The Prevalence of Self-Reported Hearing Loss in Munster

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CARL Research Project
in collaboration with
Deaf Enterprises

CARL
COMMUNITY - ACADEMIC
RESEARCH LINKS
University College Cork, Ireland

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- provide their services on an affordable basis;
- promote and support public access to and influence on science and technology;
- create equitable and supportive partnerships with civil society organisations;
- enhance understanding among policymakers and education and research institutions of the research and education needs of civil society, and
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Abstract

Background: Hearing loss can have a profound impact on individuals and their families. It can result in negative consequences on quality of life, interpersonal communication, educational attainment and employment opportunities. There is a clear deficit of epidemiological research on prevalence of hearing loss in Ireland. This study was completed on behalf of Deaf Enterprises through the Community Academic Research Links (CARL) programme in University College Cork (UCC).

Research Aim: This research aims to describe the prevalence of self-reported hearing loss in Munster, Ireland.

Research Objectives: To extract and descriptively present all information on persons who self-reported a hearing loss, the educational attainment and labour force participation of this population

Methods: To extract and descriptively present all information on self-reported hearing loss data mined the Census 2011 and 2016, Irish Health Survey (IHS) 2015, and National Disability Survey (NDS) 2006.

Results: The National figure of self- reported Deafness or Serious Hearing Impairment has risen from 92,060 in 2011 to just over 103,000 in the Census 2016. Munster has the second highest prevalence of self-reported Deafness or Serious Hearing Impairment of all provinces. Those who self-reported Deafness or a Serious Hearing Impairment in Ireland had the highest labour force participation rate and the lowest unemployment rate of all disabilities.

Conclusions: The rising prevalence of hearing loss in Ireland is crucial to informing enablement organisations like Deaf Enterprises so that they can effectively plan and deliver services based on the need and profile skills of the Deaf and hard of hearing community in Munster.

Keywords: Hearing loss, Deaf and hard of hearing, educational attainment, labour force participation, Irish Sign Language, self-reported hearing loss

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My sincere thanks and appreciation to my supervisor Dr Siobhan Laoide Kemp for her guidance throughout this project.

I would like to thank the Community Academic Research Links, particularly Anna Kingston for giving me the opportunity to undertake this research.

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Abbreviations

CARL-Community Academic Research Links
WHO-World Health Organisation
ICF-International Classification of Functioning
PCHI-Permanent Childhood Screening Impairment
GDB-Global Burden of Disease
NSHP-National Screening Hearing Programme
NARG-National Audiology Review Group
HSE-Health Service Executive
NRB-National Rehabilitative Board
CSO-Central Statistics Office
IHS-Irish Health Survey
CARL- Community Academic Research Link
CSO- Civil Society Organisation
ISL-Irish Sign Language
NDS-National Disability Survey
NHANES- National Health and Nutrition Examination Survey
SP-Specificity
SE-Sensitivity

Definitions and Terms used in this Research: Hard of hearing will include all persons who have a hearing loss either in one ear of both regardless of the severity of that hearing loss. “Deaf” includes those persons who belong to the Deaf Community. The term ‘Deafness or Serious Hearing Impairment’ will be used when describing results obtained from the Census. The term Hearing Disability will be used when describing results from the NDS.

Chapter 1- Introduction

1.1 Outline

This research explores the prevalence of self-reported hearing loss in Munster. This is the first project of its kind in Ireland. Chapter 1 will outline why this research was carried out and provide background information on the organisation Deaf Enterprises. The research rationale, aims and objectives it hopes to achieve, will also be introduced.

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1.2 Research Rationale

This research was completed on behalf of Deaf Enterprises through the Community Academic Research Links (CARL) programme in University College Cork (UCC). CARL is an initiative in UCC which contributes to Civil Society Organisations (CSO) with research they hope to carry out. (See Appendix I for more detailed information as to the CARL process). Applications from students are requested to undertake the research and are assigned based on the application criteria. Following deliberation of topic outlines, Deaf Enterprises, the University supervisor and CARL representative approved the topic '*The Prevalence of Self-Reported Hearing Loss in Munster'*. This area has not been looked at before from an Irish perspective. A copy will be provided to Deaf Enterprise's, along with a PowerPoint presentation to Deaf Enterprises committee. It will also be published on UCC's website.

1.3 Agency Profile: Deaf Enterprises

Cork Deaf Enterprises has been providing training and employment to Cork's Deaf community for the last 28 years, and has evolved a lot since it was founded by Fr. Bill Clarke. It is a not-for-profit charitable company, and Ireland's only dedicated employer of members of the Deaf and hard of hearing community. It was established to tackle the high rates of unemployment among Cork's Deaf community and continues to address many challenges, especially the lack of available employment opportunities for this population, but has also been involved in many different programs throughout its history. Their Workshop launched in 1988 for furniture

manufacturing, french polishing, sewing, re-upholstery and restoration. Training was then approved by FÁS in 1989 followed by charitable status and was incorporated as a limited company in 1989. Both Sign-Language and English are used for communication in the workshop. Over 100 deaf people have taken part in the employment, training and work experience offered by the company since its establishment and most have went on to find employment elsewhere. At present, they employ 21 people (18 deaf and 3 hearing people). Their vision involves providing employment opportunities, both directly within Deaf Enterprises and indirectly with other partner organisations, for the Deaf and hard of hearing community between the ages of 18 and 65 in Ireland (Deaf Enterprises, 2016, 2017).

1.4 Research Aims and Objectives

This research aims to describe the prevalence of self-reported hearing loss in Munster and Ireland.

1.4.1 Research Aims

1. To investigate the need for data on the prevalence of hearing loss in relation educational attainment and employment opportunities.
2. To determine if the tools we utilize to capture this data are inclusive for both Deaf and hard of hearing communities.

1.4.2 Research Objectives

1. To complete a literature review which will provide a clear understanding of the importance of the collection of prevalence data on hearing loss, data available on hearing loss in Ireland and the robustness of self-reporting as an objective health measure.
2. To extract and descriptively present all information on self-reported hearing loss, the educational attainment and labour force participation of this population from the Census 2011 and 2016, Irish Health Survey (IHS), and National Disability Survey 2006.

3. To present the findings to Deaf Enterprises, UCC Carl Committee and UCC MSc Audiology 2016/2017 cohort of students.

Chapter 2- Literature Review

2.1 Outline

This chapter will outline the impact and distribution of hearing loss, the importance of estimating prevalence of hearing loss in Ireland and the reliability of self-reporting versus objective hearing measures. The educational attainment and employment opportunities of Deaf and hard of hearing persons will also be discussed. These aspects will contribute to the aim of this research.

2.2 Impact of Hearing Loss

"Deafness separates people from people" a widely renowned quote, from the deaf-blind American author Helen Keller. Hearing loss can have profound effects on both individuals and their families. Commonly and irrespective of the age at which it develops, disabling hearing loss can have negative consequences for interpersonal communication, psychosocial well-being, quality of life, daily function and economic independence (Kotby, Tawfik, Aziz, & Taha, 2008; Mason & Mason, 2007). Childhood hearing loss impedes speech and language development leading to inability to interpret speech sounds, reduced ability to communicate, and could possibly set the affected children on a trajectory of insufficient educational and vocational accomplishment (Karchmer & Allen, 1999; Schroeder et al., 2006; Venail, Vieu, Artieres, Mondain, & Uziel, 2010). While childhood hearing loss has more serious implications due to its potential for interfering with language acquisition, it is far less common than adult onset hearing loss (Stevens et al., 2013).In adulthood, disabling hearing loss can lead to embarrassment, loneliness, social isolation and stigmatization, prejudice, abuse, psychiatric disturbance, depression, difficulties in relationships with partners and children, restricted career choices, occupational stress and relatively low earnings (Mohr et al., 2000; Ruben, 2000; Shield, 2006).

2.3 Distribution of Hearing Loss

Although population based research that aims to quantify hearing loss remain rare, it continues to be a principal cause of disease burden (Stevens et al., 2013). In 1985, when the global prevalence of hearing loss was first estimated, 42 million people – 0.9% of the world's population – were considered to having disabling hearing loss. The estimated number of people with such loss had more than doubled, by 1995 to 120 million – or 2.1% of the world's population – together with about 70 million adults and 8 million younger individuals in developing countries (A. Smith, 2003; A. W. Smith, 2001).This upward trend increases to 360 million people thought to have disabling hearing loss in 2011, approximately 32 million were children younger than 15 years and, of these, 7.5 million were younger than 5 years (World Health Organisation, 2012). In recent times, the Global Burden of Disease Hearing Loss Expert Group projected and adapted a categorization of hearing loss. According to this classification, about 538 million people older than 5 years have disabling hearing impairment (Stevens et al., 2013).Using 26 population-based studies of adults worldwide and 12 studies of children, the most recent GBD study estimated that adult onset hearing impairment was the third leading cause of disability (World Health Organsiation, 2008). Despite limited data in Ireland, hearing impairment deserves considerable attention and estimating the increasing prevalence of hearing loss is an imperative public health and societal concern.

A National review of audiological services was commissioned in 2011 but did not have any Irish prevalence data on hearing loss to include in the report. Instead prevalence data from the UK, US and Europe was utilised. According to the Review prevalence of permanent bilateral moderate or greater hearing impairment at birth is approximately 1 to 1.20 per 1,000. By the age of 14 years, the prevalence of hearing loss is estimated at 4 per thousand, or approximately 3,500 children (Health Service Executive, 2011).

