023-02419-z
- Lancet Countdown on Health and Climate Change — Europe (2024). The Lancet Public Health. https://doi.org/10.1016/S2468-2667(24)00055-0
- Wildfire PM2.5 and all-cause mortality (2024). PNAS. https://doi.org/10.1073/pnas.2403960121
- Hospital overheating in England. BMJ Open. https://doi.org/10.1136/bmjopen-2022-068298
- Physiological risks of older adults to climate hazards. PLoS ONE. https://doi.org/10.1371/journal.pone.0297116
- Extreme heat and mental health in older adults. ScienceDirect (2025). https://doi.org/10.1016/j.scs.2025.106000
- Extreme heat projections for older adults by 2050. Nature Communications (2024). https://doi.org/10.1038/s41467-024-47197-5
- Healthcare carbon footprint and sustainability strategies. ScienceDirect (2024). https://doi.org/10.1016/j.healthpol.2024.000630
- Health worker resilience and climate adaptation — scoping review. BMC Public Health (2024). https://doi.org/10.1186/s12889-024-19459-w

Reports & Fact Sheets

- WHO (2024). Climate change and health — Fact Sheet. www.who.int/news-room/fact-sheets/detail/climate-change-and-health
- Lancet Countdown 2024 — Main Report. lancetcountdown.org/2024-report/
- ECDC (2024). Worsening spread of mosquito-borne diseases in EU/EEA. www.ecdc.europa.eu/en/news-events/worsening-spread-mosquito-borne-disease-outbreaks-eueea
- EEA (2024). European bathing water quality in 2023. www.eea.europa.eu/en/analysis/publications/european-bathing-water-quality-in-2023
- WHO (2022). Protecting health workers from climate risks. www.who.int/publications/i/item/9789240040779
- EPA — Climate change and health: older adults. www.epa.gov/climateimpacts/climate-change-and-health-older-adults
- AAMC — Why older adults are especially vulnerable to climate change. www.aamc.org/news/why-older-adults-are-especially-vulnerable-climate-change
- Royal College of Physicians — Green Physician Toolkit. www.rcp.ac.uk/policy-and-campaigns/policy-documents/green-physician-toolkit/
- WWF Climate and Nature Future Report. wwf.panda.org/discover/our_focus/climate_and_energy_practice/climate_nature_future_report/

YouTube Videos

- The link between climate change, health and poverty — TEDMED (Slide 5). youtu.be/jQTykJbN8yI
- ECDC press conference — Mosquito-borne diseases situation in EU/EEA countries — ECDC (Slide 18). youtu.be/l4hI-6vSznA
- How Climate Change Could Affect the Health of Older Adults — Hebrew SeniorLife (Slide 24). youtu.be/8_6czba48qA
- The most important thing you can do to fight climate change: talk about it | Katharine Hayhoe — TED (Slide 33). youtu.be/-BvcToPZCLI
- How to turn climate anxiety into action | Renée Lertzman — TED (Slide 41). youtu.be/f52LJJFBCLc

- Ashford and St Peter's Hospitals plan to become net zero — Ashford & St Peters NHS Trust (Slide 42). youtu.be/a054WsOCLoI
- KEYNOTE: Climate Change, Older Adults, and Innovation — National Academy of Medicine (Slide 43). youtu.be/C1jD_W-eXGs

Tools & Additional Resources

- WHO — Climate change and health in pictures. www.who.int/news-room/feature-stories/detail/climate-change-and-health-in-pictures
- Lancet Countdown interactive online platform. lancetcountdown.org/2024-report/

MODULE 2 — Entrepreneurial Mindset in Healthcare

Academic Papers, books and websites

- Berkley, K. (2006). Entrepreneurship: "the pursuit of opportunity beyond the resources one currently controls." Harvard Business Review.
- UIIN (2015). Six characteristics of the entrepreneurial mindset. www.uiin.org/2015/12/07/the-six-characteristics-of-the-entrepreneurial-mindset/
- Visual Capitalist — History of innovation cycles. www.visualcapitalist.com/the-history-of-innovation-cycles/
- Books
- Christensen, C.M. (1997). The Innovator's Dilemma. Harvard Business Review Press.
- Chesbrough, H. (2003). Open Innovation: The New Imperative for Creating and Profiting from Technology. Harvard Business School Press.
- Kim, W.C. & Mauborgne, R. (2005). Blue Ocean Strategy. Harvard Business School Press.
- Ries, E. (2011). The Lean Startup. Crown Business.
- Blank, S. & Dorf, B. (2012). The Startup Owner's Manual. K&S Ranch.

YouTube Videos

- Entrepreneurial process — Entrepreneurship — Utrecht University (Slide 7). youtu.be/PsCC6DnjhPo
- The Power of an Entrepreneurial Mindset | Bill Roche | TEDxLangleyED — TEDx Talks (Slide 9). youtu.be/Ihs4VFZWwn4
- Doctors with a vision: Cultivating an Entrepreneurial Mindset | Dr. Amy Vertrees & Dr. Brian Cohen — Stand up (for) Doctors! (Slide 12). youtu.be/5oeE3R5v4bQ
- Intrapreneurship in Established Organizations | Tone Marie Wahlstrom | TEDxBergen — TEDx Talks (Slide 15). youtu.be/tTcgVCSII_o
- How To Empower Social Entrepreneurship | Ana Janošev | TEDxDonauinselSalon — TEDx Talks (Slide 16). youtu.be/eHS-M33DoYU
- "What If?: From Inspiration to Innovation" | Keith Harmeyer | TEDxTheWeissSchool — TEDx Talks (Slide 18). youtu.be/kOqNKdSubhk
- Innovation Motivation — Innovation at Harvard — Harvard University (Slide 22). youtu.be/m2y7_kP6pEk
- How LEGO IDEAS empowered FANS to build their best-selling sets — Jono Bacon (Slide 27). youtu.be/KLSmmyN6mZ4
- How Has Coca-Cola Kept Its Formula a Secret for All These Years? — Weird History Food (Slide 28). youtu.be/TG26N8zU6Uc
- The Lean Startup Summary (by Eric Ries) — The Swedish Investor (Slide 32). youtu.be/RSaIOCHbuYw
- The Explainer: Blue Ocean Strategy — Harvard Business Review (Slide 34). youtu.be/sYdaa02CS5E
- Blue Ocean Strategy (With Real World Examples) | From A Business Professor — Business School 101 (Slide 36). youtu.be/j-b7MHabLPg

Tools & Additional Resources

- Visual Capitalist — History of innovation cycles. www.visualcapitalist.com/the-history-of-innovation-cycles/
- Blue Ocean Strategy blog. www.blueoceanstrategy.com

MODULE 3 — Identifying Problems and Opportunities

Academic Papers, books and websites

- Christensen, C.M. et al. (2016). Jobs-to-Be-Done Theory: "People don't buy products. They hire solutions to do a job." Competing Against Luck.
- PBLWorks — The Problem Tree exercise (source for Problem Tree diagram, Slide 9). www.pblworks.org/blog/problem-tree-exercise-teaching-students-see-beyond-surface
- Christensen, C.M., Hall, T., Dillon, K. & Duncan, D.S. (2016). Competing Against Luck: The Story of Innovation and Customer Choice. Harper Business.
- Osterwalder, A., Pigneur, Y., Bernarda, G. & Smith, A. (2014). Value Proposition Design: How to Create Products and Services Customers Want. Wiley.

YouTube Videos

- How the Environment Affects Our Health — CDC (Slides 4–5). youtu.be/I7STZsY_-Ps
- 2024 — Year in Search — Google (Slide 15). youtu.be/61JHONRXhjs

- The Internet is Worse Than Ever – Now What? — Kurzgesagt – In a Nutshell (Slide 17). youtu.be/fuFlMtZmvY0
- AI Slop Is Destroying The Internet — Kurzgesagt – In a Nutshell (Slide 18). youtu.be/_zfN9wnPvU0
- The Official Guide: How to use AnswerThePublic.com — AnswerThePublic (Slide 20). youtu.be/Ej9cglBpFo

Tools & Additional Resources
- Google Trends — search interest analysis tool (Slides 15–16). trends.google.com
- AnswerThePublic — question and topic discovery tool (Slides 20–23). answerthepublic.com

MODULE 4 — Designing and Prototyping Solutions

Academic, books and websites
- D-Thinking — What is Design Thinking (source for definition, Slide 8). www.d-thinking.com/what-is-design-thinking
- Medium / Good Design — The 4 Essentials of Design Thinking (source for figure, Slide 12). medium.com/good-design/visualizing-the-4-essentials-of-design-thinking-17fe5c191c22
- Strategyzer — Value Proposition Canvas: the framework underlying Slides 15–28. www.strategyzer.com/library/the-value-proposition-canvas
- Brown, T. (2009). Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation. HarperBusiness.
- Osterwalder, A., Pigneur, Y., Bernarda, G. & Smith, A. (2014). Value Proposition Design: How to Create Products and Services Customers Want. Wiley.

YouTube Videos
- What Is Design Thinking? — Stanford Graduate School of Business (Slide 8). youtu.be/gnWj97CEjeo
- The Design Thinking Process — Sprouts (Slide 9). youtu.be/_r0VX-aU_T8
- The Design Thinking Process Broken Down Step-by-Step — IDEO U (Slide 11). youtu.be/McTh-xzxfRE
- Validar Ideias | Tec Labs — Tec Labs Centro de Inovação (Slide 43). youtu.be/ynpve3DqGbk
- Lean StartUp | Tec Labs — Tec Labs Centro de Inovação (Slide 47). youtu.be/zHHrdKOZ7w4

Tools Used in Module
- Strategyzer — Value Proposition Canvas (core framework, Slides 15–28). www.strategyzer.com/library/the-value-proposition-canvas
- D-Thinking — Design Thinking framework. www.d-thinking.com

MODULE 5 — Building a Business Model

Academic, books and websites
- Doblin / Deloitte — 10 Types of Innovation: study of 2,000+ companies over 30 years. www.visualcapitalist.com/10-types-of-innovation-the-art-of-discovering-a-breakthrough-product/
- Blue Ocean Strategy — Strategy Canvas template (Slides 47–49). www.blueoceanstrategy.com/blog/strategy-canvas-template/
- Blue Ocean Strategy — Strategy Canvas: Apple iPhone example (Slide 50). www.blueoceanstrategy.com/blog/strategy-canvas-examples/
- Business Model Analyst — Teladoc BMC case study (Slide 19). businessmodelanalyst.com/pt/modelo-de-negocio-teladoc/
- Frei, F., Harvard Business School: "Strategy is what a company decides NOT to do well." (Slide 47)
- Osterwalder, A. & Pigneur, Y. (2009). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. Wiley.
- Kim, W.C. & Mauborgne, R. (2005). Blue Ocean Strategy. Harvard Business School Press.
- Frei, F. & Morriss, A. (2012). Uncommon Service: How to Win by Putting Customers at the Core of Your Business. Harvard Business Review Press.
- Ries, E. (2011). The Lean Startup. Crown Business.

YouTube Videos
- Business Model Canvas | Tec Labs — Tec Labs Centro de Inovação (Slide 8). youtu.be/ZS4jC7Oc5Zo
- 10 Types of Innovation [original video unavailable — URL recycled] (Slide 32). youtu.be/yD0-1034Yvw
- Nurse Innovation: Saving the Future of Healthcare | Rebecca Love | TEDxBeaconStreet — TEDx Talks (Slide 37). youtu.be/IPBcRW8NQPY
- Segmentation: The Key to Grow Community | Mary Abbazia | TEDxFergusonLibrary — TEDx Talks (Slide 44). youtu.be/8Mb3BWs9uUg
- BMC Customer Relationships [original video unavailable — URL recycled] (Slide 56). youtu.be/-aOImSS63ec

Tools & Additional Resources
- Strategyzer — Business Model Canvas. www.strategyzer.com/library/the-business-model-canvas
- Blue Ocean Strategy — Strategy Canvas. www.blueoceanstrategy.com/blog/strategy-canvas-template/
- Visual Capitalist — 10 Types of Innovation. www.visualcapitalist.com/10-types-of-innovation-the-art-of-discovering-a-breakthrough-product/

MODULE 6 — Communicating Innovation: Pitching your Solution

Academic Papers, books and websites

- Loken, E. & Gelman, A. (2014). Measurement error and the replication crisis. Science, 355(6325), 584–585. https://doi.org/10.1126/science.1255484 (Source: 250 peer-reviewed proposals statistic, Slide 5)
- Sumner, P. et al. (2014). The association between exaggeration in health related science news and academic press releases. BMJ, 349, g7015. https://doi.org/10.1136/bmj.g7015 (Source: 460 press releases across 20 UK universities, Slide 6)
- Instituto da Próstata — prostate cancer data used in pitch case study. www.institutodaprostata.com/pt/problemas/cancro-da-prostata
- Olson, R. (2015). Houston, We Have a Narrative: Why Science Needs Story. University of Chicago Press. (AND-BUT-THEREFORE storytelling framework, Slides 18–22)
- Kawasaki, G. (2015). The Art of the Start 2.0: The Time-Tested, Battle-Hardened Guide for Anyone Starting Anything. Portfolio/Penguin. (10+1 pitch deck structure, Slides 38–47)

YouTube Videos

- Why Data Doesn't Change Minds | Andrea Olson | TEDxOkoboji — TEDx Talks (Slide 9). youtu.be/I4WaKfqchx8
- How to Speak So That People Want to Listen | Julian Treasure | TED — TED (Slide 14). youtu.be/eIho2S0ZahI
- Randy Olson Great Challenges Day at TEDMED 2013 — TEDMED (Slide 18). youtu.be/ERB7ITvabA4
- The Secret to Telling a Great Story — in Less Than 60 Seconds | Jenny Hoyos | TED — TED (Slide 21). youtu.be/ZmNpeXTj2c4
- Your Body Language May Shape Who You Are | Amy Cuddy | TED — TED (Slide 23). youtu.be/Ks-_Mh1QhMc
- You are contagious | Vanessa Van Edwards | TEDxLondon — TEDx Talks (Slide 24). youtu.be/cef35Fk7YD8
- The Secret to Successfully Pitching an Idea | The Way We Work, a TED series — TED (Slide 25). youtu.be/l0hVIH3EnlQ

Tools & Additional Resources

- Pitch Canvas — structured pitch design tool. best3minutes.com/the-pitch-canvas/

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Introduction to Climate Change Communication with Stakeholders MC9 EQF4

Microcredential Title	**Introduction to Climate Change Communication with Stakeholders**
Short Code / ID	MC9 EQF4
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, Greek, Finnish, German and Portuguese
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	National and Kapodistrian University of Athens
Module Lead / Author	Assoc. Prof. Venetia-Sofia Velonaki, National and Kapodistrian University of Athens

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Apply the principles and strategies of effective stakeholder communication in relation to climate change
LO 2	Select relevant and valid sources of information about climate change
LO 3	Manage communication challenges with diverse stakeholders

chAnGE Competence Area	Communication and Collaboration
Alignment Notes	MC9 aims to equip health and social care professionals working with older adults with the essential skills to communicate effectively with older individuals, service managers, and public authorities about climate change and its impact on the health of older populations.
Keywords	climate change, Climate-health communication; risk communication; climate literacy; older adults; misinformation; stakeholder engagement; climate resilience

Learning Activities

E-Learning Format	Text, interactive H5P content, PowerPoint-based video presentations, Audio, Moodle resources, external links and downloadable templates.
Activities	Pre- and post-module quizzes, self-assessment questions, case studies, interactive activities, final quiz and evaluation questionnaires.
Estimated Study Time	25 hours

Content & Topics

Content & Topics	Subsections
1. Key concepts in climate-health communication	1.1 Definition of communication, 1.1.2 Importance of communication, 1.1.3 Models of communication, 1.1.4 Types of communication, 1.2 What is miscommunication?, 1.2.1 Barriers to verbal communication due to differences in hearing ability and culture, 1.3 What is climate communication?, 1.4 Risk Communication, 1.5 Misinformation and false news about climate change, Key Principles of Effective Climate Communication, 1.6 Key Principles of Effective Climate Communication, 1.7 How health professionals should talk about climate change, 1.8 Key stakeholders, 1.8.1 Why Stakeholder Engagement Matters, 1.9 Climate Communication and Older Adults – Why It Matters?, 1.10 References and further reading
2. Communication with older adults	2.1 Challenges in the interaction between HSC workers and the older adults, 2.2 Ageist communication in the HSC workers – older patient interaction, 2.3 Climate and health literacy, 2.4 General Strategies to Improve Communication with Older Adults, 2.5 Specific techniques for better communication with older adults, 2.6 Communication with older adults about climate change, 2.7 Case study, 2.8 Case study, 2.9 Indicative bibliography
3. Communication with other stakeholders	3.1 Stakeholder roles, 3.2 Communicating climate change: One message doesn't fit all, 3.3 Barriers and enablers for stakeholder collaboration, 3.4 Case study, 3.5 References and further reading
4. Sources of Information	4.1 European Sources and Channels, 4.2 International Sources of Information
5. Conclusion and Summary	Summary of key learning and transition to final quizzes and post-module evaluation.

1. Key Concepts in Climate Health Communication

Thinking Space

Learners are invited to take a few minutes to consider what the word "communication" means to them and to record their thoughts in a self-reflection diary, such as a notebook, Word document, or sheet of paper.

1.1 Definition of communication

The subject of communication has concerned scholars since the time of Ancient Greece where communication was very important in daily life, politics, and education. Public speaking, or rhetoric, was highly valued, especially in places like Athens, where citizens debated and made decisions about different topics. Great thinkers like Aristotle, Plato, and Socrates studied and taught how to communicate clearly and persuasively. They believed that good communication could help people find truth, solve problems, and live better lives. Writing and storytelling were also important, helping ideas and knowledge spread across generations. Until recently, however, people usually included the topic in other subjects and assumed it was a natural part of being human. According to Leagans (1961), Communication is the process by which two or more people exchange ideas, facts, feelings or impressions in ways that each gains a common understanding of the meaning, intent and use of messages.

1.1.2 Importance of communication

1. Understanding and Clarity
    - Helps people share thoughts, feelings, and information clearly.
    - Reduces misunderstandings and confusion.
2. Builds Relationships
    - Strong communication fosters trust, respect, and connection between individuals.
    - Vital in personal relationships, friendships, and teamwork.
3. Essential in the Workplace
    - Enables collaboration and productivity.
    - Crucial for leadership, conflict resolution, and decision-making.
    - Enhances customer service and professional image.
4. Drives Social and Civic Engagement
    - Encourages active participation in society through discussions, voting, and advocacy.
    - Promotes awareness of social issues and collective action.
5. Bridges Cultural Differences
    - Promotes understanding between people of different backgrounds.
    - Helps develop empathy and intercultural competence.
6. Supports Learning and Teaching
    - Teachers communicate concepts, students ask questions and express ideas.
    - Fundamental in education and academic success.
7. Enables Innovation and Progress
    - Sharing ideas leads to creativity, problem-solving, and technological development.
    - Critical in research, science, and entrepreneurship.
8. Self-Expression and Identity
    - Allows individuals to express who they are, what they believe, and how they feel.
    - Contributes to personal growth and mental health.

1.1.3 Models of Communication

Communication can be understood in three basic ways, depending on how messages are shared and how people respond.

1. One-Way Communication (Linear)
A message goes from one person to another, but the second person doesn't reply.
Example: A teacher gives a lecture. A radio or TV broadcast.

2. Two-Way Communication (Interactive)
The message goes back and forth. The second person responds later.
Example: A student sends an email to a teacher and gets a reply.

3. Real-Time Communication (Dynamic)
Both people talk and respond at the same time.
Example: A face-to-face conversation or a phone call.

Communication can have problems, like misunderstandings or noise.
Feedback helps people understand each other better.

Comparison Table:

Model Type	Feedback	Example Use
Linear	No	TV or radio broadcast
Interactive	Yes	Email, texting
Transactional	Continuous	Face-to-face conversation

1.1.4 Types of communication
There are several types of communication, each with its own method of transmitting messages and its appropriate context. Here's an overview of the **main types of communication**:

1. Verbal Communication
Definition: The use of words and language to convey messages.
Forms:
Oral (spoken): Face-to-face conversations, phone calls, presentations, meetings.
Written: Emails, texts, reports, articles, social media posts.
Example: A conversation between two colleagues discussing a project.

2. Non-Verbal Communication
Definition: Communication without words, often using body language, gestures, facial expressions, and posture.
Forms:
Body Language: Gestures, facial expressions, posture.
Paralinguistics: Tone, pitch, volume of voice.
Eye Contact: Indicates attention, interest, or respect.
Proxemics: Use of personal space.
Example: A person crossing their arms might indicate defensiveness or discomfort.

3. Visual Communication
Definition: The use of visual elements to communicate messages.
Forms:
Flyers, Posters, Videos, Presentations
Graphics: Charts, infographics, diagrams, and illustrations.
Colors: Used in branding, design, and even to convey emotions.
Signs and Symbols: Road signs, logos, and other visual cues.
Example: A company logo that represents a brand's identity.

4. Written Communication
Definition: The exchange of messages through written symbols (letters, numbers, symbols).
Forms:
Formal: Business emails, official reports, letters.
Informal: Text messages, social media posts, casual notes.
Example: Writing a letter to a friend or sending a professional email.

5. Interpersonal Communication
Definition: Direct, face-to-face communication between two or more people.
Forms:
Conversations, discussions, or debates.
Feedback between individuals.

Example: A manager talking to their team during a meeting.

6. Group Communication
Definition: Communication that occurs among a group of people, typically in a team or collective setting.
Forms:
Team meetings, brainstorming sessions, and collaborative discussions.
Exchange of ideas, opinions, or feedback.
Example: A team discussing the strategy for an upcoming project.

7. Mass Communication
Definition: The process of transmitting information to a large audience through various media channels.
Forms:
Television, radio, newspapers, and social media platforms.
Example: A news broadcast on TV or a viral post on social media.
Comparison Table of Communication Types:

Type of Communication	Key Features	Example
Verbal Communication	Uses words, both spoken & written	Conversations, speeches
Non-Verbal Communication	Body language, gestures, expressions	Facial expressions, posture
Visual Communication	Uses images, colors, symbols	Infographics, logos
Written Communication	Relies on writing and text	Emails, reports
Interpersonal Communication	One-on-one, face-to-face	Conversations
Group Communication	Communication within a group	Team meetings, debates
Mass Communication	Large audience, media-based	TV news, social media

1.2 What is miscommunication?
Miscommunication is a failure in the communication process that results in a misunderstanding or incorrect interpretation of a message. It can be verbal, written, visual, or non-verbal.

Learners are asked to watch a video to better understand why and how miscommunication happens. **How miscommunication happens (and how to avoid it):** https://www.youtube.com/watch?v=gCfzeONu3Mo

Summary: This video explains why miscommunication happens even when people speak the same language. It shows that communication is complex because people interpret messages through their own assumptions, emotions, and context. The main message is that clearer communication requires active listening, checking understanding, and being aware that meaning is co-created between speaker and listener.

1.2.1 Barriers to verbal communication due to differences in hearing ability and culture

Barriers to verbal communication due to differences in hearing ability and culture can significantly hinder effective interaction between individuals. When one party relies on spoken language and the other communicates primarily through sign language or alternative modalities, mutual understanding becomes challenging—especially in the absence of interpreters or visual aids. Cultural differences further complicate communication, as they influence norms, non-verbal cues, and expectations about interaction. For example, eye contact, gestures, or turn-taking may carry different meanings across cultures, leading to misinterpretations. These combined factors can result in reduced trust, social exclusion, or even compromised care in health and social service settings. Addressing such barriers requires not only technical solutions (e.g., assistive technologies or sign language support) but also cultural sensitivity, inclusive communication training, and an awareness of the diverse ways in which people express and receive meaning.

Learners are asked to watch a video entitled "A failure to communicate"
https://www.youtube.com/watch?v=8Ox5LhIJSBE

Summary: This video illustrates how communication can fail when people make assumptions and when barriers such as disability, noise, technology, and context interfere with understanding. Its main message is that effective communication requires patience, empathy, flexibility, and the willingness to find alternative ways to create shared meaning.

1.3 What is climate communication?

Climate communication refers to how information about climate change is shared with the public to raise awareness, motivate behavior change, and encourage climate action. It involves the use of language, science, storytelling, media, and cultural framing to make climate issues relevant and understandable

Learners are asked to watch a video to find out some ways to better communicate climate change.

What's the best way to communicate climate change: https://www.youtube.com/watch?v=RyLr64tnvzY&t=8s

Summary: This video focuses on the difficulty of communicating climate change without making people feel overwhelmed, defensive, or disengaged. Its main message is that effective climate communication should avoid fear alone and instead connect the issue to people's values, emotions, and sense of agency, helping them see that action is possible and meaningful.

1.4 Risk Communication

Dialogue Cards

Learners engage with three H5P Dialogue Card activities by pressing the turn button to reveal the answers. The activities focus on challenges in climate risk communication, the role of emotions, and the meaning of risk communication.

1.5 Misinformation and false news about climate change

In the context of climate change, risk communication plays a critical role in informing the public, guiding policy, and encouraging behavior change. However, this communication is increasingly undermined by the spread of misinformation and false news, which distort scientific facts, erode public trust, and delay necessary action

What Is misinformation?

Misinformation refers to inaccurate or misleading information that is spread, regardless of intent. In climate change communication, misinformation can include:
Denial of climate change
Downplaying human responsibility
Misrepresenting scientific uncertainty
Promoting false solutions or conspiracy theories

What Is disinformation?
Disinformation refers to false, inaccurate, or misleading information that is deliberately distributed with the intention to deceive or manipulate the audience.
This distinguishes it from:
Misinformation: false info shared without intent to deceive

Malinformation: is information that is correct (true), but is deliberately shared in a harmful way — for example, by leaking private or confidential data to damage someone's reputation. It differs from false information in that the content is not fabricated, but its intent and context are malicious.

Common tactics in disinformation:

- Fake experts or fake news sites
- Doctored images or videos (deepfakes)
- Emotionally charged headlines
- False attribution to trusted sources
- Use of "whataboutism" or conspiracy framing

Real-world examples:

- Climate Change Denial: Fake reports claiming "scientists disagree on climate change" to create doubt.
- COVID-19 Myths: Claims like "vaccines contain microchips" spread intentionally to erode trust.
- Political Disinformation: Fake news before elections to sway opinions or suppress voting

Sources and mechanisms of spread:

- Social Media Platforms: Algorithms often amplify sensational or controversial content, allowing misinformation to go viral.
- Political and Ideological Actors: Certain groups promote skepticism or denial to protect economic or political interests.
- Lack of Media Literacy: Audiences often struggle to critically assess the credibility of online content.

Why it works

- Appeals to emotions and cognitive biases
- Exploits social trust and platform algorithms
- Often aligns with audience beliefs or fears

Optional Reading

Editorial - Health in the age of disinformation: www.thelancet.com Vol 405 January 18, 2025

This editorial highlights misinformation and disinformation as serious threats to public health. It argues that false or deliberately misleading health information spreads rapidly, especially through social media, and can undermine trust, influence health decisions, and damage collective action during crises. The main message is that combating misinformation requires more than fact-checking; it needs clear communication, trust-building, emotional awareness, responsible platforms, and systematic public health action.

Case study on climate misinformation

It focuses on the false claim that "the climate has always changed, so this is normal." Learners examine what the claim suggests, why it is misleading, what scientific evidence shows, and how such misinformation can reduce public urgency and delay climate action. The activity includes a short reflective assignment, where learners are asked to respond using facts and to consider how a Health and Social Care Worker could correct this misinformation in the community.

1.6 Key Principles of Effective Climate Communication

1. Know your audience
   - Tailor messages to the values, knowledge, and emotions of the target group
   - Two-Way Engagement – Listen as well as inform
   - Identify values, literacy levels, and social norms
   - Use audience segmentation: not all people respond the same way.
2. Make it personal and local
   - Highlight how climate change affects local environments, health, and daily life.
   - Narratives – Personal stories make climate impacts real
3. Use clear, simple language
   - Avoid jargon and focus on vivid, relatable narratives.
4. Frame around solutions
   1. Emphasize achievable actions and co-benefits (e.g., better air quality, energy savings).
   2. Local Framing – Tailor messages to community concerns
5. Acknowledge emotions
   - People may feel fear, guilt, or helplessness; provide hope and empowerment.
6. Use of Visual Aids
   - Maps, infographics, video animations are preferable instead of lecturing

1.7 How health professionals should talk about climate change

Figures 1& 2: Source: WHO (2024). Communicating on climate change and health: Toolkit for health professionals

1.8 Key stakeholders

Climate health communication refers to the process of informing and educating various audiences about the health impacts of climate change, while motivating action and policy changes. Effective communication in this context requires collaboration among a wide range of stakeholders, each playing a unique and essential role. Below are the primary stakeholders involved:

1. **Public Health Professionals**

Role: Translate scientific evidence into health messages; design community-based interventions; monitor climate-related health threats.

Example: Health departments issuing heatwave warnings or air quality alerts.

2. **Healthcare Providers (Doctors, Nurses, Social Workers, Community Health Workers, Caregivers or Care Workers)**

Role: Educate patients about climate-related health risks (e.g. respiratory diseases from pollution); act as trusted messengers.

Example: Community nurses advising vulnerable populations during extreme heat events.

3. **Scientists and Researchers**

Role: Provide evidence-based data on climate-health links; assess risks and develop projections.

Example: Publishing climate-health studies or developing health impact assessments.

4. **Policymakers and Government Agencies**

Role: Enact policies and regulations that mitigate climate change and protect public health.

Example: Ministries of Health integrating climate risks into national health plans.

5. **Media and Journalists**

Role: Disseminate accessible and accurate information; raise public awareness; counter misinformation.

Example: Reporting on local disease outbreaks linked to climate patterns (e.g. dengue fever).

6. **Non-Governmental Organizations (NGOs) and Civil Society**

Role: Advocate for climate justice; support vulnerable communities; implement local health education campaigns.

Example: NGOs conducting educational workshops on water safety during floods.

7. **Educators and Academic Institutions**

Role: Integrate climate-health topics into curricula; prepare future professionals.

Example: Universities offering courses on climate and health communication.

8. **Community Leaders and Local Influencers**

Role: Serve as bridges between professionals and the public; ensure cultural relevance of messages.

Example: Religious leaders promoting clean air practices during worship gatherings.

9. **Businesses and Employers**

Role: Protect employee health; adopt sustainable practices; communicate workplace-related climate risks.

Example: Construction companies providing heat protection guidelines during summer.

10. **General Public (Including Vulnerable Populations)**

Role: Active recipients and co-creators of communication; their feedback shapes future messaging.

> **Example:** Older adults, children, and low-income communities participating in resilience training.

1.8.1 Why Stakeholder Engagement Matters:

- Promotes interdisciplinary collaboration
- Ensures inclusive and equitable communication strategies
- Supports the implementation of effective interventions
- Enhances trust and message uptake across populations

1.9 Climate Communication and Older Adults – Why It Matters?

Failing to communicate effectively with older adults (H5P):

- Exacerbates health inequalities
- Leaves at-risk populations unprepared
- Undermines efforts for community resilience and equity in climate adaptation

Transition to the next chapter

Having explored the foundational concepts of communication and identified the key stakeholders involved in climate and health communication, we now turn our focus to a particularly important population group: older adults. Effective communication with older people requires not only an understanding of the general principles we have discussed, but also specific skills and adaptations tailored to their needs, perceptions, and vulnerabilities. In the following chapter, we will examine how healthcare professionals can apply targeted communication strategies to support older populations, promote health literacy, and build trust-especially in the context of climate-related health challenges.

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2. Communication with older adults

2.1 Challenges in the interaction between HSC workers and the older adults

Effective communication is vital for older adults to request help with daily activities, pursue lifelong learning, access important health and legal information across various media platforms, and maintain meaningful relationships with younger generations. They rely on communication, both in person and online, to connect with family, friends, neighbors, legal advisors, and healthcare providers. However, there are barriers to communicating with older adults that need to be overcome so that there is a mutual understanding of the information. Below are the challenges or barriers to communication with older adults (H5P):

- Sensory Impairments

Hearing loss: Common among older adults and can lead to misunderstandings or withdrawal from conversation.

Vision problems: Can make it difficult to read non-verbal cues, written materials, or facial expressions.

- Cognitive Decline

Conditions such as Alzheimer's disease and other forms of dementia can impair memory, language, and comprehension, making communication more complex.

- Physical Limitations

Speech difficulties due to stroke, Parkinson's disease, oral structural changes (such as tooth loss), or other conditions can affect the clarity, articulation, and pace of speech.

- Psychological Factors

Depression, anxiety, or low self-esteem can reduce motivation to engage in conversation.

Fear of being misunderstood or of appearing "slow" can make older people hesitant to participate.

- Environmental Factors

Noisy, chaotic, or poorly lit environments can hinder effective communication.

Lack of privacy may make older individuals reluctant to speak openly.

- Generational and Cultural Differences

Differences in language use, slang, or values may cause misunderstandings.

Older adults may have different expectations about formality or respect in conversations.

- Assumptions and Stereotypes

Ageist attitudes may lead others to speak in a patronizing tone, use "elderspeak," or exclude older adults from conversations.

- Low Health Literacy

Low health literacy has a negative impact on the ability of individuals to obtain, comprehend, and apply basic health information and services to make appropriate decisions in health-related situations.

Self-assessment activity

Learnersare asked to find the word that matched better the description and image. The words to be used are: depression, hearing, noise, religion, dementia, ageism. The activity is for practice only and is not included in the final assessment.

2.2 Ageist communication in the HSC workers – older patient interaction

Ageism refers to the stereotyping, prejudice, and discrimination individuals face due to their age. Studies have demonstrated that older adults affected by ageism experience negative consequences on their health, overall well-being, and the quality of health care they receive. Widespread adoption of negative attitudes toward older adults has been linked to increased mortality risk, reduced functionality, and slower recovery from illness. Additionally, holding negative views about ageing is a strong predictor of poor mental health. Ageist attitudes can result in significant practical consequences for older patients. Assumptions about cognitive and functional decline often lead to limited sharing of medical information, the withholding of specific treatment options, and exclusion from clinical trials. These biases are also present among mental health professionals and trainees, who may, for example, view symptoms like depression as a normal part of ageing, an outlook that can further restrict access to appropriate treatment. In addition, experiencing social exclusion due to negative stereotypes has been recognized as a chronic source of stress for older adults, which can have detrimental effects on their health. As the global population continues to age, the prevalence and impact of ageism are likely to increase.

Embedded Moodle presentation

“Ageist communication in the HSC workers-older patient interaction”
The presentation presents the characteristics of ageism in communication with older adults.

Optional Reading

A “guide to avoid ageism in communication”

In this guide by WHO learners can understand how they can avoid ageism in the communication with older adults.

Key messages on how to avoid ageist practices in communication with older adults:

- Avoid overgeneralizations, not all older adults have the same characteristics.
- Avoid presenting the ageing population as a problem.
- Avoid using offensive language focusing on age, other stereotypes or disability.
- Use neutral language without stigmatizing.
- Avoid treating people (or groups) as fundamentally different, inferior, or alien compared to yourself or the dominant group helps all groups feel part of the same community.
- Avoid presenting pictures that portray older adults always as sad, frail or lonely.

2.3 Climate and Health Literacy

Health literacy is defined as "people’s knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course" (Sørensen, K., Van den Broucke, S., Fullam, J. et al. 2012).

More recently **Healthy People 2030** addresses both personal health literacy and organizational health literacy and provides the following definitions:

Personal health literacy is the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.

Organizational health literacy is the degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.

The new definitions differ from the previous derived by Healthy People 2010 and 2020. They:

- Highlight individuals' capacity to utilize health information, not merely comprehend it
- Prioritize making “well-informed” choices over simply “appropriate” ones
- Include a broader public health viewpoint
- Recognize the role of organizations in supporting and improving health literacy

Learners are asked to watch 2 videos on health literacy

https://youtu.be/H4EoiNo-6ag **Summary:** This video explains what health literacy means and why it is important for people’s health and wellbeing. Its main message is that health literacy is not only about reading skills, but also about people’s ability to access, understand, evaluate, and use health information in ways that help them make informed health decisions.

https://youtu.be/3e5lXMcedDc **Summary**: This video introduces the concept of health literacy and explains why it is important for individuals, families, and communities. Its main message is that people need clear, accessible, and reliable health information in order to understand their health, make informed decisions, and use health services effectively.

Key messages:

- Health literacy is an essential skill for communicating health information and applying it in daily life.
- Health literacy is needed to understand nutrient labels, instructions about drugs and to ask about your health during the discussion with a health professional.
- Low health literacy is related to poor health outcomes, increased chronic conditions, hospitalization and medical costs.
- Cultural differences and beliefs, age, educational level and communication style have an impact on health literacy.

Older adults, non-native speakers and those with low incomes are particularly vulnerable.

Climate literacy or in other words **climate-change literacy** refer to the knowledge about the climate and acting accordingly to this knowledge. A climate literate individual is an expert in the principles of climate science and can assess information and communicate about climate change clearly and take responsible action towards decreasing unsustainable practices that negatively affect the environment” (Suhaimi and Mahmud, 2022).

Learners are asked to watch a video on climate literacy

https://youtu.be/hp8KkKtQtyM

Summary: This video explains that everyone must have skills and ability to inspire and lead in the change we all need to make for a sustainable future! Governments, businesses, communities and individuals all have a role to play in achieving this aim.

From the interaction of health literacy and climate literacy, a new dimension emerges, namely **Climate-health literacy or Climate and Health literacy.** This is defined as "the degree to which an individual understands the complex relationship between climate change and human health; a climate health–literate individual can recognize direct and indirect linkages between climate change and health, communicate risks, assess data, comprehend uncertainty, and make informed and responsible personal decisions or advocate for broader policies that protect health” (Limaye et al., 2020).

Figure 3: Climate-health literacy integrates health literacy and climate literacy as a new dimension

2.4 General strategies to improve communication with older adults

Improving communication with older adults requires sensitivity to their unique needs, as well as thoughtful adjustments in how we interact. Here are 8 key strategies that can enhance communication effectively and respectfully (H5P):

1. Active Listening: Paying close attention, showing interest, and giving the speaker time to express themselves fully.
2. Clear and Respectful Speech: Speaking slowly, clearly, and using simple, direct language without being condescending.
3. Non-verbal Support: Using gestures, facial expressions, and visual aids to support verbal communication. Maintaining eye contact and an open posture can enhance trust and connection.
4. Adapted Communication Tools: Hearing aids, reading glasses, large-print materials, and written summaries can make information more accessible.
5. Creating a Comfortable Environment: Reducing background noise, ensuring good lighting, and choosing quiet, private spaces for conversations.
6. Empathy and Patience: Being patient, showing understanding, and giving extra time for responses help build rapport and ease anxiety.
7. Involving Family and Caregivers: When appropriate, involving trusted individuals can support communication and provide context.
8. Training and Awareness: Professionals trained in geriatric communication are better equipped to handle age-related challenges respectfully and effectively.

Learners are asked to watch a video on how health literacy can improve communication with older adults https://youtu.be/BG-iY-em7mk **Summary:** This short video emphasizes the importance of organizational health literacy in improving national health goals. It talks about proven strategies organizations can use to make health information and services easier to find, understand, and use.

2.5 Specific techniques for better communication with older adults

Clear and supportive communication plays a crucial role in helping vulnerable patients manage their situations and make informed choices regarding their treatment and care (Donnelly and Neville, 2008). Nonetheless, sustaining meaningful communication in hectic healthcare settings, where patients may be in distress and staff often under significant pressure, demands strong interpersonal abilities and heightened self- and social awareness. Research increasingly shows that communication skills can be enhanced and refined through targeted training. Still, encouraging effective communication within healthcare remains a complex and demanding task due to the high-stress, fast-paced environment, which often leaves limited opportunity for thorough interaction.

Audio including a a summary of the 5 basic techniques for better communication with older adults

Embedded Slider presentation including a detailed description of the 5 basic techniques for better communication with older adults

Learners are asked to watch a video on how Teach back technique works in practice https://youtu.be/d702HIZfVWs

Summary: Teach-Back is designed to use in discussion with patients to reduce the chance of misunderstanding important health information. The technique can assist patients to understand and engage in their own care.

Learners are asked to watch a video on how Ask me 3 technique works in practice https://youtu.be/B3EB-icaNKQ

Summary: Ask Me 3 is a patient education program designed to promote communication between health care providers and patients in order to improve health outcomes. This video provides a scenario of a patient speaking to his physician about his condition. The video shows the patient and his daughter using the Ask Me 3 program, asking the three questions, and getting the answers needed to help better understand his condition and next steps.

2.6 Communication with older adults about climate change

Effectively communicating climate change to older adults is essential for advancing future research in this area. This demographic is among the most vulnerable to the health impacts of climate change, making targeted communication vital for raising awareness of the risks and protecting their wellbeing. Moreover, older individuals make up a significant portion of the population, and their views and actions often influence broader societal discussions that can drive meaningful change. As respected figures in their communities and custodians of traditional knowledge, older adults can act as role models for climate change adaptation and mitigation, especially in low-resource settings, where their lived experience is particularly valuable. Therefore, enhancing awareness through effective communication strategies can play a pivotal role in supporting these efforts.

Communicating climate change to older adults can also significantly influence future generations. As repositories of lived experience, they can help bridge past and present climate events, illustrating how environmental conditions have evolved over time. Recognizing their own role in this transformation, through everyday actions and lifestyle choices, may foster a sense of responsibility and encourage behavioral change. This awareness can, in turn, inspire greater engagement in efforts to leave a more sustainable legacy for the generations to come.

However, few studies have been done on how to communicate about climate change with older adults. These studies emphasise the need for the involvement of older adults in communication processes, the identification of their priorities, and the use of engaging technologies grounded in the realities of their daily lives as approaches that warrant further exploration and development. Raising their awareness about climate change and empowering environment friendly behavioral changes through effective communication could have a positive impact on the health of older adults and future generations.

Optional Reading

Pinna, S., Longo, D., Zanobini, P., Lorini, C., Bonaccorsi, G., Baccini, M., & Cecchi, F. (2024). How to communicate with older adults about climate change: a systematic review. *Frontiers in public health*, *12*, 1347935. https://doi.org/10.3389/fpubh.2024.1347935

This article describes how to communicate with older adults about climate change. Key Messages from this article:

- The older population is largely overlooked in climate change communication research.
- Only three studies have specifically addressed climate change communication with older adults.
- Strong potential for tailored strategies to raise older adults' awareness of climate change.
- Programs are needed to facilitate older adults' involvement by making climate issues more accessible and actionable.
- Promising approaches include:
    - Engaging older adults directly in communication processes
    - Identifying and addressing their specific priorities
    - Leveraging technologies grounded in their daily life contexts
- These strategies warrant further investigation and development.

2.7 Case Study – Ask me 3 – Teach back

Case Study – Branching Scenario

This section includes a self-assessment case study with a branching scenario focused on health literacy, patient communication, and post-operative care. Mr Mark is a 75-year-old retired Moldavian man with limited language proficiency, type 2 diabetes, recent knee replacement surgery, and limited social support. Through the scenario, learners reflect on communication challenges related to language barriers, older age, living alone, post-operative follow-up, and the patient's reduced confidence in managing health issues independently. The activity asks learners to apply two practical communication techniques: the Ask Me 3 method, by identifying the three key questions patients should be encouraged to ask, and the teach-back method, by deciding what the patient should be asked to repeat in order to confirm understanding. The exercise is designed for self-assessment only and does not contribute to the final assessment.

2.8 Case Study – Communication Challenges

Case Study

This section includes a case study focused on communication challenges in a hospital setting. Learners are introduced to Mr Ibraheem, an older Syrian refugee hospitalized due to worsening asthma, who speaks little English and appears to have difficulty hearing. The scenario also includes environmental and contextual barriers, such as noise in the ward, lack of privacy, heat, absence of an attendant, and no available translator. Learners are invited to reflect on these challenges and consider how communication could be made more effective, using their self-reflection diary to record their thoughts.

Transition to the next chapter

Having seen the difficulties in communicating with older adults and the strategies to improve communication, let's go one step further and see what is the case with communication with stakeholders.

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3. Communication with other stakeholders

This topic addresses HSC service preparedness to respond to the climate change crisis, service adaptation indicators and HSC staff awareness and readiness to recognise different needs of older people and prioritise accordingly.

3.1 Stakeholder roles

Effective communication and collaboration among stakeholders is essential for climate-resilient health and social care. These stakeholders include a wide range of actors, such as public health officials, local governments, emergency responders, healthcare providers, social workers, nonprofit organizations, academic institutions, and importantly, community members and older adults themselves. Each plays a vital role in protecting vulnerable populations, such as older adults, during climate-related events.

It is important to emphasise the diverse roles of community actors (from health care providers and local authorities to schools, media, and organisations) in preparing for and responding to climate-related health threats. Collaboration among various stakeholders can result in stronger, more coordinated responses. Inclusive, community-driven planning not only strengthens resilience but also ensures timely support and promotes equitable, person-centered care for older adults in the face of climate challenges.

Figure 4: Communities are developing a coordinated response to health risks by using CDC's Building Resilience Against Climate Effects (BRACE) framework,a five -step process for climate adaptation.

Thinking Space

This section introduces a thinking space activity on mapping diverse stakeholders in climate change communication. Learners are invited to reflect on who they could influence regarding climate change and to list key stakeholders in their self-reflection diary. The activity encourages them to consider people they regularly interact with, those who may value their perspective or expertise, and individuals or groups with the power to act or influence others. Learners may also discuss their ideas with peers in order to broaden their perspectives and expand their stakeholder list.

3.2 Communicating climate change: One message doesn't fit all

When communicating about climate change, our messages should be tailored to the audience. Different stakeholders may need different information, depending on their roles, concerns, and levels of understanding.

For example, the range of climate change messages can be as diverse as the goals and audiences we address.

We may aim to:

- Encourage a colleague to speak up about climate change
- Persuade a policymaker of the health impacts of their decisions
- Reduce climate anxiety in a peer
- Provide a journalist with clear and credible information
- Motivate social media followers to contact their elected representatives

Each audience requires a different approach and relevant content to make the message meaningful and impactful.

Figure 5: Communicating on climate change and health: toolkit for health professionals. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO.

How to communicate with diverse stakeholders

- Make a visible commitment - Lead by example: Publicly committing to climate and health action can inspire others to join. Sharing your commitment (on your website, social media, or in conversations) helps build momentum and encourages collective effort. Personal actions can also support broader advocacy for systemic change. Use available tools and resources to turn your commitment into meaningful impact.
- Start small and visible: Take simple, low-cost actions, share your successes, and encourage others. Whether you're a sole practitioner or part of a large health or social care institution, track your progress, explore clean energy options, and build momentum with quick, achievable steps.
- Use messages that connect: Whether you're talking to a colleague or a policymaker, make it personal and relatable. Focusing on health and shared values helps inspire action and make your message more impactful.
- Advocate for policy change: Engage directly with policymakers, as they depend on your input to understand what matters most. Policy changes are essential for effectively tackling climate change.

Figure 6: Spectrum of Climate Advocacy

- Engage your profession: Connect with colleagues and professional organizations. Many are concerned about climate change. Partnering with other health leaders can strengthen your knowledge, support, and impact on climate solutions.
- Engage your community: Write letters to the editor or opinion pieces to share your professional insights and personal stories. Keep messages clear and end with a strong call to action. Social media is a powerful tool to boost your advocacy. Use it to share informative posts, infographics, and videos on climate change.
- Collaboration – Networking: Collaborating with local advocacy groups and others who share your goals can strengthen your impact. Join conferences and seminars to build connections and gain insights from experts.

- Make an advocacy plan: As you get ready to talk to your community and elected officials, identify strategies, tactics, timing, and resource allocation.

Rehr, R.C., & Perkowitz, R.M., ecoAmerica (2019). Moving Forward: A Guide for Health Professionals to Build Momentum on Climate Action. Washington, DC. Available at: https://climateforhealth.org/wp-content/uploads/2020/06/CFHMFG-web.pdf
Citizens' Climate Lobby (2023) A guide to effective climate change action. In Be your best Advocate. Available at: https://citizensclimatelobby.org/blog/advocacy/a-guide-to-effective-climate-change-action/

3.3 Barriers and enablers for stakeholder collaboration

Stakeholder collaboration is essential for implementing urban planning that effectively addresses disaster risks and climate change impacts. However, this collaboration often faces major challenges. The key barriers are grouped into 4 categories: External barriers (e.g. weak policies, governance gaps, and political resistance), Inter-organisational barriers (e.g. lack of leadership, conflicting interests, poor coordination), Intra-organisational barriers (e.g. rigid structures, siloed culture, limited resources), Personal barriers (e.g. fear of losing power, lack of knowledge or commitment). A study found that external barriers (particularly weak political support, fragmented governance, and outdated laws) have the strongest influence over other barriers. Removing or addressing these high-impact barriers can significantly improve collaboration across all levels.