2.4 The Significance of Estimating Hearing Loss Prevalence

It is imperative that prevalence data on deafness be collected. Estimating hearing loss prevalence and trends are fundamental to understanding and describing the scope of issue. Historically, hearing studies have relied on convenience or clinical samples and, often, just on self-reported hearing disability. Epidemiological landmark studies, such as the *British National Study of Hearing* (1995), estimated prevalence of self-reported hearing disability and measured hearing impairment as a function of age in the adult population of Great Britain (GB) through two 2-stage surveys including accurate audiological assessment at the second stage. This pioneering study by *Davis* (1995) provided accurate estimates of the problem which led to a true assessment of the impact, and then service provisions can be appropriately targeted. In general, available estimates of the prevalence of hearing loss remain crude because many countries struggle to conduct relevant population-based surveys using standardized protocols and classification methods (Olusanya, Neumann, & Saunders, 2014).On-going population-based studies provide valuable information in prevalence trends of hearing loss which allow comparisons between health outcomes, geographical areas, gender and age that can be monitored within and between populations, provided that similar methodologies are used. What methodologies are employed remains the question. There are no standardized approaches to measuring hearing loss which is agreed by many (e.g.(Davis & Davis, 2010; Hannula, Bloigu, Majamaa, Sorri, & Maki-Torkko, 2011; Kamil, Genther, & Lin, 2015). Additionally, the disparities in population-based surveillance attempts applicable to hearing loss include insufficient knowledge about variations in the incidence of hearing loss among and across racial and ethnic populations, and across geographic areas. Inadequate knowledge is evident about the effect of hearing loss on employment, quality of life, social function, independence, and the need for social services (National Academies of Sciences, 2016).

In Ireland, there has been one study describing '*The Epidemiology of Childhood Hearing Impairment in South-East Ireland*' completed by *Pitt* and the National Rehabilitative Board (NRB) in 1996 over ten years previous. This was a retrospective study of the NRB Hearing Service assessment records of over 6,000 children who had attended clinics in seven counties in South-East Ireland from 1986. Data on referral trends and assessment outcomes was mined for all children. In the

case of children with long-standing hearing problems, supplementary data was extracted to permit an assessment of aetiological and epidemiological trends in childhood hearing impairment. This study was a milestone of its time, it provided a useful evaluation of the possible future application of a computerised audiology records system to facilitate research, as well as identifying the clear need for more standardised record-keeping (Pitt, 1996). As this study is over ten years old, the evidence to strengthen efforts to collect, analyse and distribute prospective population based data on hearing loss within an Irish context is surely evident.

2.5 Self-Reported Hearing Loss as an Objective Hearing Measure

Self-reported hearing loss is routinely used to measure objective hearing loss in both clinical situations and research studies. There are very few population-based epidemiological studies on the accuracy of self-reported hearing loss versus objective hearing health. Large scale epidemiological studies have routinely used self-report to estimate prevalence of hearing loss. Clinicians and researchers frequently use patient-reported assessments of hearing loss rather than objective audiometric assessments for accessibility. Concordance of subjective assessments of hearing in comparison to audiometric assessments have been explored in multiple studies typically using measures of sensitivity, specificity, positive and negative predictive value, these studies have produced varying results (e.g.(Kiely, Gopinath, Mitchell, Browning, & Anstey, 2012; Sindhusake et al., 2001; Valete-Rosalino & Rozenfeld, 2005) .However, measures of sensitivity/specificity and positive/negative predictive values do not explicitly inform the clinician or investigator about the overall accuracy of subjective assessments of hearing and whether individuals may preferentially under or overestimate their hearing impairment (Kamil et al., 2015). Conversely, *Hannula et al* (2011) have shown that the relationship between self-reported hearing difficulties and measured hearing thresholds is unclear and found that self-reported hearing difficulties are more frequent than hearing impairment defined by audiometric measurement (Hannula et al., 2011). An Australian study called: The Blue Mountains Hearing Study, assessed the accuracy of self-reported hearing loss, its Se and Sp were 71% and 72% respectively (Valete-Rosalino & Rozenfeld, 2005) ,while the Epidemiology of Hearing Loss Study ,carried out in the United States, found quite similar results (Se=71%; Sp=71%) (Nondahl et al., 1998).

Likewise, researchers who rely on self-reported hearing loss should be aware that common demographic factors may differentially affect perceptions of hearing loss and could substantially bias any observed analytic results (Kamil et al., 2015).Clinical research often relies on self-reported hearing data based on the assumption that self-reporting is a reasonable surrogate measure of objective hearing. *Kamil et al* (2015) call this supposition into question and demonstrate potential factors that may lead to bias. They examined 3,557 in the National Health and Nutrition Examination Survey (NHANES) they found the relationship between subjective and objective hearing ability varies in accuracy across gender, age, race/ethnicity, and education. These findings should be considered by both clinicians and researchers using self-reported hearing assessments to inform clinical decisions and interpret research studies (Kamil et al., 2015).

Audiometry is the gold standard for evaluation of hearing loss, but large-scale use of the procedure involves operational difficulties. Although self-reports of hearing loss have been recognized as effective in terms of forecasting the negative outcomes of hearing loss (e.g.(Yamada, Nishiwaki, Michikawa, & Takebayashi, 2012), the degree to which such tests can accurately measure hearing impairment related with objective hearing measures is not completely clear (Hannula et al., 2011).

2.6 Educational Attainment

Although information is available on the education of deaf and hearing-impaired students throughout their school years and into college, very little information exists about their career and college readiness or how school experiences impact their consequent development, growth, and success in college and the workplace (Kelly R, 2015; Nagle, Newman, Shaver, & Marschark, 2016). Studies have shown that, compared with their hearing peers, deaf and hearing impaired students often cross the threshold into secondary school, college, and the workplace moderately ill-equipped for the realities of 21st century working (Kelly R, 2015; Marschark, Shaver, Nagle, & Newman, 2015).In Scotland for example, evidence shows that, in comparison to school leavers with no additional support needs, deaf school leavers were more likely to leave school with no qualifications (8.9% compared with 1%), and were less likely to qualify for entry into higher education (Action on Hearing

Loss: Scotland, 2015). Similarly in the England, nearly two-thirds of deaf children (64%) failed to achieve the Government benchmark of five GCSEs (including English and Maths) at grades A* to C, compared with less than half (43%) of all pupils (National Deaf Children's Society, 2014). There is little uncertainty that joining today's modern workforce is a multifaceted effort for any student, and increasingly for deaf and hard of hearing students. It has been said that any degree of hearing loss, despite severity or the presence of additional disabilities, puts students at risk for inferior academic achievement (e.g., (Blanchfield, Feldman, Dunbar, & Gardner, 2001; Goldberg & Richburg, 2004; Moeller, Tomblin, Yoshinaga-Itano, Connor, & Jerger, 2007).

2.7 Employment Opportunities

Deaf and hard of hearing children have been educated in mainstream education now for decades and being thereby integrated with the hearing community. However, the employment needs of the Deaf and hard of hearing community are still not being completely adopted. This is evidenced by the generally acknowledged lack of available employment opportunities for them in Ireland. An increasing number of people with hearing loss are seeking help for occupational problems (Kramer, 2008). There is little doubt that joining today's modern workforce is a complex endeavour for any student, and even more so for deaf students. Reasons cited in the literature for occupational difficulties of individuals who are deaf consist of the insufficient understanding of employers concerning officially authorized directives and suitable accommodation (Bowe, McMahon, Chang, & Louvi, 2005; Houston, Lammers, & Svorny, 2010; McCrone, 2011) communication difficulties (Haynes, 2014; Houston et al., 2010) and inadequate academic training (Luft, 2012; Luft & Huff, 2011). It is difficult to draw conclusions about the employment achievement of deaf and hard of hearing people, while differing in their needs from deaf students who use sign language, adolescents who are hard of hearing experience difficulties not faced by their hearing peers. People with hearing loss consistently cite the attitude of employers as the most significant barrier to employment. It is not their hearing loss that prevents people from working – rather it is the lack of understanding and awareness on the part of others as to what deaf and hard of hearing people can do (Baker M, 2006)

2.8 Neonatal Screening

It is well established that permanent childhood hearing impairment (PCHI) has a detrimental influence on speech and language development and delayed diagnosis can lead to significant harm for children and their families. With NHSP, diagnosis and intervention occur earlier; and earlier intervention translates to improved language outcomes (Patel & Feldman, 2011). The Newborn Hearing Screening Programme for Ireland (NHSP-Ireland) was introduced across the country in a phased and nationally systematic process between 2011 and 2014 with full execution achieved in 2014 in the mid-west region in Ireland. It was also highlighted that future research needs to encompass a wider range of outcomes and to assess the impact of NHSP in adolescents and young adults. It is widely supported that early intervention is vital and information regarding outcomes is key (e.g.(Lloyd-Puryear & Brower, 2010; Moeller et al., 2007; Pimperton & Kennedy, 2012; Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998).

Chapter 3-Methodology

3.1 Outline

This chapter will outline the methodological approach engaged in carrying out this research and will explain the secondary research methods used to undertake this investigation. This study was carried out with the on-going participation of Deaf Enterprises. The scope of this chapter will describe the three sources of data utilized in this research. It will then illustrate the relevance of this data to achieve the author's research aim and objectives. It will also explain how the data was collected and distributed.

3.2 Methodological Approach: Quantitative Descriptive Research Design

A quantitative descriptive research design was employed for this study. When meeting with Deaf Enterprises they required descriptive statistics on the prevalence of hearing loss in Munster. They further required information on the educational attainment and labour force participation of the Deaf and hard of hearing community in this area. The data will be presented in numerical form such as percentages hence why quantitative techniques were employed. Descriptive research measures the sample at a moment in time and illustrates the sample's demography (Creswell, 2013). This was appropriate as all demography data relating to Deaf and hard of hearing individuals was required to fulfil this study's aim. This analysis will draw data on self-reported hearing loss mined from the Census 2011 and 2016, the National Disability Survey (NDS) 2006, and the Irish Health Survey (IHS) 2015. It will describe prevalence of self-reported hearing loss in Munster and Nationally. It will then aim to describe the educational attainment and labour force participation of those who self-reported Deafness or Serious Hearing Impairment or Hearing Disability.

3.3 The Census

The Census is a comprehensive description of everybody who is in the country on census night, simply it is study of every unit, everyone or everything, in a population. It is known as a complete enumeration. All households in Ireland are required to enter their details on a census form. The results offer valuable information on a range of different questions relating to households and individuals, where and what people work at, how people travel to work, school and college, languages spoken, health, disabilities, families, and housing. On the 1st November 2012, The Central Statistics Office (CSO) published a document entitled Profile 8"*Our Bill of Health*" which examines in more detail the definitive results of Census 2011 in relation to health, disability and carers in Ireland (Central Statistics Office, 2016).The Census includes larger samples that are more demonstrative of the target population and this can achieve greater external validity. Question 16 asked individuals if they suffer from Deafness or Serious Hearing Impairment. All persons who answered yes to this question were included in this study. Question 15 allowed the Irish Sign Language population to be captured. It was vital to include this population because ISL users will have different educational and labour force requirements than hard of hearing individuals. This analysis aimed to capture all data from both Deaf and hard of hearing communities. The interactive tables for this profile used in this study are published online at http://www.cso.ie/en/census/interactivetables/. This gives us an opportunity to update the population estimates of the number of individuals with a self-reported hearing loss. Both questions can be seen in Appendix II.

3.4 The Irish Health Survey (IHS) 2015

The Irish Health Survey (IHS) is the Irish version of the European Health Interview Survey (EIHS) conducted by the CSO. This survey fulfils the need for public health policies to obtain reliable data on health status, health care usage and health determinants. It allows for health comparisons to be made across Europe (Central Statistics Office, 2015). The questions relating to the sensory disability deafness (question 9 and 10) were not published. An effort was made through personal

communication with the statistician involved in the IHS to retrieve this information. Individuals households were randomly selected and persons within the households to represent the whole country. The sample is therefore designed to be fully representative of the country. Questions 9 and 10 are available in Appendix V.

3.5 The National Disability Survey 2006

The National Disability Survey (NDS) 2006 was conducted by the CSO and provides an inclusive analysis of the situation of persons with a disability or longstanding health condition. This source was chosen because it includes questions on hearing ability. The NDS builds on the information relating to disability obtained in the Census of population in April 2006. It was a landmark in terms of its in-depth information about people with disabilities. The results are envisioned to inform and plan services for people with a disability. A small number of persons without a health condition were included for completeness and comparison intentions. Around 17,000 persons across all ages were personally interviewed. A person was classified as having a disability if they indicated that they had a moderate or more severe level of difficulty (Central Statistics Office, 2006; Watson & Nolan, 2011). The full report can be accessed from: http://www.cso.ie/en/media/csoie/releasespublications/documents/otherreleases/nationaldisability/National_Disability_Survey_2006_First_Results_full_report.pdf. The disability threshold for hearing disability can be found in Appendix III.

3.6 Ethical Considerations

The Census 2011 and 2016, The Irish Health Survey 2015 and The National Disability Survey, 2006 are all archival data therefore published data are exempt from ethical approval.

Chapter 4-Results

4.1 Outline

This chapter analyses the findings gathered from the three sources described in the methods chapter. The results will be categorised under the following four headings:

1. Prevalence
2. Educational Attainment
3. Labour Force Participation
4. Mode of Communication: Irish Sign Language

They are grouped in this way to systematically describe all information on prevalence of self-reported hearing loss in Munster and Nationally mined from the three data sources outlined in the methods chapter.

4.2 Prevalence

4.2.1 National Figure for Self-Reported Deafness and Serious Hearing Impairment: Census 2011

In the 2011 census, there were 92,060 people with Deafness or Serious Hearing Impairment in Ireland (Figure 1). This signifies that 1 in 43 people in Ireland are Deaf or have a Serious Hearing Impairment or 2% of population have hearing difficulties.

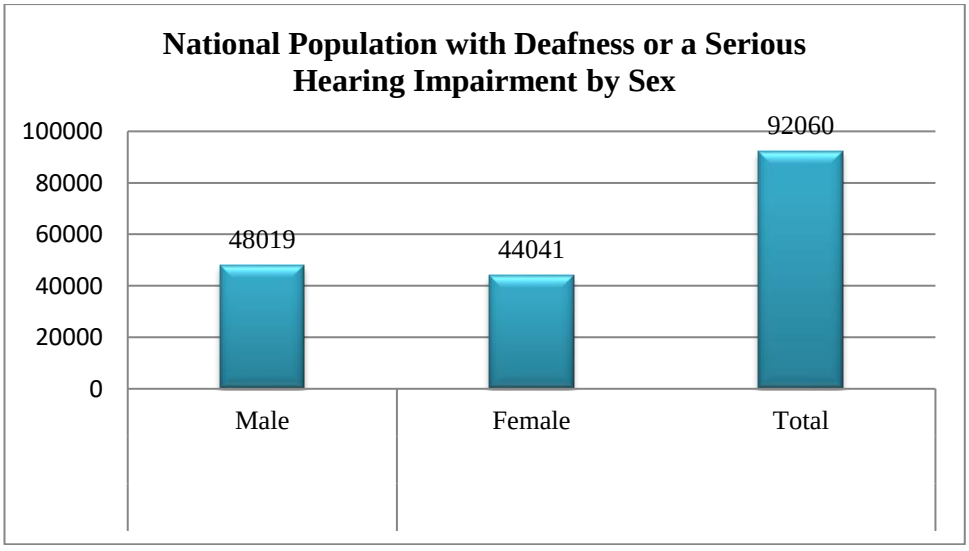

Figure 1: National Figure for Self-Reported Deafness or Serious Hearing Impairment by Sex

4.2 2 National Figure for Self-Reported Deafness and Serious Hearing Impairment: Census 2011 & 2016

Figure 2 illustrates the self-reported Deafness or Serious Hearing Impairment from both the Census 2011 and Census 2016.

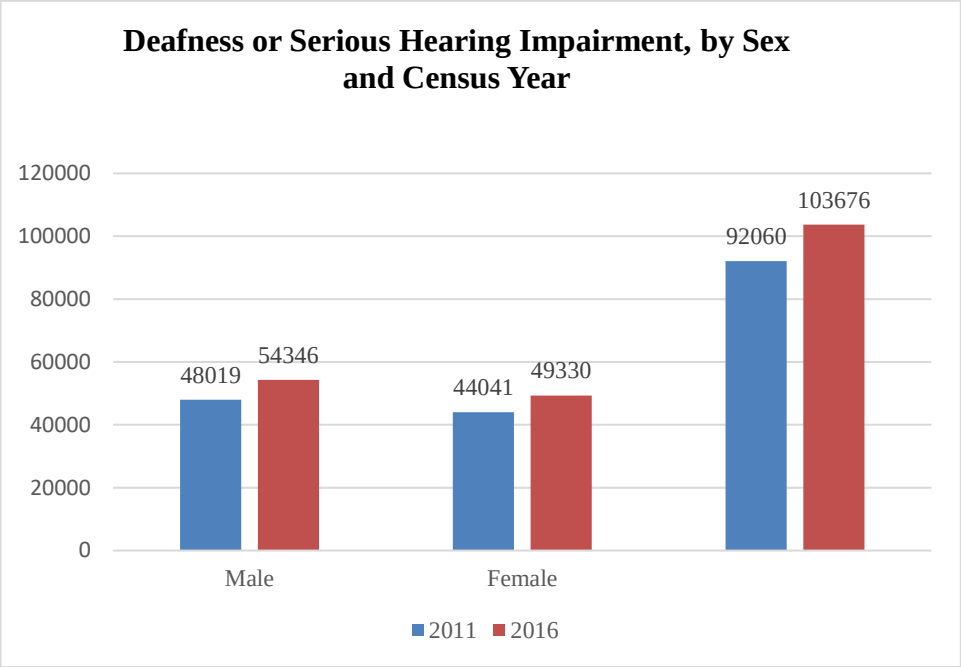

Figure 2: Persons with Deafness or a Serious Hearing Impairment in Census 2011 and 2016 by Sex

4.2.3 Prevalence in Munster: Census 2011

Figure 3 shows percentage of individuals with self-reported Deafness or Serious Hearing Impairment for each county in Munster.