Main enablers that can help overcome these barriers are: Creating collaborative governance structures, Strengthening laws and policies that support cooperation, Improving leadership and coordination across institutions, Building trust, offering incentives, and promoting shared learning.
Ganeshu, P., Fernando, T., & Keraminiyage, K. (2023). Barriers to, and Enablers for, Stakeholder Collaboration in Risk-Sensitive Urban Planning: A Systematised Literature Review. Sustainability, 15(5), 4600. https://doi.org/10.3390/su15054600

Challenges and Solutions

Drag-and-drop activity

This section presents a drag-and-drop activity where learners classify words or short statements related to stakeholder collaboration in climate resilience as either challenges or solutions. The activity helps them distinguish between barriers that hinder collaboration and actions or enablers that can support more effective cooperation.

3.4 Case Study

Case Study

This section presents a case study on heatwave resilience among older adults in a multicultural urban neighbourhood. Learners identify key stakeholders and reflect on how culturally sensitive communication and transdisciplinary collaboration can help address communication gaps and protect vulnerable older adults during extreme heat events.

3.5 References and further reading

- Ganeshu, P., Fernando, T., & Keraminiyage, K. (2023). Barriers to, and Enablers for, Stakeholder Collaboration in Risk-Sensitive Urban Planning: A Systematised Literature Review. Sustainability, 15(5), 4600. https://doi.org/10.3390/su15054600
- Rehr, R.C., & Perkowitz, R.M., ecoAmerica (2019). Moving Forward: A Guide for Health Professionals to Build Momentum on Climate Action. Washington, DC. Available: https://climateforhealth.org/wp-content/uploads/2020/06/CFHMFG-web.pdf
- UN Office for Disaster Risk Reduction (UNDRR) (2023) Partnership and Stakeholder Engagement Strategy. Available: https://www.preventionweb.net/files/61909_partnershipengagementstrategy.pdf
- World Health Organization (WHO) (2024). Communicating on climate change and health: toolkit for health professionals. Geneva. Available: https://www.who.int/publications/i/item/9789240090224

4. Sources of Information

European Sources & Channels

- *European Environment Agency (EEA)* Website: www.eea.europa.eu Provides detailed reports, data, and infographics on climate change impacts in Europe, including vulnerable groups like the elderly. Communication campaigns include public engagement on heatwaves, health, and adaptation strategies.
- *European Commission – Climate Action* Website: climate.ec.europa.eu Runs initiatives like the European Climate Pact to inform and involve citizens, including older adults, in climate resilience actions. Multimedia campaigns, newsletters, and community toolkits available in multiple languages.
- *Health-EU Portal (European Commission - DG SANTE)* Website: health.ec.europa.eu Shares resources and guidance on health risks, including climate-related ones for elderly populations (e.g., heat stress).*n*Focus on public health messaging and preparedness.
- *AGE Platform Europe* Website: www.age-platform.eu A network of organizations representing older people in Europe. Campaigns and publications linking climate policy and ageing populations, with accessible materials tailored for seniors.
- *European Centre for Disease Prevention and Control (ECDC)* Website: www.ecdc.europa.eu*n*Public health alerts and risk communication frameworks relevant during climate-related outbreaks (e.g. vector-borne diseases). Focus on vulnerable populations including the elderly.

International Sources and Channels

- *World Health Organization (WHO) – Climate Change and Health* Website: www.who.int Publishes health communication strategies addressing the risks of climate change for older people. Includes heat-health action plans, preparedness guides, and emergency communication materials.
- *United Nations Framework Convention on Climate Change (UNFCCC)* Website: unfccc.int Reports and campaigns often consider equity and vulnerability, especially in adaptation communication. Uses storytelling, case studies, and media campaigns.
- *IPCC (Intergovernmental Panel on Climate Change)* Website: www.ipcc.ch Their reports include data on older populations' vulnerability. Summaries for policymakers and the public are available, promoting science-based communication.
- *International Federation of Red Cross and Red Crescent Societies (IFRC)* Website: www.ifrc.org Engages in community-based risk communication including with elderly groups. Toolkits and communication templates for extreme weather and climate-related emergencies.

5. Conclusion and Summary

6.

By completing this module, learners should be better equipped and more confident to:

- Define the core principles of climate-health communication.
- Identify key stakeholders involved in climate-health messaging, including health professionals, policymakers, media, and civil society.
- Adapt communication strategies to different audience needs, such as older adults or low-literacy populations.
- Assess the effectiveness of various climate-health communication campaigns.
- Apply risk communication principles to create tailored messages for vulnerable groups.
- Recognize and distinguish between accurate information, misinformation, and disinformation.
- Understand how collaboration and advocacy can strengthen communication efforts.
- Navigate challenges in engaging older individuals and other diverse stakeholders.
- Select credible, evidence-based sources on climate change.
- Address and manage communication challenges when engaging with a variety of stakeholders.

Effective communication on climate change and health is a vital tool for protecting vulnerable populations, particularly older adults. The complexity of the climate crisis requires coordinated and multi-level communication that integrates scientific evidence, social inequalities, and the specific needs of target populations. Healthcare professionals play a critical role as trusted intermediaries between scientists, policymakers, and communities. Understanding stakeholder roles, tailoring messages to the capacities and sensitivities of older adults and addressing misinformation are key elements for strengthening community resilience. Promoting participation, transparency, and collaboration forms the cornerstone of a fair and effective approach to climate-related risk communication.

Assessment

Assessment element	Description
Pre-Module Quiz	A 10-question quiz taken at the beginning of the module and repeated at the end. It supports learning and reflection and does not affect the grade.
Thinking space activities	Self-reflection tasks where learners record personal thoughts, ideas, and observations in a diary. Self-assessment
Case Studies	Self-assessment activities that allow learners to apply key concepts in realistic situations, reflect on communication challenges, and consider appropriate evidence-based, culturally sensitive, and person-centred responses.
Interactive H5P activities	Dialogue cards, find the word activity, drag-and-drop activity etc Self-assessment
Mid-training evaluation questionnaire	Questionnaire used to assess learners' progress and experience halfway through the training.
Final Quiz	Final Quiz includes questions that assess MC09 (EQF6): Advanced learning of Climate Change Communication for HSC workers.
Post-Module Quiz	The same 10-question quiz is repeated to demonstrate learning progress. It does not affect the grade.
Evaluation questionnaires	Students complete evaluation questionnaires during and after the training, including overall impression of the training programme.

Final video and resource URL checklist

How miscommunication happens and how to avoid it: https://www.youtube.com/watch?v=gCfzeONu3Mo Helps learners understand why miscommunication happens and how active listening and checking understanding can improve communication.

A Failure to Communicate: https://www.youtube.com/watch?v=8Ox5LhIJSBE Illustrates how assumptions, disability, noise, technology, and context can create communication barriers.

What's the best way to communicate climate change? https://www.youtube.com/watch?v=RyLr64tnvzY&t=8s Explains how climate change can be communicated in ways that connect with people's values, emotions, and sense of agency.

What is Health Literacy? https://youtu.be/H4EoiNo-6ag Introduces health literacy as the ability to access, understand, evaluate, and use health information for informed decisions.

Health Literacy: An Overview: https://youtu.be/3e5lXMcedDc Explains why clear, accessible, and reliable health information is important for individuals, families, and communities.

Climate literacy video: https://youtu.be/hp8KkKtQtyM Highlights the importance of climate literacy and the role of individuals, communities, businesses, and governments in supporting sustainable change.

Organizational health literacy video: https://youtu.be/BG-iY-em7mk Shows how organizations can make health information and services easier to find, understand, and use.

Teach-back technique in practice: https://youtu.be/d702HIZfVWs Demonstrates how the teach-back method can help check patient understanding and reduce misunderstandings.

Ask Me 3 technique in practice: https://youtu.be/B3EB-icaNKQ: Demonstrates how patients can use three key questions to better understand their condition and next steps.

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Advanced Learning of Climate Change Communication for Health and Social Care (HSC) Workers MC9 EQF5&6

Microcredential Title	**Advanced learning of Climate Change Communication for Health and Social Care (HSC) workers**
Short Code / ID	MC9 EQF5&6
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, Greek
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	National and Kapodistrian University of Athens
Module Lead / Author	Assoc. Prof. Venetia-Sofia Velonaki, National and Kapodistrian University of Athens

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Apply the principles and strategies of effective stakeholder communication in relation to climate change
LO 2	Select relevant and valid sources of information about climate change
LO 3	Manage communication challenges with diverse stakeholders

chAnGE Competence Area	Communication and Collaboration
Alignment Notes	MC9 aims to equip health and social care professionals working with older adults with the essential skills to communicate effectively with older individuals, service managers, and public authorities about climate change and its impact on the health of older populations.
Keywords	climate change, Climate-health communication; risk communication; climate literacy; older adults; misinformation; stakeholder engagement; climate resilience

Learning Activities

E-Learning Format	Text, interactive H5P content, PowerPoint-based video presentations, Audio, Moodle resources, external links and downloadable templates.
Activities	Pre- and post-module quizzes, self-assessment questions, case studies, interactive activities, final quiz and evaluation questionnaires.
Estimated Study Time	25 hours

Content & Topics

Content & Topics	Subsections
1. Key concepts in climate-health communication	1.1 Definition of communication, 1.1.2 Importance of communication, 1.1.3 Models of communication, 1.1.4 Types of communication, 1.2 What is miscommunication?, 1.2.1 Barriers to verbal communication due to differences in hearing ability and culture, 1.3 What is climate communication?, 1.4 Risk Communication, 1.5 Misinformation and false news about climate change, Key Principles of Effective Climate Communication, 1.6 Key Principles of Effective Climate Communication, 1.7 How health professionals should talk about climate change, 1.8 Key stakeholders, 1.8.1 Why Stakeholder Engagement Matters, 1.9 Climate Communication and Older Adults – Why It Matters?, 1.10 References and further reading
2. Communication with older adults	2.1 Challenges in the interaction between HSC workers and the older adults, 2.2 Ageist communication in the HSC workers – older patient interaction, 2.3 Climate and health literacy, 2.4 General Strategies to Improve Communication with Older Adults, 2.5 Specific techniques for better communication with older adults, 2.6 Communication with older adults about climate change, 2.7 Case study, 2.8 Case study, 2.9 Indicative bibliography
3. Communication with other stakeholders	3.1 Stakeholder roles, 3.2 Communicating climate change: One message doesn't fit all, 3.3 Barriers and enablers for stakeholder collaboration, 3.4 Case study, 3.5 Definition of different types of governance (optional) 3.6 References and further reading
4. Sources of Information	4.1 European Sources and Channels, 4.2 International Sources of Information
5. Conclusion and Summary	Summary of key learning and transition to final quizzes and post-module evaluation.

1. Key Concepts in Climate Health Communication

Thinking Space

Learners are invited to take a few minutes to consider what the word "communication" means to them and to record their thoughts in a self-reflection diary, such as a notebook, Word document, or sheet of paper.

1.1 Definition of communication

The subject of communication has concerned scholars since the time of Ancient Greece where communication was very important in daily life, politics, and education. Public speaking, or rhetoric, was highly valued, especially in places like Athens, where citizens debated and made decisions about different topics. Great thinkers like Aristotle, Plato, and Socrates studied and taught how to communicate clearly and persuasively. They believed that good communication could help people find truth, solve problems, and live better lives. Writing and storytelling were also important, helping ideas and knowledge spread across generations. Until recently, however, people usually included the topic in other subjects and assumed it was a natural part of being human. According to Leagans (1961), Communication is the process by which two or more people exchange ideas, facts, feelings or impressions in ways that each gains a common understanding of the meaning, intent and use of messages.

1.1.2 Importance of communication

1. Understanding and Clarity
    - Helps people share thoughts, feelings, and information clearly.
    - Reduces misunderstandings and confusion.
2. Builds Relationships
    - Strong communication fosters trust, respect, and connection between individuals.
    - Vital in personal relationships, friendships, and teamwork.
3. Essential in the Workplace
    - Enables collaboration and productivity.
    - Crucial for leadership, conflict resolution, and decision-making.
    - Enhances customer service and professional image.
4. Drives Social and Civic Engagement
    - Encourages active participation in society through discussions, voting, and advocacy.
    - Promotes awareness of social issues and collective action.
5. Bridges Cultural Differences
    - Promotes understanding between people of different backgrounds.
    - Helps develop empathy and intercultural competence.
6. Supports Learning and Teaching
    - Teachers communicate concepts, students ask questions and express ideas.
    - Fundamental in education and academic success.
7. Enables Innovation and Progress
    - Sharing ideas leads to creativity, problem-solving, and technological development.
    - Critical in research, science, and entrepreneurship.
8. Self-Expression and Identity
    - Allows individuals to express who they are, what they believe, and how they feel.
    - Contributes to personal growth and mental health.

1.1.3 Models of Communication

There are several key models of communication, each offering different perspectives on how communication works. These models are generally grouped into three types: **linear**, **interactive**, and **transactional**. Here's an overview:

1. Linear Models: This section includes information on Shannon-Weaver Model and Lasswell's Model

2. Interactive Models: This section includes information on Osgood-Schramm Model and Berlo's SMCR Model

3. Transactional Models: This section includes information on Barnlund's Transactional Model and Dance's Helix Model

Comparison Table:

Model Type	Feedback	Example Use
Linear	No	TV or radio broadcast
Interactive	Yes	Email, texting
Transactional	Continuous	Face-to-face conversation

Optional Reading

Gammelgaard Ballantyne A. , Climate change communication: What can we learn from communication theory? WIREs Clim Change 2016, 7:329–344. doi: 10.1002/wcc.392

This article argues that climate change communication is a fragmented field, often using communication theory inconsistently or as a practical toolbox. Drawing on communication theory, it calls for a stronger theoretical foundation that understands communication not merely as information transfer, but as an interactive process through which meanings are created within social and cultural

1.1.4 Types of communication

There are several types of communication, each with its own method of transmitting messages and its appropriate context. Here's an overview of the **main types of communication**:

1. Verbal Communication
Definition: The use of words and language to convey messages.
Forms: **Oral** (spoken): Face-to-face conversations, phone calls, presentations, meetings. **Written**: Emails, texts, reports, articles, social media posts.
Example: A conversation between two colleagues discussing a project.

2. Non-Verbal Communication
Definition: Communication without words, often using body language, gestures, facial expressions, and posture.
Forms: **Body Language**: Gestures, facial expressions, posture. **Paralinguistics**: Tone, pitch, volume of voice. **Eye Contact**: Indicates attention, interest, or respect. **Proxemics**: Use of personal space.
Example: A person crossing their arms might indicate defensiveness or discomfort.

3. Visual Communication
Definition: The use of visual elements to communicate messages.
Forms: **Flyers, Posters, Videos, Presentations**, **Graphics** (Charts, infographics, diagrams, and illustrations), **Colors** (Used in branding, design, and even to convey emotions), **Signs and Symbols** (Road signs, logos, and other visual cues)
Example: A company logo that represents a brand's identity.

4. Written Communication
Definition: The exchange of messages through written symbols (letters, numbers, symbols).
Forms: **Formal** (Business emails, official reports, letters), **Informal** (Text messages, social media posts, casual notes),
Example: Writing a letter to a friend or sending a professional email.

5. Interpersonal Communication
Definition: Direct, face-to-face communication between two or more people.
Forms: Conversations, discussions, or debates. Feedback between individuals.
Example: A manager talking to their team during a meeting.

6. Group Communication
Definition: Communication that occurs among a group of people, typically in a team or collective setting.
Forms: Team meetings, brainstorming sessions, and collaborative discussions, Exchange of ideas, opinions, or feedback.
Example: A team discussing the strategy for an upcoming project.

7. Mass Communication
Definition: The process of transmitting information to a large audience through various media channels.
Forms: Television, radio, newspapers, and social media platforms.
Example: A news broadcast on TV or a viral post on social media.

Comparison Table of Communication Types:

Type of Communication	Key Features	Example
Verbal Communication	Uses words, both spoken & written	Conversations, speeches

Type of Communication	Key Features	Example
Non-Verbal Communication	Body language, gestures, expressions	Facial expressions, posture
Visual Communication	Uses images, colors, symbols	Infographics, logos
Written Communication	Relies on writing and text	Emails, reports
Interpersonal Communication	One-on-one, face-to-face	Conversations
Group Communication	Communication within a group	Team meetings, debates
Mass Communication	Large audience, media-based	TV news, social media

1.2 What is miscommunication?

Miscommunication is a failure in the communication process that results in a misunderstanding or incorrect interpretation of a message. It can be verbal, written, visual, or non-verbal.

Learners are asked to watch a video to better understand why and how miscommunication happens. https://www.youtube.com/watch?v=gCfzeONu3Mo **Summary:** This video explains why miscommunication happens even when people speak the same language. It shows that communication is complex because people interpret messages through their own assumptions, emotions, and context. The main message is that clearer communication requires active listening, checking understanding, and being aware that meaning is co-created between speaker and listener.

1.2.1 Barriers to verbal communication due to differences in hearing ability and culture

Barriers to verbal communication due to differences in hearing ability and culture can significantly hinder effective interaction between individuals. When one party relies on spoken language and the other communicates primarily through sign language or alternative modalities, mutual understanding becomes challenging—especially in the absence of interpreters or visual aids. Cultural differences further complicate communication, as they influence norms, non-verbal cues, and expectations about interaction. For example, eye contact, gestures, or turn-taking may carry different meanings across cultures, leading to misinterpretations. These combined factors can result in reduced trust, social exclusion, or even compromised care in health and social service settings. Addressing such barriers requires not only technical solutions (e.g., assistive technologies or sign language support) but also cultural sensitivity, inclusive communication training, and an awareness of the diverse ways in which people express and receive meaning.

Learners are asked to watch a video entitled “A failure to communicate”
https://www.youtube.com/watch?v=8Ox5LhIJSBE

Summary: This video illustrates how communication can fail when people make assumptions and when barriers such as disability, noise, technology, and context interfere with understanding. Its main message is that effective communication requires patience, empathy, flexibility, and the willingness to find alternative ways to create shared meaning.

1.3 What is climate communication?

Climate communication refers to how information about climate change is shared with the public to raise awareness, motivate behavior change, and encourage climate action. It involves the use of language, science, storytelling, media, and cultural framing to make climate issues relevant and understandable.

Learners are asked to watch a video to find out some ways to better communicate climate change: https://www.youtube.com/watch?v=RyLr64tnvzY&t=8s **Summary:** This video focuses on the difficulty of communicating climate change without making people feel overwhelmed, defensive, or disengaged. Its main message is that effective climate communication should avoid fear alone and instead connect the issue to people's values, emotions, and sense of agency, helping them see that action is possible and meaningful.

1.4 Risk Communication

Dialogue Cards

Learners engage with three H5P Dialogue Card activities by pressing the turn button to reveal the answers. The activities focus on challenges in climate risk communication, the role of emotions, and the meaning of risk communication.

1.5 Misinformation and false news about climate change

In the context of climate change, risk communication plays a critical role in informing the public, guiding policy, and encouraging behavior change. However, this communication is increasingly undermined by the spread of misinformation and false news, which distort scientific facts, erode public trust, and delay necessary action

What Is misinformation?

Misinformation refers to inaccurate or misleading information that is spread, regardless of intent.

In climate change communication, misinformation can include:

- Denial of climate change
- Downplaying human responsibility
- Misrepresenting scientific uncertainty
- Promoting false solutions or conspiracy theories

What Is disinformation?

Disinformation refers to false, inaccurate, or misleading information that is deliberately distributed with the intention to deceive or manipulate the audience.
This distinguishes it from:

Misinformation: false info shared without intent to deceive

Malinformation: is information that is correct (true), but is deliberately shared in a harmful way — for example, by leaking private or confidential data to damage someone's reputation. It differs from false information in that the content is not fabricated, but its intent and context are malicious.

Common tactics in disinformation

- Fake experts or fake news sites
- Doctored images or videos (deepfakes)
- Emotionally charged headlines
- False attribution to trusted sources
- Use of "whataboutism" or conspiracy framing

Real-world examples:

- Climate Change Denial: Fake reports claiming “scientists disagree on climate change” to create doubt.
- COVID-19 Myths: Claims like "vaccines contain microchips" spread intentionally to erode trust.
- Political Disinformation: Fake news before elections to sway opinions or suppress voting

Sources and mechanisms of spread

- Social Media Platforms: Algorithms often amplify sensational or controversial content, allowing misinformation to go viral.
- Political and Ideological Actors: Certain groups promote skepticism or denial to protect economic or political interests.
- Lack of Media Literacy: Audiences often struggle to critically assess the credibility of online content.

Why it works

- Appeals to emotions and cognitive biases
- Exploits social trust and platform algorithms
- Often aligns with audience beliefs or fears

Obligatory Reading

Editorial - Health in the age of disinformation: www.thelancet.com Vol 405 January 18, 2025

This editorial highlights misinformation and disinformation as serious threats to public health. It argues that false or deliberately misleading health information spreads rapidly, especially through social media, and can undermine trust, influence health decisions, and damage collective action during crises. The main message is that combating misinformation requires more than fact-checking; it needs clear communication, trust-building, emotional awareness, responsible platforms, and systematic public health action.

Case study on climate misinformation

It focuses on the false claim that “the climate has always changed, so this is normal.” Learners examine what the claim suggests, why it is misleading, what scientific evidence shows, and how such misinformation can reduce public urgency and delay climate action. The activity includes a short reflective assignment, where learners are asked to respond using facts and to consider how a Health and Social Care Worker could correct this misinformation in the community.

1.6 Key Principles of Effective Climate Communication

1. Know your audience
    - Tailor messages to the values, knowledge, and emotions of the target group
    - Two-Way Engagement – Listen as well as inform
    - Identify values, literacy levels, and social norms
    - Use audience segmentation: not all people respond the same way.
2. Make it personal and local
    - Highlight how climate change affects local environments, health, and daily life.
    - Narratives – Personal stories make climate impacts real
3. Use clear, simple language
    - Avoid jargon and focus on vivid, relatable narratives.
4. Frame around solutions
    - Emphasize achievable actions and co-benefits (e.g., better air quality, energy savings).
    - Local Framing – Tailor messages to community concerns
5. Acknowledge emotions
    - People may feel fear, guilt, or helplessness; provide hope and empowerment.
6. Use of Visual Aids
    - Maps, infographics, video animations are preferable instead of lecturing

1.7 How health professionals should talk about climate change

Figures 1& 2: Source: WHO (2024). Communicating on climate change and health: Toolkit for health professionals

Obligatory Reading

Communicating on climate change and health: toolkit for health professionals. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO.

Learners are asked to read the toolkit and become an effective and powerful climate health communicator.

1.8 Key stakeholders

Climate health communication refers to the process of informing and educating various audiences about the health impacts of climate change, while motivating action and policy changes. Effective communication in this context requires collaboration among a wide range of stakeholders, each playing a unique and essential role. Below are the primary stakeholders involved:

1. **Public Health Professionals**
Role: Translate scientific evidence into health messages; design community-based interventions; monitor climate-related health threats.
Example: Health departments issuing heatwave warnings or air quality alerts.

2. **Healthcare Providers (Doctors, Nurses, Social Workers, Community Health Workers, Caregivers or Care Workers)**
Role: Educate patients about climate-related health risks (e.g. respiratory diseases from pollution); act as trusted messengers.
Example: Community nurses advising vulnerable populations during extreme heat events.

3. **Scientists and Researchers**
Role: Provide evidence-based data on climate-health links; assess risks and develop projections.
Example: Publishing climate-health studies or developing health impact assessments.

4. **Policymakers and Government Agencies**
Role: Enact policies and regulations that mitigate climate change and protect public health.
Example: Ministries of Health integrating climate risks into national health plans.

5. **Media and Journalists**
Role: Disseminate accessible and accurate information; raise public awareness; counter misinformation.

Example: Reporting on local disease outbreaks linked to climate patterns (e.g. dengue fever).

6. **Non-Governmental Organizations (NGOs) and Civil Society**
Role: Advocate for climate justice; support vulnerable communities; implement local health education campaigns.
Example: NGOs conducting educational workshops on water safety during floods.

7. **Educators and Academic Institutions**
Role: Integrate climate-health topics into curricula; prepare future professionals.
Example: Universities offering courses on climate and health communication.

8. **Community Leaders and Local Influencers**
Role: Serve as bridges between professionals and the public; ensure cultural relevance of messages.
Example: Religious leaders promoting clean air practices during worship gatherings.

9. **Businesses and Employers**
Role: Protect employee health; adopt sustainable practices; communicate workplace-related climate risks.
Example: Construction companies providing heat protection guidelines during summer.

10. **General Public (Including Vulnerable Populations)**
Role: Active recipients and co-creators of communication; their feedback shapes future messaging.
Example: Older adults, children, and low-income communities participating in resilience training.

1.8.1 Why Stakeholder Engagement Matters:

- Promotes interdisciplinary collaboration
- Ensures inclusive and equitable communication strategies
- Supports the implementation of effective interventions
- Enhances trust and message uptake across populations

1.9 Climate Communication and Older Adults – Why It Matters?

Failing to communicate effectively with older adults (H5P):

- Exacerbates health inequalities
- Leaves at-risk populations unprepared
- Undermines efforts for community resilience and equity in climate adaptation

Transition to the next chapter

Having explored the foundational concepts of communication and identified the key stakeholders involved in climate and health communication, we now turn our focus to a particularly important population group: older adults. Effective communication with older people requires not only an understanding of the general principles we have discussed, but also specific skills and adaptations tailored to their needs, perceptions, and vulnerabilities. In the following chapter, we will examine how healthcare professionals can apply targeted communication strategies to support older populations, promote health literacy, and build trust-especially in the context of climate-related health challenges.

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2. Communication with older adults

2.1 Challenges in the interaction between HSC workers and the older adults

Effective communication is vital for older adults to request help with daily activities, pursue lifelong learning, access important health and legal information across various media platforms, and maintain meaningful relationships with younger generations. They rely on communication, both in person and online, to connect with family, friends, neighbors, legal advisors, and healthcare providers. However, there are barriers to communicating with older adults that need to be overcome so that there is a mutual understanding of the information. Below are the challenges or barriers to communication with older adults (H5P):

- Sensory Impairments: Hearing loss: Common among older adults and can lead to misunderstandings or withdrawal from conversation. Vision problems: Can make it difficult to read non-verbal cues, written materials, or facial expressions.
- Cognitive Decline: Conditions such as Alzheimer's disease and other forms of dementia can impair memory, language, and comprehension, making communication more complex.
- Physical Limitations: Speech difficulties due to stroke, Parkinson's disease, oral structural changes (such as tooth loss), or other conditions can affect the clarity, articulation, and pace of speech.
- Psychological Factors: Depression, anxiety, or low self-esteem can reduce motivation to engage in conversation. Fear of being misunderstood or of appearing "slow" can make older people hesitant to participate.
- Environmental Factors: Noisy, chaotic, or poorly lit environments can hinder effective communication. Lack of privacy may make older individuals reluctant to speak openly.
- Generational and Cultural Differences: Differences in language use, slang, or values may cause misunderstandings. Older adults may have different expectations about formality or respect in conversations.
- Assumptions and Stereotypes: Ageist attitudes may lead others to speak in a patronizing tone, use "elderspeak," or exclude older adults from conversations.
- Low Health Literacy: Low health literacy has a negative impact on the ability of individuals to obtain, comprehend, and apply basic health information and services to make appropriate decisions in health-related situations.

Self-assessment crossword activity

Learners review key communication-related terms, such as speech, literacy, culture, privacy, ageism, cognition, noise, vision, and hearing. The activity is for practice only and is not included in the final assessment.

2.2 Ageist communication in the HSC workers – older patient interaction

Ageism refers to the stereotyping, prejudice, and discrimination individuals face due to their age. Studies have demonstrated that older adults affected by ageism experience negative consequences on their health, overall well-being, and the quality of health care they receive. Widespread adoption of negative attitudes toward older adults has been linked to increased mortality risk, reduced functionality, and slower recovery from illness. Additionally, holding negative views about ageing is a strong predictor of poor mental health. Ageist attitudes can result in significant practical consequences for older patients. Assumptions about cognitive and functional decline often lead to limited sharing of medical information, the withholding of specific treatment options, and exclusion from clinical trials. These biases are also present among mental health professionals and trainees, who may, for example, view symptoms like depression as a normal part of ageing, an outlook that can further restrict access to appropriate treatment. In addition, experiencing social exclusion due to negative stereotypes has been recognized as a chronic source of stress for older adults, which can have detrimental effects on their health. As the global population continues to age, the prevalence and impact of ageism are likely to increase.

Embedded Moodle presentation "Ageist communication in the HSC workers-older patient interaction" The presentation presents the characteristics of ageism in communication with older adults.
Obligatory Reading A "guide to avoid ageism in communication" In this guide by WHO learners can understand how they can avoid ageism in the communication with older adults. Key messages on how to avoid ageist practices in communication with older adults: • Avoid overgeneralizations, not all older adults have the same characteristics. • Avoid presenting the ageing population as a problem. • Avoid using offensive language focusing on age, other stereotypes or disability. • Use neutral language without stigmatizing. • Avoid treating people (or groups) as fundamentally different, inferior, or alien compared to yourself or the dominant group helps all groups feel part of the same community. • Avoid presenting pictures that portray older adults always as sad, frail or lonely.

2.3 Climate and Health Literacy

Health literacy is defined as "people's knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course" (Sørensen, K., Van den Broucke, S., Fullam, J. et al. 2012).

More recently **Healthy People 2030** addresses both personal health literacy and organizational health literacy and provides the following definitions:

Personal health literacy is the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.

Organizational health literacy is the degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.

The new definitions differ from the previous derived by Healthy People 2010 and 2020. They:

- Highlight individuals' capacity to utilize health information, not merely comprehend it
- Prioritize making “well-informed” choices over simply “appropriate” ones
- Include a broader public health viewpoint
- Recognize the role of organizations in supporting and improving health literacy

Learners are asked to watch 2 videos on health literacy

https://youtu.be/H4EoiNo-6ag **Summary:** This video explains what health literacy means and why it is important for people’s health and wellbeing. Its main message is that health literacy is not only about reading skills, but also about people’s ability to access, understand, evaluate, and use health information in ways that help them make informed health decisions.

https://youtu.be/3e5lXMcedDc **Summary**: This video introduces the concept of health literacy and explains why it is important for individuals, families, and communities. Its main message is that people need clear, accessible, and reliable health information in order to understand their health, make informed decisions, and use health services effectively.

Key messages:

- Health literacy is an essential skill for communicating health information and applying it in daily life.
- Health literacy is needed to understand nutrient labels, instructions about drugs and to ask about your health during the discussion with a health professional.
- Low health literacy is related to poor health outcomes, increased chronic conditions, hospitalization and medical costs.
- Cultural differences and beliefs, age, educational level and communication style have an impact on health literacy.
- Older adults, non-native speakers and those with low incomes are particularly vulnerable.

Climate literacy or in other words **climate-change literacy** refer to the knowledge about the climate and acting accordingly to this knowledge. A climate literate individual is an expert in the principles of climate science and can assess information and communicate about climate change clearly and take responsible action towards decreasing unsustainable practices that negatively affect the environment” (Suhaimi and Mahmud, 2022).

Learners are asked to watch a video on climate literacy https://youtu.be/hp8KkKtQtyM

Summary: This video explains that everyone must have skills and ability to inspire and lead in the change we all need to make for a sustainable future! Governments, businesses, communities and individuals all have a role to play in achieving this aim.

From the interaction of health literacy and climate literacy, a new dimension emerges, namely **Climate-health literacy or Climate and Health literacy.** This is defined as "the degree to which an individual understands the complex relationship between climate change and human health; a climate health–literate individual can recognize direct and indirect linkages between climate change and health, communicate risks, assess data, comprehend uncertainty, and make informed and responsible personal decisions or advocate for broader policies that protect health” (Limaye et al., 2020).

Optional Reading

Churchill et al. Why climate literacy is health literacy. AMA J Ethics. 2024;26(2):E147-152. doi: 10.1001/amajethics.2024.147. This article argues that climate literacy should be understood as part of health literacy, because climate change directly affects health, health equity, and everyday health decisions. It highlights that climate-related harms, such as heat, flooding, food and water insecurity, infectious diseases, and displacement, worsen existing social and health inequalities. The main message is that health professionals, institutions, and bioethicists have a responsibility to help the public understand and use climate-related health information, while also advocating for fairer and more preventive health policies.

Figure 3: Climate-health literacy integrates health literacy and climate literacy as a new dimension

2.4 General strategies to improve communication with older adults

Improving communication with older adults requires sensitivity to their unique needs, as well as thoughtful adjustments in how we interact. Here are 8 key strategies that can enhance communication effectively and respectfully (H5P):

1. Active Listening: Paying close attention, showing interest, and giving the speaker time to express themselves fully.
2. Clear and Respectful Speech: Speaking slowly, clearly, and using simple, direct language without being condescending.
3. Non-verbal Support: Using gestures, facial expressions, and visual aids to support verbal communication. Maintaining eye contact and an open posture can enhance trust and connection.
4. Adapted Communication Tools: Hearing aids, reading glasses, large-print materials, and written summaries can make information more accessible.
5. Creating a Comfortable Environment: Reducing background noise, ensuring good lighting, and choosing quiet, private spaces for conversations.
6. Empathy and Patience: Being patient, showing understanding, and giving extra time for responses help build rapport and ease anxiety.
7. Involving Family and Caregivers: When appropriate, involving trusted individuals can support communication and provide context.
8. Training and Awareness: Professionals trained in geriatric communication are better equipped to handle age-related challenges respectfully and effectively.

Learners are asked to watch a video on how health literacy can improve communication with older adults https://youtu.be/BG-iY-em7mk **Summary:** This short video emphasizes the importance of organizational health literacy in improving national health goals. It talks about proven strategies organizations can use to make health information and services easier to find, understand, and use.

2.5 Specific techniques for better communication with older adults

Clear and supportive communication plays a crucial role in helping vulnerable patients manage their situations and make informed choices regarding their treatment and care (Donnelly and Neville, 2008). Nonetheless, sustaining meaningful communication in hectic healthcare settings, where patients may be in distress and staff often under significant pressure, demands strong interpersonal abilities and heightened self- and social awareness. Research increasingly shows that communication skills can be enhanced and refined through targeted training. Still, encouraging effective communication within healthcare remains a complex and demanding task due to the high-stress, fast-paced environment, which often leaves limited opportunity for thorough interaction.

Embedded Slider presentation including a detailed description of the 5 basic techniques for better communication with older adults

Learners are asked to watch a video on how Teach back technique works in practice https://youtu.be/d702HIZfVWs

Summary: Teach-Back is designed to use in discussion with patients to reduce the chance of misunderstanding important health information. The technique can assist patients to understand and engage in their own care.

Learners are asked to watch a video on how Ask me 3 technique works in practice https://youtu.be/B3EB-icaNKQ

Summary: Ask Me 3 is a patient education program designed to promote communication between health care providers and patients in order to improve health outcomes. This video provides a scenario of a patient speaking to his physician about his condition. The video shows the patient and his daughter using the Ask Me 3 program, asking the three questions, and getting the answers needed to help better understand his condition and next steps.

Obligatory Reading

Bramhall E. (2014) Effective communication skills in nursing practice. Nursing Standard. 29, 14, 53-59.
This article highlights the importance of effective communication skills for nurses. It focuses on core communication skills, their definitions and the positive outcomes that result when applied to practice. Effective communication is central to the provision of compassionate, high-quality nursing care. The article aims to refresh and develop existing knowledge and understanding of effective communication skills. Nurses reading this article will be encouraged to develop a more conscious style of communicating with patients and carers, with the aim of improving health outcomes and patient satisfaction.

2.6 Communication with older adults about climate change

Effectively communicating climate change to older adults is essential for advancing future research in this area. This demographic is among the most vulnerable to the health impacts of climate change, making targeted communication vital for raising awareness of the risks and protecting their wellbeing. Moreover, older individuals make up a significant portion of the population, and their views and actions often influence broader societal discussions that can drive meaningful change. As respected figures in their communities and custodians of traditional knowledge, older adults can act as role models for climate change adaptation and mitigation, especially in low-resource settings, where their lived experience is particularly valuable. Therefore, enhancing awareness through effective communication strategies can play a pivotal role in supporting these efforts.

Communicating climate change to older adults can also significantly influence future generations. As repositories of lived experience, they can help bridge past and present climate events, illustrating how environmental conditions have evolved over time. Recognizing their own role in this transformation, through everyday actions and lifestyle choices, may foster a sense of responsibility and encourage behavioral change. This awareness can, in turn, inspire greater engagement in efforts to leave a more sustainable legacy for the generations to come.

However, few studies have been done on how to communicate about climate change with older adults. These studies emphasise the need for the involvement of older adults in communication processes, the identification of their priorities, and the use of engaging technologies grounded in the realities of their daily lives as approaches that warrant further exploration and development. Raising their awareness about climate change and empowering environment friendly behavioral changes through effective communication could have a positive impact on the health of older adults and future generations.

Obligatory Reading

Pinna, S., Longo, D., Zanobini, P., Lorini, C., Bonaccorsi, G., Baccini, M., & Cecchi, F. (2024). How to communicate with older adults about climate change: a systematic review. *Frontiers in public health*, *12*, 1347935. https://doi.org/10.3389/fpubh.2024.1347935
This article describes how to communicate with older adults about climate change. Key Messages from this article:

- The older population is largely overlooked in climate change communication research.
- Only three studies have specifically addressed climate change communication with older adults.
- Strong potential for tailored strategies to raise older adults' awareness of climate change.
- Programs are needed to facilitate older adults' involvement by making climate issues more accessible and actionable.
- Promising approaches include:
    - Engaging older adults directly in communication processes

- Identifying and addressing their specific priorities
- Leveraging technologies grounded in their daily life contexts

These strategies warrant further investigation and development.

2.7 Case Study – Ask me 3 – Teach back– Branching Scenario

This section includes a self-assessment case study with a branching scenario focused on health literacy, patient communication, and post-operative care. Mr Mark is a 75-year-old retired Moldavian man with limited language proficiency, type 2 diabetes, recent knee replacement surgery, and limited social support. Through the scenario, learners reflect on communication challenges related to language barriers, older age, living alone, post-operative follow-up, and the patient's reduced confidence in managing health issues independently. The activity asks learners to apply two practical communication techniques: the Ask Me 3 method, by identifying the three key questions patients should be encouraged to ask, and the teach-back method, by deciding what the patient should be asked to repeat in order to confirm understanding. The exercise is designed for self-assessment only and does not contribute to the final assessment.

2.8 Case Study – Communication Challenges: This section includes a case study focused on communication challenges in a hospital setting. Learners are introduced to Mr Ibraheem, an older Syrian refugee hospitalized due to worsening asthma, who speaks little English and appears to have difficulty hearing. The scenario also includes environmental and contextual barriers, such as noise in the ward, lack of privacy, heat, absence of an attendant, and no available translator. Learners are invited to reflect on these challenges and consider how communication could be made more effective, using their self-reflection diary to record their thoughts.

Transition to the next chapter

Having seen the difficulties in communicating with older adults and the strategies to improve communication, let's go one step further and see what is the case with communication with stakeholders.

2.9 Indicative bibliography

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3. Communication with other stakeholders

This topic addresses HSC service preparedness to respond to the climate change crisis, service adaptation indicators and HSC staff awareness and readiness to recognise different needs of older people and prioritise accordingly.

3.1 Stakeholder roles

Effective communication and collaboration among stakeholders is essential for climate-resilient health and social care. These stakeholders include a wide range of actors, such as public health officials, local governments, emergency responders, healthcare providers, social workers, nonprofit organizations, academic institutions, and importantly, community members and older adults themselves. Each plays a vital role in protecting vulnerable populations, such as older adults, during climate-related events.

It is important to emphasise the diverse roles of community actors (from health care providers and local authorities to schools, media, and organisations) in preparing for and responding to climate-related health threats. Collaboration among various stakeholders can result in stronger, more coordinated responses. Inclusive, community-driven planning not only strengthens resilience but also ensures timely support and promotes equitable, person-centered care for older adults in the face of climate challenges.

Figure 4: Communities are developing a coordinated response to health risks by using CDC's Building Resilience Against Climate Effects (BRACE) framework,a five -step process for climate adaptation.

Thinking Space: This section introduces a thinking space activity on mapping diverse stakeholders in climate change communication. Learners are invited to reflect on who they could influence regarding climate change and to list key stakeholders in their self-reflection diary. The activity encourages them to consider people they regularly interact with, those who may value their perspective or expertise, and individuals or groups with the power to act or influence others. Learners may also discuss their ideas with peers in order to broaden their perspectives and expand their stakeholder list.

3.2 Communicating climate change: One message doesn't fit all

When communicating about climate change, our messages should be tailored to the audience. Different stakeholders may need different information, depending on their roles, concerns, and levels of understanding.

For example, the range of climate change messages can be as diverse as the goals and audiences we address.

We may aim to:

- Encourage a colleague to speak up about climate change
- Persuade a policymaker of the health impacts of their decisions
- Reduce climate anxiety in a peer
- Provide a journalist with clear and credible information
- Motivate social media followers to contact their elected representatives
- Each audience requires a different approach and relevant content to make the message meaningful and impactful.

Figure 5: Communicating on climate change and health: toolkit for health professionals. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO.

How to communicate with diverse stakeholders

- Make a visible commitment - Lead by example: Publicly committing to climate and health action can inspire others to join. Sharing your commitment (on your website, social media, or in conversations) helps build momentum and encourages collective effort. Personal actions can also support broader advocacy for systemic change. Use available tools and resources to turn your commitment into meaningful impact.
- Start small and visible: Take simple, low-cost actions, share your successes, and encourage others. Whether you're a sole practitioner or part of a large health or social care institution, track your progress, explore clean energy options, and build momentum with quick, achievable steps.
- Use messages that connect: Whether you're talking to a colleague or a policymaker, make it personal and relatable. Focusing on health and shared values helps inspire action and make your message more impactful.
- Advocate for policy change: Engage directly with policymakers, as they depend on your input to understand what matters most. Policy changes are essential for effectively tackling climate change.

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Figure 6: Spectrum of Climate Advocacy

- Engage your profession: Connect with colleagues and professional organizations. Many are concerned about climate change. Partnering with other health leaders can strengthen your knowledge, support, and impact on climate solutions.
- Engage your community: Write letters to the editor or opinion pieces to share your professional insights and personal stories. Keep messages clear and end with a strong call to action. Social media is a powerful tool to boost your advocacy. Use it to share informative posts, infographics, and videos on climate change.
- Collaboration – Networking: Collaborating with local advocacy groups and others who share your goals can strengthen your impact. Join conferences and seminars to build connections and gain insights from experts.

- Make an advocacy plan: As you get ready to talk to your community and elected officials, identify strategies, tactics, timing, and resource allocation.

Rehr, R.C., & Perkowitz, R.M., ecoAmerica (2019). Moving Forward: A Guide for Health Professionals to Build Momentum on Climate Action. Washington, DC. Available at: https://climateforhealth.org/wp-content/uploads/2020/06/CFHMFG-web.pdf

Citizens' Climate Lobby (2023) A guide to effective climate change action. In Be your best Advocate. Available at: https://citizensclimatelobby.org/blog/advocacy/a-guide-to-effective-climate-change-action/

3.3 Barriers and enablers for stakeholder collaboration

Stakeholder collaboration is essential for implementing urban planning that effectively addresses disaster risks and climate change impacts. However, this collaboration often faces major challenges. The key barriers are grouped into 4 categories: External barriers (e.g. weak policies, governance gaps, and political resistance), Inter-organisational barriers (e.g. lack of leadership, conflicting interests, poor coordination), Intra-organisational barriers (e.g. rigid structures, siloed culture, limited resources), Personal barriers (e.g. fear of losing power, lack of knowledge or commitment). A study found that external barriers (particularly weak political support, fragmented governance, and outdated laws) have the strongest influence over other barriers. Removing or addressing these high-impact barriers can significantly improve collaboration across all levels.

Main enablers that can help overcome these barriers are: Creating collaborative governance structures, Strengthening laws and policies that support cooperation, Improving leadership and coordination across institutions, Building trust, offering incentives, and promoting shared learning.

Ganeshu, P., Fernando, T., & Keraminiyage, K. (2023). Barriers to, and Enablers for, Stakeholder Collaboration in Risk-Sensitive Urban Planning: A Systematised Literature Review. Sustainability, 15(5), 4600. https://doi.org/10.3390/su15054600

Challenges and Solutions

Drag-and-drop activity: This section presents a drag-and-drop activity where learners classify words or short statements related to stakeholder collaboration in climate resilience as either challenges or solutions. The activity helps them distinguish between barriers that hinder collaboration and actions or enablers that can support more effective cooperation.

3.4 Case Study: This section presents a case study on heatwave resilience among older adults in a multicultural urban neighbourhood. Learners identify key stakeholders and reflect on how culturally sensitive communication and transdisciplinary collaboration can help address communication gaps and protect vulnerable older adults during extreme heat events.

3.5 Definition of different types of governance (optional)

This section introduces governance in climate resilience as a collaborative process involving governments, institutions, civil society, the private sector, NGOs, and local communities. Learners explore different governance approaches, including multi-level, participatory, adaptive, flexible, and inclusive governance, and reflect on how health and social care professionals can support climate action, community resilience, and the protection of vulnerable populations.

Multi-level governance and policy cycles (optional) This section includes a checklist for action (H5P)

OECD (2021), Strengthening Climate Resilience: Guidance for Governments and Development Co-operation, OECD Publishing, Paris, https://doi.org/10.1787/4b08b7be-en.. page 51 Available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2021/03/strengthening-climate-resilience_be146744/4b08b7be-en.pdf

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4. Sources of Information

4.1 European Sources & Channels

- *European Environment Agency (EEA)* **Website:** www.eea.europa.eu Provides detailed reports, data, and infographics on climate change impacts in Europe, including vulnerable groups like the elderly. Communication campaigns include public engagement on heatwaves, health, and adaptation strategies.
- *European Commission – Climate Action* **Website:** climate.ec.europa.eu Runs initiatives like the **European Climate Pact** to inform and involve citizens, including older adults, in climate resilience actions. Multimedia campaigns, newsletters, and community toolkits available in multiple languages.
- *Health-EU Portal (European Commission - DG SANTE)* **Website:** health.ec.europa.eu Shares resources and guidance on health risks, including climate-related ones for elderly populations (e.g., heat stress).*n*Focus on public health messaging and preparedness.
- *AGE Platform Europe* **Website:** www.age-platform.eu A network of organizations representing older people in Europe. Campaigns and publications linking climate policy and ageing populations, with accessible materials tailored for seniors.
- *European Centre for Disease Prevention and Control (ECDC)* **Website:** www.ecdc.europa.eu*n*Public health alerts and risk communication frameworks relevant during climate-related outbreaks (e.g. vector-borne diseases). Focus on vulnerable populations including the elderly.

4.2 International Sources and Channels

- *World Health Organization (WHO) – Climate Change and Health* **Website:** www.who.int Publishes health communication strategies addressing the risks of climate change for older people. Includes heat-health action plans, preparedness guides, and emergency communication materials.
- *United Nations Framework Convention on Climate Change (UNFCCC)* **Website:** unfccc.int Reports and campaigns often consider equity and vulnerability, especially in adaptation communication. Uses storytelling, case studies, and media campaigns.
- *IPCC (Intergovernmental Panel on Climate Change)* **Website:** www.ipcc.ch Their reports include data on older populations' vulnerability. Summaries for policymakers and the public are available, promoting science-based communication.
- *International Federation of Red Cross and Red Crescent Societies (IFRC)* **Website:** www.ifrc.org Engages in community-based risk communication including with elderly groups. Toolkits and communication templates for extreme weather and climate-related emergencies.

5. Conclusion and Summary

By completing this module, learners should be better equipped and more confident to:

- Define the core principles of climate-health communication.
- Identify key stakeholders involved in climate-health messaging, including health professionals, policymakers, media, and civil society.
- Adapt communication strategies to different audience needs, such as older adults or low-literacy populations.
- Assess the effectiveness of various climate-health communication campaigns.
- Apply risk communication principles to create tailored messages for vulnerable groups.
- Recognize and distinguish between accurate information, misinformation, and disinformation.
- Understand how collaboration and advocacy can strengthen communication efforts.
- Navigate challenges in engaging older individuals and other diverse stakeholders.
- Select credible, evidence-based sources on climate change.
- Address and manage communication challenges when engaging with a variety of stakeholders.

Effective communication on climate change and health is a vital tool for protecting vulnerable populations, particularly older adults. The complexity of the climate crisis requires coordinated and multi-level communication that integrates scientific evidence, social inequalities, and the specific needs of target populations. Healthcare professionals play a critical role as trusted intermediaries

between scientists, policymakers, and communities. Understanding stakeholder roles, tailoring messages to the capacities and sensitivities of older adults and addressing misinformation are key elements for strengthening community resilience. Promoting participation, transparency, and collaboration forms the cornerstone of a fair and effective approach to climate-related risk communication.

Assessment

Assessment element	Description
Pre-Module Quiz	A 10-question quiz taken at the beginning of the module and repeated at the end. It supports learning and reflection and does not affect the grade.
Thinking space activities	Self-reflection tasks where learners record personal thoughts, ideas, and observations in a diary. Self-assessment
Case Studies	Self-assessment activities that allow learners to apply key concepts in realistic situations, reflect on communication challenges, and consider appropriate evidence-based, culturally sensitive, and person-centred responses.
Interactive H5P activities	Dialogue cards, crossword, drag-and-drop activity, checklists etc Self-assessment
Mid-training evaluation questionnaire	Questionnaire used to assess learners' progress and experience halfway through the training.
Final Quiz	Final Quiz includes questions that assess MC09 (EQF6): Advanced learning of Climate Change Communication for HSC workers.
Post-Module Quiz	The same 10-question quiz is repeated to demonstrate learning progress. It does not affect the grade.
Evaluation questionnaires	Students complete evaluation questionnaires during and after the training, including overall impression of the training programme.

Final video and resource URL checklist

- **How miscommunication happens and how to avoid it**: https://www.youtube.com/watch?v=gCfzeONu3Mo Helps learners understand why miscommunication happens and how active listening and checking understanding can improve communication.
- **A Failure to Communicate:** https://www.youtube.com/watch?v=8Ox5LhIJSBE Illustrates how assumptions, disability, noise, technology, and context can create communication barriers.
- **What's the best way to communicate climate change?** https://www.youtube.com/watch?v=RyLr64tnvzY&t=8s Explains how climate change can be communicated in ways that connect with people's values, emotions, and sense of agency.
- **What is Health Literacy?** https://youtu.be/H4EoiNo-6ag Introduces health literacy as the ability to access, understand, evaluate, and use health information for informed decisions.
- **Health Literacy: An Overview**: https://youtu.be/3e5lXMcedDc Explains why clear, accessible, and reliable health information is important for individuals, families, and communities.
- **Climate literacy video**: https://youtu.be/hp8KkKtQtyM Highlights the importance of climate literacy and the role of individuals, communities, businesses, and governments in supporting sustainable change.
- **Organizational health literacy video**: https://youtu.be/BG-iY-em7mk Shows how organizations can make health information and services easier to find, understand, and use.
- **Teach-back technique in practice**: https://youtu.be/d702HIZfVWs Demonstrates how the teach-back method can help check patient understanding and reduce misunderstandings.
- **Ask Me 3 technique in practice**: https://youtu.be/B3EB-icaNKQ: Demonstrates how patients can use three key questions to better understand their condition and next steps.

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Introduction to using digital tools MC10 EQF4

Microcredential Title	**Introduction to using digital tools**
Short Code / ID	MC10
EQF Level	4
ECTS Credits	2 ECTS
Duration	50 hours
Delivery Mode	Online
Language(s)	English, German, Finnish, Greek and Portuguese
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Carinthia University of Applied Sciences
Module Lead / Author	Daniela Ströckl, Eleni Zografou, Maja Cetic

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Explain the Nexus of Digitalization, Climate, and Health and their interconnections.
LO 2	Recognize Benefits and Challenges of Digitalization in healthcare and environmental sustainability.
LO 3	Identify the Effects of Digitalization on Health, including physical, mental, and environmental impacts.
LO 4	Understand the Digital Carbon Footprint and how technology contributes to climate change.
LO 5	Use Effective Search Techniques to find and assess credible information on digitalization, climate, and health.
LO 6	Utilize Collaboration & Communication Tools for teamwork in digital projects.
LO 7	Create Simple Digital Climate Content to raise awareness about environmental and health issues.
LO 8	Recognize Ethical Issues in Digitalization related to privacy, AI, and sustainability.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards the responsible, ethical and sustainable use of digital tools and innovations in health and social care, with attention to climate-health interconnections, digital inclusion and the needs of older persons.
Alignment Notes	As digital technologies transform industries across the globe, their impact on health and climate is particularly profound, offering new ways to address critical challenges like sustainability and public health. In this course, you'll explore how digital tools and innovations are driving change, from improving healthcare systems to enhancing climate monitoring and response. We'll also dive into the role of media and the importance of media competence, ensuring that you can critically engage with the information shaping these fields. By the end,

	you'll have a deeper understanding of how digitalization intersects with health and climate, and how to effectively navigate and contribute to this evolving landscape. This microcredential promotes critical reflection on the responsible and sustainable use of digital technologies in health and social care. Learners explore how digitalization, climate change and health are interconnected, and how digital tools can support healthcare delivery, climate adaptation, communication and innovation. The course also encourages awareness of digital inequalities, the digital carbon footprint, media competence, ethical issues, data protection, accessibility and the responsible use of emerging technologies such as AI, wearables, health apps and data analytics.
Keywords	Digitalization, digital health, digital tools, media literacy, digital carbon footprint, digital ethics

Learning Activities

E-Learning Format	online self-paced learning with text-based content, interactive H5P elements, YouTube videos, additional literature, case studies, quizzes, and reflective learning activities.
Activities	pre- and post-module quizzes, case studies, knowledge check questions, reflection tasks, video-based learning, interactive H5P activities, reading assignments, practical analysis of the own work environment, and application-oriented strategy development.
Estimated Study Time	50 hours

Content & Topics

1. Digitalization, Climate & Health
2. Media competencies
3. Digital Tools
4. Digital Innovations

1. Digitalization, Climate & Health

Digitalization means using digital technologies to improve or transform business processes, communication, and services. It helps organizations become more efficient, data-driven, and innovative. Digitization is the process of converting analog information into digital form, such as scanning paper documents. It is a basic step and does not necessarily change how a process works.

Climate change refers to long-term changes in the Earth's climate, mainly caused by human activities such as burning fossil fuels, deforestation, and industrial processes. Its effects include rising temperatures, melting ice, sea-level rise, changing weather patterns, and more extreme weather events.

Healthcare involves the prevention, treatment, and management of illnesses and injuries, as well as improving physical and mental health. It includes services such as diagnosis, therapy, and aftercare, provided in hospitals, clinics, health centers, or at home.

1.1 Nexus Digitalization, Climate & Health

Digitalization, climate change, and health are deeply interconnected. Digital technologies offer the potential to improve healthcare delivery, enhance patient outcomes, and promote sustainability. However, the increased use of digital tools also contributes to energy consumption and electronic waste, impacting the environment and human health. Understanding these interactions is crucial in the modern world to develop effective strategies that balance technological benefits with environmental and health considerations.

Video: Nexus: In this video you can find information about how digitalization, climate change and health are connected, i.e. how they influence and change each other.	**Literature:** Tarana, I. Ediriweera, L. Maison. Embrancing Digital Health in the Face of Climate Crises. sdg.iisd.org Learn more about how the SDG Knowledge Hub deals with the issue of interconnection between digitalization, climate change and healthcare and what their 17 goals are.

1.2 Benefits and Challenges of Digitalization

Benefits of Digitalization

Digitalization has become essential for businesses, especially after the **COVID-19 pandemic**, because it helps them stay **resilient, flexible, and competitive** in a changing world.
It is more than just using technology. True digitalization changes a company's **processes, systems, and culture**. Examples include **cloud computing**, **online commerce**, **collaboration tools**, **AI**, **machine learning**, **connected devices**, and **Industry 4.0**.

Digitalization helps companies use **data** to understand customers better, track competitors, reduce costs, and improve efficiency. It is especially important because today's customers, especially **Millennials and Gen Z**, expect fast, digital, and consistent experiences across different platforms.
A good **digitalization strategy** improves business functions such as **HR, marketing, operations, customer service, supply chains, and work culture**. It also supports remote work and gives employees access to data from anywhere (11 Benefits Of Digitalization Which You Cannot Ignore - SAP India News Center).

Digital Divide and Social Inequality

What is meant by this?

The **gap between people** with and without the opportunity to **use information and communication technologies** such as the Internet (due to lack of technical access, knowledge, financial means, etc.). The digital divide varies from country to country, but there are also significant differences in accessibility within a country (assuming the same infrastructure options). This can be seen very clearly in the example of a study from the USA:

- Digital Equity: What it is and why it matters?
- Closing the Digital Divide with Digital Citizenship for Parents

But it is not just the accessibility of the infrastructure that shows clear differences. Another characteristic can be seen in the users.

"Web IQ" is the knowledge about the use of web services. Each of them uses different digital media and services every day, but depending on the level of education or age of the user, it can be seen that many supposedly simple questions would not be answered correctly, so the Web IQ is low (What Internet Users Know about Technology and the Web & Learning.com).
Another aspect in the context of the digital divide becomes clear when you look at who is actively involved in digital transformation processes. In addition to visionaries and people from all industries who use digital opportunities, it is essential that there are experts who work in the field of computer science and develop the underlying technologies. Digital transformation is a very "classically" occupied industry of "white men".
There is also a study on the subject of gender and origin that clearly shows these differences (source: Learning.com):

This aspect has several exciting side effects. Computer science is considered the fastest growing industry in the world, with a lot of unfilled positions; for example, according to US statistics, the industry will grow by at least 13% between 2020 and 2030. This means almost 1 million more jobs in this area (Talent Shortage of Software Developers). However, most of these will not be filled due to demographic change and the trend that, among other things, women are taking fewer STEM courses. This circumstance will sooner or later put a brake on technological progress (Mobile technology and home broadband 2021, Learning.com).

Video: How Technology Affects Our Health and Well-being Watch the video to find out which are the positive and which are the negative effects of technology on our lives.	**Literature** Frank Danielsen (2021). Benefits and Challenges of Digitalization-An Expert Study of Norvegian Public Organizations. Conference: DG.O'21: The 22nd Annual International Conference on Digital Government Research. Trierveiler, Heron & Sell, Denilson & Santos, Neri. (2019). The Benefits and Challenges of Digital Transformation in Industry 4.0. Global Journal of Management and Business Research. 19. 27-40.

1.3 Effects of Digitalization on Health
Digital Transformation in Healthcare
Digital transformation in healthcare means using modern technologies to make healthcare more **patient-centered**, efficient, and sustainable. It helps healthcare providers improve services, understand patient needs better, and reduce costs.

The importance of digital transformation in healthcare is shown in four main points:

1. **Patients' Expectations** – Patients want more **personalized, high-quality healthcare services**.
2. **Rise in Chronic Diseases** – Digital tools help doctors **monitor patients remotely**, especially those with chronic diseases like diabetes or high blood pressure.
3. **Cost Reduction** – Automation and digital systems can **reduce administrative costs** and improve efficiency.
4. **Shortage of Trained Staff** – Digital transformation can support healthcare workers and help reduce the impact of the **global shortage of skilled professionals** (Silvertouch).

Video: Digital Transformation in Healthcare: Watch to find out how digital transformation solutions are offered to healthcare to help build a patient-centric, smart and connected healthcare ecosystem.

Various aspects of Digitalization in Healthcare
Video: Effects of Digitalization on Healthcare

Challenges

- **Patient data security:** Hospitals must protect confidential patient data and prevent cyberattacks.
- **Integration and interoperability:** New digital tools must work together with existing healthcare systems to improve efficiency and patient care.
- **Resistance to change:** Staff may need time and training to adapt to new technologies and workflows.
- **Budget and costs:** Digital transformation requires high investment but can increase scalability and long-term value.
- **Distributed workforce:** Telemedicine creates decentralized work structures, so secure access to patient data is essential.
- **Regulatory compliance:** Healthcare organizations must follow strict rules and keep up with changing regulations.

Key Considerations

- **User-centered design:** Digital tools should be easy to use, accessible, and improved through feedback.
- **Stakeholder engagement:** Doctors, nurses, patients, IT staff, and administrators should be involved.
- **Continuous training:** Staff need regular training, workshops, and skill development.
- **Data governance:** Data must be accurate, secure, private, and properly managed.
- **Change management:** Clear communication, support systems, and training help reduce resistance.
- **Infrastructure and technology:** Reliable internet, cloud services, secure storage, and interoperable systems are necessary.
- **Regulatory compliance:** Organizations must follow laws such as **HIPAA**, **GDPR**, and local regulations.
- **Leadership and governance:** Leaders need a clear strategy, strong decision-making, and structures to guide the transformation.

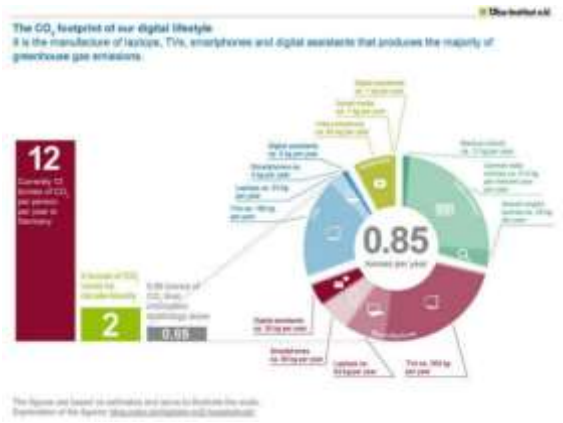
Medical progress through digitalization
Technological progress in healthcare is developing very quickly. Future healthcare will need **stronger security** and a more **proactive approach** to prevent new threats.
Technologies such as **artificial intelligence**, **machine learning**, and **extended reality** will continue to improve the **quality and efficiency** of healthcare. New innovations include **3D-printed body parts**, such as ears, corneas, bones, and skin, which are already being tested clinically. Another important development is **smart pills**. They can help patients take medication correctly through **reminders, dose tracking, and alerts**. Some digital pills can also collect and transmit health data from inside the body, especially from the digestive system (mobidev).

Video: 8 Predictions about the near future of Healthcare Over the years, there has been a big shift in the development of technology in the field of medicine, and that trend is accelerating all the time. See what digital innovations in medicine are still waiting for us.	**Literature** Kaihlanen, AM., Laukka, E., Nadav, J. *et al.* The effects of digitalisation on health and social care work: a qualitative descriptive study of the perceptions of professionals and managers. *BMC Health Serv Res* 23, 714 (2023). Kasoju N, Remya NS, Sasi R, Sujesh S, Soman B, Kesavadas C, Muraleedharan CV, Varma PRH, Behari S. Digital Health: Trends, Opportunities and Challenges. CSIT. 2023;11(1):11–30.

1.4 Digital Carbon (CO_2) Footprint and Its Consequences

CO_2 Footprint
In this short video, you can find information on what the CO2 footprint is and how it can be reduced.
Video: Climate Change: Your carbon footprint explained

What is a Digital Carbon Footprint?
Digital transformation has brought with it many advantages that also have positive effects in the fight against climate change and reduce CO_2 emissions. However, the production, use and data transmission of digital devices causes CO_2 emissions that are greater than one might think. These emissions are summarized under the term "digital CO_2 footprint" or digital carbon footprint. According to some sources (statista.com), to date more than 5 billion people worldwide have internet access.



Every single search query, every streamed video and every type of cloud computing, carried out billions of times, is responsible for an ever-increasing global energy demand - and thus also for increasing CO_2 emissions. The lion's share of the digital footprint is caused by video streaming due to the large amount of data videos contain. In comparison, using a search engine or sending plain text emails has little impact. Due to constant technological progress, increased efficiency, changing consumer habits and substitution and summation effects, it is difficult to estimate exactly how large the global CO_2 emissions are. Various studies estimate between 2.3 - 3.7 % of global CO_2 emissions, which is equivalent to the emissions of the entire aviation industry. At the individual level, it is possible to estimate more accurately how high CO_2 emissions are and how they could be reduced using simple means. (Article - The Carbon Footprint of Our Digital Lifestyles & Statista)

Sources of Digital CO_2 Footprint
The **digital carbon footprint** refers to the **CO_2 emissions caused by digital technologies and online activities**. It includes emissions from the **production, use, and disposal** of devices such as smartphones, computers, and servers, as well as the energy needed to power them.
The main sources are **data centers**, **cloud computing**, **network infrastructure**, **IoT devices**, **end-user devices**, **software and applications**, **online streaming**, **digital advertising**, and **data transfer**. Activities such as **HD streaming**, **online gaming**, **cryptocurrency mining**, and large-scale data use require especially high amounts of energy.

Social media platforms also contribute to emissions. According to the given data, **TikTok has the highest impact**, producing **2.63 g CO_2e per minute per user**, followed by **Reddit**, **Pinterest**, and **Instagram**. **YouTube has a lower impact**, with **0.46 g CO_2e per minute**.
For **Netflix**, one hour of streaming produces **less than 100 g CO_2e**, while the European average is around **55–56 g CO_2e per hour**. In 2020, Netflix's total carbon footprint was about **1.1 million metric tons of CO_2e**.

Overall, the **ICT sector** is estimated to cause around **2.1–3.9% of global emissions**. As the use of **streaming, video calls, social media, and online gaming** continues to grow, the energy demand and related emissions also increase. Data centers used about **1% of global electricity in 2020**, while **cryptocurrency mining consumed around 100 TWh** (Planbe, Myclimate, Nutanix, Oeko).

Video: AI and the energy required to power it fuel new climate concerns: Find out how much energy is needed to power AI.

Reduction of Digital Carbon Footprint

- What does Carbon Net Zero mean?
  Carbon Net Zero means balancing the amount of **greenhouse gases released** with the amount **reduced, avoided, or offset**, so the net emissions are **zero or almost zero**. This can be achieved through **decarbonization**, **clean energy**, **energy-efficient technologies**, and **reduced resource use**. Many countries aim to reach net zero, often by **2050**.
- What is digital decarbonization?
  Digital decarbonization means reducing the **carbon emissions and environmental impact** of digital technologies. This includes making the **production, use, and disposal** of devices more sustainable. Digital tools can also help by improving **energy efficiency**, for example through **automation, data analytics, and smarter power grids**.
- How to reduce your digital carbon footprint
  You can reduce your digital carbon footprint by **streaming less**, using **lower video quality**, listening to **audio instead of video**, and turning off **autoplay**. It also helps to **use devices longer**, recycle old devices correctly, activate **sleep mode**, delete unnecessary emails, use **Wi-Fi instead of mobile data**, and rely on **renewable energy**. Another simple step is to spend less time **mindlessly scrolling online**.
- How to reduce energy consumption in data centers
  Data centers can save energy through **server virtualization**, which reduces the number of physical servers. They can also use **energy management tools**, efficient storage methods like **compression and deduplication**, and integrate **renewable energy sources** such as solar or wind power. **Energy monitoring systems** help identify inefficiencies and improve overall performance (Digital Carbon Footprint - Guide for Businesses).

Literature: Sharma, Pawankumar & Dash, Bibhu. (2022). The Digital Carbon Footprint: Treat to an environmentally sustainable future. 14. 19-29. 10.5121/ijcsit.2022.14302.
The Royal Society. 2020. Digital Technology and the Planet: Harnessing Computing to Achieve Net Zero. DES7035. ISBN: 978-1-78252-501-1

2. Media Competencies

Media competencies, also known as media literacy or media expertise, are essential skills in today's digital age. These competencies encompass the ability to access, analyze, evaluate, and create media across various forms. They are crucial for understanding the role of media in society, recognizing different types of media content, and critically engaging with media messages. Media competencies go beyond merely consuming media: they involve comprehending its production, impact, and effective communication through diverse media platforms.

The Importance of Media Competencies

In a world inundated with information, media competencies are vital for several reasons:

- Recognizing Correct Information: Distinguishing between fake news and valid information is essential for making informed decisions.
- Effective Communication: Utilizing various media tools to collaborate and share information efficiently.
- Creating Engaging Content: Developing compelling and informative content that can influence and educate audiences.
- Supporting Inclusivity: Ensuring that media content is accessible to diverse audiences, including the elderly and those with disabilities.

2.1 Recognizing Correct Information

Identifying Fake News

The term Fake News is frequently used by people from all walks of life in a variety of contexts. But what exactly are fake news? And how do we identify them? Find out in this video.

Video: Fake news explained

In today's digital world, it is important to recognize **fake news** and separate it from reliable information. Fake news is created to **mislead people** and can have negative effects on individuals and society.

To avoid fake news, you should:

1. **Verify the source** – Check if the website or publisher is trustworthy and transparent.
2. **Analyze the content** – Be careful with sensational headlines, emotional language, exaggerated claims, or missing evidence.
3. **Fact-check information** – Use reliable fact-checking websites and compare the story with other sources.
4. **Use reverse image search** – Check whether images are real, manipulated, or taken out of context.
5. **Cross-reference information** – Compare the news with several credible media outlets.
6. **Investigate the author** – Check the author's background, credentials, and previous work.
7. **Check supporting sources** – Reliable articles include facts, data, expert quotes, and links to original sources.
8. **Check the publication date** – Make sure the information is current and not outdated.
9. **Be aware of bias** – Reflect on your own opinions and read different perspectives.

2.2 Effective Search Techniques

Video: Effective Search Techniques**:** Watch the video and find out what effective search techniques exist.

2.3 Collaboration and Communication Tools

Collaboration tools are digital platforms that help people work together, share information, organize tasks, and communicate in real time, even from different locations. They are important in **business, education, and personal projects** because they improve **productivity, teamwork, and innovation**. Examples include **Slack, Microsoft Teams, and Google Workspace**. With the rise of **remote work** and global teams, these tools have become essential for clear communication, accountability, and reaching shared goals.

However, successful collaboration depends not only on the tools but also on **effective communication**. Without clear and consistent communication, misunderstandings, delays, and lower productivity can occur.

Synchronous Collaboration Tools	Asynchronous Collaboartion Tools
Facilitate real-time communication and collaboration	Collaborate without needing to be online at the same time
Video Conferencing Tools: - Zoom - Microsoft Teams - Google Meet	**E-Mail and Threaded Conversation:** - Gmail - Outlook
Instant Messengers: - Slack - WhatsApp - Microsoft Teams Chat	**Project Management Tools:** - Trello - Asana - Monday.com
Collaborative Whiteboards: - Miro - Mural - Microsoft Whiteboard	**Document Collaboration Platforms:** - Google Workspace - Microsoft 365 - Dropbox Paper

2.4 Creating Engaging Climate Content

Engaging content should be **clear, relevant, original, and valuable** for the target audience. It should provide useful information, answer the audience's needs, and be easy to understand.
Important elements are **visuals** such as images, videos, and infographics, because they attract attention and make complex topics easier to understand. Good **colors, fonts, and formatting** also help make content more appealing and readable.
Strong content often uses **storytelling** to create an emotional connection and make the topic more relatable. It should also include **examples, facts, and credible sources** to build trust.
A clear **call-to-action** is important because it tells the audience what to do next, for example: **"Learn more," "Share this," or "Support us."** Content can also become more engaging through **interaction**, such as comments, quizzes, surveys, or discussions.
Useful free tools include **Canva** for visuals, **Pexels/Unsplash** for images, **Kapwing/OpenShot** for videos, **Piktochart** for infographics, **Google Fonts** for typography, **Grammarly/Hemingway** for clear writing, and **Buffer** for social media planning. **Website:** Key Elements of creating high-quality and engaging content

2.5 Barrier-Free Content for Elderly Participation

In this video you will find information about the basics of accessible content. The definitions, meanings and the specific needs of older people are explained.
Video: Barrier Free Content
Creating barrier-free content is critical to ensuring that digital environments are accessible to everyone, including people with various disabilities. Essential techniques, focusing on the use of fonts and contrasts, as well as the importance of simple language and clear structure are important.

10 principles of Good Design (Dieter Rams)

Dieter Rams' 10 Principles of Good Design are guidelines for creating products that are **functional, aesthetic, user-friendly, durable, and sustainable**. Good design should focus on the user, avoid unnecessary elements, and remain useful over time.

1. **Innovative Design** – Uses new ideas and technologies to improve functionality.
2. **Functionality** – Fulfills its purpose and focuses on usefulness.
3. **Aesthetics** – Looks and feels pleasant, improving the user experience.
4. **Self-Explanatory Quality** – Is easy and intuitive to understand.
5. **Unobtrusiveness** – Supports the user without being distracting.
6. **Honesty** – Does not pretend to be more than it is.
7. **Durability** – Avoids short trends and stays useful for a long time.
8. **Design Precision** – Pays attention to every detail.
9. **Environmental Friendliness** – Reduces waste and environmental impact.
10. **Minimalism** – Follows the idea **"Less, but better"** and focuses on essentials.

Gestalt Principles

Gestalt principles are psychological theories that explain how humans naturally perceive visual elements as unified wholes rather than just a collection of parts. These principles, rooted in Gestalt psychology, describe how our minds organize visual information based on patterns, similarities, and relationships. In design, these principles are essential for creating intuitive and visually cohesive interfaces that guide users effortlessly through content. By understanding and applying Gestalt principles, designers can enhance user experience, making information more accessible, organized, and easier to interpret. These laws include concepts such as similarity, proximity, closure, and continuity, which together help in crafting clear and effective visual communications (Youtube - NNgroup).

10 Interface Evaluation Heuristics

7. Digital Tools

Digital tools are **applications**, **platforms** or **digital devices** that enable **users** to perform multiple tasks **remotely**, often using the internet and digital media. These **digital tools** support a **wide range of functionality,** from for example in the area of **communication** and **collaboration** to the area of **productivity** and **creativity**. They are used to **increase efficiency, simplify processes** and **facilitate activities** in both private and professional contexts.

In healthcare, digital tools such as **electronic health records**, **telehealth platforms**, **mobile health apps**, **wearable devices**, and **data analytics** improve **patient care**, **communication**, **efficiency**, **remote monitoring**, and **decision-making**. These tools support healthcare professionals, especially **nurses**, by saving time and giving quick access to important patient information. **Artificial intelligence** goes one step further by helping machines **learn**, **solve problems**, and automate more complex tasks.

Literature

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3.1 Artificial Intelligence

What is AI?

Artificial Intelligence (AI) **refers to the simulation of human intelligence processes and problem-solving capabilities by machines**, particularly computer systems. Alone or in combination with other technologies (e.g. sensors, geolocalisation, robotics), AI can complete tasks that would usually require human intelligence or intervention.

These processes include learning (the acquisition of information and rules for using the information), reasoning (using rules to reach approximate or definite conclusions), and self-correction. Specific applications of AI include expert systems, natural language processing (NLP), speech recognition, and machine vision. GPS guidance, autonomous vehicles, Digital assistants and generative AI tools (such as Chat) are just a couple of examples of AI.

Video: What is AI? AI Basics

Advantages of AI	Disadvantages of AI
Efficiency: AI can automate repetitive tasks.	**High costs:** AI development and implementation can be expensive.
Data analysis: AI can quickly process large amounts of data.	**Lack of creativity:** AI cannot think creatively like humans.
24/7 availability: AI can work continuously without breaks.	**Privacy concerns:** AI may collect and use sensitive data.
Fewer human errors: AI can reduce mistakes in calculations and analysis.	**Bias and ethics:** AI can produce unfair results if trained on biased data.
Better customer service: Chatbots can give fast responses.	**Technology dependence:** Too much AI use can reduce human skills.
Medical progress: AI can support diagnosis, personalized medicine, and drug discovery.	

Video: How can artificial intelligence benefit healthcare?: Watch the video about how artificial intelligence can contribute to healthcare.
Literature: Take a look at this IBM Article. This Article discripes how can AI benefit healthcare.

3.2 Digital Sensor and Health Monitoring Systems

Wearables or wearable technologies are electronic devices that are worn on the body and can **collect, process and transmit data**. These devices are typically **equipped** with **sensors that monitor various wellbeing parameters** such as **heart rate, body temperature, movement, sleep patterns** and more. Wearables can take the form of **smartwatches**, **fitness trackers**, **smart glasses**, **clothing with integrated sensors and other portable devices**. They are more and more **used** in **healthcare**, **fitness** and other **applications** to track and analyze **personal health data** in real time to **improve health monitoring and management**.

Health apps are mobile **applications** that can be downloaded to **smartphones** and **tablets**. These apps can **help** the user to **record their own well-being** and **health status** and keep a **better overview**. They offer **functions** such as **recording fitness activities**, **documenting vital signs**, **managing medication intake**, **providing health information** and **helping** to **maintain healthy habits**. These apps can be used for personal purposes or in collaboration with **healthcare professionals** to **share health data** and receive **personalized health advice**.

Literature: Elliot Mbunge, Benhildah Muchemwa, Sipho'esihle Jiyane, and John Batani. "Sensors and healthcare 5.0: transformative shift in virtual care through emerging digital health technologies." *Global Health Journal* 5, no. 4 (2021): 169-177.
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3.3 Data and Analytics for Climate Adaption

In this chapter, the focus is on important **data sources** that help us understand the connection between **climate change, environmental conditions, and human health**. Reliable data sources are

essential for understanding how **climate change** and **environmental factors** affect **human health**. Data from weather stations, satellites, hospitals, public health organisations, environmental platforms, and geographic systems helps researchers and professionals identify risks, plan actions, and protect people and the environment. Important sources include NOAA, NASA Climate, WHO, GOARN, BreezoMeter, IQAir and the EEA.

Data Type	What It Includes	Why It Is Important
Meteorological and Climate Data	Weather and climate information such as **temperature, rainfall, wind, humidity, storms, and heatwaves**.	Helps with **weather forecasts**, **climate research**, disaster protection, and understanding health risks such as heat stress or air pollution.
Health Data	Information about **patients, diseases, health behaviour, medical records, and public health trends**.	Used for **disease monitoring**, health research, patient care, and planning healthcare services.
Environmental Data	Data on **air quality, water quality, soil quality, noise pollution, biodiversity, and ecosystems**.	Helps monitor pollution, protect health, support climate research, and preserve nature.
Geographical Data	Information about **locations, land use, population, infrastructure, maps, and natural features**.	Used for **urban planning**, emergency management, navigation, environmental protection, and research.

3.4 Digital Playful Teaching Methods

Digital playful teaching methods are **increasingly essential** in **today's learning environments**, particularly for those who need innovative approaches to engage and retain knowledge.
These methods can be **crucial** for **individuals who act as multipliers**, as they are often responsible for disseminating new concepts and practices to larger groups. Given that the topic of digital teaching methods is often controversial, playful approaches offer a less traditional, yet effective way to reach broader audiences.
By **incorporating** these **methods** into workshops and **training sessions, educators and facilitators can create interactive**, **engaging experiences** that **encourage participation** and **open-mindedness** in areas that may **initially face resistance**.

Key Components of Digital Playful Teaching Methods

- Interactive Learning Tools
- Hands-On Experience
- Engagement and Participation
- Collaborative Learning
- Storytelling and Role-Playing
- Personalized Learning
- Real-Time Feedback and Assessment
- Engaging Multimedia Content

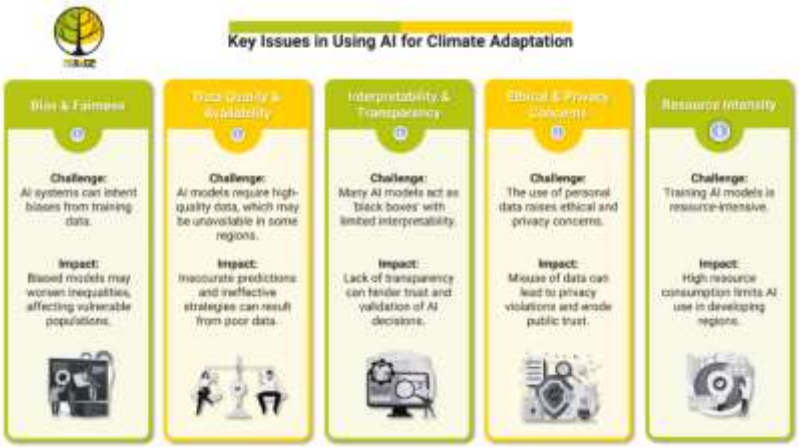
Examples of playful learning in the context of climate and health: Nasa Climate Kids, Games for Change Student Challenge, Survive the Century, Mackay Carbon Calculator, The Financial Times, Choose Our Future, Rebels of the Future

3.5 Ethics vs. Digital Ethics

Ethics means knowing the difference between **right and wrong**. It helps people live together peacefully and follow shared values. Ethics is not the same as **law** or **religion**: something can be **unethical** even if it is not illegal.

Digital ethics is about using digital technologies in a **responsible and fair** way. Important points are **privacy**, **data protection**, **transparency**, **fairness**, **security**, **user control**, and **digital well-being**. **Companies** have a responsibility to protect users' **personal data**, keep systems secure, be transparent, avoid **bias in AI**, and prevent misinformation. They should also consider **social** and **environmental responsibility**.
Individuals also have responsibilities online. They should protect their own data, respect the **privacy of others**, communicate respectfully, check information critically, and avoid spreading **misinformation**.

Data ownership can be complicated. The person who creates a file may own it, but this does not always mean they can use or publish it freely. When collecting personal data, **informed consent** is essential: people must know what data is collected, how it is used, who can access it, and they must be able to withdraw consent.
Digital ethics helps ensure that technology is used with **responsibility**, **fairness**, and **respect for people's rights**.
Video: What is Digital Ethics?: Learn about digital ethics from the perspective of Professor Andreea Gorbatai.
Video: Ethical Questions: Find out which ethical questions are raised the most when it comes to digital transformation.



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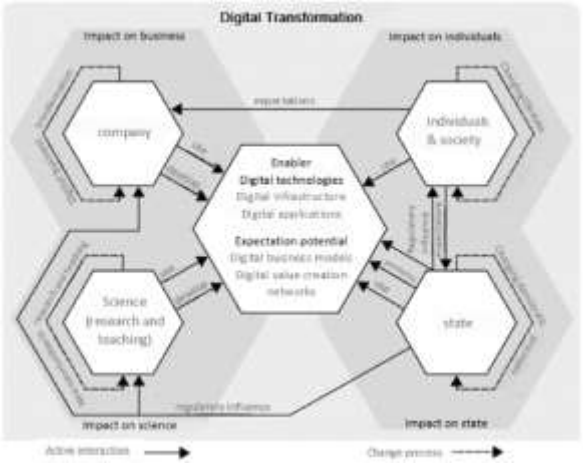
3.6 Green IT
Video: What is Green IT and why is it important? **&** What is Green IT?: In these two videos you will learn what green IT is and why it is important.

8. Digital Innovations

Digital transformation means using digital technologies to improve **business processes**, **customer experiences**, and **business models**. It is important to understand that **digitalization is not the final goal**, but a tool to create value and prepare companies for the future.
The main drivers are **digital technologies** and **new digital business opportunities**. Digital transformation usually develops from **digital competence** to **digital use** and finally to the real transformation of the company.
For successful digital transformation, companies need **agile management**, **openness to trial and error**, **cooperation between departments**, and **transparency**. The main goals are **stronger customer loyalty**, **higher efficiency**, and **increased sales**.
However, companies often face challenges such as **lack of awareness**, **no clear vision**, **IT restrictions**, **limited financial resources**, and **regulatory barriers**. Well-known examples are **Uber**, **Facebook**, **Alibaba**, and **Airbnb**, because they use digital platforms to create value without owning many traditional physical assets.



Change in Business Models
Digital business models are based on **digital technologies** and would not work in the same way without the Internet. Companies such as **Amazon**, **Uber**, and **Airbnb** depend on digital platforms to create their services and reach customers.
A key characteristic is **digital innovation**, meaning that the service is new or significantly improved through technology. Customer acquisition and sales mainly happen through **digital channels**, for example through online platforms, automated sales processes, or digital onboarding.
Another important point is that customers are **willing to pay** for the digital service because it offers a clear and useful benefit. Digital business models are often highly **scalable**, meaning they can grow quickly and reach many customers with relatively low additional costs.

Digital Transformation and Trends
Digital disruption is modernization through digitalization. Analogue is replaced by digital options. This sometimes leads to revolutionary changes in entire industries and the displacement of established companies and processes.

- What is Digital Disruption?
- Strategies for responding to digital disruption

Current digitalization trends include **AI, IoT, 5G, Big Data, cloud computing, blockchain, VR, and AR**. These technologies are changing how companies work, how people use technology, and how data is collected, processed, and secured.

The **Internet of Things (IoT)** connects physical objects, such as household devices or industrial machines, to the Internet so they can exchange data (Oracle: IoT). **Artificial intelligence (AI)** enables computers to solve tasks that normally require human intelligence, for example through **machine learning** and data analysis (IKS Frauhofer Artificial Intelligence, SAP - What is machine learning?) .
5G technology provides faster mobile internet, lower latency, and more reliable connections. It supports connected devices, autonomous vehicles, and applications like **augmented reality** and **virtual reality (**Everything you need to know about 5G).

Big Data describes very large and complex data sets that help companies identify patterns, trends, and useful information. Together with **data analysis**, it supports better decision-making and process optimization (Oracle Big Data, Oracle - The Evolution of Big Data and the Future of the Data Platform).

Cloud computing means using IT resources such as software, storage, or computing power over the Internet instead of owning them locally (IBM Cloud Computing). **Blockchain** is a decentralized and secure digital record of transactions that cannot easily be changed (SAP Blockchain-Technology). Finally, **virtual reality (VR)** creates a fully digital environment, while **augmented reality (AR)** adds digital elements to the real world in real time (VR vs AR).

Innovations Expected to Revolutionize our Lives

Innovations in technology and science are rapidly reshaping the way we live, work, and interact with the world around us. From artificial intelligence to clean energy solutions, these breakthroughs hold the potential to revolutionize entire industries and transform everyday life in profound ways. Find out what kind of innovations we can expect by 2027 and what kind by 2050.

Video: 10 AI Innovations that will change your life by 2027 & How will life look like in 2050

Medical Digital Innovations

Health care is changing from traditional processes to **digital health services**. These use **information and communication technologies** to improve **prevention, diagnosis, treatment, monitoring, and health management**.

Examples include **hospital information systems**, **electronic health records**, **telemedicine**, **wearables**, and **health apps**. These tools support **precision medicine** and help people manage their own health and well-being. They can also use **digital biomarkers**, **AI-based assistants**, or a combination of **human and digital support**.

However, many users do not yet fully use these services. Better adoption is important so that digital health innovations can reach more people.

5 conclusions for scaling up digital health innovations:

1. **Digital health services** can improve **data quality**, reach communities better, and help manage disease transmission or progression.
2. A **cultural shift** is needed so digital services are accepted as important health care tools, alongside pharmaceutical, surgical, and other treatments.
3. **Technological development** and **interoperability** support digital health services and help systems work together more effectively.
4. All **stakeholders** should be involved, especially **patients**, **citizens**, and people from different health professions.
5. The **innovation process** is important and should be divided into clear stages. New digital health technologies should be tested in real health care settings and considered in reimbursement models (Scale-up of Digital Innovations in Health Care).

Video: Smart Hospital & Top 6 Medical Innovations

Literature

Flessa S, Huebner C. Innovations in Health Care—A Conceptual Framework. *International Journal of Environmental Research and Public Health*. 2021; 18(19):10026.

Summary of the Contents Covered

This course introduced the key concepts of **digitalization, climate, health, media competence, digital tools, and digital innovation**. It showed how digital technologies can transform healthcare, support environmental sustainability, and influence the way people access, evaluate, and create information.

Digitalization, climate, and health were presented as closely connected areas. The course explained that digital tools can improve healthcare delivery, patient monitoring, climate data analysis, and sustainability efforts. At the same time, learners reflected on challenges such as the **digital divide**, social inequality, energy consumption, and the **digital carbon footprint**.

Media competencies focused on the ability to find, evaluate, and use information responsibly. Learners explored how to recognize fake news, apply effective search techniques, use collaboration and communication tools, and create accessible climate-related content.

Digital tools were introduced as practical instruments for communication, collaboration, healthcare, education, and climate adaptation. Examples included **AI, wearables, health apps, data analytics, sensors, and digital learning methods**, with a focus on **digital ethics**, privacy, data protection, fairness, and transparency.
Digital innovation highlighted how digital transformation changes business models, healthcare systems, and everyday life. Topics included digital business models, current digital trends such as **AI, IoT, 5G, Big Data, cloud computing, blockchain, VR, and AR**, as well as medical innovations and digital health services. Overall, the course helped learners understand how digital tools can be used responsibly and effectively to support **healthcare, climate action, communication, and innovation**, while considering ethical, social, and environmental challenges.

References & Materials

Literature / Documents / Websites	Games	Videos
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Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Understanding the use of digital tools MC10 EQF5&6

Microcredential Title	**Understanding the use of digital tools**
Short Code / ID	MC10
EQF Level	5/6
ECTS Credits	2 ECTS
Duration	50 hours
Delivery Mode	Online
Language(s)	English, German, Greek, Finnish and Portuguese
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Carinthia University of Applied Sciences
Module Lead / Author	Daniela Ströckl, Eleni Zografou, Maja Cetic

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Analyze the Digitalization-Climate-Health Nexus using case studies and real-world data.
LO 2	Evaluate Digitalization's Impact on Health & Environment, considering both opportunities and risks.
LO 3	Measure and Reduce the Digital Carbon Footprint through sustainable digital practices.
LO 4	Critically Assess Online Information using advanced fact-checking and research methods.
LO 5	Use AI and Digital Sensors for health monitoring and climate adaption.
LO 6	Develop Engaging and Inclusive Digital Content for diverse audiences, including the elderly.
LO 7	Apply Digital Playful Learning Methods to improve education on climate and health.
LO 8	Propose Ethical and Sustainable Digital Strategies for responsible technology use.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards the responsible, ethical and sustainable use of digital tools and innovations in health and social care, with attention to climate-health interconnections, digital inclusion and the needs of older persons.
Alignment Notes	As digital technologies transform industries across the globe, their impact on health and climate is particularly profound, offering new ways to address critical challenges like sustainability and public health. In this course, you'll explore how digital tools and innovations are driving change, from improving healthcare systems to enhancing climate monitoring and response. We'll also dive into the role of media and the importance of media competence, ensuring that you can critically engage with the information shaping these fields. By the end, you'll have a deeper understanding of

	how digitalization intersects with health and climate, and how to effectively navigate and contribute to this evolving landscape. This microcredential promotes critical reflection on the responsible and sustainable use of digital technologies in health and social care. Learners explore how digitalization, climate change and health are interconnected, and how digital tools can support healthcare delivery, climate adaptation, communication and innovation. The course also encourages awareness of digital inequalities, the digital carbon footprint, media competence, ethical issues, data protection, accessibility and the responsible use of emerging technologies such as AI, wearables, health apps and data analytics.
Keywords	Digitalization, digital health, digital tools, media literacy, digital carbon footprint, digital ethics

Learning Activities

E-Learning Format	online self-paced learning with text-based content, interactive H5P elements, YouTube videos, additional literature, case studies, quizzes, and reflective learning activities.
Activities	pre- and post-module quizzes, case studies, knowledge check questions, reflection tasks, video-based learning, interactive H5P activities, reading assignments, practical analysis of the own work environment, and application-oriented strategy development.
Estimated Study Time	50 hours

Content & Topics

1. Digitalization, Climate & Health
2. Media Competencies
3. Digital Tools
4. Digital Innovations

1. Digitalization, Climate & Health

Digitalization means using **digital technologies** to improve or transform business processes, communication, and services. It helps organizations become more **efficient**, **data-driven**, and innovative. **Digitization** is the process of converting **analog information into digital form**, such as scanning paper documents. It is a basic step and does not necessarily change how a process works.

Climate change refers to long-term changes in the Earth's climate, mainly caused by **human activities** such as burning fossil fuels, deforestation, and industrial processes. Its effects include **rising temperatures**, melting ice, sea-level rise, changing weather patterns, and more extreme weather events.

Healthcare involves the **prevention, treatment, and management** of illnesses and injuries, as well as improving physical and mental health. It includes services such as **diagnosis, therapy, and aftercare**, provided in hospitals, clinics, health centers, or at home.

1.1 Nexus Digitalization, Climate & Health

Digitalization, climate change, and health are deeply interconnected. Digital technologies offer the potential to improve healthcare delivery, enhance patient outcomes, and promote sustainability. However, the increased use of digital tools also contributes to energy consumption and electronic waste, impacting the environment and human health. Understanding these interactions is crucial in the modern world to develop effective strategies that balance technological benefits with environmental and health considerations.

Video: Nexus: In this video you can find information about how digitalization, climate change and health are connected, i.e. how they influence and change each other.	**Literature** Tarana, I. Ediriweera, L. Maison. Embracing Digital Health in the Face of Climate Crises. sdg.iisd.org Learn more about how the SDG Knowledge Hub deals with the issue of interconnection between digitalization, climate change and healthcare and what their 17 goals are.

1.2 Benefits and Challenges of Digitalization

Benefits of Digitalization

Digitalization has become essential for businesses, especially after the **COVID-19 pandemic**, because it helps them stay **resilient, flexible, and competitive** in a changing world.
It is more than just using technology. True digitalization changes a company's **processes, systems, and culture**. Examples include **cloud computing**, **online commerce**, **collaboration tools**, **AI**, **machine learning**, **connected devices**, and **Industry 4.0**.

Digitalization helps companies use **data** to understand customers better, track competitors, reduce costs, and improve efficiency. It is especially important because today's customers, especially **Millennials and Gen Z**, expect fast, digital, and consistent experiences across different platforms.
A good **digitalization strategy** improves business functions such as **HR, marketing, operations, customer service, supply chains, and work culture**. It also supports remote work and gives employees access to data from anywhere (11 Benefits Of Digitalization Which You Cannot Ignore - SAP India News Center).

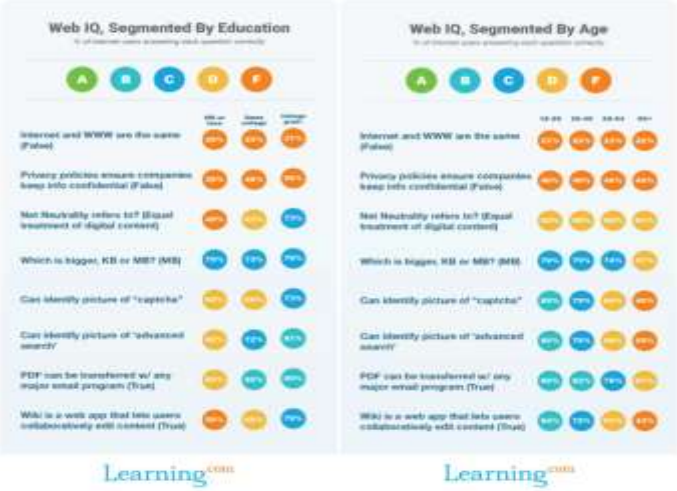
Digital Divide and Social Inequality

What is meant by this?

The **gap between people** with and without the opportunity to **use information and communication technologies** such as the Internet (due to lack of technical access, knowledge, financial means, etc.).
The digital divide varies from country to country, but there are also significant differences in accessibility within a country (assuming the same infrastructure options). This can be seen very clearly in the example of a study from the USA:

- Digital Equity: What it is and why it matters?
- Closing the Digital Divide with Digital Citizenship for Parents

But it is not just the accessibility of the infrastructure that shows clear differences. Another characteristic can be seen in the users.



"Web IQ" is the knowledge about the use of web services. Each of them uses different digital media and services every day, but depending on the level of education or age of the user, it can be seen that many supposedly simple questions would not be answered correctly, so the Web IQ is low (What Internet Users Know about Technology and the Web & Learning.com).
Another aspect in the context of the digital divide becomes clear when you look at who is actively involved in digital transformation processes. In addition to visionaries and people from all industries who use digital opportunities, it is essential that there are experts who work in the field of computer science and develop the underlying technologies. Digital transformation is a very "classically" occupied industry of "white men".
There is also a study on the subject of gender and origin that clearly shows these differences (source: Learning.com):

This aspect has several exciting side effects. Computer science is considered the fastest growing industry in the world, with a lot of unfilled positions; for example, according to US statistics, the industry will grow by at least 13% between 2020 and 2030. This means almost 1 million more jobs in this area (Talent Shortage of Software Developers). However, most of these will not be filled due to demographic change and the trend that, among other things, women are taking fewer STEM courses. This circumstance will sooner or later put a brake on technological progress (Mobile technology and home broadband 2021, Learning.com).

Video: How Technology Affects Our Health and Well-being: Watch the video to find out which are the positive and which are the negative effects of technology on our lives.	**Literature** Frank Danielsen (2021). Benefits and Challenges of Digitalization-An Expert Study of Norvegian Public Organizations. Conference: DG.O'21: The 22nd Annual International Conference on Digital Government Research. Trierveiler, Heron & Sell, Denilson & Santos, Neri. (2019). The Benefits and Challenges of Digital Transformation in Industry 4.0. Global Journal of Management and Business Research. 19. 27-40.