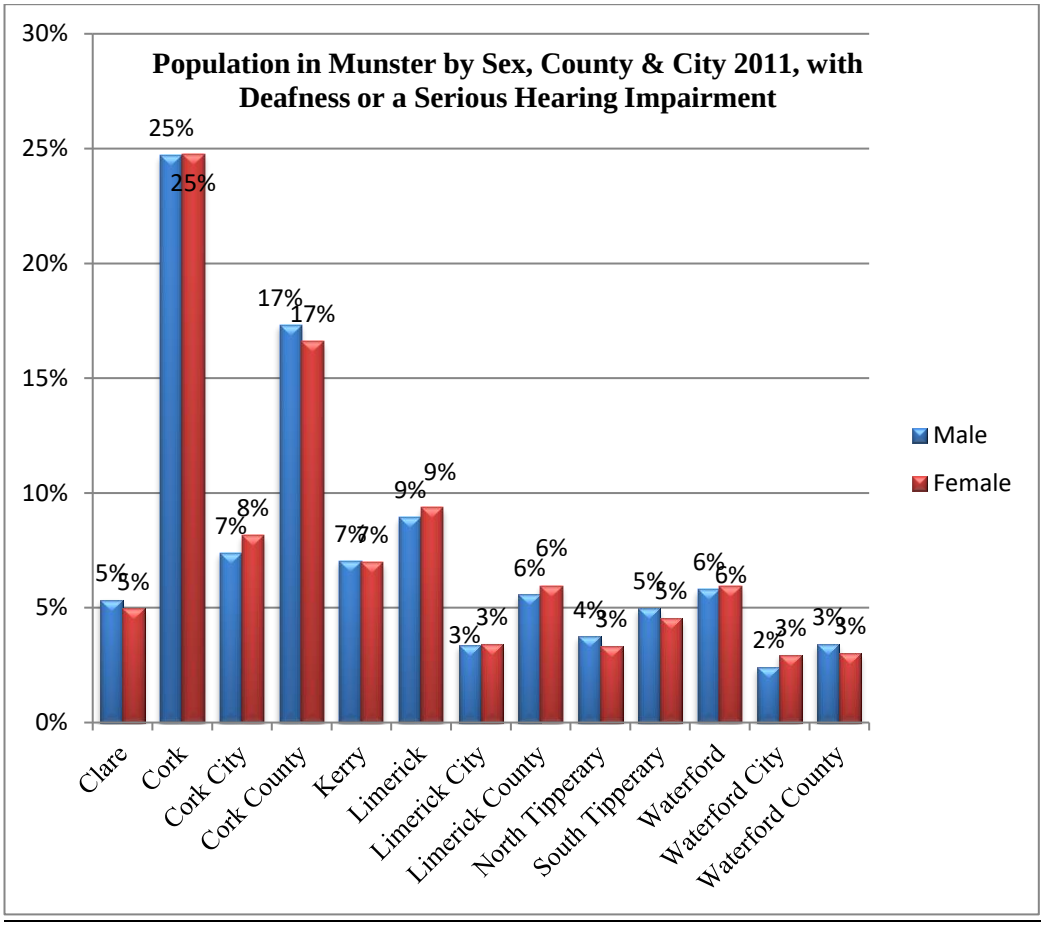

Figure 3: Population in Munster by Sex, Province County & City 2011, with Deafness or a Serious Hearing Impairment

Figure 4 shows persons in Munster compared to other Provinces with Deafness or Serious Hearing Impairment by sex. A total of 26,224 self -report Deafness or Serious Hearing Impairment in Munster.

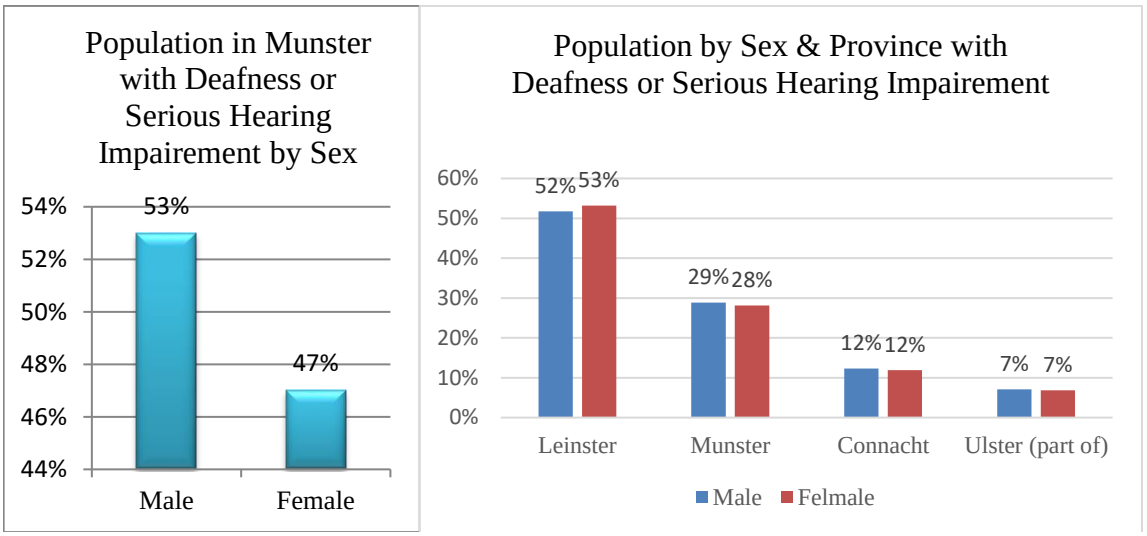

Figure 4: Population in Munster compared to other Provinces with Deafness or Serious Hearing Impairment by Sex

Figure 5 shows persons in Munster with Deafness or Serious Hearing Impairment by age group & sex.

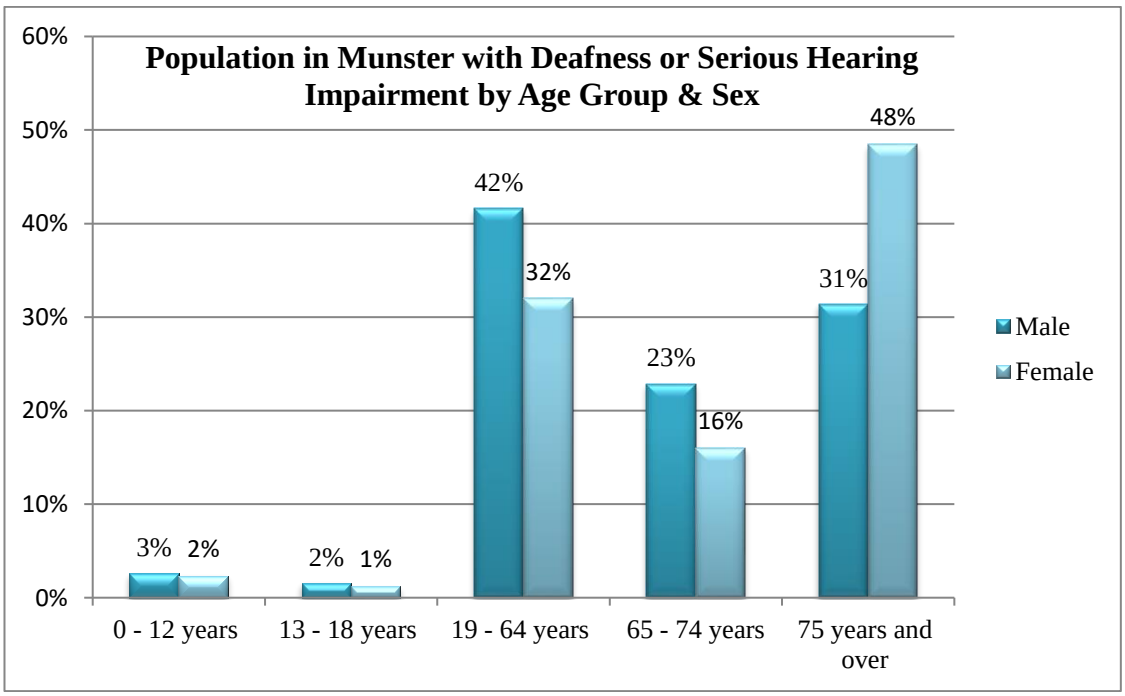

Figure 5: Population in Munster with Deafness or Serious Hearing Impairment by Age Group & Sex

4.2.4 National Prevalence of Hearing Disability: National Disability Survey 2006

The following tables report national prevalence of hearing disability from the NDS 2006. Table 1 reports national figures for individuals who reported a hearing disability in the NDS by age group, sex and level of difficulty**.**

Table 1:National Number of Persons with a Hearing disability by Level of Difficulty Age Group and Sex

				% of sex/age group	
Age Group	A moderate level	A lot of difficulty	Cannot do at all	Total Person	Persons
Persons	61	36	3	100	57,600
Males	62	35	3	100	28,600
Females	60	36	3	100	29,000
0-17	78	18	4	100	3,000
18-34	64	27	9	100	3,400
35-44	59	35	6	100	3,900
45-54	64	30	7	100	6,500
55-64	61	37	2	100	9,100
65-74	61	38	1	100	9,300
75 &over	58	40	2	100	22,100

Table 2 reports national figures for persons with a hearing disability by age group, sex and level of difficulty.