1.3 Effects of Digitalization on Health
Digital Transformation in Healthcare

Digital transformation in healthcare means using modern technologies to make healthcare more **patient-centered**, efficient, and sustainable. It helps healthcare providers improve services, understand patient needs better, and reduce costs.
The importance of digital transformation in healthcare is shown in four main points:

1. **Patients' Expectations** – Patients want more **personalized, high-quality healthcare services**.
2. **Rise in Chronic Diseases** – Digital tools help doctors **monitor patients remotely**, especially those with chronic diseases like diabetes or high blood pressure.
3. **Cost Reduction** – Automation and digital systems can **reduce administrative costs** and improve efficiency.
4. **Shortage of Trained Staff** – Digital transformation can support healthcare workers and help reduce the impact of the **global shortage of skilled professionals** (Silvertouch).

Video: Digital Transformation in Healthcare: Watch to find out how digital transformation solutions are offered to healthcare to help build a patient-centric, smart and connected healthcare ecosystem.

Various aspects of Digitalization in Healthcare
Video: Effects of Digitalization on Healthcare

Challenges

- **Patient data security:** Hospitals must protect confidential patient data and prevent cyberattacks.
- **Integration and interoperability:** New digital tools must work together with existing healthcare systems to improve efficiency and patient care.
- **Resistance to change:** Staff may need time and training to adapt to new technologies and workflows.
- **Budget and costs:** Digital transformation requires high investment, but can increase scalability and long-term value.
- **Distributed workforce:** Telemedicine creates decentralized work structures, so secure access to patient data is essential.
- **Regulatory compliance:** Healthcare organizations must follow strict rules and keep up with changing regulations.

Key Considerations

- **User-centered design:** Digital tools should be easy to use, accessible, and improved through feedback.
- **Stakeholder engagement:** Doctors, nurses, patients, IT staff, and administrators should be involved.
- **Continuous training:** Staff need regular training, workshops, and skill development.
- **Data governance:** Data must be accurate, secure, private, and properly managed.
- **Change management:** Clear communication, support systems, and training help reduce resistance.
- **Infrastructure and technology:** Reliable internet, cloud services, secure storage, and interoperable systems are necessary.
- **Regulatory compliance:** Organizations must follow laws such as **HIPAA**, **GDPR**, and local regulations.
- **Leadership and governance:** Leaders need a clear strategy, strong decision-making, and structures to guide the transformation.

Medical progress through digitalization
Technological progress in healthcare is developing very quickly. Future healthcare will need **stronger security** and a more **proactive approach** to prevent new threats.
Technologies such as **artificial intelligence**, **machine learning**, and **extended reality** will continue to improve the **quality and efficiency** of healthcare. New innovations include **3D-printed body parts**, such as ears, corneas, bones, and skin, which are already being tested clinically. Another important development is **smart pills**. They can help patients take medication correctly through **reminders, dose tracking, and alerts**. Some digital pills can also collect and transmit health data from inside the body, especially from the digestive system (mobidev).

Video: 8 Predictions about the near future of Healthcare: Over the years, there has been a big shift in the development of technology in the field of medicine, and that trend is accelerating all the time. See what digital innovations in medicine are still waiting for us.	**Literature** Kaihlanen, AM., Laukka, E., Nadav, J. *et al.* The effects of digitalisation on health and social care work: a qualitative descriptive study of the perceptions of professionals and managers. *BMC Health Serv Res* 23, 714 (2023). Kasoju N, Remya NS, Sasi R, Sujesh S, Soman B, Kesavadas C, Muraleedharan CV, Varma PRH, Behari S. Digital Health: Trends, Opportunities and Challenges. CSIT. 2023;11(1):11–30.

1.4 Digital Carbon (CO_2) Footprint and Its Consequences

CO_2 Footprint

In this short video, you can find information on what the CO2 footprint is and how it can be reduced.
Video: Climate Change: Your carbon footprint explained

What is a Digital Carbon Footprint?

Digital transformation has brought with it many advantages that also have positive effects in the fight against climate change and reduce CO_2 emissions. However, the production, use and data transmission of digital devices causes CO_2 emissions that are greater than one might think. These emissions are summarized under the term "digital CO_2 footprint" or digital carbon footprint. According to some sources (statista.com), to date more than 5 billion people worldwide have internet access.

Every single search query, every streamed video and every type of cloud computing, carried out billions of times, is responsible for an ever-increasing global energy demand - and thus also for increasing CO_2 emissions. The lion's share of the digital footprint is caused by video streaming due to the large amount of data videos contain. In comparison, using a search engine or sending plain text emails has little impact. Due to constant technological progress, increased efficiency, changing consumer habits and substitution and summation effects, it is difficult to estimate exactly how large the global CO_2 emissions are. Various studies estimate between 2.3 - 3.7 % of global CO_2 emissions, which is equivalent to the emissions of the entire aviation industry. At the individual level, it is possible to estimate more accurately how high CO_2 emissions are and how they could be reduced using simple means. (Article - The Carbon Footprint of Our Digital Lifestyles & Statista)

Sources of Digital CO_2 Footprint

The **digital carbon footprint** refers to the **CO_2 emissions caused by digital technologies and online activities**. It includes emissions from the **production, use, and disposal** of devices such as smartphones, computers, and servers, as well as the energy needed to power them.
The main sources are **data centers**, **cloud computing**, **network infrastructure**, **IoT devices**, **end-user devices**, **software and applications**, **online streaming**, **digital advertising**, and **data transfer**. Activities such as **HD streaming**, **online gaming**, **cryptocurrency mining**, and large-scale data use require especially high amounts of energy.

Social media platforms also contribute to emissions. According to the given data, **TikTok has the highest impact**, producing **2.63 g CO_2e per minute per user**, followed by **Reddit**, **Pinterest**, and **Instagram**. **YouTube has a lower impact**, with **0.46 g CO_2e per minute**.
For **Netflix**, one hour of streaming produces **less than 100 g CO_2e**, while the European average is around **55–56 g CO_2e per hour**. In 2020, Netflix's total carbon footprint was about **1.1 million metric tons of CO_2e**.

Overall, the **ICT sector** is estimated to cause around **2.1–3.9% of global emissions**. As the use of **streaming, video calls, social media, and online gaming** continues to grow, the energy demand and related emissions also increase. Data centers used about **1% of global electricity in 2020**, while **cryptocurrency mining consumed around 100 TWh** (Planbe, Myclimate, Nutanix, Oeko). .

Video: AI and the energy required to power it fuel new climate concerns**:** Find out how much energy is needed to power AI.

Reduction of Digital Carbon Footprint

- What does Carbon Net Zero mean?
  Carbon Net Zero means balancing the amount of **greenhouse gases released** with the amount **reduced, avoided, or offset**, so the net emissions are **zero or almost zero**. This can be achieved through **decarbonization**, **clean energy**, **energy-efficient technologies**, and **reduced resource use**. Many countries aim to reach net zero, often by **2050**.
- What is digital decarbonization?
  Digital decarbonization means reducing the **carbon emissions and environmental impact** of digital technologies. This includes making the **production, use, and disposal** of devices more sustainable. Digital tools can also help by improving **energy efficiency**, for example through **automation, data analytics, and smarter power grids**.
- How to reduce your digital carbon footprint
  You can reduce your digital carbon footprint by **streaming less**, using **lower video quality**, listening to **audio instead of video**, and turning off **autoplay**. It also helps to **use devices longer**, recycle old devices correctly, activate **sleep mode**, delete unnecessary emails, use **Wi-Fi instead of mobile data**, and rely on **renewable energy**. Another simple step is to spend less time **mindlessly scrolling online**.
- How to reduce energy consumption in data centers
  Data centers can save energy through **server virtualization**, which reduces the number of physical servers. They can also use **energy management tools**, efficient storage methods like **compression and deduplication**, and integrate **renewable energy sources** such as solar or wind power. **Energy monitoring systems** help identify inefficiencies and improve overall performance (Digital Carbon Footprint - Guide for Businesses).

Literature: Sharma, Pawankumar & Dash, Bibhu. (2022). The Digital Carbon Footprint: Treat to an environmentally sustainable future. 14. 19-29. 10.5121/ijcsit.2022.14302.
The Royal Society. 2020. Digital Technology and the Planet: Harnessing Computing to Achieve Net Zero. DES7035. ISBN: 978-1-78252-501-1

2. Media Competencies

Media competencies, also known as media literacy or media expertise, are essential skills in today's digital age. These competencies encompass the ability to access, analyze, evaluate, and create media across various forms. They are crucial for understanding the role of media in society, recognizing different types of media content, and critically engaging with media messages. Media competencies go beyond merely consuming media: they involve comprehending its production, impact, and effective communication through diverse media platforms.

The Importance of Media Competencies

In a world inundated with information, media competencies are vital for several reasons:

- Recognizing Correct Information: Distinguishing between fake news and valid information is essential for making informed decisions.
- Effective Communication: Utilizing various media tools to collaborate and share information efficiently.
- Creating Engaging Content: Developing compelling and informative content that can influence and educate audiences.
- Supporting Inclusivity: Ensuring that media content is accessible to diverse audiences, including the elderly and those with disabilities.

2.1 Recognizing Correct Information

Identifying Fake News

The term Fake News is frequently used by people from all walks of life in a variety of contexts. But what exactly are fake news? And how do we identify them? Find out in this video.

Video: Fake news explained: In today's digital world, it is important to recognize **fake news** and separate it from reliable information. Fake news is created to **mislead people** and can have negative effects on individuals and society.

To avoid fake news, you should:

1. **Verify the source** – Check if the website or publisher is trustworthy and transparent.
2. **Analyze the content** – Be careful with sensational headlines, emotional language, exaggerated claims, or missing evidence.
3. **Fact-check information** – Use reliable fact-checking websites and compare the story with other sources.
4. **Use reverse image search** – Check whether images are real, manipulated, or taken out of context.
5. **Cross-reference information** – Compare the news with several credible media outlets.
6. **Investigate the author** – Check the author's background, credentials, and previous work.
7. **Check supporting sources** – Reliable articles include facts, data, expert quotes, and links to original sources.
8. **Check the publication date** – Make sure the information is current and not outdated.
9. **Be aware of bias** – Reflect on your own opinions and read different perspectives.

2.2 Effective Search Techniques

Video: Effective Search Techniques: Watch the video and find out what effective search techniques exist.

2.3 Collaboration and Communication Tools

Collaboration tools are digital platforms that help people work together, share information, organize tasks, and communicate in real time, even from different locations.

They are important in **business, education, and personal projects** because they improve **productivity, teamwork, and innovation**. Examples include **Slack, Microsoft Teams, and Google Workspace**. With the rise of **remote work** and global teams, these tools have become essential for clear communication, accountability, and reaching shared goals.

However, successful collaboration depends not only on the tools but also on **effective communication**. Without clear and consistent communication, misunderstandings, delays, and lower productivity can occur.

Synchronous Collaboration Tools	Asynchronous Collaboartion Tools
Facilitate real-time communication and collaboration	Collaborate without needing to be online at the same time
Video Conferencing Tools: - Zoom - Microsoft Teams - Google Meet	**E-Mail and Threaded Conversation:** - Gmail - Outlook
Instant Messengers: - Slack - WhatsApp - Microsoft Teams Chat	**Project Management Tools:** - Trello - Asana - Monday.com

Collaborative Whiteboards:	Document Collaboration Platforms:
- Miro - Mural - Microsoft Whiteboard	- Google Workspace - Microsoft 365 - Dropbox Paper

2.4 Creating Engaging Climate Content

Engaging content should be **clear, relevant, original, and valuable** for the target audience. It should provide useful information, answer the audience's needs, and be easy to understand.

Important elements are **visuals** such as images, videos, and infographics, because they attract attention and make complex topics easier to understand. Good **colors, fonts, and formatting** also help make content more appealing and readable.

Strong content often uses **storytelling** to create an emotional connection and make the topic more relatable. It should also include **examples, facts, and credible sources** to build trust.

A clear **call-to-action** is important because it tells the audience what to do next, for example: **"Learn more," "Share this," or "Support us."** Content can also become more engaging through **interaction**, such as comments, quizzes, surveys, or discussions.

Useful free tools include **Canva** for visuals, **Pexels/Unsplash** for images, **Kapwing/OpenShot** for videos, **Piktochart** for infographics, **Google Fonts** for typography, **Grammarly/Hemingway** for clear writing, and **Buffer** for social media planning.

Website: Key Elements of creating high-quality and engaging content

2.5 Barrier-Free Content for Elderly Participation

In this video you will find information about the basics of accessible content. The definitions, meanings and the specific needs of older people are explained.

Video: Barrier Free Content

Creating barrier-free content is critical to ensuring that digital environments are accessible to everyone, including people with various disabilities. Essential techniques, focusing on the use of fonts and contrasts, as well as the importance of simple language and clear structure are important.

10 principles of Good Design (Dieter Rams)

Dieter Rams' 10 Principles of Good Design are guidelines for creating products that are **functional, aesthetic, user-friendly, durable, and sustainable**. Good design should focus on the user, avoid unnecessary elements, and remain useful over time.

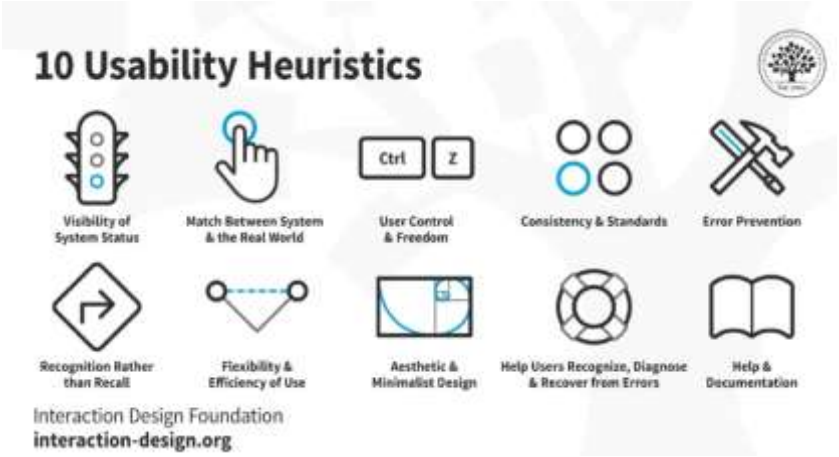
1. **Innovative Design** – Uses new ideas and technologies to improve functionality.
2. **Functionality** – Fulfills its purpose and focuses on usefulness.
3. **Aesthetics** – Looks and feels pleasant, improving the user experience.
4. **Self-Explanatory Quality** – Is easy and intuitive to understand.
5. **Unobtrusiveness** – Supports the user without being distracting.
6. **Honesty** – Does not pretend to be more than it is.
7. **Durability** – Avoids short trends and stays useful for a long time.
8. **Design Precision** – Pays attention to every detail.
9. **Environmental Friendliness** – Reduces waste and environmental impact.
10. **Minimalism** – Follows the idea **"Less, but better"** and focuses on essentials.

Gestalt Principles

Gestalt principles are psychological theories that explain how humans naturally perceive visual elements as unified wholes rather than just a collection of parts. These principles, rooted in Gestalt psychology, describe how our minds organize visual information based on patterns, similarities, and relationships. In design, these principles are essential for creating intuitive and visually cohesive interfaces that guide users effortlessly through content. By understanding and applying Gestalt principles, designers can enhance user experience, making information more accessible, organized,

and easier to interpret. These laws include concepts such as similarity, proximity, closure, and continuity, which together help in crafting clear and effective visual communications (Youtube - NNgroup).

10 Interface Evaluation Heuristics



3. Digital Tools

Digital tools are **applications**, **platforms** or **digital devices** that enable **users** to perform multiple tasks **remotely**, often using the internet and digital media. These **digital tools** support a **wide range of functionality,** from for example in the area of **communication** and **collaboration** to the area of **productivity** and **creativity**. They are used to **increase efficiency, simplify processes** and **facilitate activities** in both private and professional contexts.

In healthcare, digital tools such as **electronic health records**, **telehealth platforms**, **mobile health apps**, **wearable devices**, and **data analytics** improve **patient care**, **communication**, **efficiency**, **remote monitoring**, and **decision-making**. These tools support healthcare professionals, especially **nurses**, by saving time and giving quick access to important patient information. **Artificial intelligence** goes one step further by helping machines **learn**, **solve problems**, and automate more complex tasks.

Literature: Grossu-Leibovica, D & Kalkis, H. (2023). Total quality management tools and techniques for improving service quality and client satisfaction in the healthcare environment: A qualitative systematic review. *Management Science Letters* , 13(2), 118-123.
Wosny M, Strasser L, Hastings J. Experience of Health Care Professionals Using Digital Tools in the Hospital: Qualitative Systematic Review. JMIR Hum Factors 2023;10:e50357.
Lo Presti, L.; Testa, M.; Marino, V.; Singer, P. Engagement in Healthcare Systems: Adopting Digital Tools for a Sustainable Approach. *Sustainability* 2019, *11*, 220.
Sharma, Ridhima & Singh, Amrik. (2023). Use of Digital Technology in Improving Quality Education: A Global Perspectives and Trends.

3.1 Artificial Intelligence

What is AI?

Artificial Intelligence (AI) **refers to the simulation of human intelligence processes and problem-solving capabilities by machines**, particularly computer systems. Alone or in combination with other technologies (e.g. sensors, geolocalisation, robotics), AI can complete tasks that would usually require human intelligence or intervention.

These processes include learning (the acquisition of information and rules for using the information), reasoning (using rules to reach approximate or definite conclusions), and self-correction. Specific applications of AI include expert systems, natural language processing (NLP), speech recognition, and machine vision. GPS guidance, autonomous vehicles, Digital assistants and generative AI tools (such as Chat) are just a couple of examples of AI.

Video: What is AI? AI Basics

Advantages of AI	Disadvantages of AI
Efficiency: AI can automate repetitive tasks.	**High costs:** AI development and implementation can be expensive.
Data analysis: AI can quickly process large amounts of data.	**Lack of creativity:** AI cannot think creatively like humans.
24/7 availability: AI can work continuously without breaks.	**Privacy concerns:** AI may collect and use sensitive data.
Fewer human errors: AI can reduce mistakes in calculations and analysis.	**Bias and ethics:** AI can produce unfair results if trained on biased data.
Better customer service: Chatbots can give fast responses.	**Technology dependence:** Too much AI use can reduce human skills.
Medical progress: AI can support diagnosis, personalized medicine, and drug discovery.	

Video: **How can artificial intelligence benefit healthcare?**: Watch the video about how artificial intelligence can contribute to healthcare.
Literature: Take a look at this IBM Article. This Article discripes how can AI benefit healthcare.

3.2 Digital Sensor and Health Monitoring Systems

Wearables or wearable technologies are electronic devices that are worn on the body and can **collect, process and transmit data**. These devices are typically **equipped** with **sensors that monitor various wellbeing parameters** such as **heart rate, body temperature, movement, sleep patterns** and more. Wearables can take the form of **smartwatches**, **fitness trackers**, **smart glasses**, **clothing with integrated sensors and other portable devices**. They are more and more **used** in **healthcare**, **fitness** and other **applications** to track and analyze **personal health data** in real time to **improve health monitoring and management**.

Health apps are mobile **applications** that can be downloaded to **smartphones** and **tablets**. These apps can **help** the user to **record their own well-being** and **health status** and keep a **better overview**. They offer **functions** such as **recording fitness activities**, **documenting vital signs**, **managing medication intake**, **providing health information** and **helping** to **maintain healthy habits**. These apps can be used for personal purposes or in collaboration with **healthcare professionals** to **share health data** and receive **personalized health advice**.

Literature: Elliot Mbunge, Benhildah Muchemwa, Sipho'esihle Jiyane, and John Batani. "Sensors and healthcare 5.0: transformative shift in virtual care through emerging digital health technologies." *Global Health Journal* 5, no. 4 (2021): 169-177.
Sara Nasiri and Mohammad Reza Khosravani. "Progress and challenges in fabrication of wearable sensors for health monitoring." *Sensors and Actuators A: Physical* 312 (2020): 112105.
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Fourati, Lamia & Said, Sana. (2020). Remote Health Monitoring Systems Based on Bluetooth Low Energy (BLE) Communication Systems

3.3 Data and Analytics for Climate Adaption

In this chapter, the focus is on important **data sources** that help us understand the connection between **climate change, environmental conditions, and human health**. Reliable data sources are essential for understanding how **climate change** and **environmental factors** affect **human health**. Data from weather stations, satellites, hospitals, public health organisations, environmental platforms, and geographic systems helps researchers and professionals identify risks, plan actions, and protect people and the environment. Important sources include **NOAA**, **NASA Climate**, **WHO**, **GOARN**, **BreezoMeter**, **IQAir** and the **EEA**.

Data Type	What It Includes	Why It Is Important
Meteorological and Climate Data	Weather and climate information such as **temperature, rainfall, wind, humidity, storms, and heatwaves**.	Helps with **weather forecasts**, **climate research**, disaster protection, and understanding health risks such as heat stress or air pollution.
Health Data	Information about **patients, diseases, health behaviour, medical records, and public health trends**.	Used for **disease monitoring**, health research, patient care, and planning healthcare services.
Environmental Data	Data on **air quality, water quality, soil quality, noise pollution, biodiversity, and ecosystems**.	Helps monitor pollution, protect health, support climate research, and preserve nature.
Geographical Data	Information about **locations, land use, population, infrastructure, maps, and natural features**.	Used for **urban planning**, emergency management, navigation, environmental protection, and research.

3.4 Digital Playful Teaching Methods

Digital playful teaching methods are **increasingly essential** in **today's learning environments**, particularly for those who need innovative approaches to engage and retain knowledge.
These methods can be **crucial** for **individuals who act as multipliers**, as they are often responsible for disseminating new concepts and practices to larger groups. Given that the topic of digital teaching methods is often controversial, playful approaches offer a less traditional, yet effective way to reach broader audiences.
By **incorporating** these **methods** into workshops and **training sessions, educators and facilitators can create interactive**, **engaging experiences** that **encourage participation** and **open-mindedness** in areas that may **initially face resistance**.

Key Components of Digital Playful Teaching Methods

- Interactive Learning Tools
- Hands-On Experience
- Engagement and Participation
- Collaborative Learning
- Storytelling and Role-Playing
- Personalized Learning
- Real-Time Feedback and Assessment
- Engaging Multimedia Content

Examples of playful learning in the context of climate and health: Nasa Climate Kids, Games for Change Student Challenge, Survive the Century, Mackay Carbon Calculator, The Financial Times, Choose Our Future, Rebels of the Future

3.5 Ethics vs. Digital Ethics

Ethics means knowing the difference between **right and wrong**. It helps people live together peacefully and follow shared values. Ethics is not the same as **law** or **religion**: something can be **unethical** even if it is not illegal.

Digital ethics is about using digital technologies in a **responsible and fair** way. Important points are **privacy**, **data protection**, **transparency**, **fairness**, **security**, **user control**, and **digital well-being**. **Companies** have a responsibility to protect users' **personal data**, keep systems secure, be transparent, avoid **bias in AI**, and prevent misinformation. They should also consider **social** and **environmental responsibility**.

Individuals also have responsibilities online. They should protect their own data, respect the **privacy of others**, communicate respectfully, check information critically, and avoid spreading **misinformation**.

Data ownership can be complicated. The person who creates a file may own it, but this does not always mean they can use or publish it freely. When collecting personal data, **informed consent** is essential: people must know what data is collected, how it is used, who can access it, and they must be able to withdraw consent.
Digital ethics helps ensure that technology is used with **responsibility**, **fairness**, and **respect for people's rights**.

Video: What is Digital Ethics?: Learn about digital ethics from the perspective of Professor Andreea Gorbatai.
Video: Ethical Questions: Find out which ethical questions are raised the most when it comes to digital transformation.

Literature

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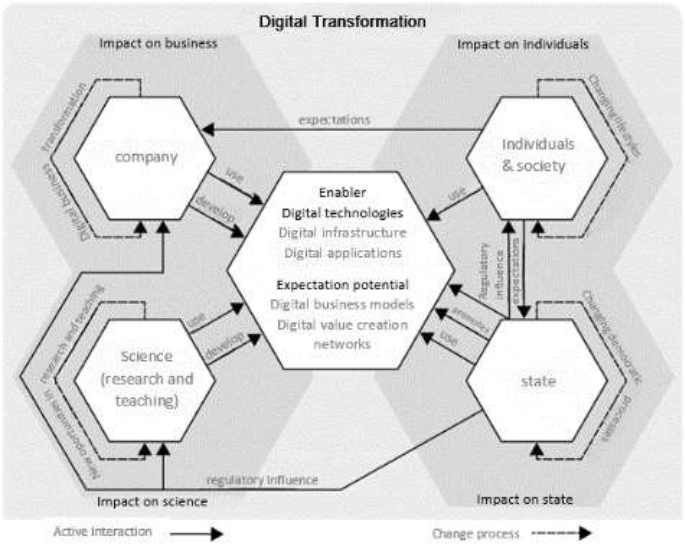
3.6 Green IT

Video: What is Green IT and why is it important? **&** What is Green IT?: In these two videos you will learn what green IT is and why it is important.

4. Digital Innovations

Digital transformation means using digital technologies to improve **business processes**, **customer experiences**, and **business models**. It is important to understand that **digitalization is not the final goal**, but a tool to create value and prepare companies for the future.
The main drivers are **digital technologies** and **new digital business opportunities**. Digital transformation usually develops from **digital competence** to **digital use** and finally to the real transformation of the company.

For successful digital transformation, companies need **agile management**, **openness to trial and error**, **cooperation between departments**, and **transparency**. The main goals are **stronger customer loyalty**, **higher efficiency**, and **increased sales**.
However, companies often face challenges such as **lack of awareness**, **no clear vision**, **IT restrictions**, **limited financial resources**, and **regulatory barriers**. Well-known examples are **Uber**, **Facebook**, **Alibaba**, and **Airbnb**, because they use digital platforms to create value without owning many traditional physical assets.



Change in Business Models
Digital business models are based on **digital technologies** and would not work in the same way without the Internet. Companies such as **Amazon**, **Uber**, and **Airbnb** depend on digital platforms to create their services and reach customers.
A key characteristic is **digital innovation**, meaning that the service is new or significantly improved through technology. Customer acquisition and sales mainly happen through **digital channels**, for example through online platforms, automated sales processes, or digital onboarding.
Another important point is that customers are **willing to pay** for the digital service because it offers a clear and useful benefit. Digital business models are often highly **scalable**, meaning they can grow quickly and reach many customers with relatively low additional costs.

Digital Transformation and Trends
Digital disruption is modernization through digitalization. Analogue is replaced by digital options. This sometimes leads to revolutionary changes in entire industries and the displacement of established companies and processes.

- What is Digital Disruption?
- Strategies for responding to digital disruption

Current digitalization trends include **AI, IoT, 5G, Big Data, cloud computing, blockchain, VR, and AR**. These technologies are changing how companies work, how people use technology, and how data is collected, processed, and secured.

The **Internet of Things (IoT)** connects physical objects, such as household devices or industrial machines, to the Internet so they can exchange data (Oracle: IoT). **Artificial intelligence (AI)** enables computers to solve tasks that normally require human intelligence, for example through **machine learning** and data analysis (IKS Frauhofer Artificial Intelligence, SAP - What is machine learning?) .
5G technology provides faster mobile internet, lower latency, and more reliable connections. It supports connected devices, autonomous vehicles, and applications like **augmented reality** and **virtual reality (**Everything you need to know about 5G).

Big Data describes very large and complex data sets that help companies identify patterns, trends, and useful information. Together with **data analysis**, it supports better decision-making and process

optimization (Oracle Big Data, Oracle - The Evolution of Big Data and the Future of the Data Platform).

Cloud computing means using IT resources such as software, storage, or computing power over the Internet instead of owning them locally (IBM Cloud Computing). **Blockchain** is a decentralized and secure digital record of transactions that cannot easily be changed (SAP Blockchain-Technology). Finally, **virtual reality (VR)** creates a fully digital environment, while **augmented reality (AR)** adds digital elements to the real world in real time (VR vs AR).

Innovations Expected to Revolutionize our Lives
Innovations in technology and science are rapidly reshaping the way we live, work, and interact with the world around us. From artificial intelligence to clean energy solutions, these breakthroughs hold the potential to revolutionize entire industries and transform everyday life in profound ways. Find out what kind of innovations we can expect by 2027 and what kind by 2050.
Video: 10 AI Innovations that will change your life by 2027 & How will life look like in 2050

Medical Digital Innovations
Health care is changing from traditional processes to **digital health services**. These use **information and communication technologies** to improve **prevention, diagnosis, treatment, monitoring, and health management**.
Examples include **hospital information systems**, **electronic health records**, **telemedicine**, **wearables**, and **health apps**. These tools support **precision medicine** and help people manage their own health and well-being. They can also use **digital biomarkers**, **AI-based assistants**, or a combination of **human and digital support**.
However, many users do not yet fully use these services. Better adoption is important so that digital health innovations can reach more people.

5 conclusions for scaling up digital health innovations:

1. **Digital health services** can improve **data quality**, reach communities better, and help manage disease transmission or progression.
2. A **cultural shift** is needed so digital services are accepted as important health care tools, alongside pharmaceutical, surgical, and other treatments.
3. **Technological development** and **interoperability** support digital health services and help systems work together more effectively.
4. All **stakeholders** should be involved, especially **patients**, **citizens**, and people from different health professions.
5. The **innovation process** is important and should be divided into clear stages. New digital health technologies should be tested in real health care settings and considered in reimbursement models (Scale-up of Digital Innovations in Health Care).

Video: Smart Hospital & Top 6 Medical Innovations

Literature: Flessa S, Huebner C. Innovations in Health Care—A Conceptual Framework. *International Journal of Environmental Research and Public Health*. 2021; 18(19):10026.

Summary of the Contents Covered
This course introduced the key concepts of **digitalization, climate, health, media competence, digital tools, and digital innovation**. It showed how digital technologies can transform healthcare, support environmental sustainability, and influence the way people access, evaluate, and create information.
Digitalization, climate, and health were presented as closely connected areas. The course explained that digital tools can improve healthcare delivery, patient monitoring, climate data analysis, and sustainability efforts. At the same time, learners reflected on challenges such as the **digital divide**, social inequality, energy consumption, and the **digital carbon footprint**.

Media competencies focused on the ability to find, evaluate, and use information responsibly. Learners explored how to recognize fake news, apply effective search techniques, use collaboration and communication tools, and create accessible climate-related content.
Digital tools were introduced as practical instruments for communication, collaboration, healthcare, education, and climate adaptation. Examples included **AI, wearables, health apps, data analytics, sensors, and digital learning methods**, with a focus on **digital ethics**, privacy, data protection, fairness, and transparency.
Digital innovation highlighted how digital transformation changes business models, healthcare systems, and everyday life. Topics included digital business models, current digital trends such as **AI, IoT, 5G, Big Data, cloud computing, blockchain, VR, and AR**, as well as medical innovations and digital health services. Overall, the course helped learners understand how digital tools can be used responsibly and effectively to support **healthcare, climate action, communication, and innovation**, while considering ethical, social, and environmental challenges.

References & Materials

Literature / Documents / Websites	Games	Videos
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Climate Adaptation in Health and Social Care Settings for Healthcare Professionals and Caregivers MC11 EQF 5&6

Microcredential Title	**Climate Adaptation in Health and Social Care Settings for Healthcare Professionals and Caregivers**
Short Code / ID	MC11
ECTS Credits	2 ECTS
Duration	40 hours
Delivery Mode	Online
Language(s)	English and Portuguese
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	GLSMED Learning Health, SA
Module Lead / Author	Cátia Botelho Costa

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Evaluate and critically analyse specific risks, and climate adaptation impacts, for older people in health and social care settings.
LO 2	Develop and adapt care plans that incorporate climate-adaptive strategies tailored to the specific needs of older individuals.
LO 3	Monitor and evaluate climate-adaptive interventions, using appropriate methods to support informed decision-making and continuous improvement.
LO 4	Design and implement training programmes, enabling colleagues and teams to confidently address climate-related challenges in practice.

chAnGE Competence Area	Communication & Collaboration
Alignment Notes	MC11 is a microcredential designed to equip health and social care (HSC) professionals with the knowledge and skills needed to support older adults in the context of climate change. It focuses on developing climate-adaptive care practices that enhance the well-being, safety, and resilience of ageing populations, who are particularly vulnerable to climate-related risks. MC11 covers the design of adaptive care plans, as well as the monitoring and evaluation of interventions, and the development of training programmes to strengthen team and organisational readiness. Through practical learning activities, including self-assessment quizzes, participants deepen their understanding of climate impacts in HSC settings and build confidence in responding effectively to emerging challenges.
Keywords	Climate-adaptative care, agpopulations, Climate change resilience, Care planning and interventions, Workforce training and capacity building

Learning Activities

E-Learning Format	Interactive modules, original video lectures, multimedia learning content and reading materials
Activities	Pre and post module quizzes, knowledge check questions, final assessment, and students' evaluation questionnaire
Estimated Study Time	40 hours

Content & Topics

1. Revisiting Climate Change and its Effects
2. Climate-Adaptative Care Strategies for Older People in Health and Social Care
3. Monitoring and Evaluating Climate-Adaptative Interventions
4. Train the Trainer
5. Essential Reading
6. Assessment of Learning

1. Revisiting Climate Change and its Effects: Risks and Impacts Associated with Climate Adaptation in the Context of Health and Social Care for Older People

Environmental Determinants of Health and Emerging Climate Risks

Recent perspectives on the determinants of health suggest a significant shift in the relative importance of environmental factors. Traditionally, health outcomes were understood as being primarily influenced by individual behaviours (approximately 40%), followed by genetic factors, socioeconomic conditions, and healthcare services, with environmental determinants contributing a relatively minor proportion. However, this distribution is rapidly changing.

It is increasingly recognised that environmental determinants are emerging as the dominant drivers of health in the coming decades, particularly in the context of climate change and global ecological degradation. This shift reflects the scale and interconnected nature of environmental challenges, which now directly influence both population health and healthcare systems.

Key Environmental Determinants Affecting Health

Key determinants include overpopulation and demographic pressure; climate change and global warming; ecosystem degradation and pollution; biodiversity loss; and depletion of natural resources. Population growth and consumption have exceeded the Earth's regenerative capacity, increasing pressure on health, food, water and care systems.

Climate Change and Accelerating Environmental Stress

Climate change involves rising temperatures, ocean acidification and melting polar ice. Approaching or exceeding the 1.5°C threshold is linked to wider drought exposure, stronger impacts in Southern Europe, more extreme events and possible tipping points that may become irreversible.

The practical implication is that climate risk should not be treated as an occasional emergency topic. It needs to be integrated into routine assessment, seasonal planning, infrastructure decisions and daily professional judgement, particularly in services supporting older adults.

Environmental Degradation and Biodiversity Loss

Environmental degradation adds further risk through altered ecosystems, air and water pollution, microplastics, toxic exposure and biodiversity loss. These pressures weaken ecosystem resilience and may increase the spread of vector-borne, zoonotic, food-related and water-related disease.

Current Health Impacts of Environmental Factors

Environmental factors already contribute substantially to global mortality. The main affected conditions include cardiovascular and cerebrovascular disease, respiratory illness and allergies, cancer, vector-borne and zoonotic disease, water- and food-related illness and mental health disorders, including climate anxiety.

Examples should be discussed with learners in terms of prevention and early warning: respiratory symptoms during smoke or ozone episodes, dizziness and confusion during heat, worsening pain or infections during cold, and distress after storms, fires or displacement.

Implications for Health Systems

HSC systems must respond to rising disease burden, emergencies and service disruption while also reducing their own environmental footprint. This creates a dual responsibility: adapt services to protect vulnerable groups and mitigate emissions, waste and inefficient resource use.

Mitigation and Adaptation Approaches

Mitigation reduces greenhouse gas emissions and environmental impact; adaptation protects people from climate effects that are already occurring. Examples include urban cooling, green spaces, awareness campaigns, renewable energy and sustainable healthcare practices. Preventive health promotion can produce co-benefits for people and the planet.

In practice, mitigation and adaptation should be taught together. A care home may reduce energy waste, but it must also keep residents safe during heat. A home-care team may optimise travel routes, but it must still maintain contact with isolated older adults. Good planning balances environmental responsibility with safety and continuity.

Role of Health Professionals

Health professionals are trusted messengers and practical agents of change. Their role includes advocating for public health and sustainability, supporting behaviour change, influencing organisational practice and helping communities prepare for a more climate-resilient health system.

Link for video-lecture: MC11: Risks and Impacts Associated with Climate Adaptation in the Context of Health and Social Care

2. Climate-Adaptative Care Strategies for Older People in Health and Social Care

2.1. Concept of climate adaptation in the context of Health and Social Care for older people

Core concepts: climate adaptation and climate resilience

Climate adaptation means anticipating harmful climate impacts and taking practical measures to prevent or reduce harm. Climate resilience is the capacity of people, teams and care environments to anticipate, manage, recover from and, when needed, transform after climate shocks.

Why climate-adapted care is necessary for older people

Older adults are more vulnerable to climate hazards because of frailty, chronic illness, reduced thermoregulation, mobility limitations, cognitive impairment and dependence on support. Climate-adapted care planning reduces avoidable deterioration, protects dignity and supports continuity during heatwaves, cold spells, floods, storms and service disruption.

Adaptation measures for heat, cold and extreme events

During heatwaves, priorities include hydration routines, monitoring urine colour, consciousness and mucosal condition, lighter meals, cooling systems, ventilation and regular contact. During cold periods, care focuses on heating, insulation, layered clothing, infection prevention, mobility support and fall-risk monitoring. Storms and floods require evacuation planning, medication continuity, emergency supplies and safe access to services.

A concise heatwave checklist should include: identify high-risk residents; confirm fluid plans and clinical restrictions; monitor room temperature; check medication storage; adapt meals and clothing; ensure access to cooled spaces; and define when staff must escalate to clinical review.

Organisational preparedness and contingency planning

Organisations need contingency plans based on risk assessment, infrastructure, location and resident vulnerability. Preparedness includes clear communication with teams, authorities and families; stocks of medicine, food, potable water and generators; accessible transport, shelters and evacuation routes; and monitoring of temperature and humidity.

Rapid response capacity and staff preparedness

Rapid response depends on trained staff, defined escalation protocols and simulation exercises. In heat events, teams should intensify hydration monitoring, identify warning signs early, adjust ventilation or cooling and escalate clinical concerns without delay.

Simulation exercises are especially useful because climate incidents often require coordination under pressure. Teams should rehearse who communicates with families, who checks supplies, who supports evacuation, who reviews medication and who documents decisions.

Key vulnerabilities: mobility, medication and cognitive function

Climate extremes intensify existing vulnerabilities: mobility limitations complicate evacuation and increase falls; heat and humidity affect medication storage and adherence; cognitive impairment may worsen disorientation, refusal of care, dehydration and malnutrition. Continuity planning must also protect access to healthcare and social support.

Strategies to ensure continuity of care

Continuity of care requires at least two weeks of medication stock where appropriate, safe storage, adherence aids, functional assessment, mobility devices, nutrition and hydration support, telemedicine, updated emergency contacts and community partnerships with local services.

Family involvement and communication

Families contribute knowledge about routines, preferences and needs. Regular meetings, education on climate risks and clear communication channels support shared planning. Person-centred communication uses active listening, plain language, empathy, respect and feedback mechanisms to improve trust and adherence.

Family communication should be planned before crises. Clear messages should explain what may change during heatwaves, floods or storms, what families can do, what the service will do and which contact channels will be used if normal services are disrupted.

Application to clinical scenarios

Care plans must match individual risks. Oxygen-dependent residents need backup power, oxygen-access facilities, evacuation routes and emergency medication. Cardiovascular conditions require medication review, hydration and nutrition monitoring. Cognitive impairment calls for fall prevention, wandering monitoring, familiar routines and support for nutrition and medicine even when care is resisted.

In all scenarios, the care plan should make responsibilities explicit: who monitors the person, who checks supplies, who contacts the family, who has authority to escalate and how information is documented. This turns adaptation from a general intention into an operational routine.

Self-care practices for climate adaptation

Self-care strengthens resilience: drink regularly before thirst, avoid alcohol and excess caffeine, stay cool, wear light clothing and avoid peak heat. In cold periods, maintain warmth, eat energy-rich foods and keep gentle activity. For wildfires, floods and storms, follow official alerts, prepare emergency kits, reduce smoke or floodwater exposure and evacuate when instructed.

Professionals should adapt self-care recommendations to the person's capacity and clinical restrictions. For some older adults, self-care means independent action; for others, it means recognising risk signs, accepting support and having a clear plan with family or professionals.

Link for video-lecture: MC11 (eqf5) with Andre rodrigues - YouTube

2.2. Communication and Health literacy for Healthcare and Social sector professionals

Behaviour change as the goal of communication

Communication aims to support behaviour change, not simply transmit information. Effective messages must be understandable, connected to the person's motivation and realistic within family, community and daily routines until the behaviour becomes habitual.

Professionals should translate advice into one or two observable actions. Instead of saying 'drink more water', they can agree a specific routine such as one glass at breakfast, one mid-morning, one with lunch and one mid-afternoon, adapted to clinical guidance.

This approach is especially important when instructions involve climate risk. People are more likely to act when the plan states the trigger, the action, the place and the support person: for example, 'if the indoor temperature reaches this level, move to this room and call this contact'.

Communication process and the role of reinforcement

Communication involves an emitter, receiver, message, code, context and feedback. Noise can distort meaning, while non-verbal cues such as posture, facial expression, tone and setting may reinforce or undermine the message. Environments can also act as cues that make change easier, less confrontational and more practical.

Message strength and readiness to change

Direct messages work best when readiness and motivation are already present. When readiness is low, professionals should use less directive messages, build supportive contexts and reinforce small steps towards action.

Common barriers that undermine effective communication

Common barriers include technical constraints, limited time or space, cultural differences, weak understanding of the person's living context, excessive information, semantic mismatch, unconscious filtering, insufficient validation and emotional influences. Professionals should avoid assuming that what they meant is what was understood.

A useful professional discipline is to validate meaning before ending the interaction. This includes checking units, timing, location, who is responsible and what the person will do if the plan becomes difficult in their real environment.

Reducing ambiguity through meaningful common references

Ambiguity should be reduced with shared, meaningful references. Instead of vague measures such as 'one glass' or 'one piece of fruit', use practical standards that make sense to the person, such as a portion that fits in the hand.

Communication styles and implications for practice

Four styles are relevant: passive, aggressive, passive-aggressive and assertive. Assertive communication is preferred because it remains clear and goal-oriented while listening, adapting and respecting the other person's perspective.

Teach-back as a verification strategy

Teach-back verifies understanding by asking the person to explain the message in their own words. This shows whether information was retained, understood and likely to be applied in daily life.

Why behaviour does not change despite “good communication”

Good communication may still fail when change conflicts with life goals, social context, readiness or self-efficacy. Behaviour change therefore requires attention to emotion, confidence and feasibility, not only message clarity.

Health literacy as the foundation for informed action

Health literacy connects communication, information management and action. It involves accessing, understanding, evaluating and using health information across healthcare, health promotion and disease prevention, including judgement about credible sources.

Health literacy is not a fixed attribute of the person; it changes with stress, illness, fatigue, language, environment and the complexity of the task. Climate events can reduce people's ability to process information, making simple and repeated messages even more important.

Levels of health literacy (pyramidal model)

The pyramidal model includes functional literacy for basic decisions, interactive literacy for engaging with professionals and systems, and critical literacy for interpreting wider determinants such as neighbourhood safety, green space and housing conditions.

Practical indicators of limited health literacy

Signs of limited health literacy include few questions, poorly completed forms, quiet participation and inconsistent self-monitoring. Professionals should use plain language, limit topics, be specific, break tasks into steps, repeat key points, use positive framing and avoid closed questions such as 'Do you understand?'.

The practical learning point is to make the message usable after the conversation. Written summaries, icons, fridge notes, medication boxes, emergency cards and follow-up calls can help older adults and caregivers remember and apply the plan when stress or disruption occurs.

Link for video-lecture: MC 11: Communication and Health Literacy for Healthcare and Social Sector Professionals

2.3. Humanising Healthcare

Humanised care protects dignity by treating health as subjective wellbeing across physical, mental, social and spiritual dimensions. It rejects dismissive responses such as 'it is age-related', because ageing and disease are not the same. People value proximity, easy contact, early screening, efficient interventions and care that allows them, whenever possible, to live, age and die at home.

This perspective helps learners avoid ageist assumptions. A symptom should be investigated because it affects the person's wellbeing and function, not dismissed because the person is old. Humanisation therefore supports safety as well as dignity.

Humanised ageing at home requires formal and informal networks, shared responsibility and a workforce that is valued, trained and retained. The relational dimension of care cannot be left to 'vocation' alone; it must be professionalised through approaches such as Humanitude, leadership development, social innovation, quality management and impact measurement.

Key messages:

- Humanised care starts with subjective wellbeing, not only symptoms.
- Ageing is not a diagnosis; chronological age must not be confused with disease.
- Quality depends on relationships, availability and continuity, not only technology.
- Ageing at home requires strong formal and informal care networks.
- Sustainable care depends on competent, motivated and retained caregivers.

Link for YouTube video: Humanização dos cuidados de saúde | João Araújo | TEDxAlcobaca

2.4. Care Models and Training for Climate-Adapted Health and Social Services for Older Adults

2.4.1. Care delivery model in nursing homes

Care home models in England

In England, residential care homes support mostly independent residents and may use community nurses when needs increase. Nursing homes provide 24-hour on-site nursing. Mixed, specialist, rehabilitation and palliative care models also exist to match different levels of need.

Regulation, inspection and accountability

All settings are regulated by the Care Quality Commission and monitored through inspections covering quality, safety, food, workplace requirements, medication, care plans, supervision, training and leadership. Ratings range from Outstanding to Inadequate, and reporting duties include deaths, severe events, outbreaks and complaints.

Four pillars of high-quality care (model example)

High-quality care is organised around four pillars: direct person-centred care; care for family, staff, volunteers and the surrounding environment; education that improves daily life; and research that supports continuous improvement.

These pillars also provide a useful audit lens. Learners can ask whether the service knows the person, supports the people around them, trains staff for current needs and uses evidence or feedback to improve practice.

Person-centred and relationship-centred care in practice

Person-centred care begins before admission by identifying expectations, priorities and preferences, including advance care planning. Relationship-centred practice recognises that resident wellbeing is shaped by staff and family relationships, especially at end of life.

Workforce wellbeing, values and competence development

Staff wellbeing is a condition for quality. Organisations need clear expectations, annual mandatory training, regular management meetings, career development and fair processes. Technical skills can be taught, but caring values must also be present and supported.

Managers should treat supervision, recognition and realistic workload as quality measures. Exhausted teams are less able to communicate well, notice early deterioration, implement climate procedures or provide emotionally present care.

Leadership should also protect learning time. Climate adaptation cannot depend only on individual motivation; it needs scheduled training, clear procedures, supervision, feedback and management follow-up so that new practices survive staff turnover and daily pressure.

Research as a driver of continuous improvement

Research improves practice by questioning routines, updating policies and supporting evidence-based decisions. Partnerships and co-production with residents, staff and researchers strengthen relevance and help services prepare for future social care challenges.

Education and role-specific training requirements

Training plans should be role-specific and cover clinical, managerial, support and cleaning roles. Nurses, for example, need palliative care, medication and advance care planning competence. Clear requirements reduce improvisation and improve cost control.

Monitoring, governance and incremental improvement

Implementation follows a cycle: assess needs and preferences, develop personalised plans, train staff, involve families and volunteers, audit internally and review quality through leadership meetings. Small improvements accumulate into meaningful quality gains.

Climate change impact, sustainability and operational adaptations

Climate adaptation is also operational. Organisations can reduce waste, optimise heating, install LEDs, improve insulation, manage cooling responsibly, create cooled areas during heat events and build a culture of simple sustainable behaviours through staff and resident involvement.

Link for video-lecture: MC11(EQF6): Care Delivery Model in Nursing Homes in England Nuno Lopes ENG

2.4.2.Geriatric Self-Care in a Home Setting: adapting to climate change

The home context in the provision of geriatric care

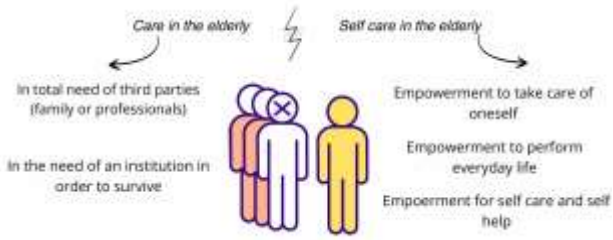
Home-based geriatric care preserves privacy, routines, social roles and the sense of home. It is feasible when clinical stability, a competent caregiver, an adapted environment, professional access, financial support and social engagement are present.

Home assessment should consider both clinical and environmental risks: indoor temperature, ventilation, stairs, lighting, access to drinking water, medication storage, social isolation, emergency contacts, transport options and the capacity of the caregiver.

The aim is not to turn the home into an institution, but to make normal life safer. Small changes such as shaded areas, accessible water, safer flooring, working phones, visible emergency numbers and clear medication routines can preserve independence without reducing dignity.

Family caregiving carries emotional, social, professional and financial burden. Effective home self-care therefore depends on public, social, private, family and neighbourhood support, as well as aligned professional training, service adaptation and socio-economic measures.

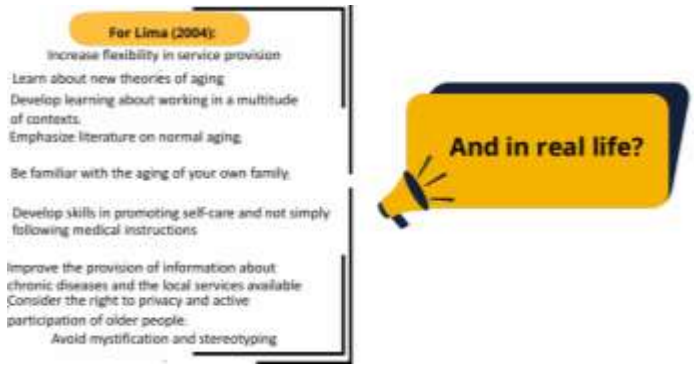
Self-care and learning in older people: guidance for home-based geriatric professionals



Self-care covers activities of daily living, psychosocial wellbeing, medication adherence and dignity. Older adults can learn when pace, experience and real needs are respected. Home professionals assess physical, functional and emotional dimensions and teach procedures directly in the living context.

The Individual Home Self-Care Plan records training activities, services, responsibilities, evaluation and review. It supports autonomy, structured communication, monitoring, adaptation over time and family involvement while keeping care flexible and individualised.

The IHSCP should be reviewed when health status, home conditions, caregiver availability or climate risk changes. It is most useful when written in practical language and shared with everyone involved in care, including the older person.



Climate change is already affecting older adults through heat, cold, storms, fires, food insecurity, infection risks, antimicrobial resistance and polypharmacy. Consequences include dehydration, respiratory disease, renal injury, falls, burns, mental health impacts, nutritional deficiencies, service congestion and lower wellbeing.

Professionals should avoid viewing these hazards separately. Heat can worsen medication effects, dehydration can increase falls, smoke can aggravate respiratory disease, and service disruption can weaken nutrition, social support and treatment adherence at the same time.

Home adaptation requires teaching cycles for older adults, families and teams; support for housing adjustments; proximity between home teams and older adults; and coordination with other health contexts. Service-level measures include electric vehicles, optimised routes, balanced virtual and physical contact, recycling, reuse and ecological professional clothing.

2.4.3.Climate-Adaptative Care Strategies for Older People in HSC

Rationale for change: from symptom-focused care to health, dignity and sustainability

Care must move from symptom-focused routines to health, dignity and sustainability. Longer life expectancy, multimorbidity and climate risk require prevention and health promotion that meet current needs without compromising future generations.

Leadership and organisational culture as prerequisites for person-centred care

Leadership must be person-centred towards older adults and team-centred towards staff. Care quality suffers when workers are treated as interchangeable task executors; sustainable person-centred care needs wellbeing, recognition and involvement of the team.

Consequences of task-centred routines: depersonalisation and burnout

Task-centred routines measure activity by outputs such as baths or appointments, often reducing people to schedules and increasing depersonalisation and burnout. Real priorities are shown by how work is organised, not only by stated values.

Operationalising person-centred care: voice, biography, and continuity of meaningful habits

Person-centred care requires listening to the older adult, knowing their biography and preserving meaningful habits such as food, exercise, toileting and daily routines. Often, the most effective innovation is continuity with what already supported health across life.

Person-centred care as climate adaptation: strengthening autonomy and resilience

Person-centred practice supports climate adaptation by strengthening autonomy, functional capacity and mental health, reducing dependence and improving the ability to cope with heat, pollution, disruption and other stressors. Poverty and social disadvantage must be considered because they increase exposure and vulnerability.

Conditions for effective interventions

Effective interventions must be socially and culturally appropriate, contextualised with older adults actively involved, and frequent enough to change entrenched habits. Interventions may target the person, the environment or the care team.

This is why co-design matters. Older adults and caregivers should be asked what already works, what they fear, which routines they value and which changes are acceptable. Adaptation is more sustainable when it protects identity as well as safety.

Examples of person-centred health promotion linked to dignity and sustainability

Core interventions include vision and hearing support, oral health, incontinence prevention, falls prevention, outdoor activity, safe sunlight exposure, seasonal and local practices and reduction of unnecessary disposables. Dignity and sustainability align when routines avoid dependence and waste.

These interventions are climate-relevant because they preserve independence. A person who sees, hears, walks, eats and toilets safely is less dependent during extreme events and is more able to follow warnings, move to safer spaces and maintain routines.

Context and environment: enabling autonomy, relationship, and sustainable comfort

Care environments should provide accessible outdoor spaces, natural light, ventilation, sustainable temperature control and indoor layouts that promote movement and relationships instead of sedentarism and isolation.

Team-focused interventions: training, supervision, and health literacy

Teams need training, supervision and health literacy to shift from symptom mitigation to health promotion. Communication should be non-prescriptive and should support participation by older adults and families.

Occupational therapy, ecology and occupational justice

Occupational therapy links climate action with daily occupation, consumption and justice. Supporting autonomy can reduce dependence on materials, devices and medication while improving access to health-promoting occupations for vulnerable groups.

Communication principles: autonomy, anti-paternalism and role-modelling

Communication should support choices rather than impose prescriptions. Professionals must avoid paternalism, infantilisation and ageism, and should model sustainable practices in the materials and routines they recommend.

Link for video-lecture: MC11(EQF6)ENG: Climate-Adaptive Care Strategies for Older People in HSC Patrícia Paquete

Level 0	Long-term planning *All year*
Level 1	Heatwave and Summer preparedness programme *1 June – 15 September*
Level 2	Heatwave is forecast – Alert and readiness *60% risk of heatwave in the next 2–3 days*
Level 3	Heatwave Action *Temperature reached in one or more Met Office National Severe Weather Warning Service regions*
Level 4	Major Incident – Emergency response *Central Government will declare a Level 4 alert in the event of severe or prolonged heatwave affecting sectors other than health*

2.4.4.Targeted Solutions for Climate Change

Impact of climate change on the health of older people

Extreme heat creates a progression of risk: cramps, rashes, heat oedema, syncope, heat exhaustion and, if untreated, heatstroke. Warning signs include confusion, disorientation, convulsions, loss of consciousness, hot dry skin and sustained core temperature above 40°C.

Prevention regulation: policies, guidelines, and heat alert systems

Policies and heat alert systems support prevention, readiness and response. Heat-health watch levels move from long-term planning to alert and readiness, heatwave action and national emergency. In care homes, monitoring forecasts, room temperatures and high-risk zones enables timely local action.

Alert levels should be translated into local actions that staff can recognise quickly: review rotas, prepare cool rooms, check thermometers, move vulnerable residents, contact families, adjust activities and increase observation during the hottest hours.

The value of an alert system depends on whether staff know exactly what to do at each stage. Posters, pocket cards, team huddles and short pre-summer refreshers can make the escalation pathway visible and reduce hesitation during the event.

Medication safety under extreme heat: risks and mitigation

Heat can reduce medication potency, change formulations, affect absorption and increase adverse effects. Medicines should be stored according to label instructions, generally below 25°C unless refrigeration is required. During prolonged heat, stock may need to move to temperature-controlled rooms and pharmacy advice may be required.

Medication review should be anticipatory rather than reactive. Services should identify medicines sensitive to heat, residents using diuretics or anticholinergics, and storage points where temperatures may exceed safe limits before the hottest period begins.

Mechanism of action	Examples
Anticholinergics – reduce sweating	Hyoscine, glycopyrronium, tricyclic antidepressants
Diuretics – can cause dehydration	Furosemide, amiloride
Direct effect on body temperature	Antidepressants
Increased absorption of the drug through the skin	Fentanyl patches, buprenorphine patches

Some medications increase heat risk: anticholinergics may reduce sweating, diuretics increase dehydration risk and transdermal drugs may become more toxic through heat-related vasodilation. Monitoring and individual medical review are essential.

Additional mitigation strategies in care settings

Additional strategies include contingency plans, green spaces, regular meetings with staff, relatives and residents, surveys, open-access refrigerators, thermometers in medicine cabinets, climate-ready heating and cooling infrastructure and carbon footprint audits for energy savings.

Planning review and future-oriented strategies

Strategies should be reviewed continuously. Building solutions such as Passivhaus can support net-zero readiness, energy efficiency and occupant health in both new and existing facilities.

2.4.5.Training for Health and Social Care Professionals

Training maintains care quality and organisational readiness in a context of complexity, changing regulation and climate risk.

Mandatory training provides legal, safe and ethical baseline competence. Elective training develops complementary skills, innovation and personalised responses. Together, they protect older adults from direct climate threats and support service improvement.

Frequency of training and climate-specific considerations

Training frequency depends on risk, content and change. Onboarding, annual or biannual refreshers and updates after new protocols are essential for first aid, evacuation, heatwaves, floods and emerging disease threats. Programmes should be informed by regional climate projections and adapted after atypical events.

Role-specific training improves performance and motivation. Nurses may focus on clinical protocols and devices; maintenance staff on energy efficiency and pest control; and cleaning staff on ecological products and low-impact techniques.

3. Monitoring and Evaluating Climate-Adaptative Interventions

3.1. Climate-Adaptative Care Plans for Older Adults

Warming context and Europe's heat risk profile

Recent warming is rapid compared with the stable climate that supported human civilisation. The Mediterranean, including Portugal, is particularly exposed to heatwaves, making regional and national heat adaptation plans essential.

Nature of climate-related health impacts: complexity, cascades, and inequity

Climate impacts are compound, cascading and unequal. They affect disease, mortality, nutrition, mental health, displacement and conflict, with vulnerability shaped by age, gender, exposure, social conditions and adaptive capacity.

Health pathways and vulnerable groups

Climate-sensitive disease pathways include heat, cold, dust, fine particles and ozone. Older adults face higher risk because of reduced thermoregulation, dehydration sensitivity, altered immunity and chronic conditions such as diabetes and cardio-respiratory disease. Urban heat islands and outdoor work further increase exposure.

Climate change and non-communicable diseases: key interactions

Climate change interacts with non-communicable diseases: heat and dehydration worsen cardiovascular disease; pollution and wildfires aggravate respiratory illness; floods and ultraviolet exposure may increase cancer risk; and extreme events disrupt diabetes care and other chronic treatment.

Adaptation options: from heat warning systems to built environment measures

Adaptation options include heat action plans, early warning systems, stakeholder communication, nature-based urban design, cooler spaces, shading, insulation, passive and efficient cooling, building regulation, land-use planning, active mobility, renewable energy, safe hydration advice and mental health support.

Climate-resilient health systems: preparedness, infrastructure, and governance

Climate-resilient HSC systems need proactive governance, trained staff, information systems, safe infrastructure and sustainable management of water, sanitation, waste, energy, technologies and products. Resilience must operate before, during and after extreme events.

Heat–health action planning: core components and operational cycle

Heat-health action planning requires a coordinating body, alert systems, health information, indoor heat reduction, focus on vulnerable groups, HSC preparedness and real-time surveillance. The cycle runs from long-term planning to pre-summer preparation, summer prevention, heatwave response and post-event evaluation.

Monitoring should not end when the heatwave ends. Post-event review should examine morbidity, incidents, staffing, communication, medication issues, family feedback and environmental failures, then convert lessons learned into revised protocols.

Risk communication: dialogue, trust, intermediaries, and evaluation

Risk communication should be a dialogue. It must understand public perceptions, provide specific protective actions, use trusted intermediaries and remain transparent, factual and comprehensible. Communication activities should be monitored to improve future plans.

Dialogue also means listening to resistance. Some older adults may refuse cooling, drinking, evacuation or changes to routine because these actions feel unfamiliar or threatening. Professionals should explore the reason, adapt the plan and preserve autonomy wherever possible.

Identifying and protecting vulnerable populations; actions across settings

Vulnerable groups can be identified through age, sex, living situation, chronic disease, mental health, renal or cardiovascular conditions, social isolation and low socio-economic status. Actions include pre-summer assessments, medication review, home monitoring, outreach calls, advice lines, evacuation support, hospital capacity planning, cooled rooms and intensified monitoring in residential settings.

In community settings, active surveillance may combine registries, professional judgement and local knowledge. The aim is to know in advance who lives alone, who has limited mobility, who depends on equipment and who may need transport, calls or home visits.

Illustrative plans and projects

Illustrative plans show the value of staged activation, epidemiological monitoring, community distribution of guidance and practical items, climate shelters, school-based pilots, green and adapted spaces, cooled rooms, hydration and nutrition planning, symptom surveillance, medication review and coordinated municipal alerts.

Link for video-lecture: MC11: Climate-Adaptive Care Plans for Older Adults

4. Train the trainer

4.1. Empowering Health and Social Care Professionals in Climate Adaptation Training

Empowerment as a capability for effective climate-related care

Empowerment gives professionals knowledge, tools and confidence to make decisions under changing climate conditions. It improves crisis response, reduces stress, strengthens collaboration and supports organisational resilience.

Barriers to training implementation in practice

Implementation barriers include shortages of resources, resistance to change and insufficient institutional support. These weaken the sustainability of continuous education even when the training is relevant.

Enablers and delivery strategies: digital tools, flexible learning, and collaboration

Digital platforms, e-learning, simulations, continuous training, Train the Trainer models and partnerships make training more flexible, scalable and collaborative. They also support access to expertise across different contexts.

However, digital access should not replace practical rehearsal. Climate adaptation training is strongest when online content is combined with scenario discussion, local protocols, role clarification and opportunities to practise communication and escalation.

Illustrative initiatives and institutional integration

Examples include climate resilience toolkits, digital training initiatives, e-learning for remote professionals, national health system climate training, regional resilience missions and global capacity-building for disaster response.

For organisations, the most useful training initiatives are those connected to real policy, real facilities and real workflows. A generic course should therefore be translated into local checklists, decision trees, contact lists and scenario exercises.

Workforce development, incentives, and a holistic care approach

A holistic approach involves healthcare professionals, social workers, families and communities. Incentives, recognition and flexible learning help build a culture of continuous improvement and readiness.

4.2. Designing and Delivering Training for Climate Adaptation in Health and Social Care: Instructional Strategies, Communication Skills and Simulation

4.2.1. Multimedia Learning

Scientific basis: how learning from words and pictures works

Multimedia learning combines words and pictures. It is based on dual channels, limited working memory and active processing, in which learners select, organise and integrate verbal and visual information with prior knowledge.

From learning science to instruction science: what instruction should optimise

Instruction should align learning conditions with cognitive limits and objectives. Meaningful learning is shown through retention and transfer. Design should reduce extraneous load, manage essential load and foster generative processing.

Evidence-based multimedia principles for instructional design (and why they work)

Key principles are: coherence, signalling and spatial contiguity to reduce unnecessary load; pre-training, segmenting and modality to manage complexity; and multimedia, personalisation and human voice to promote engagement.

Practical implications for presentations and training design

Training materials should be clean, focused and aligned with objectives. Use cues, avoid redundancy, place labels near diagrams, synchronise narration with visuals and segment complex content with glossaries or summaries.

4.2.2. Instructional Design

Foundations: why instructional design is needed

Instructional design connects learning science and instruction science through objectives, methods and evaluation. It helps teaching move beyond opinion or tradition towards evidence-based learning.

A practical design rule is to start with the behaviour expected at work. If learners must implement a heat action plan, training should include the plan, realistic cases, practice using decision triggers and assessment of applied decision-making.

From opinion-based pedagogy to evidence-based learning

Effective learning is problem-based, activates prior knowledge, demonstrates skills, enables application and supports integration into real contexts. Student-centred learning is contextual, self-directed, collaborative and participatory.

The instructional designer's core questions and backward design logic

Backward design asks: Where do we want to go? How will we get there? How will we know we have arrived? Objectives, methods and assessment should be designed from the intended learner performance.

Instructional alignment ("the magic bullet")

Instructional alignment is essential: objectives, learning activities and assessment must measure the same outcome. Misalignment produces memorisation or distorted competence; alignment supports retention, transfer and meaningful learning.

Defining objectives: what is being changed in the learner

Objectives define the expected change in knowledge, skills and attitudes. They should be specific, measurable and connected to facts, concepts, procedures, strategies and beliefs or attitudes, supported where useful by Bloom's taxonomy.

Design-phase process within ADDIE and the 10 instructional elements

Within ADDIE, design translates analysis into a plan: goals, sequenced objectives, material, examples, practice, feedback, review, assessment, media and strategies. Practice and feedback should match assessment, while review supports retrieval and spaced reinforcement.

Matrix model versus top-down model for improving alignment

The matrix model improves alignment by mapping each objective to content, practice, feedback, assessment, review, media and strategy. It makes gaps visible and is more systematic than a simple top-down list.

For example, if an objective states that learners will monitor a climate-adaptive intervention, the training should teach monitoring indicators, provide a case or template, allow practice interpreting data and assess the learner's monitoring decision.

Communication and transparency to learners

Learners should receive clear objectives, methods, assessment criteria and performance indicators at the start, with time for questions to ensure shared expectations.

4.2.3. Feedback

Why feedback matters: impact and learning value

Feedback can strongly improve learning when it is specific, timely and useful. Its impact depends less on the existence of feedback and more on its design, credibility and follow-up.

What feedback is, and what makes it effective

Effective feedback compares performance with an objective or previous performance and explains how to progress. It should answer feed-up, feedback and feed-forward: where am I going, how am I going and where next?

In climate adaptation training, feedback should focus on observable actions: whether the learner identified risk, communicated clearly, escalated appropriately, worked with the team and adapted the plan to the older person's needs.

Levels at which feedback operates

Feedback operates at task, process and self-regulation levels. The aim is to move beyond correctness towards better strategies, self-monitoring and learner autonomy.

Practical guidance for high-quality feedback in clinical education (Do's, Don'ts, and key uncertainties)

High-quality feedback is a conversation grounded in direct observation, trust and credibility. It should be tailored, specific, actionable, motivation-aware and focused on behaviour and process, not personal judgement.

Structuring feedback conversations: practical scripts and examples

Structured feedback can follow Pendleton's rules: learner, peers and trainer identify what went well, then what can improve. Useful feedback is descriptive and linked to improvement; vague or personality-focused comments should be avoided.

Feedback culture and system supports

A strong feedback culture requires regular observation, trusting supervisor-learner relationships, workplace assessment, reflection, refresher training and, where appropriate, video review in a psychologically safe environment.

4.2.4. Planning a Presentation: Enhancing Success and Impact through preparation

Foundations of an effective presentation: planning before speaking

Successful presentations are shaped before delivery through clarity, organisation, simplicity, emotional connection, relevance and interaction.

The Preparation Triangle: structuring thinking before the presentation

The Preparation Triangle defines the title, audience analysis, personal perspective, objectives and benefits. The DNA model analyses demographics, needs and attitude so content depth, tone and examples match the audience.

Structuring the presentation: the Planning Grid

The planning grid has three phases. The opening captures attention through one SHARP technique, the personal perspective, objectives and benefits. Development should use up to three key points with up to three sub-points and short recaps. The closing reinforces the main message and leaves a memorable final idea.

Managing attention as a design principle

Attention is high at the beginning, falls in the middle and rises again at the end. Openings, recaps and conclusions should therefore be deliberately designed to maintain engagement and retention.

Practical application and example

Frameworks help presenters plan title, audience, objectives, benefits, key points, recaps and closing elements, while delivering naturally so the audience experiences coherence rather than rigid structure.

Key principle: planning as a driver of quality and impact

Concise, impactful presentations require more preparation than long unstructured ones. Planning increases clarity, confidence and learning impact.

4.2.5. Non-Technical Skills and Simulation-based Training Programs Addressing Climate Adaptation and Older Individuals

What are Non-Technical Skills (NTS) and why they matter

Non-technical skills (NTS) are cognitive, social and interpersonal skills that support performance in complex settings. They include situational awareness, decision-making, prioritisation, stress management, communication, teamwork and leadership.

Relevance of NTS in social care and climate adaptation

In social care and climate adaptation, NTS help teams communicate under pressure, decide quickly and respond collaboratively to older adults affected by heatwaves, floods, wildfires or service disruption.

Crisis Resource Management (CRM): origins and evolution

Crisis Resource Management began in aviation to reduce communication and teamwork failures and was later adapted to healthcare. Frameworks such as TeamSTEPPS, ANTS and NOTECHS emphasise human factors, safety and coordinated performance.

Training modalities for developing NTS

Training modalities include simulation-based training, role-play, TeamSTEPPS, structured debriefing, video review, e-learning and blended learning. These approaches provide safe practice, repetition, reflection, teamwork tools and scalable access.

For climate scenarios, simulation does not need high technology to be effective. A table-top exercise using a forecast, resident profiles, staff availability and building constraints can reveal gaps in coordination and produce immediate improvements to protocols.

Debriefing is the point where experience becomes learning. Facilitators should help participants reconstruct what happened, identify decisions and communication patterns, connect actions to outcomes and define one improvement for future practice.

Impact of NTS training in healthcare

NTS training reduces errors, improves safety and collaboration, strengthens crisis management and builds empowerment, resilience and psychological safety.

Core NTS domains and development strategies

Core domains can be developed through structured communication tools, role-play, video analysis, mentoring, group exercises, scenario training, observation tasks, decision frameworks and varied emergency drills.

A simple scenario can combine several domains: a heat alert is issued, one resident becomes confused, a medicine cabinet is above the recommended temperature and family members request information. Learners must prioritise, communicate, coordinate and document under pressure.

Application to climate preparedness for older adults

For climate preparedness, NTS support evacuation decisions, environmental risk awareness, empathetic communication and community teamwork. Training must be adapted to older adults' health, mobility, social context and individual capacities.

Teaching principles for working with older populations

Teaching older populations requires simple language, visual aids, hands-on practice, repetition, peer learning, familiar environments and an empowering tone focused on actionable knowledge rather than fear.

The final training message is practical: climate adaptation is not a separate task added to care. It is a way of making everyday care safer, more person-centred, more resilient and more sustainable for older adults, families, professionals and organisations.

Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

The student should complete the following written assignment:

- What organizational barriers exist in your context that may affect the successful implementation, training, and monitoring of climate-adaptive interventions? (bullet points or short sentences are sufficient; 5 marks).

    - In about 500-600 words, describe how these effects of climate change can affect:
        - the health of the elderly people in your care (10 marks) AND
        - your provision of care to these people (5 marks).

Resources & Materials

Essential Reading per topic:

Topic	References
Climate adaptation and resilient healthcare systems	• Academy of Medical Royal Colleges. (2014). *Protecting resources, promoting value: A doctor's guide to cutting waste in clinical care*. • World Health Organization. (2020). *WHO guidance for climate-resilient and environmentally sustainable health care facilities*. World Health Organization. • Blashki, G., Armstrong, G., Berry, H. L., Weaver, H. J., Hanna, E. G., Bi, P., Harley, D., & Spickett, J. T. (2011). Preparing health services for climate change in Australia. *Asia Pacific Journal of Public Health, 23*(2 Suppl), 133S–143S. https://doi.org/10.1177/1010539510395121
Older people, vulnerability, adaptation and social care	• Garland, J. (1985). Adaptation skills in the elderly, their supporters and carers. *British Journal of Medical Psychology, 58*(3), 267–274. https://doi.org/10.1111/j.2044-8341.1985.tb02644.x • Curtis, S., Oven, K., Wistow, J., Dunn, C., & Dominelli, L. (2018). Adaptation to extreme weather events in complex health and social care systems: The example of older people's services in England. *Environment and Planning C: Politics and Space, 36*(1), 67–91. https://doi.org/10.1177/2399654417695101 • Benevolenza, M. A., & DeRigne, L. (2019). The impact of climate change and natural disasters on vulnerable populations: A systematic review of literature. *Journal of Human Behavior in the Social Environment, 29*(2), 266–281. https://doi.org/10.1080/10911359.2018.1527739
Climate change and healthcare workforce education / competencies	• Iira, T., Ruth, M. L., Hannele, T., Jouni, J., & Lauri, K. (2021). Finnish nurses' perceptions of the health impacts of climate change and their preparation to address those impacts. *Nursing Forum, 56*(2), 365–371. • McDermott-Levy, R., Jackman-Murphy, K. P., Leffers, J. M., & Jordan, L. (2019). Integrating climate change into nursing curricula. *Nurse Educator, 44*(1), 43–47.

	• Jagals, P., & Ebi, K. (2021). Core competencies for health workers to deal with climate and environmental change. *International Journal of Environmental Research and Public Health, 18*(8), Article 3849. https://doi.org/10.3390/ijerph18083849 • Philipsborn, R. P., Sheffield, P., White, A., Osta, A., Anderson, M. S., & Bernstein, A. (2021). Climate change and the practice of medicine: Essentials for resident education. *Academic Medicine, 96*(3), 355–367. https://doi.org/10.1097/ACM.0000000000003719
Climate change and clinical practice / emergency medicine	• Sorensen, C. J., Salas, R. N., Rublee, C., Hill, K., Bartlett, E. S., Charlton, P., Dyamond, C., Fockele, C., Harper, R., Barot, S., Calvello-Hynes, E., Hess, J., & Lemery, J. (2020). Clinical implications of climate change on US emergency medicine: Challenges and opportunities. *Annals of Emergency Medicine, 76*(2), 168–178. https://doi.org/10.1016/j.annemergmed.2020.03.010
Clinical education, feedback and instructional design	• Lefroy, J., Watling, C., Teunissen, P. W., & Brand, P. (2015). Guidelines: The do's, don'ts and don't knows of feedback for clinical education. *Perspectives on Medical Education, 4*(6), 284–299. https://doi.org/10.1007/s40037-015-0231-7 • Martin, F. (2011). Instructional design and the importance of instructional alignment. *Community College Journal of Research and Practice, 35*(12), 955–972. https://doi.org/10.1080/10668920802466483 • Mayer, R. E. (2010). Applying the science of learning to medical education. *Medical Education, 44*(6), 543–549. https://doi.org/10.1111/j.1365-2923.2010.03624.x

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Climate Change and Older People in Healthcare: Planning and Applying Solutions MC12 EQF6

Microcredential Title	**Climate Change and Older People in Healthcare: Planning and Applying Solutions**
Short Code / ID	MC12
EQF Level	6
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, Portuguese
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Hospital da Luz Learning Health
Module Lead / Author	Cátia Costa, Carolina Silveiro, Joana Branco

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Analyse the main innovation frameworks, models and strategies used to develop, implement and diffuse innovation within healthcare organisations.
LO 2	Critically evaluate innovative and climate-resilient solutions designed to address the health and social care needs of older adults.
LO 3	Apply structured problem-solving and decision-making approaches to complex healthcare challenges associated with climate change and population ageing.
LO 4	Apply Impact Assessment principles and the Impact Assessment Logic Tree to evaluate healthcare interventions and their outcomes.
LO 5	Critically reflect on how innovation, sustainability and impact assessment can be integrated to strengthen resilient, person-centred and future-oriented health and social care systems.

chAnGE Competence Area	Innovation, climate resilience, problem-solving and impact assessment for sustainable health and social care systems.
Alignment Notes	This microcredential equips learners with the knowledge, analytical skills and practical tools required to design, implement and evaluate innovative solutions addressing the health impacts of climate change on ageing populations. Developed for **EQF Level 6**, the course promotes critical thinking, systems thinking and evidence-informed decision-making within complex health and social care environments. The course progressively develops learners' competencies in: • healthcare innovation processes and implementation frameworks; • climate adaptation strategies for older adults and vulnerable populations; • sustainable and climate-resilient health and care systems; • structured problem-solving and decision-making in complex contexts; • impact assessment methodologies and evaluation of health interventions.

	The microcredential emphasises the application of theoretical concepts to real-world healthcare challenges, enabling participants to critically analyse existing practices, identify opportunities for innovation, and develop evidence-based solutions that strengthen the resilience and sustainability of health and social care systems. The content integrates: • evidence-based theoretical frameworks; • international case studies and best practices; • reflective learning activities; • video-based learning resources; • practical examples of innovative healthcare solutions; • impact assessment tools and implementation frameworks. Throughout the course, learners are encouraged to adopt a systems perspective, integrating innovation, sustainability and impact assessment to support person-centred, climate-resilient healthcare for older adults.
Keywords	climate change, healthy ageing, healthcare innovation, climate resilience, older adults, sustainable healthcare, problem-solving, decision-making, impact assessment, health systems

Learning Activities

E-Learning Format	Video-based learning supported by optional readings, text-based learning resources and case-based activities.
Activities	Pre and post module quizzes, case studies and knowledge check questions.
Estimated Study Time	25 hours

Content & Topics

1. Innovation in Healthcare: Processes, Frameworks and Adoption
2. Innovative Solutions for Climate Change and Healthy Ageing
3. Problem-Solving and Decision-Making in Complex Healthcare Systems
4. Impact Assessment for Sustainable Health and Social Care
5. Assessment of Learning

1. Innovation Process

A. Opportunities and challenges of innovation in healthcare

Healthcare systems are facing unprecedented challenges driven by population ageing, climate change, unhealthy lifestyles and the growing prevalence of chronic diseases and multimorbidity. These interconnected trends require more integrated and sustainable approaches capable of improving health outcomes while ensuring the long-term viability of health and social care systems. Sustainable healthcare seeks to meet current health needs without compromising the ability of future generations to meet their own. Achieving this goal requires healthcare systems that are environmentally responsible, socially equitable and economically sustainable, while responding to the growing demand for preventive, long-term and comprehensive care in the context of global workforce shortages.

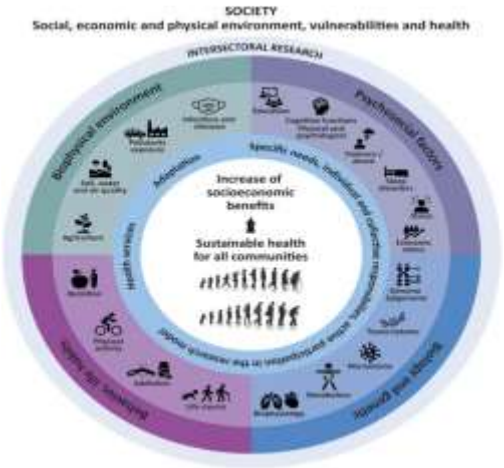

Fig. 1 Sustainable Health Model - Social, economic and physical environment, vulnerabilities and health.

Innovation has therefore become a key driver of healthcare transformation. It encompasses not only new technologies but also new organisational models, processes and ways of working that improve health outcomes, efficiency and the experiences of patients and professionals.
Despite its importance, healthcare continues to adopt innovation more slowly than many other sectors. Major barriers include resistance to change, complex regulatory requirements, limited opportunities for clinical validation and the fragmented nature of healthcare systems. Successfully implementing innovation therefore requires collaboration among multiple stakeholders and organisational environments that support experimentation, learning and continuous improvement.

B. Types of innovation

Innovation can be classified according to the novelty of the technology, the market it addresses and the nature of the problem being solved. One of the most widely used frameworks is Frank Rothaermel's Innovation Matrix, which distinguishes innovation according to technological and market novelty.
Within existing markets, two main types of innovation can be identified: incremental and disruptive innovation. Incremental innovation represents the most common form of innovation in healthcare, focusing on the continuous improvement of existing products, services or processes to enhance performance, functionality and efficiency while reducing costs.
In contrast, disruptive innovation, introduced by Clayton Christensen, fundamentally changes how value is created and delivered. Rather than improving existing solutions, disruptive innovations introduce new business models or technologies that reshape markets and address previously unmet needs. In healthcare, disruption may result from technological advances such as Artificial Intelligence or from innovative models of care that improve accessibility, affordability and patient-centredness. Disruptive innovation may also arise from organisational redesign. An example is Iora Health, which transformed primary care by adopting multidisciplinary teams and introducing health coaches to support patients with chronic conditions, demonstrating that innovation extends beyond technology to include new ways of organising healthcare delivery.

MARKETS	TECHNOLOGIES: Existing	TECHNOLOGIES: New
New	**4.Architectural Innovation** E.g. Application of -omics technologies (genomics, proteomics,...) in the field of personalized medicine	**2. Radical Innovation** E.g. MRI, CRISPR gene editing technology, Bioprinting for tissue engineering and organ replacement, Next-generation sequencing for identifying at-risk populations and targeting therapies;
Existing	**1.Incremental Innovation** E.g. Orthopedic implants, Drug-eluting stents	**3. Disruptive innovation** E.g. 3D printing for customized prosthetics, AI and Machine learning for improving diagnostic accuracy and personalized care, Covid-19 mRNA-vaccines

Fig. 2 Innovation Matrix by Frank Rothaermel

C. Architectural vs. radical innovation

Beyond distinguishing between incremental and disruptive innovation, innovation can also be classified according to its ability to create new markets. Within Rothaermel's framework, two additional categories are identified: architectural and radical innovation.

Architectural innovation combines or repurposes existing technologies to create new applications without fundamentally changing their core components. Examples in healthcare include telehealth platforms and wearable technologies that extend existing capabilities to improve patient monitoring and access to care.

By contrast, radical innovation introduces entirely new technologies or services capable of transforming healthcare delivery or creating new markets. Examples include Magnetic Resonance Imaging (MRI), gene-editing technologies and next-generation genomic sequencing, all of which have fundamentally changed diagnosis and treatment.

Selecting the most appropriate innovation strategy depends not only on the type of innovation but also on the nature of the problem being addressed. Greg Satell's Innovation Matrix proposes that organisations choose different innovation approaches according to how well both the problem and the required expertise are understood. Depending on these conditions, organisations may adopt sustaining innovation, breakthrough innovation, basic research or divergent thinking to generate effective solutions.

Understanding these complementary frameworks helps organisations recognise that successful innovation is not driven by a single methodology but by selecting the strategy that best fits the specific challenge.

D. Capacity of healthcare organizations to integrate innovation

Healthcare organisations must be capable of integrating different types of innovation according to their strategic objectives and organisational context. From this perspective, innovation can be broadly classified as technology-driven or process-driven.

Technology-driven innovation originates from the development or application of new technologies that create innovative products, services or systems capable of transforming healthcare delivery. Although these advances create new opportunities, they also require substantial investment, regulatory approval and evidence of clinical value before widespread adoption.

In contrast, process-driven innovation focuses on improving the organisation and delivery of healthcare services by redesigning workflows, increasing efficiency, reducing costs and enhancing patient and professional experience. Successfully implementing process innovation requires organisational change, staff engagement and appropriate training.

While technology-driven innovation is more frequently associated with disruptive change, process-driven innovation generally supports incremental improvement. Effective healthcare organisations combine both approaches according to the challenges they seek to address.

E. Innovation development frameworks

Healthcare innovation follows structured development pathways that guide ideas from early research to routine clinical implementation. Two widely recognised frameworks are the Technology Readiness Level (TRL) framework and the Healthcare Innovation Cycle developed by EIT Health.

The TRL framework, originally developed by NASA, classifies technological maturity across nine levels, ranging from basic research (TRL 1) to technologies fully validated for routine use (TRL 9). Although widely adopted, TRLs primarily assess technological maturity and do not fully capture the additional requirements associated with healthcare innovation.

To address these limitations, the Healthcare Innovation Cycle incorporates four complementary dimensions throughout the development process: technological, clinical, regulatory and market readiness. This framework recognises that successful healthcare innovation requires not only technological development but also clinical validation, regulatory approval and market adoption.

Development timelines vary according to the type of innovation. Digital health solutions and medical devices generally reach implementation more rapidly than pharmaceutical or biotechnology innovations, which require extensive clinical trials and regulatory evaluation. More recently, Artificial Intelligence has accelerated innovation development by supporting drug discovery, predicting drug efficacy and toxicity, and improving the design of clinical trials.

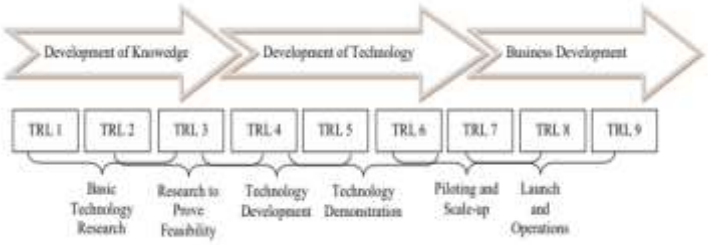

Fig 3. Technology Readiness Level

Fig 4. The 10 stages of the innovation cycle in healthcare

F. Adoption and diffusion of innovations in healthcare

Successful innovation depends not only on technological performance but also on its adoption by healthcare organisations and professionals. Adoption is influenced by the value an innovation delivers, the organisational context in which it is introduced and the willingness of stakeholders to embrace change.

Innovations are more likely to be adopted when they offer clear advantages over existing standards of care by improving clinical outcomes, efficiency, cost-effectiveness or patient experience. Adoption also occurs at different levels of the healthcare system. At the micro level, innovation influences patients and clinical practice; at the meso level, it affects organisations, providers and healthcare management; while at the macro level, it influences policies, societal values and health systems.

Successful implementation also depends on organisational leadership and governance. Innovation promoters play an essential role by championing change, mobilising resources and overcoming organisational resistance. Their support is influenced by factors such as the simplicity of the innovation, alignment with organisational priorities, cost-effectiveness and the perceived limitations of existing solutions.

Together, these organisational, technical and behavioural factors determine whether innovations successfully transition from promising ideas to routine clinical practice.

G. Innovation readiness of healthcare organizations

Successful innovation depends not only on the characteristics of the innovation itself but also on an organisation's capacity to implement change. This concept, known as innovation readiness, reflects the structures, leadership, culture and resources that enable organisations to successfully adopt and sustain innovation.

A key component of innovation readiness is creativity, which allows individuals and teams to identify opportunities, generate new ideas and develop innovative solutions. Creativity is strengthened by organisational conditions such as professional autonomy, participatory decision-making, effective project management and a culture that supports calculated risk-taking. Conversely, limited resources, unclear strategic priorities and highly centralised management may inhibit innovation.

A scoping review identified four key dimensions of innovation readiness: strategic orientation, leadership, organisational commitment and an innovation-supportive climate. Leadership is particularly important, with transformational leadership encouraging creativity and empowering leadership promoting autonomy and decision-making. Organisations that invest in employee development, training and innovation capabilities are better positioned to reduce resistance to change and successfully implement innovative solutions.

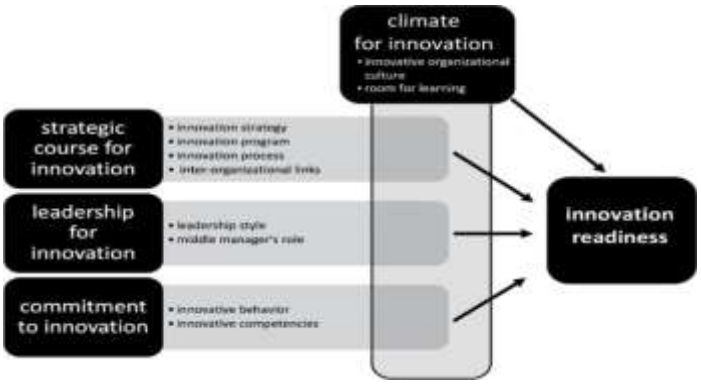

Fig. 5 Factors contributing to innovation readiness

H. Workforce-driven innovation

Healthcare innovation is not generated solely by researchers, technology companies or organisational leaders. Workforce-driven innovation emerges when frontline healthcare professionals use their daily experience to identify problems and develop solutions that improve patient care and organisational performance.

Healthcare organisations benefit from actively engaging professionals in innovation activities. Workforce-driven innovation may follow top-down, hybrid or bottom-up approaches, depending on whether initiatives originate from organisational leadership, frontline staff or a combination of both. Despite its potential, workforce-driven innovation faces important organisational and individual barriers, including limited resources, hierarchical organisational cultures, insufficient opportunities for idea sharing and a lack of innovation knowledge. In addition, knowledge inertia—the tendency to rely on familiar routines and previous experience—may reduce openness to new approaches. Supporting workforce-driven innovation therefore requires leadership that encourages employee participation, provides appropriate training and creates organisational structures that facilitate collaboration, experimentation and continuous improvement.

I. Rogers' Innovation Adoption Curve and the Valley of Death

Successfully translating innovation into routine healthcare practice requires understanding how innovations spread through organisations and society. Everett Rogers' Diffusion of Innovation Theory describes this process by categorising adopters into five groups: innovators, early adopters, early majority, late majority and laggards.

One of the greatest challenges occurs during the transition from early adopters to wider implementation. This stage is closely associated with the Valley of Death, where many innovations fail because they cannot secure sufficient funding, clinical validation or market support.

The Valley of Death typically occurs between Technology Readiness Levels (TRLs) 4 and 7, where public funding decreases while private investment has not yet begun. Healthcare innovation is particularly vulnerable during this period due to demanding regulatory requirements, extensive clinical validation and slower organisational adoption, highlighting the importance of dedicated support mechanisms to facilitate successful implementation.

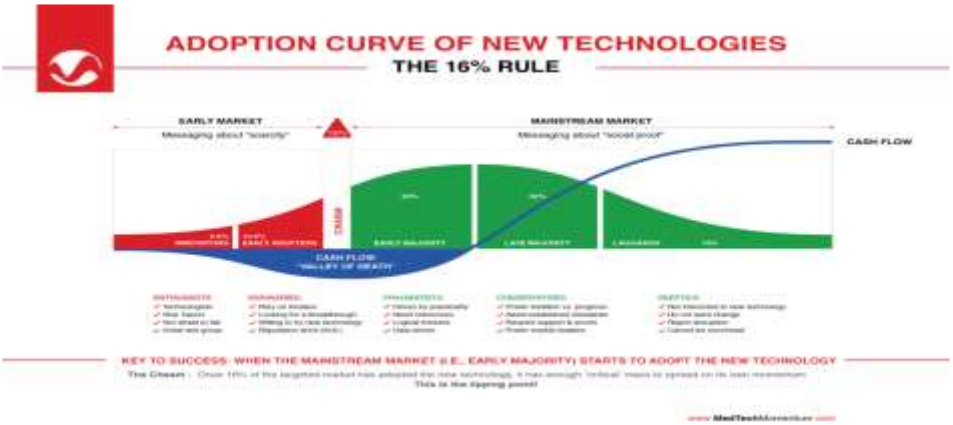

Fig. 6 Adoption curve of new technologies.

J. Innovation tools

Healthcare innovation is supported by structured methodologies that enable organisations to systematically identify problems, develop solutions and validate new ideas. Two of the most widely adopted approaches are Design Thinking and Lean Startup.

Design Thinking is a user-centred, iterative methodology that guides innovation through five stages: Empathize, Define, Ideate, Prototype and Test. By combining multidisciplinary collaboration, rapid prototyping and continuous user feedback, it supports the development of solutions that respond to genuine user needs.

Lean Startup, developed by Eric Ries, complements this approach by rapidly testing the viability of new products, services or business models. The methodology combines the Business Model Canvas, hypothesis testing, Minimum Viable Products (MVPs) and continuous customer feedback to reduce uncertainty and support evidence-based decision-making.

Together, these methodologies provide practical frameworks for developing, testing and implementing innovative healthcare solutions.

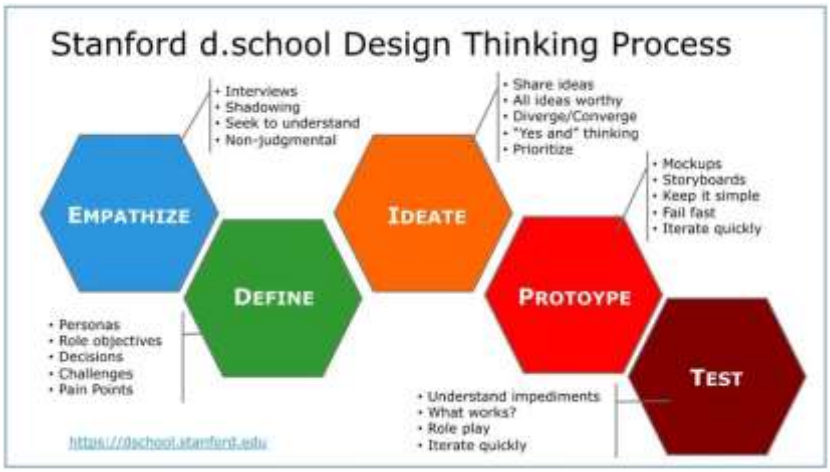

Fig. 7 The 5 steps of design thinking.

K. Artificial Intelligence as an innovation accelerator

Generative Artificial Intelligence (GenAI) is increasingly supporting healthcare innovation by enhancing idea generation, evaluation, refinement and collaboration. Rather than replacing human creativity, GenAI complements established innovation methodologies such as Design Thinking and Lean Startup by helping organisations synthesise information, explore alternative solutions and improve decision-making.

By supporting divergent thinking, facilitating collaboration and accelerating knowledge creation, Generative AI has the potential to democratise innovation and strengthen organisational innovation capabilities across healthcare.

L. Models of corporate innovation

Healthcare organisations increasingly adopt collaborative innovation models that reduce barriers to innovation and facilitate the translation of ideas into clinical practice.

Innovation Labs provide physical, virtual or hybrid environments where healthcare professionals, patients, researchers and industry partners collaboratively develop and test innovative solutions. Open Innovation extends this collaboration beyond organisational boundaries by engaging external stakeholders such as universities, research centres, suppliers and start-ups to accelerate knowledge sharing and innovation.

An important example of open innovation is the use of Test Beds, controlled environments where new products, services and technologies can be evaluated under real or near real-world conditions before widespread implementation. By supporting experimentation, validation and collaboration, these corporate innovation models help organisations overcome the Valley of Death and accelerate the successful adoption of healthcare innovations.

2. Innovative Solutions

A. Climate Change and Healthy Ageing: Innovative Solutions for Older Adults

- **Heat-Health Action Plans**

Climate change and population ageing are creating new and interconnected challenges for health and social care systems. Older adults are particularly vulnerable to climate-related hazards, including heatwaves, poor air quality and extreme weather events, due to age-related physiological changes, chronic diseases and, in many cases, social isolation. Addressing these risks requires innovative adaptation strategies that strengthen resilience while protecting the health and wellbeing of ageing populations.

One of the most effective approaches is the implementation of Heat-Health Action Plans (HHAPs). These coordinated public health programmes combine early warning systems, public guidance on protective behaviours during periods of extreme heat and community outreach initiatives to ensure that vulnerable individuals receive timely support.

Several cities have successfully implemented Heat-Health Action Plans. Following the devastating 2003 heatwave, Paris introduced cooling centres, SMS alert systems and home visits for isolated older adults, contributing to a significant reduction in heat-related mortality. Similar initiatives have also been adopted in cities such as Toronto.

Heat-Health Action Plans illustrate how climate adaptation extends beyond emergency response. By integrating early warning, targeted community support and public health interventions, they protect vulnerable populations while promoting more resilient, equitable and climate-adapted communities.

- **Climate-resilient infrastructures**

As climate change increases the frequency and intensity of extreme weather events, healthcare infrastructure must be able to maintain essential services under adverse conditions. Older adults are particularly dependent on resilient health systems, as they often require continuous access to healthcare, medications and long-term care services.

Building climate-resilient health infrastructures involves adapting hospitals, primary care facilities and care homes to withstand climate-related hazards such as heatwaves, floods, storms and power outages. Measures may include reinforcing buildings, improving ventilation and water management systems, and installing backup energy supplies to ensure continuity of care during emergencies.

Countries such as Uganda have already implemented initiatives to strengthen the resilience of healthcare facilities against climate impacts. These adaptations help ensure that critical services—including emergency care, medication storage and assisted living—remain operational when they are needed most.

According to the Intergovernmental Panel on Climate Change (IPCC), strengthening healthcare infrastructure is not only a technical necessity but also a public health priority. Investing in climate-resilient facilities reduces vulnerability to climate change while supporting safer, more reliable and sustainable healthcare for ageing populations.

- **Climate shelters**

As climate change increases the frequency and intensity of heatwaves, older adults become particularly vulnerable to heat-related illnesses due to age-related physiological changes, chronic conditions and reduced thermoregulation. An effective adaptation strategy is the establishment of Climate Shelters, also known as Cooling Centres, which provide safe, air-conditioned public spaces during periods of extreme heat.

Climate shelters are typically located in accessible community facilities such as libraries, community centres or other public buildings. Beyond offering protection from high temperatures, they provide a safe and welcoming environment where older adults can rest, stay hydrated and maintain social

interaction. To maximise their effectiveness, these facilities must be well publicised and easily accessible, particularly for individuals living alone or experiencing mobility limitations.