Table 2:National Number of Persons with a Hearing disability by Level of Difficulty Age Group and Sex

				% of sex/age group	
Sex	A Moderate Level	A lot of Difficulty	Cannot do at all	Total	Persons
Males	62	35	3	100	28,600
0-17	77	21	3	100	1,800
18-64	61	34	5	100	13,000
65 & over	60	39	1	100	13,900
Females	60	36	3	100	29,000
0-17	79	16	6	100	15,000
18-64	63	32	5	100	10,000
65 & over	61	38	2	100	17,600

4.3 Education

Figure 6 shows the National figures of self-reported Deafness or Serious Hearing Impairment population who attained a third level qualification, by sex, and field of study from Census 2011.

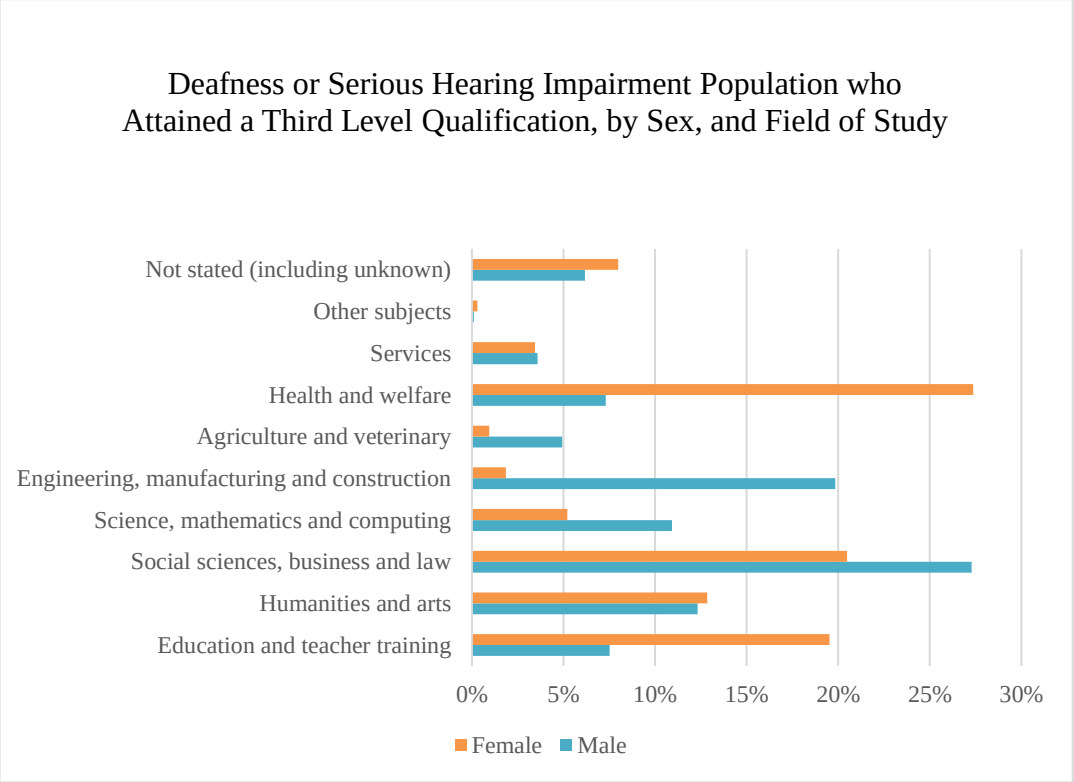

Figure 6: Deafness or Serious Hearing Impairment Population who attained a Third Level Qualification, by Sex, and Field of Study

Figure 7 reports the national figures for Deafness or Serious Hearing Impairment population aged 15 and over with the highest level of education completed by sex from Census 2011.

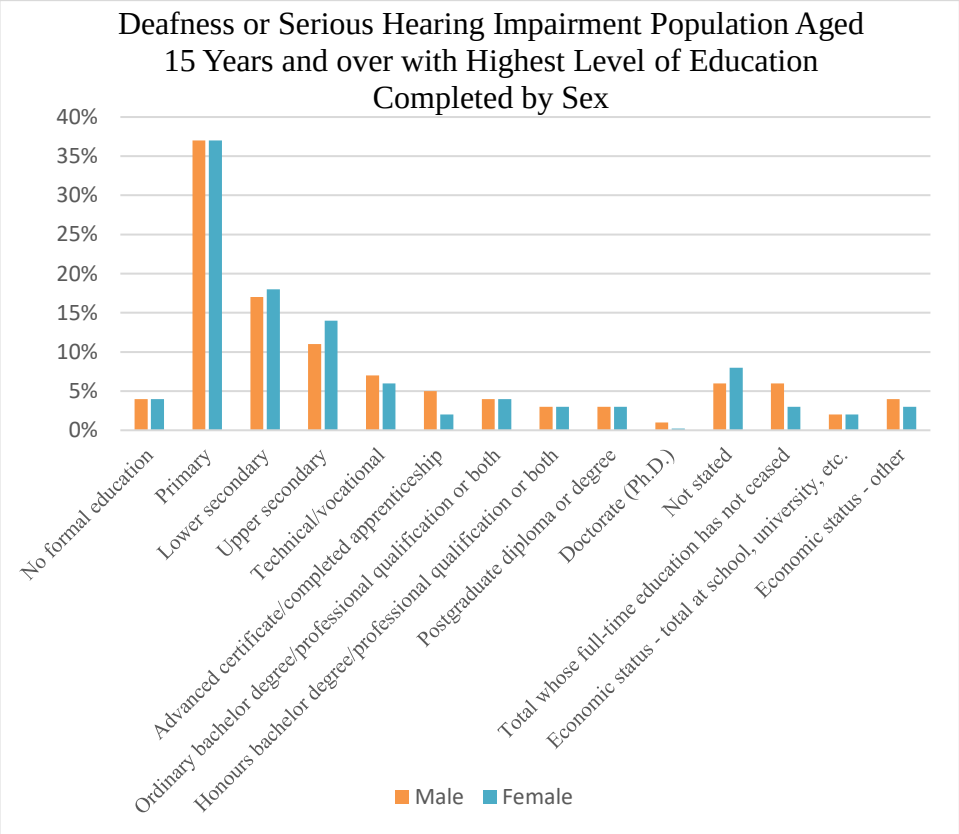

Figure 7: Deafness or Serious Hearing Impairment Population Aged 15 Years and over with Highest Level of Education Completed by Sex

4.4 Labour Force Participation

The labour force participation rate for those aged 15 to 64 with each type of disability is shown in figure 8 from the Census 2011.

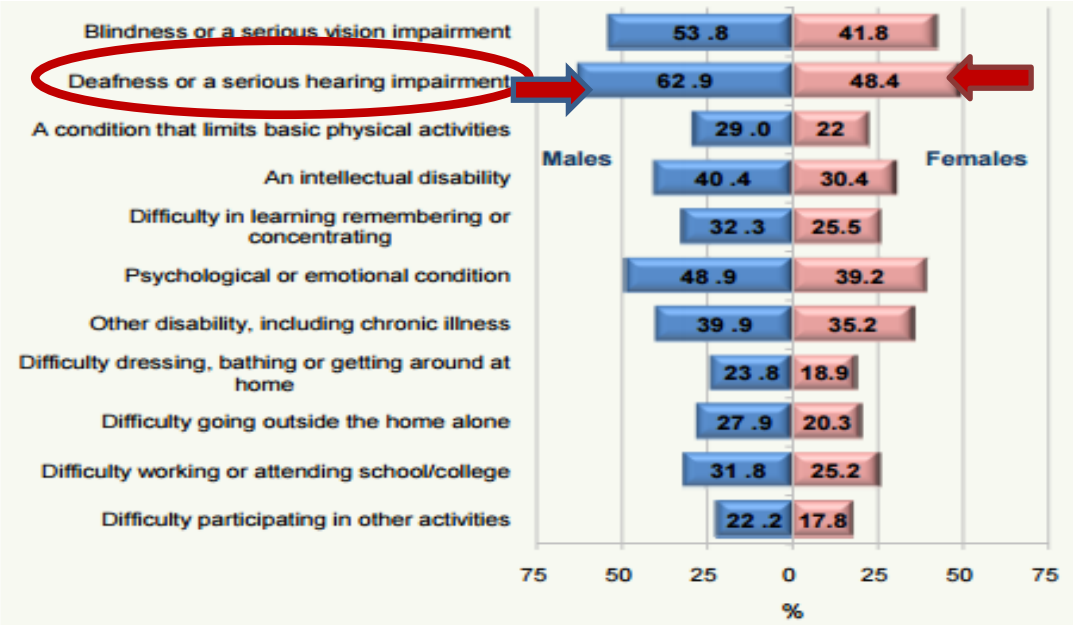

Figure 8: Labour Force Participation Rates for persons aged 15 to 64 with Deafness or Serious Hearing Impairment by Sex (CSO, 2011a)

Figure 9 below shows labour force participation figures for self-reported Deafness or Serious Hearing Impairment persons compared to labour force participation nationally in persons aged 20-64.