Evidence suggests that climate shelters can significantly reduce heat-related morbidity and mortality among vulnerable populations. In addition to their direct health benefits, they also help reduce social isolation, an important determinant of health and wellbeing in older adults. As a relatively low-cost, high-impact intervention, climate shelters represent an essential component of comprehensive heat-health adaptation strategies and climate-resilient communities.

- **Green urban planning**

Urban areas are warming faster than surrounding rural regions due to the urban heat island effect, increasing the health risks associated with heatwaves, particularly for older adults. Green urban planning is a sustainable climate adaptation strategy that integrates natural elements into the built environment to reduce temperatures and improve urban resilience.

Key interventions include planting trees, expanding parks and creating urban forests—small, densely planted areas of native vegetation that help cool the surrounding environment, improve air quality and support biodiversity. Cities such as Medellín, Cali and Melbourne have successfully implemented green urban planning initiatives, demonstrating their potential to reduce urban heat while creating healthier and more liveable communities.

Beyond mitigating heat exposure, green spaces provide multiple health and social benefits for older adults. They encourage physical activity, promote mental wellbeing, reduce stress and create opportunities for social interaction, helping to address social isolation and improve quality of life.

Green urban planning therefore represents a highly effective adaptation strategy that not only strengthens climate resilience but also supports healthier, more inclusive and age-friendly cities.

- **Telemedicine**

Climate change is increasing the frequency of extreme weather events, making it more difficult—and sometimes unsafe—for older adults to access healthcare services in person. Telemedicine has emerged as an important adaptation strategy, enabling remote consultations through digital technologies such as telephones, tablets and computers while ensuring continuity of care during climate-related emergencies.

Telemedicine is particularly valuable during heatwaves, periods of poor air quality and flooding, when travelling to healthcare facilities may pose significant health risks. It supports the management of chronic diseases, facilitates access to mental health services and reduces unnecessary hospital visits, helping older adults maintain their health while remaining safely at home.

However, the successful implementation of telemedicine depends on overcoming digital barriers that disproportionately affect older populations. Limited access to digital technologies, insufficient digital literacy and lack of confidence in using online services may reduce the benefits of remote care. Addressing these challenges requires complementary community-based initiatives, including digital training programmes, caregiver support and assisted access points within local health and community centres.

By maintaining access to healthcare during climate-related disruptions, telemedicine represents more than a technological innovation. It is an effective climate adaptation strategy that promotes continuity of care, supports independent living and enhances the resilience of health systems serving ageing populations.

- **Emergency preparedness**

Climate change is increasing the frequency and severity of extreme weather events, including heatwaves, floods and storms, placing older adults at greater risk during emergencies. Age-related physical, cognitive and social vulnerabilities may reduce their ability to respond effectively, highlighting the importance of targeted emergency preparedness strategies.

Emergency preparedness programmes equip older adults with the knowledge and skills needed to respond safely before, during and after climate-related emergencies. These programmes typically include personalised evacuation plans, emergency kits containing essential supplies, and clear guidance on protective actions. In regions frequently affected by hurricanes and other extreme weather events, such initiatives have demonstrated that adequately prepared older adults respond more effectively and with greater confidence during emergencies.

To maximise their effectiveness, preparedness programmes should be specifically tailored to the needs of older adults. This includes using simple and accessible language, visual communication materials and community-based support to ensure that information is easily understood and translated into practical action.

Emergency preparedness extends beyond providing information; it empowers older adults to anticipate and respond to climate-related risks while strengthening individual and community resilience. As a relatively low-cost, high-impact intervention, it represents an essential component of climate adaptation strategies for healthy ageing.

- **Social support**

Climate-related emergencies can increase the risk of social isolation, particularly among older adults who live alone or have limited social support. During heatwaves, storms and other extreme weather events, the absence of regular contact and assistance may significantly increase vulnerability. Strengthening social support networks is therefore a key climate adaptation strategy that complements healthcare and emergency response systems.

Social support networks help ensure that vulnerable older adults receive regular check-ins, access to essential supplies, practical assistance and emotional support during climate-related events. By connecting volunteers, neighbours, community organisations and local authorities, these initiatives promote coordinated responses that protect those most at risk.

One example is the Radar Project in Lisbon, which brings together community members and local institutions to identify, monitor and support vulnerable older adults. This community-based approach strengthens trust, facilitates timely intervention and enhances resilience during emergencies.

Beyond improving emergency preparedness and response, strong social support networks help reduce loneliness, promote mental wellbeing and strengthen community cohesion. Climate resilience therefore depends not only on robust infrastructure but also on the relationships and social connections that enable communities to protect and care for their most vulnerable members.

- **Climate-adapted housing**

As climate change increases the frequency and intensity of heatwaves, storms and other extreme weather events, housing plays an increasingly important role in protecting the health and wellbeing of older adults. Climate-adapted housing aims to improve the resilience of homes by reducing climate-related risks while supporting safe and independent living.

Climate adaptation measures include improving energy efficiency, enhancing thermal insulation, incorporating natural ventilation, installing solar panels, using reflective building materials and ensuring accessible home layouts. These features help maintain comfortable indoor temperatures, reduce energy consumption and improve resilience during climate-related emergencies.

For older adults, climate-adapted housing provides benefits that extend beyond comfort. Well-designed homes reduce the risk of heat-related illness, improve safety, lower household energy costs and support independent living, particularly during periods of extreme weather. Retirement homes and long-term care facilities are increasingly incorporating sustainable building practices, while innovative projects such as Climate-Proof Houses demonstrate how resilient housing can contribute to healthier ageing.

By integrating climate resilience into housing design and renovation, communities can better protect older populations while promoting healthier, safer and more sustainable living environments.

- **Early warning systems**

As climate change increases the frequency and intensity of extreme weather events, effective adaptation requires proactive rather than reactive responses. Integrated surveillance and early warning systems support this approach by combining real-time information on weather conditions, air quality and public health indicators to identify emerging risks and trigger timely interventions. These systems enable health authorities and care providers to anticipate climate-related events, such as heatwaves, and implement preventive measures before they occur. For example, early warnings can prompt healthcare services to contact vulnerable older adults, activate community support networks and open cooling centres in advance. In some cities, digital platforms already integrate meteorological data with hospital admissions and community health indicators, enabling more targeted and coordinated responses.
For older adults, early warning systems help prevent heat-related illness, reduce avoidable hospitalisations and ensure that health and social care resources are directed to those most at risk. They also reduce pressure on caregivers and healthcare services by facilitating earlier intervention and improving emergency preparedness.
By integrating environmental monitoring with health surveillance, early warning systems represent a proactive climate adaptation strategy that strengthens public health preparedness and enhances the resilience of ageing populations.

- **Inclusion of older adults**

Older adults are often portrayed primarily as a vulnerable population in the context of climate change. However, they also possess valuable experience, knowledge and strong community connections that can contribute meaningfully to climate adaptation. Promoting the agency and inclusion of older adults in climate policy is therefore essential for developing more effective, equitable and person-centred adaptation strategies.

Meaningful participation involves engaging older adults directly in the design, implementation and evaluation of climate adaptation initiatives, recognising them not only as beneficiaries of public policies but also as active contributors. Their lived experiences, needs and perspectives provide valuable insights that can improve the relevance, acceptability and effectiveness of adaptation measures.

International organisations, including HelpAge International, the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC), emphasise that successful climate action should be inclusive, equitable and informed by the experiences of the populations most affected. Integrating older adults into decision-making processes strengthens autonomy, dignity and social justice while contributing to more responsive and sustainable public policies.

The innovative solutions presented throughout this module demonstrate that protecting older adults from the impacts of climate change requires coordinated action across healthcare, public health, urban planning and community services. Ensuring that older people are not only protected but also empowered to participate in climate adaptation is fundamental to building resilient, inclusive and age-friendly societies.

B. Artificial Intelligence and Multimorbidity: The IntelligentCare Project

The IntelligentCare Project Interview

IntelligentCare is a multidisciplinary research project developed through a collaboration between healthcare organisations, universities and technology companies. Its primary objective is to develop innovative digital tools that improve the management of **multimorbidity**, one of the greatest challenges facing modern healthcare systems.
As populations age, an increasing number of individuals live with multiple chronic conditions simultaneously. While clinical guidelines are generally well established for single diseases, caring for

patients with multimorbidity is considerably more complex, requiring more integrated and personalised approaches. The IntelligentCare project addresses this challenge by combining clinical expertise, data science and Artificial Intelligence (AI) to better understand disease progression and support more effective decision-making.

Artificial Intelligence for Personalised Care

The project makes extensive use of **Artificial Intelligence**, particularly **Machine Learning**, to analyse large volumes of heterogeneous health data. These data include electronic health records, clinical notes, physiological signals, patient-reported outcomes, patient-reported experience measures, physical activity data and information collected outside traditional healthcare settings.

Machine learning algorithms are used to identify hidden patterns within these complex datasets, classify patients into clinically meaningful groups and predict how chronic conditions evolve over time. Natural Language Processing (NLP) also plays an important role by extracting clinically relevant information from unstructured data, such as free-text clinical records.

By integrating multiple data sources, IntelligentCare supports a more comprehensive understanding of patients' health status and enables more personalised and proactive models of care.

From Reactive to Predictive Healthcare

A central objective of IntelligentCare is to move healthcare from a **reactive** to a **predictive** model. Instead of responding only after clinical deterioration occurs, AI-based tools help identify patients at higher risk of adverse outcomes, allowing earlier intervention.

Proof-of-concept predictive models developed within the project support the identification of patients at increased risk of emergency department visits or clinical deterioration. This predictive capability enables healthcare professionals to prioritise interventions, optimise resource allocation and improve the continuity of care for patients living with multimorbidity.

The project also demonstrates the value of combining traditional clinical information with patient-generated data collected outside healthcare facilities, providing a more complete picture of patients' health trajectories and everyday experiences.

Challenges and Future Implementation

Developing AI solutions for healthcare presents important scientific, technological and organisational challenges. These include integrating clinical and technical expertise, accessing and preparing high-quality health data, annotating large datasets and validating AI models before implementation in clinical practice.

The project also highlighted the importance of educating healthcare professionals in basic concepts of data science and Artificial Intelligence. Successful implementation depends not only on developing accurate algorithms but also on ensuring that professionals understand, trust and appropriately integrate these tools into routine clinical practice.

Future work focuses on validating the developed models in additional healthcare settings, expanding data collection and strengthening collaborations between healthcare organisations, academic institutions and technology partners.

Relevance for Climate Change and Healthy Ageing

Although IntelligentCare was not specifically designed for climate change, its predictive approach has important implications for climate-resilient healthcare. Older adults with multimorbidity are particularly vulnerable to climate-related hazards such as heatwaves and air pollution, which frequently trigger exacerbations of chronic cardiorespiratory diseases.

By combining hospital information with patient-generated data—including activity patterns and social determinants of health—Artificial Intelligence can support earlier identification of clinical deterioration and facilitate timely preventive interventions. These capabilities contribute to more resilient healthcare systems by improving preparedness, anticipating health risks and enabling more proactive management of vulnerable populations during climate-related events.

C. Applying a Climate-Resilient and Environmentally Sustainable Lens to Health and Care Facilities

- **Integrating sustainability and resilience in HSC organizations and practices – case studies tailored to meeting the needs of the older populations**

Healthcare and social care facilities are increasingly at the frontline of climate change. Population ageing, together with the growing frequency and intensity of climate-related events, is increasing the demand for healthcare services while simultaneously exposing health infrastructure, supply chains and essential services to significant climate risks. These challenges require healthcare organisations to strengthen both their environmental sustainability and their capacity to anticipate, respond to and recover from climate-related events.

An environmentally sustainable health and social care facility seeks to improve health while minimising its environmental footprint. This involves reducing greenhouse gas emissions, improving energy and water efficiency, promoting sustainable procurement and waste management, and adopting practices that minimise environmental degradation. Sustainability therefore extends beyond environmental responsibility and contributes directly to the long-term resilience of health systems.

At the same time, climate-resilient health and social care facilities are designed to maintain essential services despite climate-related shocks and stresses, such as heatwaves, floods, storms or prolonged droughts. Resilient organisations are able to anticipate risks, prepare for emergencies, maintain critical operations during disruptions and recover while continuously strengthening their capacity to respond to future events. Learning from previous climate events is therefore an essential component of organisational resilience.

Importantly, sustainability and resilience should not be viewed as separate objectives. Climate mitigation and climate adaptation are complementary strategies that should be planned and implemented together. Focusing exclusively on one dimension may lead to maladaptation, where interventions unintentionally increase greenhouse gas emissions, create new vulnerabilities or produce unintended negative consequences for health and equity. A systems perspective is therefore essential, ensuring that climate actions are integrated into existing organisational strategies, emergency preparedness plans and quality improvement initiatives.

Developing climate-resilient and environmentally sustainable organisations generally follows four sequential steps:

- Assess the current situation, including organisational vulnerabilities to climate hazards and environmental impacts.
- Develop preparedness, response and recovery plans to strengthen organisational resilience.
- Establish strategies to reduce greenhouse gas emissions while improving climate adaptation.
- Implement climate-resilient processes, technologies and organisational practices supported by multidisciplinary teams and strong leadership.

The following case studies illustrate how these principles can be translated into practical interventions that improve resilience while addressing the specific needs of older adults in health and social care settings.

- **Case 1 Heatwave Preparedness in Botkyrka, Sweden**

Following a severe heatwave in 2010, the municipality of Botkyrka (Sweden) recognised the vulnerability of older adults living in residential care facilities and implemented a structured heatwave preparedness programme. The initiative began with a climate risk assessment to identify vulnerable populations and care facilities, followed by the development of practical response protocols for nursing homes.

Preparedness measures included promoting hydration, encouraging additional showers, reducing indoor temperatures by closing blinds and increasing staff support during periods of extreme heat. Heatwave preparedness was subsequently incorporated into routine inspections of elderly care facilities to ensure continuous readiness.

This case demonstrates that simple organisational measures, supported by risk assessment and integrated into routine practice, can significantly improve the protection of older adults during heatwaves. Where technological solutions are required, such as air conditioning, they should be implemented alongside energy-efficient and renewable energy strategies to support both climate adaptation and mitigation.

- **Case 2 Reducing Urban Heat: Schoolyard Oasis Project**

To address the urban heat island effect, the City of Paris launched the Schoolyard Oasis Project, transforming asphalt-covered schoolyards into greener, cooler and more climate-resilient spaces. The project replaced impermeable surfaces with vegetation and permeable materials, creating shaded environments that reduce temperatures during heatwaves.

Beyond benefiting schools, these spaces are open to the wider community outside school hours, providing accessible areas that promote social interaction, physical activity and wellbeing. The initiative also demonstrates how nature-based solutions can simultaneously support climate adaptation, biodiversity and community resilience.

The principles of the Schoolyard Oasis Project can be applied to health and social care facilities, creating greener environments that improve thermal comfort, encourage healthy ageing and reduce social isolation among older adults.

- **Nourishing Our Community: an innovative project by Boston Medical Center**

Climate change affects the entire food system, from production and processing to distribution and consumption. Extreme weather events such as floods, droughts and heatwaves reduce agricultural productivity, disrupt supply chains and increase food prices, affecting access to nutritious food, particularly among vulnerable populations such as older adults.

Health and social care organisations can contribute to climate resilience by promoting environmentally sustainable, low-carbon diets based on locally produced and seasonal foods. These dietary approaches not only reduce environmental impacts but also align with the nutritional needs of older adults by encouraging the consumption of fruits, vegetables and other healthy foods. Sustainable food procurement therefore represents an important strategy for improving both population health and environmental sustainability.

- **Case study 3 – Nourishing Our Community: an innovative project by The Boston Medical**

The Nourishing Our Community programme developed by Boston Medical Center demonstrates how healthcare organisations can integrate nutrition, sustainability and patient care. The initiative combines a rooftop farm, a preventive food pantry and a Teaching Kitchen to improve access to healthy food while promoting nutritional education and healthier lifestyles.

Beyond improving patient nutrition, the programme strengthens local food systems, supports sustainable procurement and reduces the environmental footprint of healthcare services. This case illustrates how hospitals can become active contributors to food security, climate resilience and preventive healthcare by integrating sustainability into everyday clinical practice.

A further example of sustainable healthcare comes from Kaiser Permanente, which strengthened the resilience of its healthcare facilities following the 2019 California wildfires. After widespread power outages disrupted healthcare delivery, the organisation implemented a Green Microgrid powered by solar energy and battery storage to reduce dependence on diesel generators while ensuring continuity of essential services during climate-related emergencies. This initiative demonstrates how renewable energy can simultaneously enhance organisational resilience, reduce greenhouse gas emissions and support uninterrupted healthcare delivery.

Together, these examples illustrate how sustainable procurement, resilient infrastructure and innovative organisational practices enable health and social care organisations to protect both population health and the environment. Integrating climate resilience, environmental sustainability and strong organisational leadership is essential for delivering high-quality care to older adults in an increasingly uncertain climate.

- **Psychosocial Support for Climate-Related Disasters: The Schleiden Trauma**

Following the devastating floods in southwest Germany in 2021, the town of Schleiden established an intercommunal trauma centre to support survivors, caregivers and emergency responders. The initiative combined immediate psychological first aid, accessible counselling services, caregiver training and long-term mental health support through therapy, peer networks and resilience programmes.

This case demonstrates that climate resilience extends beyond physical infrastructure. Integrating psychosocial support into disaster preparedness is essential to protect the mental wellbeing of older adults and strengthen community resilience following climate-related emergencies.

- **Building partnerships for resilience**

Building climate resilience requires collaboration across multiple sectors to protect vulnerable populations, particularly older adults, before, during and after climate-related emergencies. Effective preparedness depends not only on healthcare organisations but also on strong partnerships with governments, emergency services, academic institutions, community organisations and the private sector.

These collaborations support climate risk assessment, emergency planning, professional training, community outreach, sustainable procurement and the adoption of innovative solutions. By integrating expertise and resources across sectors, health and social care organisations can strengthen their capacity to respond to climate-related challenges while maintaining high-quality, person-centred care.

This module encourages learners to reflect on how collaborative partnerships can be developed within their own organisations to improve resilience, support healthy ageing and promote sustainable healthcare systems.

3. Problem-Solving and Decision-Making

A. Understanding Complexity

Healthcare systems are complex adaptive systems in which multiple actors, organisations and processes interact continuously. Climate change further increases this complexity by introducing uncertainty, cascading effects and interdependent risks that extend beyond traditional healthcare boundaries.

Many climate-related challenges are wicked problems—problems that have no single solution, involve multiple stakeholders and require continuous adaptation rather than one-time fixes. Addressing these challenges requires systems thinking, recognising that interventions in one part of the system may have unintended consequences elsewhere.

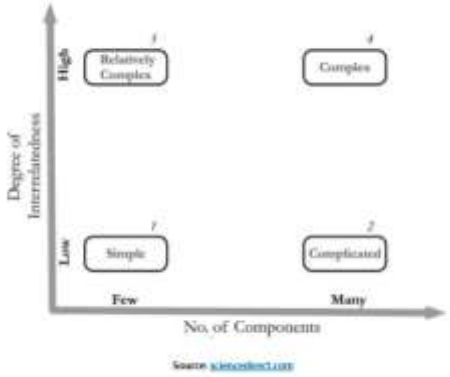

Fig. 8 Range of complexity of systems

B. Fundamentals of Problem-Solving and Decision-Making

Effective decision-making begins with correctly defining the problem before selecting possible solutions. Decisions are influenced not only by evidence but also by experience, values, available information and time constraints.

Human decision-making relies on two complementary cognitive processes. System 1 thinking is fast, intuitive and automatic, supporting rapid responses in familiar situations. System 2 thinking is slower, analytical and deliberate, allowing professionals to evaluate alternatives, challenge assumptions and make reasoned decisions when facing unfamiliar or complex situations.

Understanding when each cognitive process is appropriate is fundamental for improving judgement in healthcare.

C. Structured Problem-Solving

Structured problem-solving provides a systematic approach for analysing complex situations and identifying effective solutions. Rather than reacting immediately to visible symptoms, healthcare professionals should identify root causes, generate alternative solutions, evaluate possible consequences and implement actions based on available evidence.

Several structured methodologies support this process by encouraging critical thinking, multidisciplinary collaboration and continuous evaluation. These approaches help organisations learn from previous experiences while strengthening their capacity to respond to future challenges.

D. Collaborative Decision-Making in Crisis

Climate-related emergencies require coordinated decision-making across multiple organisations and professional groups. Collaborative decision-making brings together different perspectives, expertise and resources to improve situational awareness and support timely responses.

Successful collaboration depends on effective communication, clearly defined roles, shared objectives and mutual trust between healthcare providers, emergency services, public authorities and community organisations. These partnerships strengthen organisational resilience while ensuring that vulnerable populations receive coordinated and person-centred care during crises.

E. Application: Case Studies in Action

The principles presented throughout this module are applied to practical case studies involving climate-related emergencies, including heatwaves and flooding events. These scenarios demonstrate how structured problem-solving, systems thinking and collaborative decision-making can be applied to identify risks, prioritise interventions and protect vulnerable populations.

By analysing real-world situations, learners are encouraged to reflect on how these approaches can be adapted to their own professional contexts, strengthening preparedness, resilience and evidence-informed decision-making within health and social care organisations.

4. Impact Assessment

A. Impact Assessment Concept

Impact assessment is the systematic process of understanding whether an intervention, programme or service produces meaningful and lasting changes for individuals, organisations or society. While organisations often report the activities they perform or the services they deliver, demonstrating impact requires showing that these activities have actually contributed to observable changes.

The concept of impact is frequently misunderstood. Impact may be positive or negative, intended or unintended, and should not be confused with the immediate results of an intervention. More importantly, impact implies attribution—determining whether the observed changes occurred because of the intervention rather than other external factors.

In healthcare, this distinction is particularly important. For example, a patient may fully recover after surgery in a hospital with excellent clinical outcomes. However, recovery may also have been influenced by other factors such as the patient's physical condition before treatment, family support, rehabilitation

adherence or socioeconomic circumstances. Similarly, a medication may improve health outcomes while simultaneously generating adverse effects or environmental impacts. Understanding these multiple influences is essential for credible impact assessment.

One of the greatest methodological challenges is establishing causal inference. Ideally, evaluators would compare what actually happened with what would have happened had the intervention not occurred—the so-called counterfactual. Since it is impossible to observe both realities simultaneously for the same individual, impact assessment relies on robust evaluation designs capable of comparing intervention and control groups while minimising selection bias and other confounding factors.

Consequently, simple before-and-after comparisons rarely provide sufficient evidence of impact, as many external factors may influence the observed results. Although retrospective reports remain valuable management tools, demonstrating true impact requires structured methodologies capable of supporting causal claims.

Ultimately, impact assessment is not merely about measuring results. It provides organisations with a framework for understanding how their activities contribute to meaningful and sustainable improvements, supporting better decision-making, accountability and continuous learning.

B. Impact Assessment Logic

Once the societal problem has been clearly identified, organisations need a structured framework that explains how their activities are expected to generate meaningful change. This process is commonly described as the organisation's Theory of Change, which can be operationalised through two complementary tools: the Problem Tree and the Logic Model.

The Problem Tree begins with the societal problem, identifies its underlying causes and root causes, and explores its consequences. Rather than focusing on symptoms alone, this analysis encourages organisations to understand the broader system in which the problem exists. Many healthcare challenges, including those associated with ageing and climate change, are complex or "wicked" problems, involving multiple interacting causes, stakeholders and feedback loops. Understanding these relationships helps organisations design interventions that address root causes rather than isolated symptoms.

Building upon this analysis, the Logic Model establishes the pathway between organisational activities and their expected impact. It describes how available resources (inputs) support specific activities, which generate immediate outputs, medium-term outcomes, and ultimately long-term impact.
Unlike outputs, which usually measure what the organisation delivers (for example, the number of participants trained or patients screened), outcomes describe behavioural or organisational changes resulting from those activities. Impact represents the broader and more sustainable changes achieved over time, often extending beyond the organisation itself.

A Logic Model also serves as a management and evaluation tool by helping organisations identify appropriate indicators for each stage of implementation. Outputs are generally measured through operational Key Performance Indicators (KPIs), whereas outcomes and impacts often require proxy indicators, longitudinal measurement or external data sources.

Finally, the Logic Model can be aligned with the United Nations Sustainable Development Goals (SDGs). Rather than simply associating activities with broad SDGs, organisations should demonstrate how their interventions contribute to specific SDG targets and measurable indicators, strengthening both accountability and strategic alignment.

Together, the Problem Tree and the Logic Model provide a coherent representation of an organisation's impact pathway, supporting programme design, monitoring, evaluation and continuous improvement.

A. Impact Assessment Logic Tree

The Impact Assessment Logic Tree translates the Theory of Change into a practical framework that links a societal problem to the activities designed to address it and the changes expected over time.

A simplified example related to healthy ageing is presented below.

Problem	Activity	Outputs	Outcomes	Long-term Impact
High burden of chronic diseases among older adults	Preventive health and wellness programme	Number of participants enrolled; health screenings performed; vaccinations administered; educational sessions delivered	Earlier diagnosis of chronic diseases; improved treatment adherence; healthier lifestyles; increased physical activity	Reduced complications and hospitalisations; improved quality of life; healthier ageing; increased life expectancy

Although programmes are often evaluated as a whole, each activity may contribute differently to the expected outcomes. For this reason, organisations are encouraged to develop individual Logic Models for major activities before integrating them into an overall organisational impact framework.

The Logic Tree is not only an evaluation instrument but also a decision-support tool. By making explicit the relationships between problems, interventions and expected results, it helps organisations prioritise activities, allocate resources more effectively and monitor whether implementation remains aligned with their intended impact.

When combined with the Problem Tree, the Logic Model and appropriate indicators, the Impact Assessment Logic Tree provides a structured approach for planning, implementing and evaluating programmes aimed at creating meaningful and sustainable improvements in health and social care.

Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

In approximately 500–600 words, describe a specific climate-change-related challenge in the student's work context and explain how TWO tools covered in the microcredential can be applied to support identification of the most appropriate solution.
Total marks: 10.

Criterion	Guidelines for assessors	Marks
1) Clear description of a specific challenge (context + problem definition)	Challenge is concrete and situated (who/where/what is affected). The problem definition is clear and plausible for a health/social care setting. Look for focus (one main challenge) and sufficient contextual detail.	3
2) Selection of two relevant tools from the microcredential	Tools are explicitly named (or clearly described) and are appropriate for the stated challenge. Look for alignment between tools and the type of problem (assessment, planning, prioritisation, monitoring, etc.).	2
3) Application of the tools (how they would be used)	Explains step-by-step or process-level application: what data/inputs are needed, who would be involved, and what outputs the tools generate. Look for feasibility and a logical sequence.	4
4) Link to solution identification and justification	Shows how the tool outputs support selecting the most appropriate solution (e.g., comparing options, prioritising actions, identifying risks). Look for a coherent justification tied to the context.	1

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Influencing Policy Makers & Advocating MC13 EQF6

Microcredential Title	**Influencing Policy Makers & Advocating**
Short Code / ID	MC13
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, Finnish
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Karelia University of Applied Sciences
Module Lead / Author	Tuula Kukkonen, PhD; Kaija Saramäki, MSc, Outi Sulopuisto MHc

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Understand the role and ethical responsibility of social and health care workers in affecting decision-making connected to health effects of climate change to older people.
LO 2	Describe international, national and regional level policy frameworks concerning health effects of climate change to older people.
LO 3	Influence policy which addresses the health challenges of older people affected by climate change.
LO 4	Promote actively the older people's participation and possibilities to influence policy.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards climate change advocacy.
Alignment Notes	MC13 provides health and social care workers with understanding of their role as climate health advocates. The MC promotes advocacy and older people's participation in the climate health nexus. The themes include policy frameworks, ethical responsibility, community participation, advocacy and knowledge-based management.
Keywords	climate change, decision-making, advocacy, policy, participation

Learning Activities

E-Learning Format	Text and video lectures. Note: [ ] brackets in this document refers to further content on Moodle.
Activities	Pre and post module quizzes, forums and poster submission.
Estimated Study Time	25 hours

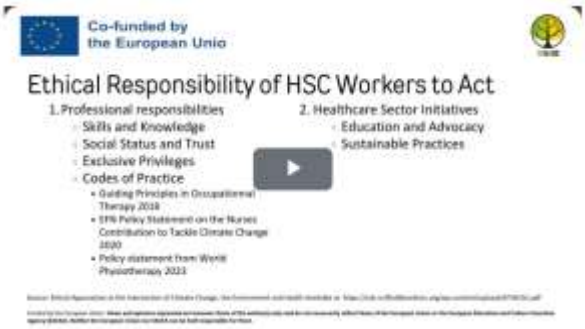
Content & Topics

1. The ethical responsibility of social and healthcare workers to influence decision-making.
2. International, national and regional policy frameworks as a background of decision-making concerning health effects of climate change to older people.

3. Policy advocacy and knowledge-based management in social and health politics and decision-making from the perspective of health benefits of older people.
4. Supporting older people's participation and possibilities to influence decision-making.

1. Ethical Responsibility of Social and Healthcare Workers to Influence Decision-Making

The first section *ethical responsibility of social and health care workers to influence decision making* starts with a 6-minute video lecture on the ethical foundations of HSC workers to act. The slides and narration used in the video are also available as a pdf.



Transcript: *Welcome to the orientation video on the first topic, ethical responsibility of social and healthcare workers to influence decision making. This relates to the learning outcome: understand the role and ethical responsibility of social and healthcare workers in affecting decision making connected to health effects of climate change to older people. Please note that in this video we can only start to scratch the surface of ethical responsibility, there is much more to the topic than can be covered here. For example, we will stay anthropocentric and not look into the discussion about whether the nature and non-humans have rights as well. The aim is to offer some additional perspectives to the professional ethics on why health and social care workers have the responsibility to act on climate change, for example by influencing decision making. The essential reading will give you the opportunity to explore the topic in more depth.*

On this slide there are some arguments for why health and social care workers can be seen as responsible for taking action on climate change outside of their immediate practice with patients and clients.
First, stemming from the professional responsibilities are unique skills and knowledge:
*Healthcare workers possess **specialised skills and knowledge** that can be crucial for addressing health impacts of climate change, social status and trust.*
*The profession holds a significant **social status** which comes with the responsibility to act ethically and maintain public trust.*
*Healthcare professionals are considered **trustworthy** and therefore seem well suited for climate advocacy.*
*Healthcare workers may have **exclusive privileges** that necessitate a service back to society including addressing environmental health issues, codes of practice.*
*Professional responsibilities are often codified in **ethical guidelines and codes of practice** such as the World Medical Association's International Code of Medical Ethics which now includes principles of environmentally sustainable practice.*
*Also, to name a few the World Federation of Occupational Therapists, the European Federation of Nurses Associations and World Physiotherapy have published **policy statements** acknowledging the profession's role and responsibility in tackling climate change.*

Second, stemming from initiatives in the healthcare sector are education and advocacy. Healthcare professionals are increasingly involved in educating patients about the health impacts of climate change and advocating for policies that mitigate these impacts.

Sustainable practices: there is a growing emphasis on adopting sustainable practices within healthcare settings to minimise healthcare systems greenhouse gas production. This is not possible without the health and social care workers supporting this change.
When it comes to the foundations of ethical responsibility of health and social care workers we can start looking for them in the four principles of biomedical ethics which are

1: respect for autonomy

2: beneficence

3: non-maleficence and

4 justice.

Traditionally these principles guide the work with patients and clients in the biomedical field ignoring environmental factors. Arguments have been made to adapt them to include consideration of sustainability and environmental justice ensuring that healthcare practices do not harm the environment and acknowledging that individual health is only possible in a healthy environment. It has been suggested that the broad concept of justice could be the way to incorporate these considerations. Other suggestions include adding sustainability as a fifth principle or revising principlism by introducing a new set of principles. In case you are interested in delving more in to this topic please read ethical approaches at the intersection of climate change the environment and health by Timmerman et al.

Second, the foundations for ethical responsibilities can also be approached from a rights based point of view as part of human rights. There is the right to health, this can be understood either narrowly meaning that access to adequate healthcare suffices or more broadly including a healthy environment also in its social sense. On Moodle you will find a study on promoting and protecting the rights of older people from the effects of climate change which can be seen to present a broad understanding of health.

Third, integrated concepts of health such as one health and planetary health emphasise the interconnectedness of health with the health of ecosystems locally and globally advocating for a holistic approach that includes environmental sustainability, the responsibility and rationale to care for the whole web of life is inherent in these concepts. It is worth mentioning that many indigenous and non-western perspectives inherently include this understanding.

Fourth, justice approaches evaluate how institutions and social practices should protect the environment and promote health. They focus on identifying rights and entitlements and determining tasks and obligations. Distributed approaches, for example a clean environment and health services and burdens for example financial contributions or behavioral changes should be distributed. Different perspectives include egalitarian meaning equal shares prioratarian meaning priority to the worst off and sufficitarian meaning needs covered above a certain threshold, relational approaches scrutinize the quality of social interactions and relations at national and international levels. They address discrimination and asymmetries in power and influence promoting equal respect for all voices.
Climate health justice combines distributive and relational elements. It acknowledges different burdens and capacities of communities ensuring fair treatment and participation in environmental decisions. These foundations underscore the ethical imperative for healthcare workers to engage in actions that address the health impacts of climate change promote environmental sustainability and advocate for justice and equity in health and environmental policies these implications also trickle down to the micro level to the work with patients and clients.

The video lecture is followed by essential reading, gathered in a Moodle booklet:

- Gregg, B. (2025). Navigating Ethical and Political Barriers to Climate-Responsive Clinical Practice. *The American Journal of Bioethics*, *25*(7), 25–27. https://doi.org/10.1080/15265161.2025.2509921
- Timmermann, C., Wabnitz, K. & Wild, V. (2024). Ethical Approaches at the Intersection of Climate Change, the Environment and Health. Nuffield Council on Bioethics. https://cdn.nuffieldbioethics.org/wp-content/uploads/ETHICA1.pdf

The section is wrapped up with **Assignment 1: Ethical responsibility**

Assignment 1.

Read the case descriptions below and reflect on the following questions:

1. What ethical issues are involved in the cases?
   Think beyond the four principles of biomedical ethics (autonomy, beneficence, non-maleficence, and justice). Consider:
   - Structural and systemic factors (e.g. climate change, rural isolation, housing standards)
   - Professional boundaries and responsibilities
   - Resource limitations and moral distress

2. How do you see your role as a professional?
   - How should you act in these kinds of situations?
   - How can you contribute to preventing similar situations from arising?

3. To whom should you produce information on these matters?
   Consider clients, families, colleagues, policymakers, and the public.

Justify your views by referring to different ethical standpoints presented in the introductory video and essential reading.

Write your reflections and thoughts on the discussion forum by posting a discussion starter. Please mention your country of residence.

Case 1: Maria

Maria lived alone in her cozy apartment, a place she had called home for many years. As an elderly woman, she had grown accustomed to the quiet solitude, with only the occasional visit from the home care workers who came by each morning to check on her well-being.

The summer had been particularly harsh, with a relentless heatwave that showed no signs of abating. Day after day, the temperature soared to a sweltering 30 degrees Celsius, and Maria's apartment, lacking any mechanical ventilation or cooling systems, became an oven.

One morning, as the home care worker arrived, they noticed a troubling change in Maria. Her once lively eyes seemed dull, and her movements were slow and labored. It was clear that the heat was taking its toll on her frail body. She struggled to stay hydrated and found it increasingly difficult to move around, even within the confines of her own home.

The home care workers knew they had to act quickly. They took on the role of a guardian, ensuring Maria received the care and attention she desperately needed. They encouraged her to drink more water, helped her find cooler spots in the apartment, and stayed by her side, offering comfort and support.

Case 2: Mikko
In a small rural village, 87-year-old Mikko lived alone in his modest home. Despite his age, he managed most of his daily chores and took care of his yard with remarkable independence. However, a severe snowstorm hit the village last week, causing a power outage that still hadn't been resolved.

Mikko's house was kept warm by a wood-burning stove, but without electricity, he couldn't charge his mobile phone to contact his family or friends. The isolation began to weigh on him, and he grew increasingly worried about his ability to cope with the situation. With no car and no neighbors nearby, Mikko felt truly alone.

As a home care worker, you had a visit scheduled with an older person living five kilometers away from Mikko. During your visit, the elderly person expressed concern about Mikko's well-being, knowing that he was without power.

You had a very busy day and several clients to visit. Your schedule had no flexibility. You were already stressed and just wanted to get home to enjoy a free evening.

Case 3: Leena
Leena was the kind of client Mika always looked forward to seeing. At 72, she was sharp, independent, and full of stories from her years as a librarian. She lived alone in a modest house just outside the city, tended her garden with care, and rarely missed her weekly yoga class. Her osteoarthritis was manageable, and Mika, her physiotherapist, had been helping her maintain joint mobility and balance for the past two years.

But something had shifted.

During her last few visits, Mika noticed Leena seemed more tired than usual. She mentioned feeling dizzy and swollen during the recent heatwave, brushing it off with a laugh— "I guess I'm not as heatproof as I used to be." Mika adjusted her exercises, encouraged hydration, and made a note to monitor her symptoms more closely.

Still, the pattern nagged him. Leena wasn't frail, but she was clearly affected by the rising temperatures. She admitted she avoided using her fan because of electricity costs, and her home lacked proper insulation. Mika began to think about his other older clients, many of whom were similarly resilient on the surface but quietly struggling with the effects of climate change.

He started reading more about heat stress in older adults and realized how underrepresented their needs were in public health planning. There were few policies addressing thermal comfort in older people's homes, and even fewer considered the financial barriers to cooling solutions.

Mika found himself at a crossroads. His role was to support Leena's physical health—but wasn't her environment part of that? Could he, as a health and social care professional, do more than adjust her treatment plan? Could he speak up, advocate for better housing standards, or push for public health campaigns that addressed the hidden vulnerabilities of older adults in a warming climate?

2. International, National and Regional Policy Frameworks

The second section *International, national and regional policy frameworks as a background of decision-making concerning health effects of climate change to older people* starts with a 12-minute video lecture presenting an overview of the central authorities, structures and documents guiding action on climate change and health on global level. The slides and narration used in the video are also available as a pdf.

Transcript: *In this video we will give you an overview of the central structures and documents guiding action on climate change and health on global level.*
The international frameworks are important but may feel distant. Here we have the chance to take a short look at them because it's good to understand what kind of policy documents the national and regional policies rely on. What is also crucial in our case is to turn words into actions. The so-called knowledge action gap regarding climate change and health refers to the disparity between what is known about the impacts of climate change on health and the actions taken to address these impacts. Simply put there is quite a lot of evidence although gaps exist about the climate change effects on health and well-being, but our response to it is not yet enough. We all have the ball in our hands. Let's get started.

*This slide presents a **pyramid diagram** illustrating 3 levels of initiatives and implementation macro meso and micro. There are many ways to define the different levels but in this case the **macro level** involves overarching framework conditions like global initiatives and IPCC reports. The **meso level** includes national initiatives and adaptation strategies. The **micro level** focuses on the implementation by individuals and organizations. All levels are necessary for climate action. In this video we will address overarching frameworks meaning we are on the macro level. We will go through the Sustainable Development Goals (SDG), United Nations framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change (IPCC), Conferences of the Parties (COP) and the role of WHO.*

*First the **sustainable development goals**. A lot could be said about the connections between the sustainable development goals and climate change but in this video we will stay at the level of mentioning this issue. The sustainable development goals are a vision of a world without hunger and poverty that enables prosperity for all people while respecting the natural limits of our planet. Altogether there are 17 sustainable development goals. Health is an important element of the global development agenda 2030. All sustainable development goals have a direct or indirect link to health including SDG 13 which is climate action, climate protection and SDG 3 which is good health and well-being. Next let's have a look at UNFCCC, IPCC and COP.*

*When it comes to UNFCCC, IPCC and COPs it's good to know about their aims roles and relationships. First let's look at their descriptions and names and on the next slide their roles and relationship to others. The **UNFCCC** is short for United Nations framework Convention on Climate Change was founded at the UN Conference on Environment and Development in Rio de Janeiro in 1992. It is responsible for supporting the global response in line with the global climate agreements. It has 197 supporting parties for example all 193 UN member states. EU is a party and USA is still part of UNFCCC although it removed itself from the Paris agreement with the aim to stabilize greenhouse gas concentrations in the atmosphere and stabilize anthropogenic climate change at a level that allows the ecosystem to adapt naturally and to enable sustainable development. As we saw in the previous slide health is an essential component in it.*

***IPCC** is short for Intergovernmental Panel on Climate Change is a United Nations body for the assessment of the scientific findings on climate change. It was founded in 1988 with the aim to provide political decision makers with regular scientific assessments of the current state of*

knowledge on climate change. So, IPCC does not conduct its own research but publishes a range of authoritative scientific reports that assess the state of knowledge on climate change. These publications are widely used by policymakers researchers and international organizations. Here's a breakdown of what the IPCC publishes. Assessment reports for example AR-6, first IPCC assessment report FAR was published in 1990, special reports for example Sr 1.5 SRCCL, methodology reports, summaries for policymakers, technical and supporting materials.

*The **COP** is the supreme decision-making body of the convention. All states that are parties to the convention are represented in the COP. The COP reviews the implementation of the convention and takes the decisions to promote the effective implementation of the convention including institutional and administrative arrangements. Most known and may be celebrated COPs were held in Kyoto in 1997 due to the Kyoto Protocol and in Paris in 2015 due to the Paris agreement. However these important milestones have not directly and explicitly been linked to health. You'll hear more about those soon.*

Here is a summary of the relationships of UNFCCC, IPCC and the COPs. The UNFCCC is the legal and institutional framework, the IPCC is the scientific advisory body and the COPs are the decision-making forums where countries negotiate and agree on climate actions informed by IPCC science under the UNFCCC framework. Next their relationships to each other. UNFCCC is the umbrella framework under which cops are held. It provides the legal and institutional foundation for international climate negotiations. IPCC provides scientific assessments that inform UNFCCC negotiations and COP decisions. It does not make policy but offers the evidence base for it. COPS operate under the UNFCCC. They use IPCC reports to guide decisions on climate targets adaptation and mitigation strategies.

Hopefully the aims and roles of UNFCCC, IPCC and COP and their relationship to each other are now clearer. Next let's bring in the topic of health by having a look at the milestones for health in climate action on the global level.

There are several milestones for health and climate action, here we'll have a brief look at them but first let's remind ourselves of the probably most celebrated global accomplishments. First the UN Conference on Environment and Development in Rio de Janeiro in 1992 was foundational since the outcome was the framework convention on climate change in other words UNFCCC. Second the Kyoto Protocol in 1997 realized the UNFCCC goal of minimizing for warming by reducing greenhouse gas concentrations to a level that would prevent dangerous human-induced disruption of the climate system. Third, the Paris agreement in 2015 set the goal to reduce global warming to well below 2°C compared to preindustrial times and to endeavor to limit it to 1.5°C.

The 6th IPCC assessment report in 2022 stressed the importance of integrating health considerations into climate adaptation and mitigation strategies. COP 26 in Glasgow saw the first major recognition of health in climate negotiations. Health was prominently featured for the first time in the cop agenda. The WHO COP 26 health program was launched encouraging countries to commit to building climate resilient and low-carbon health systems. Over 50 countries committed to strengthening health systems to be climate resilient and sustainable. Additionally a dedicated health pavilion was introduced showcasing the health impacts of climate change and the benefits of climate action for health.

COP 28 in Dubai had the first official health day in COP history on December 3rd. Health was included in the global stock take emphasizing the need for health-centered climate action. Over 120 countries signed the COP 28 UAE declaration on climate and health committing to integrating health into climate policies and investments. The final agreement included language on transitioning away from fossil fuels which has direct implications for reducing air pollution and improving public health. COP 29 in Baku November 18th 2024 was observed as health day, reinforcing the momentum from the previous COP who also released the COP 29 special report on climate and health titled Health is the

argument for climate action highlighting the health benefits of climate mitigation. Emphasis was placed on integrating health into nationally determined contributions (NDC).

A coalition involving the presidencies of COP 26 to COP 30 in who was established to embed health in climate action permanently. In summary the COP 26 and Glasgow in 2021 COP 28 in Dubai in 2023 and COP 29 in Baku in 2024 are considered milestones for health due to their increasing emphasis on the climate health nexus and the integration of health into climate policy and action.

Last but not least, we cannot really talk about health without mentioning the World Health Organization. The WHO has committed to working actively within the framework of the UNFCCC to promote effective climate and health policies in two ways:
1 participating in the UNFCCC negotiations as a UN observer organization with the aim of promoting the health issue at the COPs.
2 supporting and informing government representatives, political decision makers and civil society for example by supporting the participation of health representatives in national delegations with the aim of strengthening health and climate-related cross-cutting issues.
This brief gives an example of a document which has answered the call to integrate climate change in existing programs. It was published in 2022 and is aimed at global and national leaders and influencers working with the topic of healthy aging. This structure ensures a fairly comprehensive yet concise approach to addressing the intersection of healthy aging and climate change providing clear action areas and recommendations for stakeholders.
By systematically addressing the context and key messages detailing the effects of climate change on the health and well-being of older people identifying gaps opportunities and key actions and linking these to the four action areas of the decade of healthy aging the document provides a comprehensive and actionable framework. The conclusion calls for urgent action aiming at stakeholders being both informed and motivated to integrate these insights into their policies and practices. You can find the link to this brief on Moodle.

The second 7-minute video lecture presents structures and documents guiding climate health policy on the European level. The slides and narration used in the video are also available as a pdf.

Transcript: *Welcome to the introductory video to topic one national and regional policy frameworks as a background for decision making concerning health effects of climate change to older people. Since we have covered the global level in the earlier introductory video in this one, we will take a look at the structures and documents guiding climate health policy on the European level. Needless to say, we cannot dive deep so there's no claim to completeness, but we'll look at two big entities. Let's go.*

Our two big entities are WHO European Centre for Environment and Health (ECEH) and European Union with its different policies and networks. First let's look at what ECEH is and what it does in terms of climate change and health and then turn to European Union. WHO European Centre for Environment and Health ECEH was founded in 1992 as part of The WHO regional office for Europe. It sits in Bonn Germany and it has three tasks related to existing and emerging environmental health risks compiling evidence, supporting the implementation of strategies and developing guidelines and as part of this it supports the European environment and health process.

So, what is that about. European environment and health process was established in 1989 and is led by the governing bodies of WHO Europe. Its goal is to eliminate the greatest environmental threats to human health and agree on the priorities for an environment and health agenda with implementation at country level. In order to reach those agreements a ministerial conference is organized every five years. The European environment and health task force also has a network and two working groups one of them on health and climate change HIC. HIC's task is to advocate the inclusion of health aspects into national climate protection and adaptation policy. It also supports the uptake of the commitments made in the ministerial conference. Next let's look at the most recent commitment.

In the last ministerial conference which was held in the beginning of July in 2023 in Budapest a declaration on environment and health was made, it's known with the name Budapest declaration, you can find this document on Moodle in optional reading. Next let's have a look of some European policies which address climate adaptation and health. This list by no means exhaustive but gives a rough idea of what is happening in the EU.

The framework policies include EU Green Deal and the 8th environment action program. The health impacts of climate change are mentioned in these documents as one of many aspects of climate change. The communication forging a climate resilient Europe the new EU strategy on adaptation to climate change was adopted in the beginning of 2021 and includes the key action of European climate and health observatory. It is a joint initiative of the European Commission the European Environment Agency (EEA) and nine other organizations. The observatory aims to support Europe in preparing for and adapting to the impacts of climate change on human health by providing access to relevant information and tools. It also fosters information exchange and cooperation between relevant international, European, national, sub-national and non-governmental actors. It contributes to the European Green Deal and the EU4 health vision for a healthier European Union. In 2024 European Environment Agency published the first European climate risk assessment EUCRA which assesses climate change impacts and risks including public health. EUCRA gave impetus for the communication managing climate risks protecting people and prosperity. You can find link to this document on Moodle in optional reading.

There are many other EU agencies and authorities not mentioned here which take the health effects of climate change into consideration at least to some extent. There are also many other EU policies which indirectly address the health impacts associated with climate change. This illustrates on one hand the multifaceted nature of climate change and its wide-ranging impacts across various sectors and on the other hand the inherent difficulty in mounting a cohesive and coordinated response across different institutions and policy areas. It's important to highlight the health effects and keep them in the spotlight, that being said the last slide will present a recently launched Commission on climate and health.