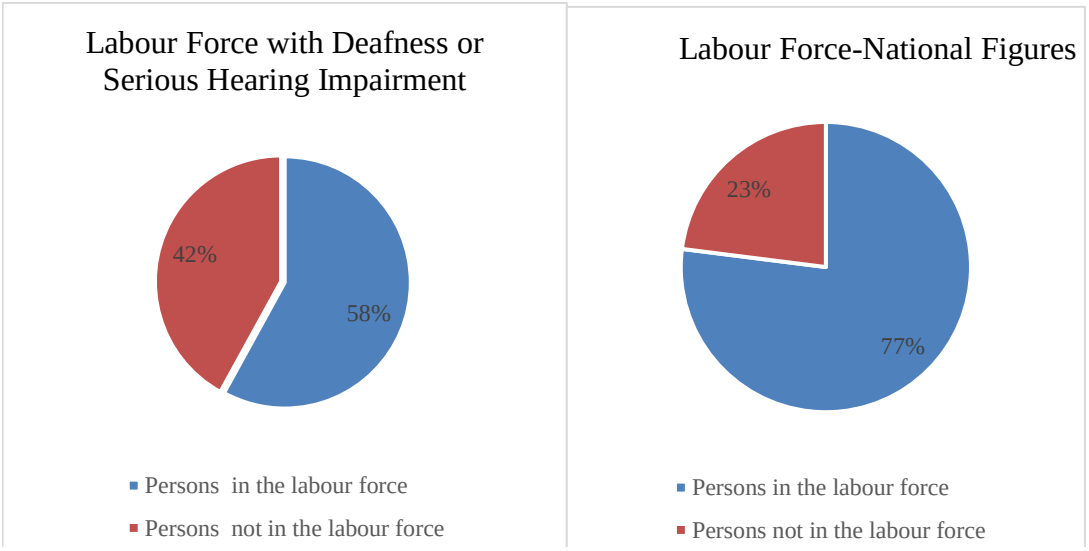

Figure 9: Labour Force Participation among Deafness or Serious Hearing Impairment compared to Labour Force Participation Nationally in persons aged 20-64

Figure 10 presents reasons for no labour force participation among Deafness or Serious Hearing Impairment population compared to national figures with no deafness or a serious hearing impairment in persons aged 20-64.

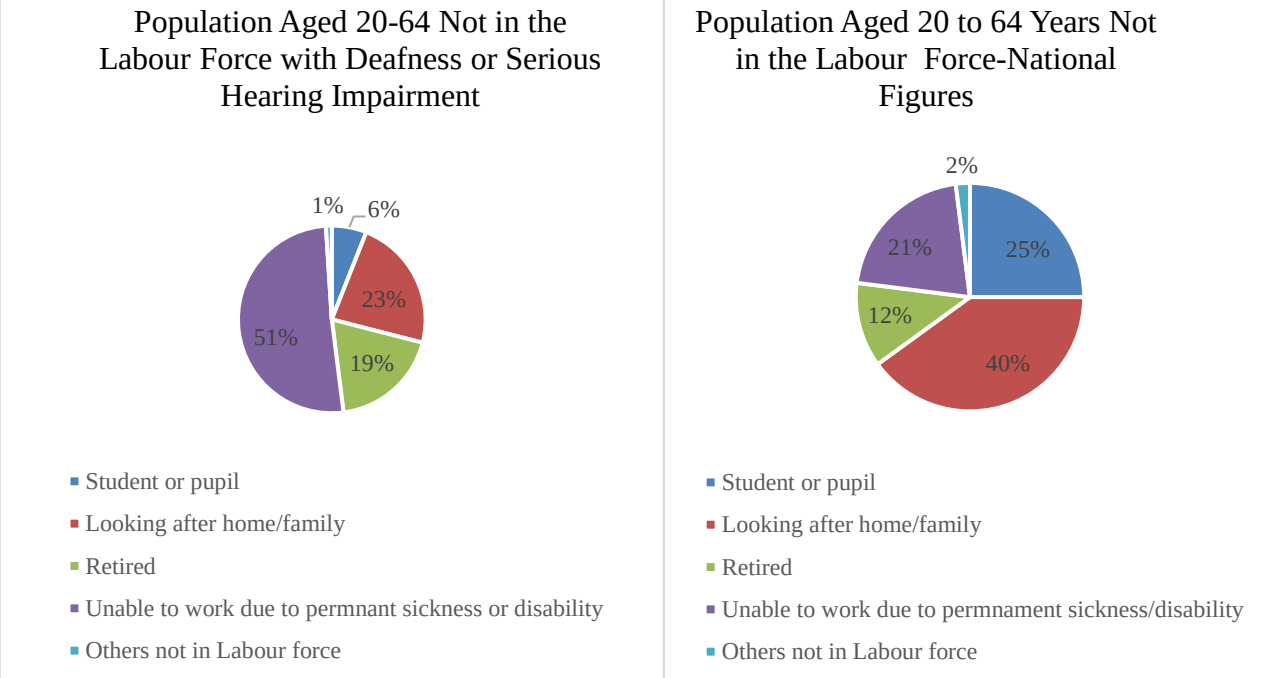

Figure 10: Reasons for not being in the labour force (persons aged 20 to 64)

In Figure 11 shows the rate of unemployment amongst disabled persons aged 15 and over by type of disability from the Census 2011, The unemployment rate amongst disabled people was 30.8 per cent, compared with 19 per cent for the overall population.

Figure 11: Unemployment rates by type of disability(CSO, 2011b)

4.5 Mode of Communication: Irish Sign Language

Table 3 presents national prevalence of persons who use Irish Sign Language (ISL) and other sign language reported from the Question 15 in the Census 2011.

Table 3:People who used Sign Language			
	Irish Sign Language	Other Sign Language	Total
No disability	1,327	476	1,803
Persons with a disability	1,263	436	1,699
Persons who were deaf or had a serious hearing impairment	1,077	301	1,378
Total	2,590	912	3,502

4.5.1 Population using a Hearing Aid, Cochlear Implant or Similar: Irish Health Survey

Table 4 demonstrates percentage of population aged 15 and over who use a hearing aid or similar by age group, region, and Deprivation/affluence.[1]

Table 4: Percentage of the population aged 15 or over who use a hearing aid - by region, sex, age group, and level of affluence, 2015			
			% of persons
	Do you use a hearing aid? (including cochlear implant or similar)		
	Yes	No	Profoundly deaf
State			
State	3	97	<0.5
Sex			
Male	3	97	<0.5
Female	3	97	<0.5
Age group			
15-24	<0.5	99	<0.5
25-34	<0.5	99	<0.5
35-44	<0.5	99	<0.5
45-54	1	99	<0.5
55-64	3	97	<0.5
65-74	9	91	<0.5
75+	19	80	1
Region			
Border	4	96	<0.5
Midland	2	98	<0.5
West	3	97	<0.5
Dublin	3	97	<0.5
Mid-East	2	98	<0.5
Mid-West	2	98	<0.5
South-East	4	96	<0.5
South-West	3	97	<0.5
Deprivation/affluence			
Very Affluent	2	98	<0.5
Affluent	2	97	<0.5
Average	3	97	<0.5
Disadvantaged	3	96	<0.5
Very Disadvantaged	3	96	<0.5

[1] Table 4 by Kind Permission of Damien Lenihan Statistician, Central Statistics Office, Cork

Chapter 5 Discussion

5.1 Outline

The aim of this study was to establish the prevalence of self-reported hearing loss in Munster through mining data from the Census 2011 and 2016, the NDS 2006 and the IHS 2015 for the Deaf Enterprises. It also aimed to investigate the educational attainment and labour force participation of those who self-reported Deafness or Serious Hearing Impairment in Munster. The most noticeable points raised in relation to these aspects will now be outlined and based on these; the author will propose recommendations for future research in this area.

5.2 Prevalence Self-Reported Deafness or a Serious Hearing Impairment

To estimate the prevalence of hearing loss in Munster, data from both the Census and NDS was used. Although the general population sample is small in the NDS, pooled with the Census disability sample it allows the overall prevalence of self-reported hearing loss to be estimated, even if somewhat primitively (differences of these sources can be found in Appendix IV). The precision of the estimates from the Census disability sample are robust given the sample size and their confirmed identification as disabled in both the Census and the NDS questions.

According to the Census 2011 data, people with disabilities comprise around 13% of the population, numbering approximately 595,000 (This has increased from 9.3% in the 2006 census). Of this 13%, 15.5% self-reported Deafness or Serious Hearing Impairment. Figures 1 and 2 show the national prevalence of self-reported Deafness or Serious Hearing Impairment. 2% of the population self-reported deafness in Ireland in 2011, this has risen to 2.2% in the Census 2016. Of the 92,060 who reported Deafness or Serious Hearing Impairment in 2011, 28% are from Munster. Additionally, and vitally, Munster has the second highest rate of self-reported Deafness or Serious Hearing Impairment of all provinces in Ireland (see figure 4). This reinforces the need for increased funding and resources for enablement programmes like Deaf Enterprises to plan for future service provision within Munster. As the population increases, the trend of self-reported hearing loss likewise rises and is more prevalent today than in 2011.