Last but not least there is the pan European Commission on climate and health which was formally launched in June 2025. It will be expected to complete its work by December 2026. A call to action will be published in May 2026 in the 79th World Health assembly prefaced by an event at COP 30 in Brazil in November 2025. The call to action will be followed by the development of an action plan for presentation at the 76th session of The WHO regional committee for Europe in 2026. On the next slide you will hear about the five objectives of the Commission please pay attention to the many aspects of action that need to be addressed.

The five objectives of the Commission are to
1: determine interconnected global and regional risks to health the implications of reaching climate tipping points the health implications of inaction and opportunities for population health improvement through climate change adaptation and mitigation actions in The WHO European region

2: identify gaps in government actions structures policies and governance systems which have so far prevented successful climate change action
3: recommend key entry points measures approaches and levers for accelerated health and climate action both long and short term
4: raise the profile of health and climate policy and advocate for the final policy recommendations to high level decision makers across the region and
5: advise The WHO regional office for Europe on how best to strengthen its support to member states around health and climate change by recommending concrete actions to tackle the threats of the climate crisis. The commission's activities are expected to support the outcomes of the 7th ministerial conference on environment and health and the 77th World Health Assembly resolution on climate change and health. Additionally, a consistency with WHO policy frameworks and be synergic to ongoing initiatives, you can find the commissions website with more information and video recordings of their expert hearings in optional reading.

The video lectures are followed by optional reading, gathered into a Moodle booklet:

- Declaration of the Seventh Ministerial Conference on Environment and Health: Budapest, Hungary 5–7 July 2023. Declaration of the Seventh Ministerial Conference on Environment and Health: Budapest, Hungary 5–7 July 2023
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Managing climate risks - protecting people and prosperity EUR-Lex - 52024DC0091 - EN - EUR-Lex
- Pan-European Commission on Climate and Health Pan-European Commission on Climate and Health
- European Observatory on Health Systems and Policies (2023): Addressing long-term challenges such as population ageing and climate change Addressing long-term challenges such as population ageing and climate change

The section is wrapped up with **Assignment 2: National and regional policy documents.**

3. Policy Advocacy

The 3rd section of the course is about understanding policy advocacy. It starts with a short app. 3-minute introductory video to what policy advocacy is.

Transcript: *You have heard about the different international policies that affect the elderly as well as climate change adaptation and mitigation. How can you advocate for change. In the following presentations we will provide an overview of what policy advocacy is and how it can be used. We will also provide an overview of participation and engagement. After watching these presentations you will have an idea of what you can do as an individual to create change.*

Policy advocacy is more than just voicing opinions it's a deliberate process aimed at influencing laws regulations and public programs. It typically involves engaging with decision makers using evidence and strategic messaging to push for change.

Advocacy is crucial because it ensures that the voices of citizens especially marginalized groups such as the elderly and differently abled are heard in policymaking. It can lead to more equitable outcomes and helps bridge the gap between the public and policymakers. Effective advocacy often combines several strategies lobbying is direct, while grassroots efforts filled public pressure media campaigns raise awareness and coalitions amplify impact by uniting voices. These examples show the breadth of policy advocacy from Environmental Protection; the digital rights advocacy efforts have shaped major legislative and social changes. Each movement uses tailored strategies to influence public opinion and policy outcomes.

Let's take a closer look at HelpAge international and its advocacy with older people. They focus on empowering older people to advocate for their rights and influence policy by training older individuals in advocacy skills, raising awareness among policymakers and promoting inclusion in community planning. Their work across Europe and globally ensures older voices are heard in decisions affecting pensions healthcare and social inclusion.

European parliament's active aging policies focus on promoting active aging through access to services in five key areas, economic activity, social participation, health, long term care and supportive environments. Their study on aging policies highlights national advocacy efforts that led to reforms in long term care and age friendly housing in countries like Sweden Germany and the Netherlands. Remember that advocacy is a powerful tool for shaping the world around us whether you're part of an organization or acting as an individual your voice can make a difference.

The first subsection is orientation to knowledge-based management (KBM) and it includes a 5-minute video about different knowledge-based management theories and some practical examples.

Transcript: *Here is a short introduction to knowledge-based management (KBM) and some of its applications in healthcare. Why is KBM important? Because it enhances organizational learning, supports evidence-based decision-making, encourages innovation and adaptability and reduces redundancy and knowledge loss. Here we cover the theoretical underpinnings of KBM the SECI model by Nonaka and Takeuchi; explains how knowledge is transferred from tacit knowledge to explicit knowledge. This means that knowledge can be shared from individual knowledge to organizational knowledge. Understanding tacit and explicit knowledge is key to managing it effectively.*

The SECI model has four points on knowledge transfer socialization, externalization, combination and internalization.
***Socialization** tacit to tacit - sharing experiences to create tacit knowledge such as shared mental models or technical skills. For example a junior nurse learning bedside manner by shadowing a senior nurse.*
***Externalization** tacit to explicit -articulating tacit knowledge in to explicit sets often through dialogue or documentation. For example a doctor writing a protocol based on years of clinical experience.*

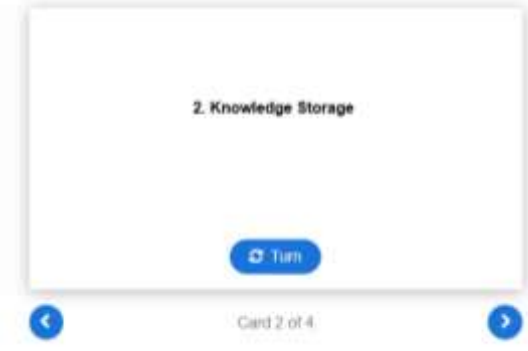
Combination *explicit to explicit - systematically combining different pieces of explicit knowledge to form more complex and systematic sets. For example integrating patient data from different departments into a centralized electronic health record.*
Internalization *explicit to tacit - learning and embodying explicit knowledge so it becomes part of an individual's tacit knowledge base. For example a healthcare worker studying emergency procedures and applying them instinctively in real life situations.*
Tacit knowledge *also referred to as silent knowledge is knowledge that is personal context specific and hard to formalize or communicate. It can be gained through experience is subconscious or intuitive and therefore hard to identify and it can be shared through observation imitation or practice. Common examples of tacit knowledge in healthcare are a nurse's intuition about a patient's condition or a surgeon's hand movements during a complex procedure.*

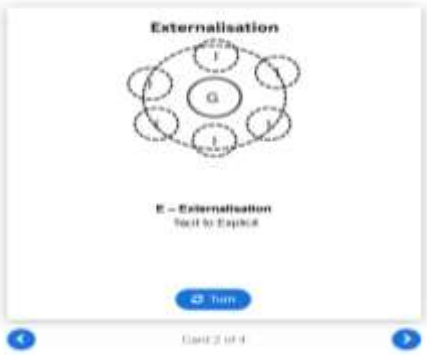
Explicit knowledge *can be defined as knowledge that is codified documented and easily shared. It can be written down or stored digitally and it is easily communicated and transferred. Explicit knowledge is found in manuals databases training materials and the like. Examples in healthcare include clinical guidelines medical textbooks and standard operating procedures. KBM helps organizations become more efficient make better decisions and adapt to changes more effectively. Healthcare is a complex field with vast amounts of data. KBM helps professionals make evidence-based decisions and collaborate across disciplines.*

How can KBM be applied in healthcare? Examples include decision support systems and electronic health records (EHR) that store and share knowledge. Home visits provide valuable knowledge. Providers can gather clinical environmental and social data that can inform personalised care and risk assessments. Elderly individuals are especially vulnerable to climate change. The key health risks include for example heat stress respiratory problems and mobility issues. KBM can help prepare for heat waves by using data to identify at risk individuals and sharing knowledge with caregivers and communities.

How about managing respiratory issues? Integrating air quality data and educating patients can reduce risks during high pollution periods. In emergencies KBM supports continuity of care mobile units telemedicine and training help providers respond effectively to climate-related events. Finally, KBM supports policymaking collaboration across sectors and data-driven policies can improve healthcare resilience to climate change.

It is followed by a H5P Dialog card on the components of KBM and the SECI model:





The section is finalised by an assignment where the student writes a post in a forum:

Assignment 3.
Think about the four key components of KBM: knowledge creation, storage, sharing, and application. Then think about your own job and the effects of climate change on the elderly. If you are no employed at the moment, think about your prospective job.

1. What kind of data could you collect in your work?
2. How/where would you store it?
3. How could you share it with others?
4. How could that knowledge/data be used to create new procedures?

Write 3-5 sentences for each of the components in the forum. Submit your contribution by replying to the starter post.

Remember to mention your country of residence.

4. Participation

The fourth section is about participation. It includes a 5-minute introductory video and an assignment to plan a participatory event.

Transcript: *In this presentation we will talk about community participation and engagement. Public participation is grounded in the belief that people affected by decisions should have a say in the process.*

Community participation emphasizes active involvement from self-mobilization to shared decision-making and resource contribution. It's also about ownership and recognizing participation as a right. Engagement refers to the broader process of connecting individuals communities and institutions in shaping decisions that impact them. Community participation leads to better policies and services by incorporating real-life experiences. It builds trust between communities and government, increases

awareness and fosters ownership. Engagement ensures practical solutions, supports implementation and provides feedback mechanisms. It also enhances communication, builds capacity, legitimizes decisions and encourages mutual learning. Ultimately it reduces conflict and brings forward new ideas and expertise. Community participation leads to better planning outcomes by incorporating local knowledge and values. It strengthens trust between residents and local authorities and helps people understand the challenges and impacts of planning decisions. When communities are involved they are more likely to support and take ownership of planning instruments.

Participation also opens channels for feedback, builds capacity and fosters mutual understanding. Ultimately it reduces conflict and brings forward innovative ideas from the community. Meaningful community engagement is formed of using plain language, sharing information, transparency, dialogue, positive attitude and behavior, active listening and building relationships. Ivan Illich's concept of participation particularly as it relates to learning and social organization, emphasizes the value of unconstrained engagement in meaningful activities over structured instruction. He argued that learning thrives when individuals are actively involved in their own development rather than being passively taught. He envisioned a society where people could learn through shared experiences and networks of informal relationships rather than relying solely on formal institutions like schools.

Why is participation important? When stakeholders have a real say in decisions that affect their lives they are more likely to take ownership and support the outcomes. Using participatory methods not only increases efficiency and impact but also ensures transparency and long-term sustainability these methods should always be bottom up rooted in the community where real change happens empowerment is strongest when people feel heard and valued in the process. There were a number of scholars who have contributed to explaining participation. For example, Sherry Arnstein in the late 60s Arnstein's ladder of participation is one of the most referenced study the latter of participation. It has eight runs going from non-participation to citizen power.
1: manipulation - citizens are involved only to support decisions already made. The real goal is to convince them that the plan is good, not to let them influence it. It's more about public relations than participation.
2 Therapy - participation is used as a way to fix people rather than listen to them. The assumption is that people need to be educated or treated not heard. Like manipulation it's not real participation. Both 1 and 2 are non-participative, they aim to control not empower.
3 Informing - citizens are told what is happening or planned, it's a one way flow of information. There's no real opportunity to respond or influence decisions.
4 consultation -people are asked for their opinions e.g. surveys, public meetings but there's no guarantee their input will be used. It can feel like a formality.
5 placation - citizens may be invited to join committees or give advice. The decision makers still hold the power. It looks participatory but doesn't shift control.
6 partnership - power is shared. Citizens and officials work together in planning and decision making often through joint committees or agreements.
7 delegation - citizens have real decision-making power they hold a majority on decision-making bodies and can influence outcomes directly.
8 citizen control - communities have full control over programs and decisions they plan manage and implement without intermediaries.

Transcript: *To give a better idea of how to engage the public in decision making and participating in planning healthcare here are some examples from across Europe. Well-being serviced counties in Finland are self-governing public entities responsible for organizing publicly funded healthcare and social welfare and rescue services in its geographical area of operation. Finland is split into 21 well-being services counties, and the city of Helsinki is its own service provider. Community engagement is statutory and an integral part of the county's operations. Versatile channels of influencing support, democracy and quality of the services. Several laws and decrees state the right of the general public to participate in developing the society and having the right to be heard.*

In connection to the well-being service counties, some of the most important ones include the constitution law, the law for the well-being service counties, law on the rights of patients, healthcare law and social care law. The law states that an individual has the right to participate in an affect the development of their living environment and that the public administration's task is to further the individual's possibilities to participate in the society. The governing bodies of the well-being service counties are obliged to ensure that there are versatile and impactful means and mechanisms for participation and advocacy.

The counties implement different forms of participation for example citizen panels and forums digital surveys and feedback mechanisms, participatory budgeting and collaboration with municipalities associations and other actors. Participatory budgeting and regional citizen forums are implemented in Advisory Board for NGO cooperation in southwest Finland. North sabo has a youth advisory group participating in service development and South Karelia has open hearings. These are just a few examples of participatory actions and the Finnish well-being service counties.

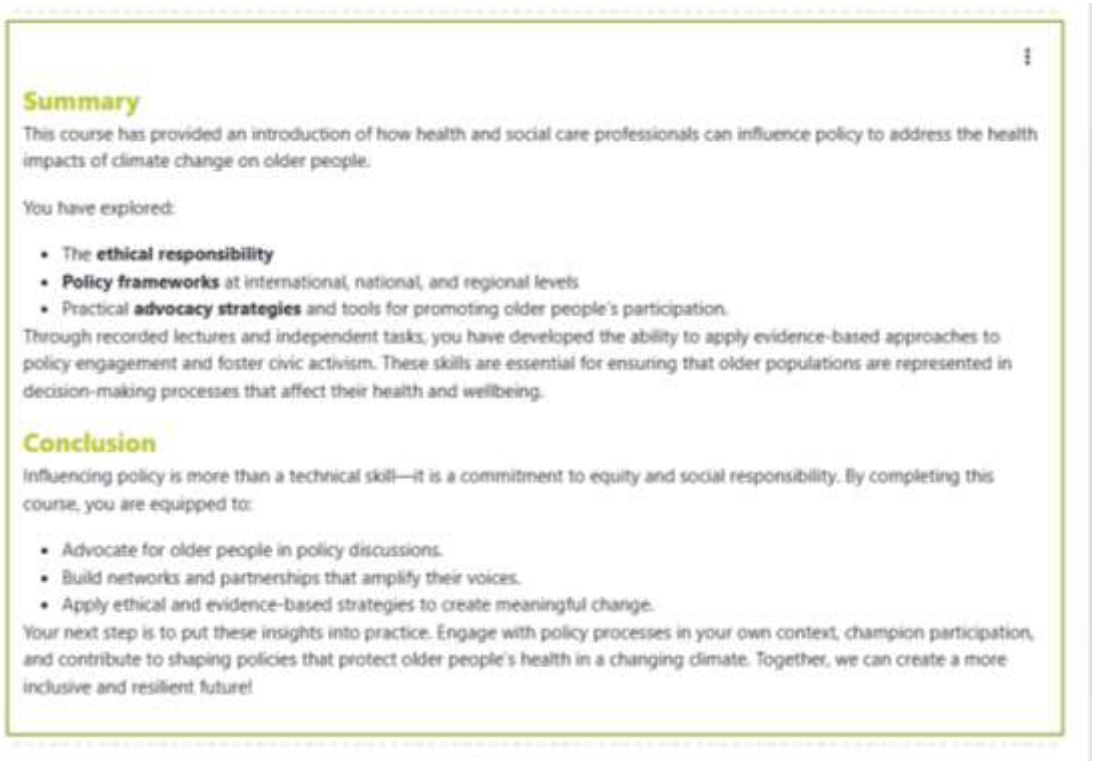
In Germany there are local forums, health conferences with the citizens professionals and policymakers. They focus on mental health elderly care and health promotion. In Italy public participation in healthcare is for example the Turin Urban Health Equity Initiative which engages stakeholders to address health inequalities. Stakeholders include NGO's, citizens, government and universities. Organizations in Portugal use participatory budgeting enabling the citizens to propose and vote on health-related topics examples include mobile health units and mental health support to name a few. Regional Health conferences are held in France involving patients professionals and the civil society these conferences provide recommendations to the Regional Health agencies.

Assignment 4.
Create an idea for a participatory event with the elderly
Participation and engagement call for joint activities and active listening of the stakeholders. Your task is to plan an event to implement with aging people. **The idea is to get an insight of the needs of the elderly on any given topic related to health.** You can define the topic yourself. The plan needs to include at least:

- what kind of an event you would organize
- what would be the objective of your event
- duration of the event
- what kind of information you would provide for the participants, in which format
- what kind of information you would like to gather
- what kind of methods you would use

Your plan can be presented in the form of an infographic, flowchart, script, video, etc. Submit it in this folder.

5. Conclusion & Summary



Summary

This course has provided an introduction of how health and social care professionals can influence policy to address the health impacts of climate change on older people.

You have explored:

- The **ethical responsibility**
- **Policy frameworks** at international, national, and regional levels
- Practical **advocacy strategies** and tools for promoting older people's participation.

Through recorded lectures and independent tasks, you have developed the ability to apply evidence-based approaches to policy engagement and foster civic activism. These skills are essential for ensuring that older populations are represented in decision-making processes that affect their health and wellbeing.

Conclusion

Influencing policy is more than a technical skill—it is a commitment to equity and social responsibility. By completing this course, you are equipped to:

- Advocate for older people in policy discussions.
- Build networks and partnerships that amplify their voices.
- Apply ethical and evidence-based strategies to create meaningful change.

Your next step is to put these insights into practice. Engage with policy processes in your own context, champion participation, and contribute to shaping policies that protect older people's health in a changing climate. Together, we can create a more inclusive and resilient future!

Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass/Fail: In order to pass, make sure you a) have addressed national level policies, regional level strategies and b) analysed them according to the questions given in the instructions under number 3, and c) posted your summary on the discussion forum.

Final Assignment

The goal of this assignment is to gain an understanding of the extent to which the health effects of climate change on older people are addressed in national climate (mitigation and adaptation) policies and regional strategies.

Estimated time: 6 hours

Your task:

1. National Level
   - Search for your country's **national strategies and plans** related to preventing and addressing the **health impacts of climate change**.
   - Visit the websites of relevant ministries and institutions (e.g., Ministry of Health, Ministry of Environment).
   - Choose **1–2 documents** that you find most relevant.
2. Regional Level
   - Search for **regional strategies and plans** (e.g., municipal, county, or regional government).
3. Choose **1 document**, if available.
   What to look for
   - Do the strategies or programs explicitly address older people?

- What health risks related to climate change are identified?
- What measures are proposed to combat or mitigate these risks?
- Are there any gaps or strengths in how older people's needs are considered?

4. Write a brief summary of your observations, length 750 -1000 characters. Please write in English.
5. Submit your contribution by replying to the starter post. Please make sure your country is clearly indicated.

Please note: this is an individual assignment

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- UN Decade of Healthy Ageing 2021-2030 in a Changing Climate. https://cdn.who.int/media/docs/default-source/decade-of-healthy-ageing/decade-connection-series-climatechange.pdf?sfvrsn=e926d220_3&download=true

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Promoting Inclusion and Empowering Individuals, Families & Groups MC14 EQF4

Microcredential Title	**Promoting Inclusion and Empowering Individuals, Families & Groups**
Short Code / ID	MC14
EQF Level	4
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, German, Greek, Finnish and Portuguese
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Carinthia University of Applied Sciences
Module Lead / Author	Bianca Lidolt-Petscher, Christine Dullnig-Pichler, Romina Graier

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Recognize and define the concept of inclusion across various contexts.
LO 2	Identify key interactions between inclusion and social, cultural, economic, and ecological factors.
LO 3	Develop an understanding of empowerment.
LO 4	Identify supporting factors that foster empowerment in diverse environments.
LO 5	Gain insight into systemic approaches to inclusion and empowerment.
LO 6	Understand the importance of viewing individuals and groups within broader systems.
LO 7	Explore interconnections between inclusion, empowerment, and systemic thinking.
LO 8	Understand the roles of peer groups, citizen science, and multipliers.
LO 9	Identify how these elements contribute to inclusive and empowering practices.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards promoting inclusion, empowerment, active ageing and systemic, age-friendly practices for older persons in health and social care.
Alignment Notes	This course introduces you to the **key concepts of inclusion and empowerment** and explores **how they can be promoted in diverse social, cultural, economic, and ecological contexts.** You will learn **how to support individuals, families, and groups** in becoming active participants in their communities. We take a **systemic approach**, helping you understand how inclusion and empowerment are connected to broader systems and structures. You will also **explore**

	the roles of peer support, citizen science, and multipliers in creating inclusive and empowering environments. **This microcredential also promotes** critical reflection on learners' own professional practice, the identification of barriers to inclusion and empowerment, and the development of supportive strategies for older adults in health and social care settings. Learners are encouraged to consider how inclusive, resource-oriented and systemic approaches can strengthen autonomy, participation, belonging, intergenerational support and active ageing in diverse communities.
Keywords	inclusion, empowerment, active ageing, systemic thinking, peer support, multipliers, citizen science

Learning Activities

E-Learning Format	online self-paced learning with text-based content, interactive H5P elements, YouTube videos, additional literature, podcasts, quizzes, and reflective learning activities
Activities	pre- and post-module quizzes, case studies, knowledge check questions, reflection tasks, video-based learning, interactive H5P activities, reading assignments, practical analysis of the own work environment, and application-oriented strategy development
Estimated Study Time	25 hours

Content & Topics

1. Understanding Inclusion
2. Understanding Empowerment
3. Systematic Approaches & the Role of Peer Groups, Multipliers and Citizen Science

1. Understanding Inclusion

Inclusion is a key principle in shaping equitable and supportive environments for all individuals, particularly those with disabilities or health-related challenges. This chapter explores the concept of inclusion in depth, offering a clear definition and distinguishing it from related terms such as exclusion, separation, and integration (Schirmer & Michailakis, 2013; Prengel, 2006).
By understanding these distinctions, you will gain insight into the various ways societies respond to diversity. We will examine how inclusive practices benefit not only individuals and their families but also strengthen communities as a whole. Additionally, we will identify common barriers to inclusion in everyday practice and encourage you to reflect on your own experiences and attitudes (Sciortino, 2021; World Conference of Special Needs Education, 1994).
Through this chapter, you will build a foundational understanding of inclusion and develop a more conscious, informed approach to fostering inclusive environments in your personal and professional life.

1.1 Introduction to the concepts of Inclusion

This illustration is a very common way of describing equal opportunities and inclusion.

The animals are asked to climb the tree - their request is: "In the spirit of fair selection, the test task is the same for everyone - climb the tree!"
(Russel, 2012)

What is INCLUSION?

Inclusion refers to the practice of ensuring that all individuals, regardless of their background, abilities, or circumstances, have equal access to opportunities, resources, and participation in all aspects of society.

This encompasses:

- access to housing, transportation, and public spaces.
- opportunities for employment and volunteering.
- participation in cultural, recreational, and political activities.
- feeling accepted, valued, and connected within the community.

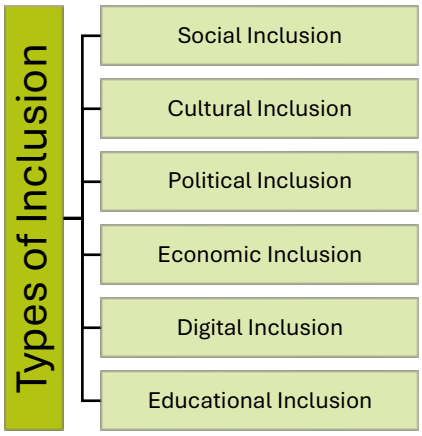
It involves creating an environment where everyone feels valued, respected, and supported, and where diversity is embraced and celebrated. Inclusion aims to remove barriers and promote fairness, enabling all individuals to contribute to and benefit from social, economic, and cultural activities. (United Nations Human Rights, 2006; United Nations, 2019; European Commission, 2017)

Inclusion is not about making people fit into systems — it's about adapting systems so that everyone belongs.

Video: The Evolution of Inclusion: This video from the Five Moore Minutes series explores how the concept of inclusion has developed over time. Shelley Moore takes us on a journey from early community living and neighborhood school movements to today's inclusive education practices.

Types of Inclusion

Inclusion encompasses various dimensions that affect different aspects of social life, as highlighted by Sciortino (2021), the European Commission (2017) and the United Nations (2019). Understanding these different types of inclusion is crucial for creating a more equitable society.



Social Inclusion promotes participation and access to social networks and communities.
Key Aspects: It ensures that all individuals, regardless of their abilities, backgrounds, or circumstances, have the opportunity to actively engage in social life and feel a sense of belonging within their communities.
Importance: Social inclusion helps combat isolation and loneliness, fostering connections that enhance mental and emotional well-being.

Cultural inclusion emphasizes the recognition and appreciation of cultural diversity and the promotion of cultural exchange.
Key Aspects: It involves respecting and celebrating different cultural identities, allowing individuals to express their cultural traditions and practices freely.
Importance: Cultural inclusion enriches society by fostering mutual understanding, respect, and collaboration among diverse groups.

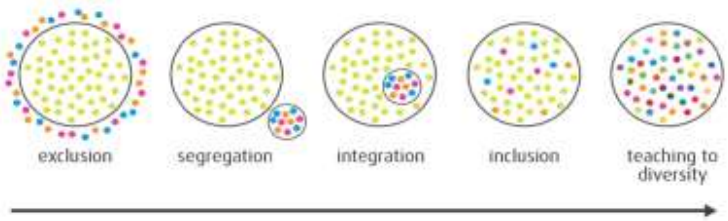
Political inclusion pertains to the active participation of all individuals in the political process.
Key Aspects: This includes the right to vote, the ability to stand for election, and participation in political decision-making.
Importance: Ensuring that all voices are heard and considered in political processes is vital for democracy and for making decisions that reflect the needs and interests of the entire population.

Economic inclusion refers to providing all individuals with access to economic resources and opportunities.
Key Aspects: This includes access to quality education, employment opportunities, fair wages, and financial services.
Importance: The goal is to reduce economic inequalities and empower everyone to achieve financial stability and success, ultimately contributing to a more robust economy.

Digital inclusion ensures that all individuals have access to digital technologies and the internet.
Key Aspects: This includes providing access to devices, reliable internet connections, and the necessary digital skills to navigate the online world effectively.
Importance: The aim is to bridge the digital divide, enabling everyone to enjoy the benefits of the digital age, including access to information, services, and opportunities for social interaction.

Educational inclusion guarantees that all individuals have access to quality education, regardless of their abilities or backgrounds.
Key Aspects: This includes access to inclusive schools, adaptable curricula, and support systems that cater to diverse learning needs.
Importance: Educational inclusion allows everyone to learn and develop their potential, leading to more equitable opportunities in life and career paths.

Deliminiation of Terms
To make the concept of inclusion more tangible, it is often contrasted with other related concepts: **inclusion, integration, separation/segregation, and exclusion**.
While these representations frequently pertain to education for students with special educational needs, they can also be applied to other societal functions, such as the workplace or the experiences of older adults (Prengel, 2006).



Concept	Definition	Goal	Example
Exclusion	Preventing individuals from accessing certain parts of society due to their differences	To deny access to resources, rights, or opportunities	Denying older adults employment opportunities based on age-related stereotypes, leading to economic and social marginalization
Segregation	Creating separate systems of environments for individuals based on their differences	To provide specialized support within separate systems, but not integrating them into the main system	Establishing senior centers or retirement communities where older adults live and socialize separately from younger populations

Integration	Incorporating individuals who were previously excluded into the main system, often by providing support to help them adapt	To help individuals fit into existing system without changing the system itself	Offering technology training programs for older adults to help them use digital devices and stay connected with family and friends
Inclusion	Ensuring that all individuals, regardless of their differences, have equal access to opportunities and resources within society	To remove barriers and create an environment where diversity is valued and everyone can participate fully	Creating age-friendly communities where older adults can participate in social activities, access healthcare and use public transportation without barriers

(Prengel, 2006)

Inclusion is accompanied by an **intersectional perspective** which assumes that **discrimination is rarely caused by a single disadvantage alone**, but rather can arise from **multiple, overlapping sources**. The concept of Intersectionality explores this in detail and offers a wide range of research apporaches.
In the context of older adults, this means that inequalities may not stem solely from age, but also from gender, social and ethnic background, and other dimensions of diversity. **Intersectionality describes the convergence of these diversity dimensions**, which can intensify when they intersect and therefore must be considered when talking about inclusive environments for older adults (Crenshaw, 1989; Mefebue et al., 2022).
Intersectionality therefore deepens our understanding of inclusion by showing that strategies must address overlapping structures of disadvantages to be truly effective.

1.2 The Importance of Inclusion for Individuals, Families and Communities

Benefits for Individuals

Inclusion improves well-being and mental health by fostering belonging, self-esteem, and social participation. People feel valued, less isolated, and are supported in developing a positive identity (Schirmer & Michailakis, 2013; World Conference of Special Needs Education, 1994).

Benefits for Families

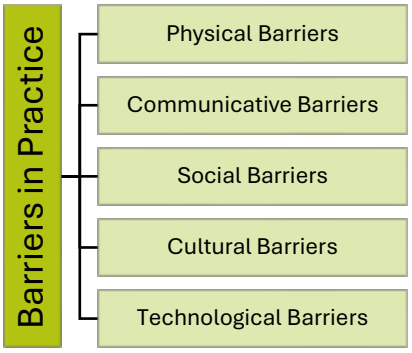
Inclusion strengthens families by ensuring that all members are involved, heard, and supported. It promotes open communication, mutual respect, and helps families face challenges together (United Nations Human Rights, 2006; European Commission, 2017).

Benefits for Communities

Inclusion strengthens social cohesion and makes communities more resilient. Diversity brings different perspectives and skills, supporting collaboration, problem-solving, and collective action (Sciortino, 2021; United Nations, 2019).

Identifying Barriers in Practice

Understanding and addressing barriers faced by (older) people is **crucial for promoting inclusivity and improving their quality of life**. In various social sector settings, **simple barriers can impede the ability of older adults to access services, participate in activities, and maintain social connections** (United Nations, 2006, Art.9).



Physical barriers are environmental obstacles that prevent older individuals from accessing spaces or services effectively.
Communicative barriers arise from difficulties in understanding or conveying information, which can lead to confusion and frustration.
Social barriers often stem from isolation or lack of support, affecting the emotional and mental well-being of older individuals.
Cultural barriers can arise from differences in language, customs, or beliefs, leading to misunderstandings or miscommunication.
Technological or digital barriers involve difficulties in accessing or using modern technology, which can limit engagement and participation.

Video: Removing the Barriers: Planning for ALL!**:**This video from Five More Minutes Series highlights how inclusive planning in the educational sector can help overcome systemic barriers. Instead of focusing on what students lack, it emphasizes designing learning environments that remove obstacles and support all learners.

Podcast: Diverse Matters – Episode Three: Age Inclusion**:** If you're interested in deepening your understanding of inclusion, especially in relation to age, the podcast offers valuable insights and real-world perspectives.

1.3 Good-Practice Examples

Professionals in healthcare and social services play an important role in promoting inclusion through their daily work with patients and clients. The following examples present good practices and strategies for inclusive professional practice.
You will explore practical strategies to overcome barriers to inclusion in different social settings, especially for older adults. Through examples, you will learn to identify barriers, analyse real-life situations, and propose inclusive solutions for health and social care practice.
General Example: Inclusive Thinking at Events
This example shows how inclusive thinking can be integrated into events. At the "Let's Make Inclusion Happen" Conference in Warsaw in March 2025, a code of conduct was presented to create a respectful and inclusive experience for all participants.
Healthcare & Social Services Example: Dementia-Inclusive Practice
The Elevate Eldercare Podcast presents ways to make care environments more inclusive for people living with dementia. Key strategies include creating clear and supportive spaces, training staff in person-centred communication, and involving people with dementia in decisions.

2. Understanding Empowerment

2.1 Active Aging and Empowerment

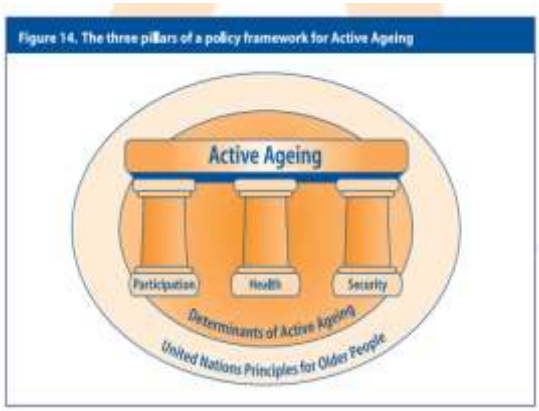
Building on the principles of inclusion, this chapter explores **how empowerment enables older adults to take an active role in their lives and communities.** As professionals working in social services, healthcare, or community development (and/or others), it is **crucial to understand how to support and engage older adults** in meaningful ways. **Empowerment is a central concept in promoting active aging**—it enables older people to maintain control over their lives, make informed decisions, and participate actively in society.

Before exploring the concept of empowerment, it is **essential to first define the term "active ageing".** This concept plays a **crucial role in understanding the broader context of ageing** in modern societies and serves as a foundation for the topics that follow. Understanding active ageing is key to developing effective strategies for empowerment, inclusion, and lifelong well-being.

According to the WHO (2002), active ageing is:
"The process of optimizing opportunities for health, participation, and security in order to enhance quality of life as people age. Active ageing applies to both individuals and population groups. It

allows people to realize their potential for physical, social, and mental well-being throughout the life course and to participate in society according to their needs, desires and capacities, while providing them with adequate protection, security and care when they require assistance."
This definition emphasizes that ageing should not be seen merely as a period of decline, but as a phase of life with opportunities for continued growth, engagement, and dignity.

Key Pillars of Active Ageing
The WHO identifies three core pillars in their WHO's Active Ageing: A Policy Framework (2002) that support active ageing:



Health: Promoting physical, mental, and social well-being throughout the life course.
Participation: Enabling older people to remain active contributors to their families, communities, and society—through paid work, volunteering, or informal roles.
Security: Ensuring protection, dignity, and care when individuals are no longer able to fully care for themselves.
Building on this foundation, Mendoza-Núñez et al. (2009) **describe active ageing as a process of empowering older adults toward**:

- **Self-actualisation**
- **Self-confidence**
- **Independent and dignified living**

This empowerment is grounded in personal values and the ability to stand up for one's own rights and freedoms.

Empowerment in the Context of Health and Social Care
Empowerment refers to the process of **enabling individuals**, especially those who are vulnerable or marginalized, such as older adult, **to gain control over the decisions and actions that affect their lives.** In health and social care, empowerment involves supporting people to:

- build self-confidence,
- make informed decisions,
- and actively participate in their own care and community life (Kam, 1996; Zimmermann, 2000).

Empowerment is a multifaceted concept with roots in:

- Community psychology (Orford, 2008)
- Social movements and critical social work
- Civil rights, feminist, and social justice movements

Historically, empowerment has been central to movements for civil rights, feminism, and social justice, helping people understand and challenge the dynamics of power, discrimination, and marginalization (Lenz & Stark, 2002).
It is important to note that empowerment is difficult to define precisely because it is deeply dependent on the specific forms of action taken by individuals, communities, and practitioners in real-world contexts (Zimmermann, 2000). It is inherently political and contextual, requiring professionals to recognize and draw on individual and collective resources while adopting supportive, respectful attitudes.
At its core, empowerment addresses the unequal distribution of power in society, which often contributes to social suffering and exclusion. Psychosocial work has the responsibility to help shift these power dynamics and create fairer, more inclusive conditions.

Key Perspectives

- Rostila (2001) describes empowerment as an "ideal space", an interaction between an individual's choices and the surrounding environment. This highlights that empowerment is not only about personal agency, but also about the opportunities and constraints shaped by social contexts.
- Kam (1996) links empowerment to the goals of community work: enhancing people's power and participation, raising social consciousness, and transforming the environment to remove social barriers that restrict people's lives.
- Zimmermann (2000) expands this view by emphasizing that empowerment connects individual well-being to the broader social and political environment. He stresses the importance of creating opportunities for people to engage actively in community decision-making processes.

Three Levels of Empowerment

Empowerment operates on three interconnected levels (Lenz & Stark, 2002):

Individual Level

- Building self-awareness and confidence
- Strengthening the ability to act independently
- Encouraging personal responsibility and autonomy

Group Level

- Strengthening collective identity and mutual support
- Encouraging shared action within peer groups or communities
- Promoting solidarity and cooperation

Societal Level

- Challenging systemic inequalities
- Advocating for structural change
- Promoting inclusion, justice, and equal opportunities

Empowerment in Elderly Care

In the context of ageing, empowerment means supporting older adults to:

- Make choices about their care and daily lives
- Participate in peer groups and community activities
- Advocate for their rights and dignity in society

This requires professionals to adopt a supportive, respectful, and resource-oriented approach, recognizing the strengths, values, and lived experiences of older individuals (Kam, 1996).

Video: Promoting Independence – Empowering Seniors to Lead a Fulfilling Life

What does it mean to age with dignity and independence?: This video showcases practical ways seniors are supported to live fulfilling lives—through community engagement, accessible services, and personal empowerment.

Video: Active Ageing – Inspiring Stories from Two Remarkable Seniors

What does it mean to age with grace and vitality?: Meet two inspiring older adults who are redefining ageing through active lifestyles, lifelong learning, and meaningful contributions to their communities.

Examples of Structural Barriers to Empowerment and Active Ageing

In everyday life, there are many built-in challenges that can make it harder for people to stay active and feel empowered as they grow older.

- **Financial insecurity** can limit access to healthcare, mobility, social activities, and independent living, increasing the risk of poverty and isolation.
- **Loneliness, living alone, and mobility problems** can reduce participation in community life and negatively affect mental and physical health.

- **Widowhood and loss of belonging** may weaken social connections, create emotional isolation, and reduce motivation to engage with others.
- **Poor physical and mental health**, combined with a lack of trust in services, can lower confidence, independence, and social participation.
- **Negative stereotypes about ageing** can lead to exclusion, discrimination, and fewer opportunities for older adults to contribute to society.
- **Low community social capital** means fewer supportive networks and social connections, which can increase loneliness and depression.

Overall, these barriers can reduce well-being, independence, and social inclusion in later life (Berry, 2009; De Souza, 2003; Lauder et al., 2006).

2.2 Facilitative Structures for Empowerment and Active Ageing

Empowerment and active ageing are supported by a variety of social, health-related, and community-based factors, commonly referred to as facilitative structures. These structures enable older adults to remain:

- healthy,
- socially engaged, and
- resilient—especially in the face of emerging global challenges such as climate change.

Long-term investments in:

- social capital,
- community infrastructure, and
- intergenerational programs

are essential for building resilient and inclusive communities. These facilitative structures not only promote empowerment and active ageing but also enhance society's capacity to adapt to the growing impacts of climate change (WHO, 2014).

In the following section, we will explore eight key facilitative structures in detail. Each of them plays a vital role in supporting older adults and fostering healthy, empowered, and climate-resilient communities.

1. Community-Based Prevention of Chronic Diseases	2. Preventive Healthcare	3. Participation and Social Capital	4. Religiosity and Voluntary Engagement
5. Trust and Social Networks	6. Social Networks as Social Capital	7. Self-Actualisation and Mutual Help	8. Family and Intergenerational Support

1. Community-Based Prevention of Chronic Diseases

At the community level, preventive actions play a central role in promoting healthy ageing. Programs that encourage:

- physical activity (e.g. walking groups),
- healthy nutrition (e.g. cooking classes),
- smoking cessation, and
- regular health screenings

can significantly reduce or delay the onset of age-related illnesses.

Climate relevance: Activities such as morning walks in shaded parks help reduce vulnerability to heat, air pollution, and extreme weather (Mendoza-Nunez et al., 2009).

2. Preventive Healthcare
Within the healthcare system, regular check-ups, vaccinations, and early interventions are essential for maintaining the health and quality of life of older adults.
Climate relevance: Medical advice on hydration and heat protection can prevent complications from cardiovascular, respiratory, or renal conditions during heatwaves (WHO, 2014; Mendoza-Nunez et al., 2009).

3. Participation and Social Capital
Social capital—the resources available through social networks—enhances well-being, resilience, and a sense of belonging. Participation in:

- social,
- cultural, or
- civic activities

strengthens community ties and reduces the risk of isolation and depression.
Climate relevance: Volunteering in community gardens or local initiatives fosters both social inclusion and environmental sustainability (Berry, 2008; Nummela et al., 2009; Glass et al., 2004).

4. Religiosity and Voluntary Engagement
Membership in faith-based or voluntary organizations can provide:

- emotional support,
- a sense of purpose, and
- social connection.

However, as noted by Lauder et al. (2006), such involvement may also carry potential drawbacks, such as social restrictions or moral pressure.
Climate relevance: Religious groups often play a key role in distributing resources (e.g. fans, water) during extreme weather events.

5. Trust and Social Networks
Trust—on personal, community, and institutional levels—is a foundation for successful social relationships. It promotes cooperation, mutual aid, and social cohesion.
Climate relevance: Trust in neighbors and local leaders is crucial during emergencies such as floods or power outages (Nummela et al., 2009; Berry, 2008).

6. Social Networks as Social Capital
Close relationships with family, friends, neighbors, and community members provide both emotional comfort and practical support.
Climate relevance: These networks help older adults prepare for extreme weather (e.g. setting up cooling systems or emergency kits) (Souza, 2003; Glass et al., 2004).

7. Self-Actualisation and Mutual Help
Pursuing personal goals, practicing self-care, and engaging in mutual support contribute to a sense of purpose and well-being.
Climate relevance: Older adults leading intergenerational workshops on sustainable living can strengthen both personal fulfillment and community adaptation (Kam, 1996; Zimmermann, 2000).

8. Family and Intergenerational Support
Emotional, practical, and financial support between generations fosters resilience and combats loneliness.
Climate relevance: Younger family members can assist older adults with digital tools (e.g. weather apps, emergency alerts), enhancing safety and preparedness (Glass et al., 2004; Souza, 2003).

2.3 Good practice experiences of empowerment
Programs such as **Cycling Without Age** help older adults experience the outdoors and reconnect with their communities through free trishaw rides. This supports mobility, social interaction, and

emotional well-being. **Kairos Alive!** uses dance, music, and storytelling to improve older adults' physical and mental health, especially in long-term care settings. Similarly, **ONEgeneration** brings older adults and young children together in shared activities, creating mutual learning, companionship, and stronger intergenerational bonds.

Other initiatives focus on education and lifelong learning. **Senior Synergy** and **AliVe** support older adults in gaining knowledge, improving health awareness, and participating in higher education. These programs help reduce barriers to learning and encourage older adults to remain engaged, independent, and confident.
The climate-related examples show that older adults are also important actors in environmental and social change. **Elders Climate Action** mobilizes older people to advocate for climate policies and educate communities. **KlimaSeniorinnen Schweiz** demonstrates how older women can use legal action to demand stronger climate protection and defend their health rights. The **COALESCE** Project empowers older adults as leaders and co-researchers in climate action, while **The Elders** and **HelpAge International** promote intergenerational cooperation, climate justice, and the inclusion of older adults in resilience strategies.

Overall, these examples show that active ageing is not only about health, but also about participation, empowerment, learning, advocacy, and belonging. Older adults can play a valuable role in building inclusive, sustainable, and resilient communities.

3. Systemic Approaches & the Role of Peer Groups, Multipliers and Citizen Science

After exploring inclusion and empowerment primarily at the individual level, this chapter shifts the **focus to the systems and structures** that shape these experiences. In recent years, the focus has shifted from expecting individuals to adapt to existing systems, to designing systems that are inclusive by default. This means **creating environments that recognize and respond to the diverse ways people live, learn, move, and connect.** Rather than treating difference as an exception, inclusive systems embrace it as the norm.

Inclusion is a fundamental human right. It is not only about access, but about enabling everyone—regardless of age, background, or ability—to fully participate and feel they belong from the start.
A broader view of inclusion also considers how identity factors such as gender, ethnicity, sexuality, religion, and political beliefs intersect. These intersections can deepen exclusion, but they also highlight the need for more equitable and responsive systems.

To move toward real inclusion, we must rethink the boundaries that define who is "in" and who is "out." This involves questioning the assumptions behind our systems and recognizing that support measures alone are not enough, inclusion requires continuous reflection, adaptation, and collaboration.

3.1 Introduction to Systems Thinking

Systems thinking helps us understand how different parts of life are connected. It's like looking at a puzzle where all the pieces fit together. This is especially helpful when working with older people, because their lives often involve many people, services, and changes (Guy-Evans, 2025; Mulé & Gringrich, 2023).

Formally defined, **systems thinking is an approach to problem-solving** that views "systems" as wholes, **recognizing the interconnections, feedback loops, and dynamic behavior of their components** (Meadows, 2008). It emphasizes that outcomes cannot be understood in isolation but must be seen as the result of interactions across the entire system. Importantly, the World Economic Forum has highlighted systems thinking as one of the core skills needed by 2030, underlining its growing importance in education, health, and social innovation (World Economic Forum, 2025).

Main Ideas

- Everything is connected: What happens in one area (like health) can affect others (like mood or social life).
- Feedback: Small changes can make a big difference. For example, regular visits from a caregiver can improve both health and happiness.
- Change over time: As people age, their needs and situations change. Systems thinking helps us keep track of these changes.
- Look at the whole picture: Instead of focusing only on one problem (like memory loss), we look at the full situation (home life, support, health, feelings (Guy-Evans, 2025).

Examples with Older People:

- Health and family: An older person with diabetes may need help from both doctors and family. If the family is stressed, care might suffer.
- Loneliness and mobility: If someone can't leave the house easily, they might feel lonely. Helping with transport or visits can improve their well-being.
- Medication and memory: If someone forgets to take medicine, it can affect their health. A nurse, family member, or reminder system can help.
- Home safety and independence: A small change like installing a handrail can prevent falls and help someone stay independent longer.
- Care coordination: When doctors, social workers, and family members work together, the older person gets better support (Guy-Evans, 2025; Ronzi et al., 2018).

Why It Matters:

Older people often deal with many things at once—health, family, money, housing. Systems thinking helps us understand how these things are connected so we can give better support (Tiittanen & Turjamaa, 2022).

3.2 A Systemic Perspective on Inclusion and Empowerment of Older Adults

From a systemic perspective, inclusion and empowerment are not isolated interventions but outcomes of interconnected social, institutional, and interpersonal dynamics. Older adults are embedded in multiple systems—family, community, healthcare, and policy—which shape their opportunities for participation and autonomy**. These systems do not operate in isolation; their interactions can either reinforce or hinder inclusion and empowerment.** When these systems are aligned to support respect, accessibility, and agency, they can significantly enhance quality of life in later years (Guy-Evans, 2025). Ronzi et al. (2018) conducted **a systematic review on community-based interventions promoting respect and social inclusion among older adults.** Their logic model identified intergenerational activities—such as mentoring, storytelling, and educational support—as key mechanisms. These activities not only improved mental and physical health outcomes but also fostered a sense of belonging and value, which are essential for systemic inclusion and healthy aging.

Core Systems in the Lives of Older Adults

Family System: Provides emotional support, daily assistance, and a sense of identity. Family relationships can be both a source of strength and stress.
Community and Neighborhood: Offers opportunities for social interaction, civic engagement, and belonging. Local initiatives and accessible public spaces are key to fostering inclusion.
Healthcare System: Ensures access to medical care, prevention, and long-term support. Systemic barriers such as bureaucracy or ageism can limit participation and autonomy.
Policy and Legal Framework: Shapes the structural conditions for inclusion, social protection, and civic rights. Age-friendly policies can actively promote empowerment and reduce inequalities.

Key Activities that Promote Inclusion

Intergenerational Programs: Activities like reading to children, mentoring, or storytelling foster a sense of purpose and reduce age-based stereotypes.

Civic Engagement: Participation in local initiatives, volunteering, or citizen science projects enables older adults to contribute meaningfully and feel valued.
Peer Support: Support from peers fosters trust, mutual understanding, and strengthens social networks among older adults.

For older adults, activities are most effective when supported by interconnected systems. Community programs, policy support, and family involvement can reinforce each other and create stronger outcomes. Positive experiences, such as feeling valued in a volunteer role, can boost self-esteem and encourage continued participation. A systemic perspective also helps identify and reduce barriers like limited accessibility or digital exclusion.

Outcomes and Long-Term Effects
Improved Well-being
Research such as Ronzi et al. (2018) shows that social inclusion reduces depressive symptoms and improves both physical and mental health.

Reduced Social Isolation
Active participation and recognition help older adults feel more connected and less lonely.

Healthy Aging and Reduced Inequalities
Systemically designed interventions contribute to equal opportunities in later life and support active, self-determined aging.

Systematic Approach: Linking Inclusion and Empowerment for Older Adults
Building on the systemic perspective outlined above, this section explores how inclusion and empowerment can be operationalized across different levels of society. **Empowerment is not a one-size-fits-all solution—it must be tailored to the individual, group, and societal context in which older adults live.** When these levels are addressed in an integrated way, they reinforce each other and create sustainable pathways to inclusion.