5.2.1 Prevalence of Self-Reported Hearing Disability Reported in the NDS

By including the NDS this study could obtain the level of difficulty of those who self-reported a hearing disability as this could pertain to the educational attainment and labour force participation of this group. The NDS using different criteria to that of the 2011 Census in contrast, found that 18.5% of the population had a disability. Small number of persons who had no disability in the Census specified a disability in the NDS. These persons have an increased weight attached to them as they represented around 91% of the population (Brady & Roche, 2008).Of the estimated 57,600 persons with a Hearing disability, 61% reported a moderate level of difficulty, 36% a lot of difficulty and 3% could not hear at all. There were approximately equivalent figures of males and females with a hearing disability in total and similar amounts across scales of difficulty. Both males and females in the youngest age group, 0-17, were more probable to report moderate levels of difficulty than those in the older age groups at 77% of males aged 0-17 and 79% of females in contrast with 60-63% of males and females in the 18 and over age groups. This variability could pertain back variability of self-reporting. The NHANES study outlined in the literature review, found the relationship between subjective and objective hearing ability varies in accuracy across gender, age, race/ethnicity, and education (Kamil et al., 2015). This should be considered in interpreting results from the NDS. The magnitude of males (1%) and females (2%) aged 65 and over reporting that they could not hear at all were lower than for the 18-64 age group where 5% of both males and females report “Cannot do at all (see table 1 and 2).

5.3 Education

Census 2011 shows that people with a disability ceased their full-time education at an earlier age than the total population with 8,313 or 7.4% of disabled persons aged 15 to 49 having left full-time education before reaching the age of 15, compared with 32.7%, for the State. Figure 6 describes National data on those who self-reported Deafness or Serious Hearing Impairment who attained a third level degree and it is still unknown whether this attainment is replicated from a Munster viewpoint. Furthermore, there is no data to suggest whether the skills and expertise that deaf and hard of hearing children in Munster, are leaving with are the skills that are relevant

to the 21st century workforce. Additionally, we do not know are there factors that influence deaf students' decision-making regarding specific subject option for employment planning or career selection

5.4 Labour Force Participation

From the Census 2011, unemployment rate amongst disabled people was 30.8%, compared with 19% for the overall population. An unanticipated result was that lowest rate of unemployment at 25.3% was amongst persons who were deaf or had a Serious Hearing Impairment (figure 11).In contrary to what one would expect Persons who self-reported Deafness or a Serious Hearing Impairment had the highest participation rate of all disabilities at 56.9%.Of the people aged 20 to 64 not in the labour force 51% of Deafness or Serious Hearing Impairment are unable to work due to permanent sickness or disability compared to 21% of the hearing population. The percentage of Deafness or Serious Hearing Impairment aged 20 to 64 not in the labour force as they are a student/pupil is only 6% compared to the national figure of 25% (see figure 10).Of the 92,060 self-reported deafness or serious hearing impairment, a substantial portion, could participate in the workforce: 34,502 people are aged between 20 and 64. However, only 58% of people with Deafness or a Serious hearing impairment, between the ages of 20 and 64, are in the labour force compared to 77% of the national hearing population seen in Figure 9. This result asked the question: What are the labour force barriers for the Deaf and hard of hearing community in Munster? Some barriers include communication supports during the recruitment process was not offered, which would compound any disadvantage that they might have in contending for a job. Without communication supports, Deaf and hard of hearing people are not given the opportunity to show their skills and potential. The recruitment process and lack of awareness is the first barrier that Deaf and hard of hearing people experience in obtaining employment, but it is often the most excluding barrier (Treanor, 2015).

5.5 Irish Sign language

As seen in table 3 ISL was used by 2,590 persons, over half of whom specified that they did not have a disability. Of sign language users with a disability, 81.1% were Deaf or had a Serious Hearing Impairment. This information is vital as this cohort will have different communication challenges in the workplace compared to hearing aid users. The IHS addressed the question on hearing aid, cochlear implant or similar use (table 4). This data is again crucial for enablement programs like Deaf Enterprises and other similar organisations to achieve facilitating effective communication practices based on individual need. In addition, it is necessary to capture all the Deaf and hard of hearing community in Munster if Deaf Enterprises are to achieve their vision of providing employment opportunities with partner organisations.

5.6 Limitations of the study

1. The NDS does not include any educational attainment or labour force participation in persons self-reporting a hearing disability. Additionally, it does not present any employment outcomes of this population.

2. The Census does not break down those who self-reported Deafness or Serious Hearing Impairment into geographical regions in relation to educational or third level qualification attainment. Although the National figures have been presented in this study, these figures might not be representative of the educational attainment or labour force participation in Munster. Therefore, it is not possible to build a profile of skills for the Deaf and hard of hearing community to inform current or future service provision in Munster.

3. The IHS does break down deprivation and affluence into geographical region, age or gender. Therefore, it is not possible to describe the full burden or scale of difficulty of self-reported hearing loss in Munster.

4. Additionally, for these individuals that have self-reported Deafness or Serious Hearing Impairment in the data sources described in this study it is

still unknown if these individuals have a diagnosed ‘hearing loss,' by audiological assessment. Furthermore, we don't know if it is unilateral hearing loss, bilateral hearing loss or how severe the hearing loss is. It is also unknown which of these individuals are being treated for their hearing loss.

5.4 Recommendations and Future Research

We should ask questions about what research is needed to fill in the gaps in our knowledge, and how we can change or alter the services we give to deaf and hard of hearing people. The release of Profile 8 *Our Bill of Health* in the Census part two later this year will give us a more detailed trend on self-reported hearing loss and allow comparisons of educational attainment and labour force participation of this population to be made between 2011 and 2016. If questions relating to hearing in the Census, NDS, and the IHS were combined, this would allow all the Deaf and hard of hearing community to be captured. This would identify mode of communication or assistive devices, level of difficulty/affluence by region, gender and age group so that effective employability programs can be introduced. An Irish dashboard could potentially be developed which should comprise proposed metrics for: risk factors, prevalence, social support, quality of life, and economic influence of deaf and hard of hearing community in Ireland. Audiology services in Ireland have a national database that could be potentially utilized to aid estimating prevalence and distribution of hearing and other problems in the deaf and hard of hearing communities.As mentioned in the literature review the establishment of the NHSP was crucial for early intervention for PCHI .Although the NHSP is now fully operational there remains no national register of hearing impaired children or indeed adults functioning in Ireland, and accurate estimates of the prevalence of PCHI and of its profile across age, gender and degree of impairment are unavailable. The implementation of NHSP should result in a well-documented screening history for all children. That information, together with the results of genetic investigations in children with a newly confirmed diagnosis of permanent hearing impairment, would permit the rising profile of prevalence with age to be confirmed prospectively and would allow us to unravel the relative contributions of the three effects to the rise (Fortnum, Summerfield, Marshall, Davis, & Bamford, 2001). We need to know more

about prevalence before we start to look at the sorts of interventions we offer to those who seek services, as well as the sorts of interventions we could offer those who do not seek help but who would actually benefit from our services (Davis & Davis, 2010).

5.5 Conclusion

This study has achieved its aim of describing the prevalence of self-reported hearing loss in Munster**.** The impact of hearing loss on an individual is highly dependent on the severity of the loss and on the individual's lifestyle, communication needs, and specific environment. Yet we have limited answers to any of these aspects from a Munster perspective. Although those who self-reported Deafness or a Serious Hearing Impairment in the Census 2011 had the lowest unemployment rate and highest labour force participation rate of all disabilities, this finding might not be replicated from a Munster nor Deaf Enterprises perspective. The necessity of having adequate enablement programs like Deaf Enterprises for this specific group of people, are warranted. Irelands needs to set clear communication standards and monitor services to ensure that people with hearing loss are never excluded from work because of communication challenges. We need to measure provision of communication support (professional services or assistive equipment) and participate in the training of communication support professionals to ensure supply meets growing demand in the 21st Century. The implication of the increasing population is the rising prevalence of self-reported hearing loss in Ireland. No longer should hearing loss be considered an individual problem, but should be dealt with by actions at numerous levels engaging individuals and families, the health-care community, voluntary organisations, industries, and government ("Hearing loss: an important global health concern," 2016).