1. Individual Level: Personal Empowerment
Challenge: Older adults may experience social isolation, reduced mobility, and a loss of purpose.
Empowerment Response: Provide tools, resources, and opportunities that allow them to:

- Make decisions about their own care and lifestyle.
- Regain a sense of control, self-worth, and independence.
  Example: Offering digital literacy training so older adults can connect with family and access services online.

2. Group Level: Peer and Community Empowerment
Challenge: Lack of meaningful social interaction and community engagement.
Empowerment Response: Foster inclusive peer groups and community activities that:

- Encourage mutual support and shared experiences.
- Promote active participation and collective identity.
  Example: Organizing peer-led walking groups or storytelling circles in community centers.

3. Societal Level: Structural Empowerment
Challenge: Systemic ageism and barriers to participation in public life.
Empowerment Response: Advocate for policies and practices that:

- Ensure access to resources, inclusive infrastructure, and representation.
- Recognize and value the contributions of older adults.
  Example: Campaigning for age-friendly urban planning or inclusive healthcare policies.

Empowering older individuals requires more than recognizing their needs - it involves creating opportunities for active participation and shared knowledge (Mulé & Gringrich, 2023).

Peer Groups & Peer Support

A peer group is a social group composed of individuals who share similar characteristics such as age, social status, interests, or life experiences. In psychology and sociology, peer groups are recognized as powerful agents of socialization and emotional support (Harring et al., 2010).

Key Characteristics

- Shared identity or life stage
- Regular interaction
- Mutual influence
- Emotional and social support

Peer Groups and the Elderly

Peer groups are important for older adults because they offer emotional support, reduce social isolation, and encourage active participation in community life. They can help older people cope with life transitions such as retirement, bereavement, or reduced mobility.

In both physical and online settings, peer groups promote social interaction, shared learning, and mutual encouragement. They also support mental well-being, independence, and a sense of belonging.

Examples include senior walking clubs, online forums for retirees, community activity groups, and peer-led support groups for chronic illness.

Practical Applications in Health and Social Care

Health and social care professionals can support peer group formation by creating inclusive and accessible spaces where older adults can connect. Regular activities such as art, music, or exercise sessions can encourage participation and social interaction.

Shared storytelling can help build trust and strengthen relationships, while digital tools such as online communities or video calls can support connection beyond physical meetings. Peer mentoring is also valuable, as it allows older adults with similar experiences to support and encourage one another.

Multipliers

A multiplier is an individual who influences and activates others within their social or professional networks. In the context of health, education, or community development, multipliers are often trained individuals who pass on knowledge, motivate peers, and initiate change processes.

A multiplier is someone who, after receiving training or information, shares this knowledge with others in their community or peer group, thereby amplifying the impact of an intervention.

Multipliers are trusted individuals who act as bridges between institutions and communities, helping to translate knowledge into action and fostering local ownership (Pauls et al, 2024).

Key Characteristics

- Trusted by peers or community
- Able to communicate and motivate
- Often embedded in local networks
- Act as role models or facilitators

Multipliers and the Elderly

Multipliers play an important role in supporting older adults by sharing information, encouraging participation, and promoting digital inclusion. As trusted members of the community, they can relate to the experiences and concerns of their peers and help connect older adults with institutions and services.

They increase trust, strengthen program reach, support peer learning, and promote empowerment and community cohesion. Examples include retired teachers leading learning groups, seniors acting as digital ambassadors, and volunteer health educators in senior centers.

Practical Applications in Health and Social Care
To support multipliers, professionals should identify trusted people in the community and provide them with training, guidance, and practical materials. It is also important to recognize and value their contributions, as this strengthens motivation and long-term engagement.

Citizen Science
Citizen science refers to the involvement of non-professionals in scientific research. Participants contribute to data collection, analysis, or dissemination, often in collaboration with academic or institutional researchers.
Citizen science is the practice of public participation and collaboration in scientific research to increase scientific knowledge. Through citizen science, people share and contribute to data monitoring and collection programs. Citizen science empowers individuals to engage with science in meaningful ways, fostering inclusion, education, and community engagement (Den Broeder et al., 2018; Fraisl et al., 2020; Fritz et al., 2022).
Key Characteristics

- Voluntary participation
- Collaboration with researchers
- Focus on real-world issues
- Accessible to non-experts

Citizen Science and the Elderly
Citizen science offers older adults opportunities to use their life experience, local knowledge, and time in meaningful research projects. Participation can support lifelong learning, cognitive stimulation, social inclusion, and a stronger sense of purpose.
Older adults may contribute by monitoring biodiversity or air quality, taking part in health studies, or sharing memories in oral history projects.
However, citizen science also involves challenges, such as ethical issues, research bias, and data quality. Therefore, inclusive methods, clear guidance, and suitable training resources are important for effective participation.

Practical Applications in Health and Social Care
Health and social care professionals can involve older adults in citizen science by choosing accessible and meaningful topics, offering clear guidance and support, and using inclusive technologies. It is also important to show that their contributions are valuable and have a real impact.

3.3 Good practice examples

The **United Nations Decade of Healthy Ageing (2021–2030)** is a global collaboration aligned with the final decade of the Sustainable Development Goals (SDGs). Its aim is to **improve the lives of older people, their families, and the communities in which they live—by addressing the social, environmental, and institutional systems that shape the experience of ageing.**
This initiative represents a systemic approach to ageing by involving multiple stakeholders, including governments, civil society, organizations, academia, the private sector, and the media. Together, they work to create broader and more coordinated support for older adults.
The Decade focuses on four key pillars that reflect a holistic and systemic strategy:

1. **Creating age-friendly environments**
   – Designing communities that support mobility, inclusion, and safety.
2. **Combating ageism**
   – Challenging stereotypes and promoting respect for older people.
3. **Providing integrated care**
   – Ensuring that health and social care systems work together across the life course.
4. **Ensuring access to long-term care**
   – Supporting those who need assistance with daily living in a dignified and sustainable way.

These pillars go beyond individual interventions. They address the broader structures that influence health, inclusion, and resilience in older age—making the Decade a model for systemic, rights-based, and inclusive ageing policy.

Film: Alive Inside: A Story of Music and Memory**:** The documentary Alive Inside: A Story of Music and Memory (2014) offers a compelling real-world example of how systemic approaches can transform the care of older adults—particularly those living with dementia.

Podcast: Eliminating the Barriers Between Care Levels – and People: For a deeper exploration of person-centered care, listen to this episode of the Elevate Eldercare podcast. It presents a vision for care that breaks down institutional silos and centers the individual—emotionally, socially, and systemically.

Summary of the Contents Covered

This course introduced the key concepts of inclusion, empowerment, and systemic approaches in the context of ageing.

Inclusion was presented as a foundation for creating fair and supportive environments for people of all ages, abilities, and backgrounds. The course showed that inclusion means more than access: it also involves belonging, recognition, and participation.

Empowerment focused on supporting older adults' autonomy, decision-making, and active involvement in society. Learners reflected on how professionals can promote self-determined ageing through respectful and resource-oriented practices.

The systemic perspective highlighted how social, institutional, and political structures influence inclusion and empowerment. Practical examples such as peer support, citizen science, and multipliers showed how participation and structural change can be strengthened.

Overall, the course helped learners connect theory with practice and develop tools to promote inclusion and empowerment in later life.

Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

Imagine you are part of a community team tasked with involving older adults in a local climate adaptation or resilience-building project. Your goal is to design a small-scale initiative that is both practical and systemically aware—meaning it considers not only individual actions, but also how these actions connect to broader structures (e.g. policies, institutions, social norms, or environmental systems).

Write a proposal (500–600 words) that includes the following elements:

1. **Goal**
   What is the main aim of your initiative? What challenge or opportunity does it address?
2. **Form of Participation**

How will older adults be involved? (e.g. peer groups, workshops, citizen science)

3. **Support Structure**

What resources, partnerships, or tools will support participants? (e.g. local NGOs, digital platforms, multipliers, training)

4. **Expected Impact**

What are the anticipated outcomes—both for older adults and the wider community? What changes do you hope to see?

Optional Additions:

- Creative Name: Give your initiative a meaningful or catchy title.
- Visual Element: Include a simple sketch, infographic, or concept map.
- Reflection: Briefly reflect on what you learned about ageing, inclusion, empowerment, and systems thinking through this task.

References & Materials

Projects	Videos	Podcasts
Cycling Without Age Kairos Alive! ONEgeneration Senior Synergy AliVe Elders Climate Action KlimaSeniorinnen Schweiz COALESCE The Elders HelpAge International United Nations Decade of Healthy Ageing (2021–2030)	The Evolution of Inclusion Removing the Barriers: Planning for ALL! Promoting Independence – Empowering Seniors to Lead a Fulfilling Life Active Ageing – Inspiring Stories from Two Remarkable Seniors Alive Inside: A Story of Music and Memory	Diverse Matters – Episode Three: Age Inclusion Elevate Eldercare Podcast Eliminating the Barriers Between Care Levels – and People

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Promoting Inclusion and Empowering Individuals, Families & Groups MC14 EQF5&6

Microcredential Title	**Promoting Inclusion and Empowering Individuals, Families & Groups**
Short Code / ID	MC14
EQF Level	5/6
ECTS Credits	1 ECTS
Duration	25 hours
Delivery Mode	Online
Language(s)	English, German
Target Audience	Health and Social Care Professionals working with older people
Prerequisites	None
Awarding Institution	Carinthia University of Applied Sciences
Module Lead / Author	Bianca Lidolt-Petscher, Christine Dullnig-Pichler, Romina Graier

Learning Objectives

Upon successful completion, learners will be able to:

LO 1	Recognize and define the concept of inclusion across various contexts.
LO 2	Identify key interactions between inclusion and social, cultural, economic, and ecological factors.
LO 3	Develop an understanding of empowerment.
LO 4	Identify supporting factors that foster empowerment in diverse environments.
LO 5	Gain insight into systemic approaches to inclusion and empowerment.
LO 6	Understand the importance of viewing individuals and groups within broader systems.
LO 7	Explore interconnections between inclusion, empowerment, and systemic thinking.
LO 8	Understand the roles of peer groups, citizen science, and multipliers.
LO 9	Identify how these elements contribute to inclusive and empowering practices.

chAnGE Competence Area	Increased knowledge, skills and attitudes towards promoting inclusion, empowerment, active ageing and systemic, age-friendly practices for older persons in health and social care.
Alignment Notes	This course introduces you to the **key concepts of inclusion and empowerment** and explores **how they can be promoted in diverse social, cultural, economic, and ecological contexts.** You will learn **how to support individuals, families, and groups** in becoming active participants in their communities. We take a **systemic approach**, helping you understand how inclusion and empowerment are connected to broader systems and structures. You will also **explore the roles of peer support, citizen science, and multipliers** in creating inclusive and empowering environments. **This**

	microcredential also promotes critical reflection on learners' own professional practice, the identification of barriers to inclusion and empowerment, and the development of supportive strategies for older adults in health and social care settings. Learners are encouraged to consider how inclusive, resource-oriented and systemic approaches can strengthen autonomy, participation, belonging, intergenerational support and active ageing in diverse communities.
Keywords	inclusion, empowerment, active ageing, systemic thinking, peer support, multipliers, citizen science

Learning Activities

E-Learning Format	online self-paced learning with text-based content, interactive H5P elements, YouTube videos, additional literature, podcasts, quizzes, and reflective learning activities
Activities	pre- and post-module quizzes, case studies, knowledge check questions, reflection tasks, video-based learning, interactive H5P activities, reading assignments, practical analysis of the own work environment, and application-oriented strategy development
Estimated Study Time	25 hours

Content & Topics

1. Understanding Inclusion
2. Understanding Empowerment
3. Systematic Approaches & the Role of Peer Groups, Multipliers and Citizen Science

1. Understanding Inclusion

Inclusion is a key principle in shaping equitable and supportive environments for all individuals, particularly those with disabilities or health-related challenges. This chapter explores the concept of inclusion in depth, offering a clear definition and distinguishing it from related terms such as exclusion, separation, and integration (Schirmer & Michailakis, 2013; Prengel, 2006).

By understanding these distinctions, you will gain insight into the various ways societies respond to diversity. We will examine how inclusive practices benefit not only individuals and their families but also strengthen communities as a whole. Additionally, we will identify common barriers to inclusion in everyday practice and encourage you to reflect on your own experiences and attitudes (Sciortino, 2021; World Conference of Special Needs Education, 1994). Through this chapter, you will build a foundational understanding of inclusion and develop a more conscious, informed approach to fostering inclusive environments in your personal and professional life.

1.1 Introduction to the concepts of Inclusion

This illustration is a very common way of describing equal opportunities and inclusion.

The animals are asked to climb the tree - their request is: "In the spirit of fair selection, the test task is the same for everyone - climb the tree!"
(Russel, 2012)

What is INCLUSION?

Inclusion refers to the practice of ensuring that all individuals, regardless of their background, abilities, or circumstances, have equal access to opportunities, resources, and participation in all aspects of society.

This encompasses:

- access to housing, transportation, and public spaces.
- opportunities for employment and volunteering.
- participation in cultural, recreational, and political activities.
- feeling accepted, valued, and connected within the community.

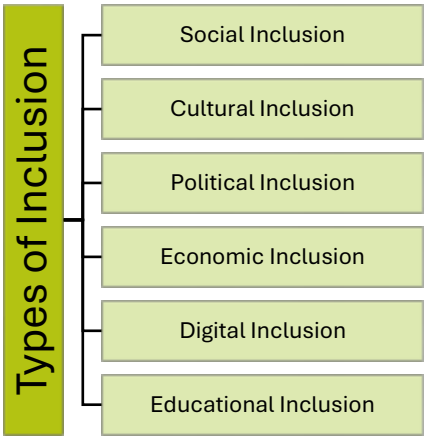
It involves creating an environment where everyone feels valued, respected, and supported, and where diversity is embraced and celebrated. Inclusion aims to remove barriers and promote fairness, enabling all individuals to contribute to and benefit from social, economic, and cultural activities. (United Nations Human Rights, 2006; United Nations, 2019; European Commission, 2017)

Inclusion is not about making people fit into systems — it's about adapting systems so that everyone belongs.

Video Example: The Evolution of Inclusion: This video from the Five Moore Minutes series explores how the concept of inclusion has developed over time. Shelley Moore takes us on a journey from early community living and neighborhood school movements to today's inclusive education practices.

Types of Inclusion

Inclusion encompasses various dimensions that affect different aspects of social life, as highlighted by Sciortino (2021), the European Commission (2017) and the United Nations (2019). Understanding these different types of inclusion is crucial for creating a more equitable society.



Social Inclusion promotes participation and access to social networks and communities.
Key Aspects: It ensures that all individuals, regardless of their abilities, backgrounds, or circumstances, have the opportunity to actively engage in social life and feel a sense of belonging within their communities.
Importance: Social inclusion helps combat isolation and loneliness, fostering connections that enhance mental and emotional well-being.

Cultural inclusion emphasizes the recognition and appreciation of cultural diversity and the promotion of cultural exchange.
Key Aspects: It involves respecting and celebrating different cultural identities, allowing individuals to express their cultural traditions and practices freely.
Importance: Cultural inclusion enriches society by fostering mutual understanding, respect, and collaboration among diverse groups.

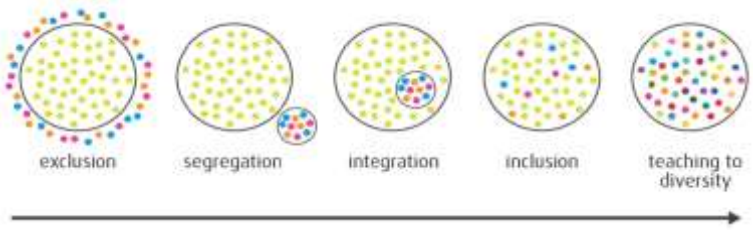
Political inclusion pertains to the active participation of all individuals in the political process.
Key Aspects: This includes the right to vote, the ability to stand for election, and participation in political decision-making.
Importance: Ensuring that all voices are heard and considered in political processes is vital for democracy and for making decisions that reflect the needs and interests of the entire population.

Economic inclusion refers to providing all individuals with access to economic resources and opportunities.
Key Aspects: This includes access to quality education, employment opportunities, fair wages, and financial services.
Importance: The goal is to reduce economic inequalities and empower everyone to achieve financial stability and success, ultimately contributing to a more robust economy.

Digital inclusion ensures that all individuals have access to digital technologies and the internet.
Key Aspects: This includes providing access to devices, reliable internet connections, and the necessary digital skills to navigate the online world effectively.
Importance: The aim is to bridge the digital divide, enabling everyone to enjoy the benefits of the digital age, including access to information, services, and opportunities for social interaction.

Educational inclusion guarantees that all individuals have access to quality education, regardless of their abilities or backgrounds.
Key Aspects: This includes access to inclusive schools, adaptable curricula, and support systems that cater to diverse learning needs.
Importance: Educational inclusion allows everyone to learn and develop their potential, leading to more equitable opportunities in life and career paths.

Deliminiation of Terms
To make the concept of inclusion more tangible, it is often contrasted with other related concepts: **inclusion, integration, separation/segregation, and exclusion**. While these representations frequently pertain to education for students with special educational needs, they can also be applied to other societal functions, such as the workplace or the experiences of older adults (Prengel, 2006).



Concept	Definition	Goal	Example
Exclusion	Preventing individuals from accessing certain parts of society due to their differences	To deny access to resources, rights, or opportunities	Denying older adults employment opportunities based on age-related stereotypes, leading to economic and social marginalization
Segregation	Creating separate systems of environments for individuals based on their differences	To provide specialized support within separate systems, but not integrating them into the main system	Establishing senior centers or retirement communities where older adults live and socialize separately from younger populations

Integration	Incorporating individuals who were previously excluded into the main system, often by providing support to help them adapt	To help individuals fit into existing system without changing the system itself	Offering technology training programs for older adults to help them use digital devices and stay connected with family and friends
Inclusion	Ensuring that all individuals, regardless of their differences, have equal access to opportunities and resources within society	To remove barriers and create an environment where diversity is valued and everyone can participate fully	Creating age-friendly communities where older adults can participate in social activities, access healthcare and use public transportation without barriers

(Prengel, 2006)

Inclusion is accompanied by an **intersectional perspective** which assumes that **discrimination is rarely caused by a single disadvantage alone**, but rather can arise from **multiple, overlapping sources**. The concept of Intersectionality explores this in detail and offers a wide range of research apporaches.

In the context of older adults, this means that inequalities may not stem solely from age, but also from gender, social and ethnic background, and other dimensions of diversity. **Intersectionality describes the convergence of these diversity dimensions**, which can intensify when they intersect and therefore must be considered when talking about inclusive environments for older adults (Crenshaw, 1989; Mefebue et al., 2022).
Intersectionality therefore deepens our understanding of inclusion by showing that strategies must address overlapping structures of disadvantages to be truly effective.

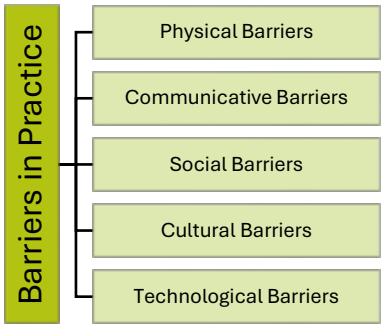
1.2 The Importance of Inclusion for Individuals, Families and Communities

Benefits for Individuals
Inclusion improves well-being and mental health by fostering belonging, self-esteem, and social participation. People feel valued, less isolated, and are supported in developing a positive identity (Schirmer & Michailakis, 2013; World Conference of Special Needs Education, 1994).

Benefits for Families
Inclusion strengthens families by ensuring that all members are involved, heard, and supported. It promotes open communication, mutual respect, and helps families face challenges together (United Nations Human Rights, 2006; European Commission, 2017).

Benefits for Communities
Inclusion strengthens social cohesion and makes communities more resilient. Diversity brings different perspectives and skills, supporting collaboration, problem-solving, and collective action (Sciortino, 2021; United Nations, 2019).

Identifying Barriers in Practice
Understanding and addressing barriers faced by (older) people is **crucial for promoting inclusivity and improving their quality of life**. In various social sector settings, **simple barriers can impede the ability of older adults to access services, participate in activities, and maintain social connections** (United Nations, 2006, Art.9).



- **Physical barriers** are environmental obstacles that prevent older individuals from accessing spaces or services effectively.
- **Communicative barriers** arise from difficulties in understanding or conveying information, which can lead to confusion and frustration.
- **Social barriers** often stem from isolation or lack of support, affecting the emotional and mental well-being of older individuals.
- **Cultural barriers** can arise from differences in language, customs, or beliefs, leading to misunderstandings or miscommunication.
- **Technological or digital barriers** involve difficulties in accessing or using modern technology, which can limit engagement and participation.

Video: Removing the Barriers: Planning for ALL!: This video from Five More Minutes Series highlights how inclusive planning in the educational sector can help overcome systemic barriers. Instead of focusing on what students lack, it emphasizes designing learning environments that remove obstacles and support all learners.

Podcast: Diverse Matters – Episode Three: Age Inclusion: If you're interested in deepening your understanding of inclusion, especially in relation to age, the podcast offers valuable insights and real-world perspectives.

1.3 Good-Practice Examples

Professionals in healthcare and social services play an important role in promoting inclusion through their daily work with patients and clients. The following examples present good practices and strategies for inclusive professional practice.
You will explore practical strategies to overcome barriers to inclusion in different social settings, especially for older adults. Through examples, you will learn to identify barriers, analyse real-life situations, and propose inclusive solutions for health and social care practice.

General Example: Inclusive Thinking at Events
This example shows how inclusive thinking can be integrated into events. At the “Let’s Make Inclusion Happen” Conference in Warsaw in March 2025, a code of conduct was presented to create a respectful and inclusive experience for all participants.

Healthcare & Social Services Example: Dementia-Inclusive Practice
The Elevate Eldercare Podcast presents ways to make care environments more inclusive for people living with dementia. Key strategies include creating clear and supportive spaces, training staff in person-centred communication, and involving people with dementia in decisions.

2. Understanding Empowerment

2.1 Active Aging and Empowerment

Building on the principles of inclusion, this chapter explores **how empowerment enables older adults to take an active role in their lives and communities.** As professionals working in social services, healthcare, or community development (and/or others), it is **crucial to understand how to support and engage older adults** in meaningful ways. **Empowerment is a central concept in promoting active aging**—it enables older people to maintain control over their lives, make informed decisions, and participate actively in society.

Before exploring the concept of empowerment, it is **essential to first define the term "active ageing".** This concept plays a **crucial role in understanding the broader context of ageing** in modern societies and serves as a foundation for the topics that follow. Understanding active ageing is key to developing effective strategies for empowerment, inclusion, and lifelong well-being.

According to the WHO (2002), active ageing is:
"The process of optimizing opportunities for health, participation, and security in order to enhance quality of life as people age. Active ageing applies to both individuals and population groups. It allows people to realize their potential for physical, social, and mental well-being throughout the life course and to participate in society according to their needs, desires and capacities, while providing them with adequate protection, security and care when they require assistance."
This definition emphasizes that ageing should not be seen merely as a period of decline, but as a phase of life with opportunities for continued growth, engagement, and dignity.

Key Pillars of Active Ageing
The WHO identifies three core pillars in their WHO's Active Ageing: A Policy Framework (2002) that support active ageing:

Health: Promoting physical, mental, and social well-being throughout the life course.
Participation: Enabling older people to remain active contributors to their families, communities, and society—through paid work, volunteering, or informal roles.
Security: Ensuring protection, dignity, and care when individuals are no longer able to fully care for themselves.
Building on this foundation, Mendoza-Núñez et al. (2009) **describe active ageing as a process of empowering older adults toward**:

- **Self-actualisation**
- **Self-confidence**
- **Independent and dignified living**

This empowerment is grounded in personal values and the ability to stand up for one's own rights and freedoms.

Empowerment in the Context of Health and Social Care
Empowerment refers to the process of **enabling individuals**, especially those who are vulnerable or marginalized, such as older adult, **to gain control over the decisions and actions that affect their lives.** In health and social care, empowerment involves supporting people to:

- build self-confidence,
- make informed decisions,
- and actively participate in their own care and community life (Kam, 1996; Zimmermann, 2000).

Empowerment is a multifaceted concept with roots in:

- Community psychology (Orford, 2008)
- Social movements and critical social work
- Civil rights, feminist, and social justice movements

Historically, empowerment has been central to movements for civil rights, feminism, and social justice, helping people understand and challenge the dynamics of power, discrimination, and marginalization (Lenz & Stark, 2002).

It is important to note that empowerment is difficult to define precisely because it is deeply dependent on the specific forms of action taken by individuals, communities, and practitioners in real-world contexts (Zimmermann, 2000). It is inherently political and contextual, requiring professionals to recognize and draw on individual and collective resources while adopting supportive, respectful attitudes.

At its core, empowerment addresses the unequal distribution of power in society, which often contributes to social suffering and exclusion. Psychosocial work has the responsibility to help shift these power dynamics and create fairer, more inclusive conditions.

Key Perspectives

- Rostila (2001) describes empowerment as an "ideal space", an interaction between an individual's choices and the surrounding environment. This highlights that empowerment is not only about personal agency, but also about the opportunities and constraints shaped by social contexts.
- Kam (1996) links empowerment to the goals of community work: enhancing people's power and participation, raising social consciousness, and transforming the environment to remove social barriers that restrict people's lives.
- Zimmermann (2000) expands this view by emphasizing that empowerment connects individual well-being to the broader social and political environment. He stresses the importance of creating opportunities for people to engage actively in community decision-making processes.

Three Levels of Empowerment

Empowerment operates on three interconnected levels (Lenz & Stark, 2002):

Individual Level

- Building self-awareness and confidence
- Strengthening the ability to act independently
- Encouraging personal responsibility and autonomy

Group Level

- Strengthening collective identity and mutual support
- Encouraging shared action within peer groups or communities
- Promoting solidarity and cooperation

Societal Level

- Challenging systemic inequalities
- Advocating for structural change
- Promoting inclusion, justice, and equal opportunities

Empowerment in Elderly Care

In the context of ageing, empowerment means supporting older adults to:

- Make choices about their care and daily lives
- Participate in peer groups and community activities
- Advocate for their rights and dignity in society

This requires professionals to adopt a supportive, respectful, and resource-oriented approach, recognizing the strengths, values, and lived experiences of older individuals (Kam, 1996).

Video: **Promoting Independence – Empowering Seniors to Lead a Fulfilling Life**
What does it mean to age with dignity and independence?: This video showcases practical ways seniors are supported to live fulfilling lives—through community engagement, accessible services, and personal empowerment.
Video: **Active Ageing – Inspiring Stories from Two Remarkable Seniors**
What does it mean to age with grace and vitality?: Meet two inspiring older adults who are redefining ageing through active lifestyles, lifelong learning, and meaningful contributions to their communities.

Examples of Structural Barriers to Empowerment and Active Ageing
In everyday life, there are many built-in challenges that can make it harder for people to stay active and feel empowered as they grow older.

- **Financial insecurity** can limit access to healthcare, mobility, social activities, and independent living, increasing the risk of poverty and isolation.
- **Loneliness, living alone, and mobility problems** can reduce participation in community life and negatively affect mental and physical health.
- **Widowhood and loss of belonging** may weaken social connections, create emotional isolation, and reduce motivation to engage with others.
- **Poor physical and mental health**, combined with a lack of trust in services, can lower confidence, independence, and social participation.
- **Negative stereotypes about ageing** can lead to exclusion, discrimination, and fewer opportunities for older adults to contribute to society.
- **Low community social capital** means fewer supportive networks and social connections, which can increase loneliness and depression.

Overall, these barriers can reduce well-being, independence, and social inclusion in later life (Berry, 2009; De Souza, 2003; Lauder et al., 2006).

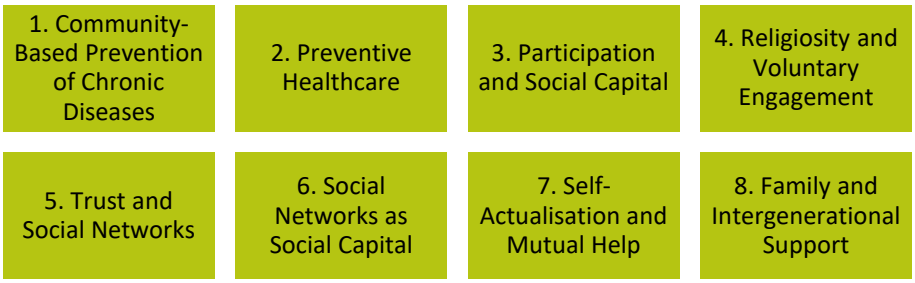
2.2 Facilitative Structures for Empowerment and Active Ageing
Empowerment and active ageing are supported by a variety of social, health-related, and community-based factors, commonly referred to as facilitative structures. These structures enable older adults to remain:

- healthy,
- socially engaged, and
- resilient—especially in the face of emerging global challenges such as climate change.

Long-term investments in:

- social capital,
- community infrastructure, and
- intergenerational programs

are essential for building resilient and inclusive communities. These facilitative structures not only promote empowerment and active ageing, but also enhance society's capacity to adapt to the growing impacts of climate change (WHO, 2014). In the following section, we will explore eight key facilitative structures in detail. Each of them plays a vital role in supporting older adults and fostering healthy, empowered, and climate-resilient communities.



1. Community-Based Prevention of Chronic Diseases
At the community level, preventive actions play a central role in promoting healthy ageing. Programs that encourage:

- physical activity (e.g. walking groups),
- healthy nutrition (e.g. cooking classes),
- smoking cessation, and
- regular health screenings

can significantly reduce or delay the onset of age-related illnesses.

Climate relevance: Activities such as morning walks in shaded parks help reduce vulnerability to heat, air pollution, and extreme weather (Mendoza-Nunez et al., 2009).

2. Preventive Healthcare
Within the healthcare system, regular check-ups, vaccinations, and early interventions are essential for maintaining the health and quality of life of older adults.
Climate relevance: Medical advice on hydration and heat protection can prevent complications from cardiovascular, respiratory, or renal conditions during heatwaves (WHO, 2014; Mendoza-Nunez et al., 2009).

3. Participation and Social Capital
Social capital—the resources available through social networks—enhances well-being, resilience, and a sense of belonging. Participation in:

- social,
- cultural, or
- civic activities

strengthens community ties and reduces the risk of isolation and depression.
Climate relevance: Volunteering in community gardens or local initiatives fosters both social inclusion and environmental sustainability (Berry, 2008; Nummela et al., 2009; Glass et al., 2004).

4. Religiosity and Voluntary Engagement
Membership in faith-based or voluntary organizations can provide:

- emotional support,
- a sense of purpose, and
- social connection.

However, as noted by Lauder et al. (2006), such involvement may also carry potential drawbacks, such as social restrictions or moral pressure.
Climate relevance: Religious groups often play a key role in distributing resources (e.g. fans, water) during extreme weather events.

5. Trust and Social Networks
Trust—on personal, community, and institutional levels—is a foundation for successful social relationships. It promotes cooperation, mutual aid, and social cohesion.
Climate relevance: Trust in neighbors and local leaders is crucial during emergencies such as floods or power outages (Nummela et al., 2009; Berry, 2008).

6. Social Networks as Social Capital
Close relationships with family, friends, neighbors, and community members provide both emotional comfort and practical support.
Climate relevance: These networks help older adults prepare for extreme weather (e.g. setting up cooling systems or emergency kits) (Souza, 2003; Glass et al., 2004).

7. Self-Actualization and Mutual Help
Pursuing personal goals, practicing self-care, and engaging in mutual support contribute to a sense of purpose and well-being.
Climate relevance: Older adults leading intergenerational workshops on sustainable living can strengthen both personal fulfillment and community adaptation (Kam, 1996; Zimmermann, 2000).

8. Family and Intergenerational Support
Emotional, practical, and financial support between generations fosters resilience and combats loneliness.
Climate relevance: Younger family members can assist older adults with digital tools (e.g. weather apps, emergency alerts), enhancing safety and preparedness (Glass et al., 2004; Souza, 2003).

2.3 Good practice experiences of empowerment

Programs such as **Cycling Without Age** help older adults experience the outdoors and reconnect with their communities through free trishaw rides. This supports mobility, social interaction, and emotional well-being. **Kairos Alive!** uses dance, music, and storytelling to improve older adults' physical and mental health, especially in long-term care settings. Similarly, **ONEgeneration** brings older adults and young children together in shared activities, creating mutual learning, companionship, and stronger intergenerational bonds.

Other initiatives focus on education and lifelong learning. **Senior Synergy** and **AliVe** support older adults in gaining knowledge, improving health awareness, and participating in higher education. These programs help reduce barriers to learning and encourage older adults to remain engaged, independent, and confident.

The climate-related examples show that older adults are also important actors in environmental and social change. **Elders Climate Action** mobilizes older people to advocate for climate policies and educate communities. **KlimaSeniorinnen Schweiz** demonstrates how older women can use legal action to demand stronger climate protection and defend their health rights. The **COALESCE** Project empowers older adults as leaders and co-researchers in climate action, while **The Elders** and **HelpAge International** promote intergenerational cooperation, climate justice, and the inclusion of older adults in resilience strategies.

Overall, these examples show that active ageing is not only about health, but also about participation, empowerment, learning, advocacy, and belonging. Older adults can play a valuable role in building inclusive, sustainable, and resilient communities.

3. Systemic Approaches & the Role of Peer Groups, Multipliers and Citizen Science

After exploring inclusion and empowerment primarily at the individual level, this chapter shifts the **focus to the systems and structures** that shape these experiences. In recent years, the focus has shifted from expecting individuals to adapt to existing systems, to designing systems that are inclusive by default. This means **creating environments that recognize and respond to the diverse ways people live, learn, move, and connect.** Rather than treating difference as an exception, inclusive systems embrace it as the norm.

To move toward real inclusion, we must rethink the boundaries that define who is "in" and who is "out." This involves questioning the assumptions behind our systems and recognizing that support measures alone are not enough, inclusion requires continuous reflection, adaptation, and collaboration.

3.1 Introduction to Systems Thinking

Systems thinking helps us understand how different parts of life are connected. It's like looking at a puzzle where all the pieces fit together. This is especially helpful when working with older people, because their lives often involve many people, services, and changes (Guy-Evans, 2025; Mulé & Gringrich, 2023).

Formally defined, **systems thinking is an approach to problem-solving** that views "systems" as wholes, **recognizing the interconnections, feedback loops, and dynamic behavior of their components** (Meadows, 2008).

Main Ideas

Systems thinking means looking at the whole situation rather than focusing on one problem alone. In older age, different areas of life are connected: health can influence mood, social life, and everyday well-being. Small changes, such as regular caregiver visits, can have positive effects over time. Since people's needs change as they age, systems thinking helps understand how health, support, home life, and emotions interact.

Why It Matters:

Older people often deal with many things at once—health, family, money, housing. Systems thinking helps us understand how these things are connected so we can give better support (Tiittanen & Turjamaa, 2022).

Systems Theory

Systems theory is a multidisciplinary approach used to understand complex systems in nature, society, health care, and science. It emphasizes that the parts of a system are **interconnected** and **interdependent**. Unlike **linear thinking**, which focuses on simple cause-and-effect relationships, systems thinking looks at how different elements interact and influence one another over time.

Important contributors include:

- **Ludwig von Bertalanffy** – General Systems Theory
- **Donella Meadows** – systems thinking and sustainability
- **Russell Ackoff** – organizational and management theory
- **Jay Forrester** – system dynamics
- **Peter Senge** – learning organizations

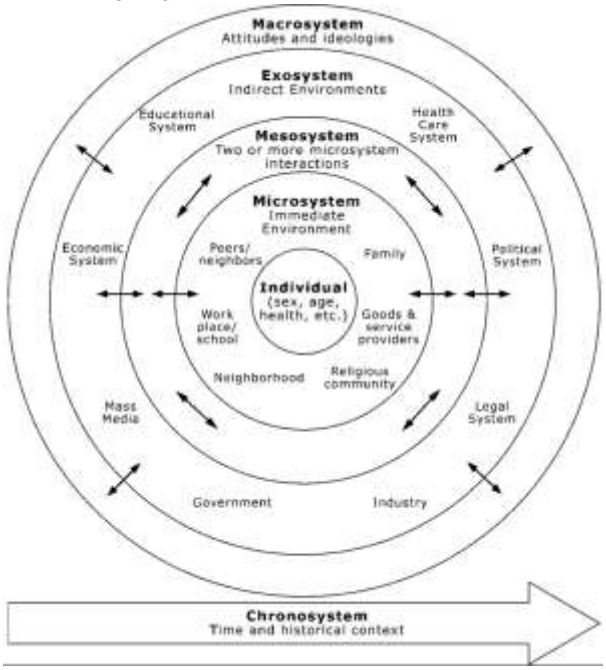
Key Concepts

Concept	Meaning
Interconnectedness	Elements within a system influence one another. A change in one part can affect the whole system.
Feedback Loops	The output of a system influences its own input. Positive feedback amplifies change, while negative feedback stabilizes the system.
Dynamic Systems	Systems change over time. Delays, developments, and long-term effects must be considered.
Holistic Perspective	A system is viewed as a whole, not just as a collection of separate parts.

Bronfenbrenner's Ecological Systems Theory

Bronfenbrenner's model explains that human development is shaped by multiple environmental and social influences. These influences are shown as concentric circles around the individual, representing different systems that interact with each other. The theory highlights that development does not happen in isolation but is affected by family, community, culture, and wider social contexts. It provides a holistic view of how these layers together shape human growth and development.

Video: Bronfenbrenner's Theory Explained



Linear Thinking vs. Systems Thinking

Systems thinking provides a broader and more realistic understanding of complex challenges.

Linear Thinking	Systems Thinking
Focuses on simple cause-and-effect chains	Focuses on relationships and interactions
Looks at isolated problems	Looks at the whole system
Often searches for one clear cause	Recognizes multiple causes and influences
May overlook long-term effects	Considers feedback, delays & change over time
Useful for simple problems	Useful for complex social, health, and organizational problems

3.2 A Systemic Perspective on Inclusion and Empowerment of Older Adults

From a systemic perspective, inclusion and empowerment in later life **depend on the interaction between family, community, healthcare, and policy systems.** These systems can either support or limit older adults' participation and autonomy. When they **promote respect, accessibility, and agency,** they can improve quality of life (Guy-Evans, 2025). Community-based interventions, such as mentoring, storytelling, and intergenerational activities, can strengthen belonging, social inclusion, and healthy aging (Ronzi et al., 2018).

Core Systems in the Lives of Older Adults

Family System: Provides emotional support, daily assistance, and a sense of identity. Family relationships can be both a source of strength and stress.
Community and Neighborhood: Offers opportunities for social interaction, civic engagement, and belonging. Local initiatives and accessible public spaces are key to fostering inclusion.
Healthcare System: Ensures access to medical care, prevention, and long-term support. Systemic barriers such as bureaucracy or ageism can limit participation and autonomy.
Policy and Legal Framework: Shapes the structural conditions for inclusion, social protection, and civic rights. Age-friendly policies can actively promote empowerment and reduce inequalities.

Key Activities that Promote Inclusion

Intergenerational Programs: Activities like reading to children, mentoring, or storytelling foster a sense of purpose and reduce age-based stereotypes.
Civic Engagement: Participation in local initiatives, volunteering, or citizen science projects enables older adults to contribute meaningfully and feel valued.
Peer Support: Support from peers fosters trust, mutual understanding, and strengthens social networks among older adults.

For older adults, activities are most effective when supported by interconnected systems. Community programs, policy support, and family involvement can reinforce each other and create stronger outcomes. Positive experiences, such as feeling valued in a volunteer role, can boost self-esteem and encourage continued participation. A systemic perspective also helps identify and reduce barriers like limited accessibility or digital exclusion.

Outcomes and Long-Term Effects

Improved Well-being

Research such as Ronzi et al. (2018) shows that social inclusion reduces depressive symptoms and improves both physical and mental health.

Reduced Social Isolation

Active participation and recognition help older adults feel more connected and less lonely.

Healthy Aging and Reduced Inequalities

Systemically designed interventions contribute to equal opportunities in later life and support active, self-determined aging.

Systematic Approach: Linking Inclusion and Empowerment for Older Adults
Building on the systemic perspective outlined above, this section explores how inclusion and empowerment can be operationalized across different levels of society. **Empowerment is not a one-size-fits-all solution—it must be tailored to the individual, group, and societal context in which older adults live.** When these levels are addressed in an integrated way, they reinforce each other and create sustainable pathways to inclusion.

1. **Individual Level: Personal Empowerment**

Challenge: Older adults may experience social isolation, reduced mobility, and a loss of purpose.
Empowerment Response: Provide tools, resources, and opportunities that allow them to:

- Make decisions about their own care and lifestyle.
- Regain a sense of control, self-worth, and independence. Example: Offering digital literacy training so older adults can connect with family and access services online.

2. **Group Level: Peer and Community Empowerment**

Challenge: Lack of meaningful social interaction and community engagement.
Empowerment Response: Foster inclusive peer groups and community activities that:

- Encourage mutual support and shared experiences.
- Promote active participation and collective identity. Example: Organizing peer-led walking groups or storytelling circles in community centers.

3. Societal Level: Structural Empowerment

Challenge: Systemic ageism and barriers to participation in public life.
Empowerment Response: Advocate for policies and practices that:

- Ensure access to resources, inclusive infrastructure, and representation.
- Recognize and value the contributions of older adults. Example: Campaigning for age-friendly urban planning or inclusive healthcare policies.

Empowering older individuals requires more than recognizing their needs - it involves creating opportunities for active participation and shared knowledge (Mulé & Gringrich, 2023).

Peer Groups & Peer Support
A peer group is a social group composed of individuals who share similar characteristics such as age, social status, interests, or life experiences. In psychology and sociology, peer groups are recognized as powerful agents of socialization and emotional support (Harring et al., 2010).

Key Characteristics

- Shared identity or life stage
- Regular interaction
- Mutual influence
- Emotional and social support

Peer Groups and the Elderly
Peer groups are important for older adults because they offer emotional support, reduce social isolation, and encourage active participation in community life. They can help older people cope with life transitions such as retirement, bereavement, or reduced mobility.
In both physical and online settings, peer groups promote social interaction, shared learning, and mutual encouragement. They also support mental well-being, independence, and a sense of belonging.
Examples include senior walking clubs, online forums for retirees, community activity groups, and peer-led support groups for chronic illness.

Multipliers

A multiplier is an individual who influences and activates others within their social or professional networks. In the context of health, education, or community development, multipliers are often trained individuals who pass on knowledge, motivate peers, and initiate change processes.
A multiplier is someone who, after receiving training or information, shares this knowledge with others in their community or peer group, thereby amplifying the impact of an intervention.
Multipliers are trusted individuals who act as bridges between institutions and communities, helping to translate knowledge into action and fostering local ownership (Pauls et al, 2024).

Key Characteristics

- Trusted by peers or community
- Able to communicate and motivate
- Often embedded in local networks
- Act as role models or facilitators

Multipliers and the Elderly

Multipliers play an important role in supporting older adults by sharing information, encouraging participation, and promoting digital inclusion. As trusted members of the community, they can relate to the experiences and concerns of their peers and help connect older adults with institutions and services.
They increase trust, strengthen program reach, support peer learning, and promote empowerment and community cohesion. Examples include retired teachers leading learning groups, seniors acting as digital ambassadors, and volunteer health educators in senior centers.

Citizen Science

Citizen science refers to the involvement of non-professionals in scientific research. Participants contribute to data collection, analysis, or dissemination, often in collaboration with academic or institutional researchers.
Citizen science is the practice of public participation and collaboration in scientific research to increase scientific knowledge. Through citizen science, people share and contribute to data monitoring and collection programs. Citizen science empowers individuals to engage with science in meaningful ways, fostering inclusion, education, and community engagement (Den Broeder et al., 2018; Fraisl et al., 2020; Fritz et al., 2022).

Key Characteristics

- Voluntary participation
- Collaboration with researchers
- Focus on real-world issues
- Accessible to non-experts

Citizen Science and the Elderly

Citizen science offers older adults opportunities to use their life experience, local knowledge, and time in meaningful research projects. Participation can support lifelong learning, cognitive stimulation, social inclusion, and a stronger sense of purpose.

Older adults may contribute by monitoring biodiversity or air quality, taking part in health studies, or sharing memories in oral history projects.

However, citizen science also involves challenges, such as ethical issues, research bias, and data quality. Therefore, inclusive methods, clear guidance, and suitable training resources are important for effective participation.

3.3 Good practice examples

The United Nations Decade of Healthy Ageing (2021–2030) is a global collaboration aligned with the final decade of the Sustainable Development Goals (SDGs). Its aim is to **improve the lives of older people, their families, and the communities in which they live—by addressing the social, environmental, and institutional systems that shape the experience of ageing.**
This initiative represents a systemic approach to ageing by involving multiple stakeholders, including governments, civil society, organizations, academia, the private sector, and the media. Together, they work to create broader and more coordinated support for older adults.

The Decade focuses on four key pillars that reflect a holistic and systemic strategy:

1. **Creating age-friendly environments -** Designing communities that support mobility, inclusion, and safety.
2. **Combating ageism -** Challenging stereotypes and promoting respect for older people.
3. **Providing integrated care -** Ensuring that health and social care systems work together across the life course.
4. **Ensuring access to long-term care -** Supporting those who need assistance with daily living in a dignified and sustainable way.

These pillars go beyond individual interventions. They address the broader structures that influence health, inclusion, and resilience in older age—making the Decade a model for systemic, rights-based, and inclusive ageing policy.

Film: Alive Inside: A Story of Music and Memory**:** The documentary Alive Inside: A Story of Music and Memory (2014) offers a compelling real-world example of how systemic approaches can transform the care of older adults—particularly those living with dementia.
Podcast: Eliminating the Barriers Between Care Levels – and People**:** For a deeper exploration of person-centered care, listen to this episode of the Elevate Eldercare podcast. It presents a vision for care that breaks down institutional silos and centers the individual—emotionally, socially, and systemically.

Summary of the Contents Covered

- This course introduced the key concepts of inclusion, empowerment, and systemic approaches in the context of ageing.
- **Inclusion** was presented as a foundation for creating fair and supportive environments for people of all ages, abilities, and backgrounds. The course showed that inclusion means more than access: it also involves belonging, recognition, and participation.
- **Empowerment** focused on supporting older adults' autonomy, decision-making, and active involvement in society. Learners reflected on how professionals can promote self-determined ageing through respectful and resource-oriented practices.
- **The systemic perspective** highlighted how social, institutional, and political structures influence inclusion and empowerment. Practical examples such as peer support, citizen science, and multipliers showed how participation and structural change can be strengthened.
- Overall, the course helped learners connect theory with practice and develop tools to promote inclusion and empowerment in later life.

Assessment

Assessment Type	Written assignment
Pass Mark / Criteria	Pass mark 50%

Imagine you are part of a community team tasked with involving older adults in a local climate adaptation or resilience-building project. Your goal is to design a small-scale initiative that is both practical and systemically aware—meaning it considers not only individual actions, but also how these actions connect to broader structures (e.g. policies, institutions, social norms, or environmental systems).

Write a proposal (500–600 words) that includes the following elements:

5. **Goal**
   What is the main aim of your initiative? What challenge or opportunity does it address?
6. **Form of Participation**

How will older adults be involved? (e.g. peer groups, workshops, citizen science)

7. **Support Structure**

What resources, partnerships, or tools will support participants? (e.g. local NGOs, digital platforms, multipliers, training)

1. **Systemic Perspective**

How does your initiative connect to larger systems?

- Does it align with local or national policies?
- Does it address social inequalities or environmental justice?
- Does it aim to influence institutions or long-term change?

8. **Expected Impact**

What are the anticipated outcomes—both for older adults and the wider community? What changes do you hope to see?

Optional Additions:

- Creative Name: Give your initiative a meaningful or catchy title.
- Visual Element: Include a simple sketch, infographic, or concept map.
- Reflection: Briefly reflect on what you learned about ageing, inclusion, empowerment, and systems thinking through this task.

References & Materials

Projects	Videos	Podcasts
Cycling Without Age Kairos Alive! ONEgeneration Senior Synergy AliVe Elders Climate Action KlimaSeniorinnen Schweiz COALESCE The Elders HelpAge International United Nations Decade of Healthy Ageing (2021–2030)	The Evolution of Inclusion Removing the Barriers: Planning for ALL! Promoting Independence – Empowering Seniors to Lead a Fulfilling Life Active Ageing – Inspiring Stories from Two Remarkable Seniors Alive Inside: A Story of Music and Memory	Diverse Matters – Episode Three: Age Inclusion Elevate Eldercare Podcast Eliminating the Barriers Between Care Levels – and People

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