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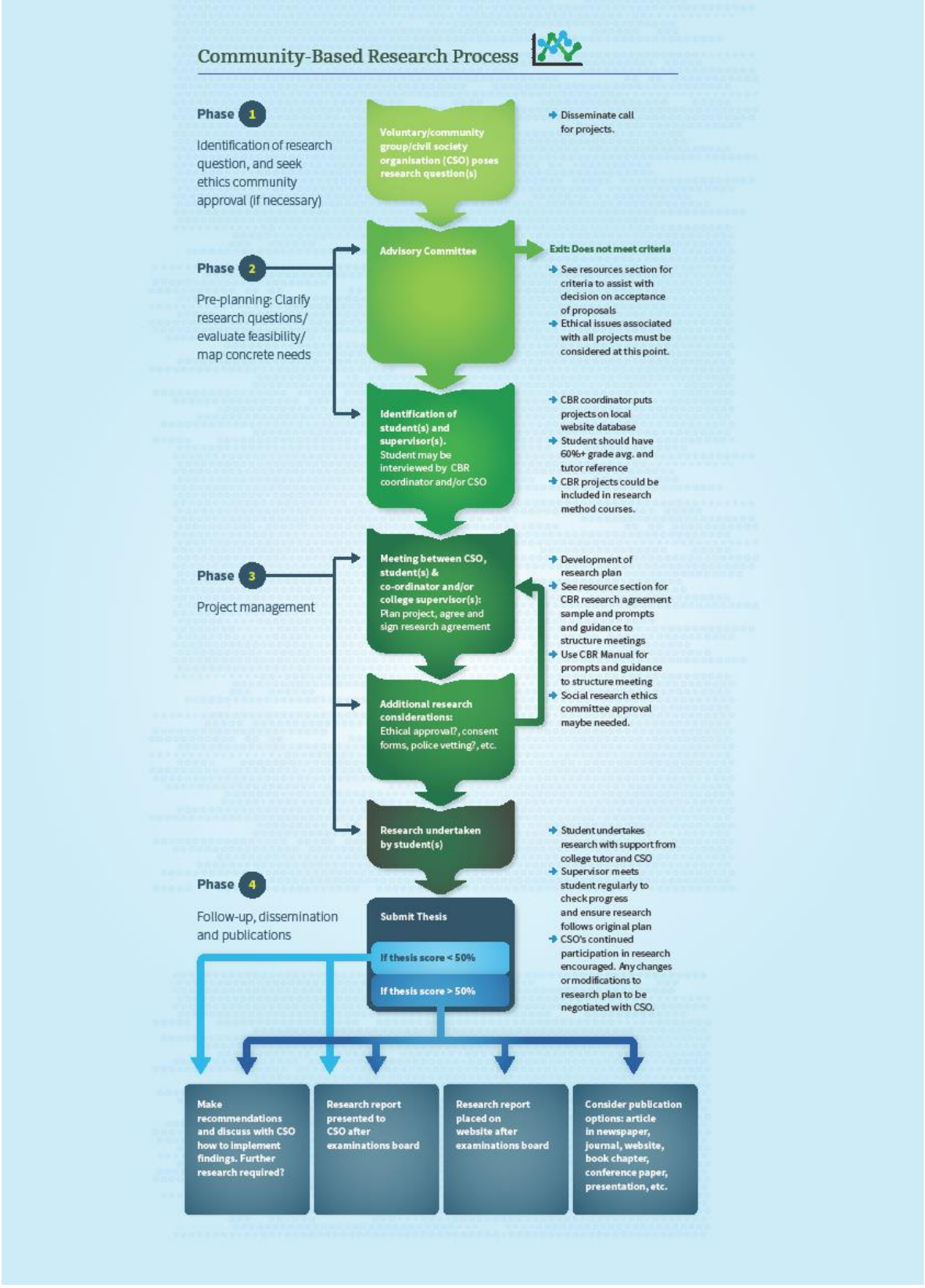
APPENDIX I

CARL-Community-Based Research Process

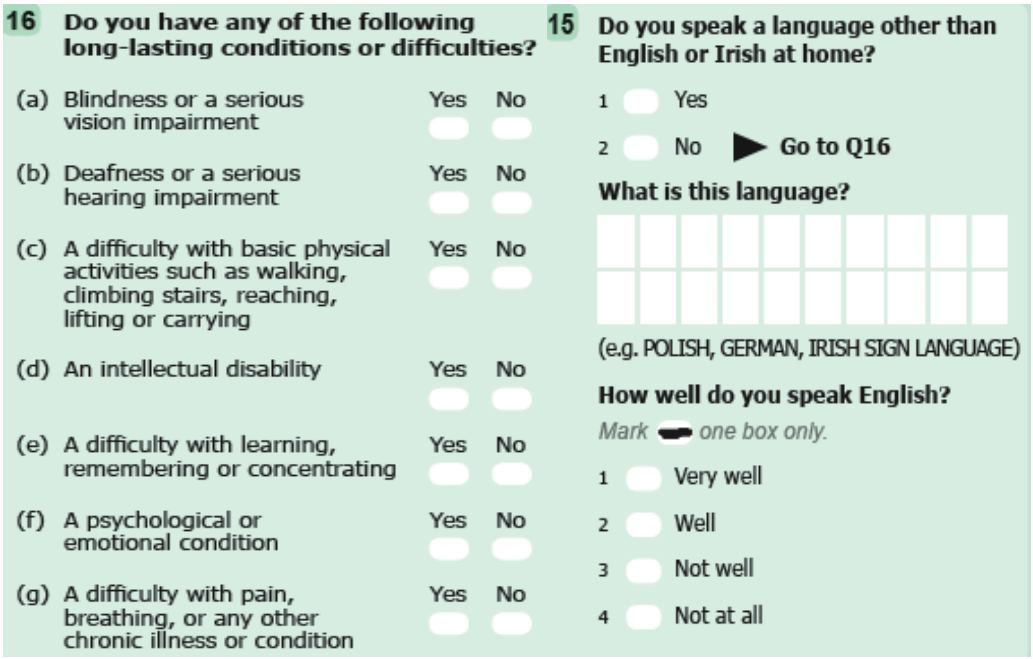


APPENDIX II

Census 2011 and 2016 Question 15 and 16

ISL Question 15: Do you speak a language other than English or Irish at home?

Question 16: Do you have any of the following long-lasting conditions or difficulties?



16 **Do you have any of the following long-lasting conditions or difficulties?**

		Yes	No
(a)	Blindness or a serious vision impairment	○	○
(b)	Deafness or a serious hearing impairment	○	○
(c)	A difficulty with basic physical activities such as walking, climbing stairs, reaching, lifting or carrying	○	○
(d)	An intellectual disability	○	○
(e)	A difficulty with learning, remembering or concentrating	○	○
(f)	A psychological or emotional condition	○	○
(g)	A difficulty with pain, breathing, or any other chronic illness or condition	○	○

15 **Do you speak a language other than English or Irish at home?**

1 ○ Yes

2 ○ No ▶ **Go to Q16**

What is this language?

(e.g. POLISH, GERMAN, IRISH SIGN LANGUAGE)

How well do you speak English?

Mark ● one box only.

1 ○ Very well

2 ○ Well

3 ○ Not well

4 ○ Not at all

APPENDIX III

The National Disability Survey 2006 classification for having a hearing disability

Disability type	Level of difficulty in every day activities				
	No difficulty	Just a little	A moderate level	A lot of difficulty	Cannot do at all
A. Seeing			√	√	√
B. Hearing			√	√	√
C. Speech			√	√	√
D. Mobility & dexterity			√	√	√
E. Remembering & concentrating			√	√	√
F. Intellectual & learning		√	√	√	√
G. Emotional, psychological, & mental health		√	√	√	√
H. Pain			√	√	√
I. Breathing			√	√	√

√ = Persons reporting this level of difficulty under a particular disability were classified as having that disability type.

APPENDIX IV

Review of differences between Census 2011 and NDS 2006

Census 2011	NDS 2006
Prevalence 9.3%	Prevalence 18.5%
Multi-purpose survey	Specific survey
Yes or No response	5-point scale
Self-completed at household level	Personal interviews of named individuals
Long-lasting condition	Lasting 6 months or more or regularly re-occurring

Note. Retrieved from (Brady & Roche, 2008)

APPENDIX V

The Irish Health Survey 2015 Questions 9 & 10

9	**Do you use a hearing aid?** (including cochlear implant or similar)	Yes ☐	No ☐	Profoundly deaf ☐	
10	**Do you have difficulty doing any of the following:**	No difficulty	Some difficulty	A lot of difficulty	Cannot do at all
	Seeing, even when wearing glasses or contact lenses	☐	☐	☐	☐
	Hearing what is said in a conversation with one other person in a quiet room, even if using a hearing aid	☐	☐	☐	☐
	Hearing what is said in a conversation with one other person in a noisy room, even if using a hearing aid	☐	☐	☐	☐
	Walking half a kilometre (a third of a mile) on level ground without the use of any aid	☐	☐	☐	☐
	Walking up or down a flight of stairs?	☐	☐	☐	☐

APPENDIX VI

The Irish Health Survey: Additional Data

All The following data from the IHS was received by kind permission of Senior Statistician Mr Damien Linehan by personal communication.

Ability to hear what is said in conversation with one other person in a noisy room, even when wearing a hearing aid - by region, sex, age group, and level of affluence, 2015					
					% of persons
	Hearing what is said in a conversation with one other person in a noisy room, even if using a hearing aid				
	No difficulty	**Some difficulty**	**A lot of difficulty**	**Cannot do at all**	***Unweighted sample***
State					
State	82	14	3	<0.5	*10,323*
Sex					
Male	80	16	4	<0.5	*4,626*
Female	84	13	2	<0.5	*5,697*
Age group					
15-24	91	6	2	<0.5	*290*
25-34	92	7	1	<0.5	*1,017*
35-44	90	8	1	<0.5	*1,981*
45-54	82	16	2	<0.5	*2,031*
55-64	73	22	5	<0.5	*2,086*
65-74	68	25	7	1	*1,709*
75+	54	33	12	2	*1,209*
Region					
Border	81	15	4	1	*1,102*
Midland	83	14	3	<0.5	*630*
West	82	14	3	<0.5	*1,008*
Dublin	81	15	3	<0.5	*2,821*
Mid-East	83	14	3	<0.5	*915*
Mid-West	83	14	3	1	*842*
South-East	82	14	3	<0.5	*1,288*
South-West	83	13	3	<0.5	*1,717*
Deprivation/affluence					
Very Affluent	82	14	3	<0.5	*2,062*
Affluent	83	14	2	<0.5	*2,227*
Average	82	14	3	<0.5	*1,993*
Disadvantaged	81	15	3	1	*2,134*
Very Disadvantaged	81	14	5	<0.5	*1,907*

Ability to hear what is said in conversation with one other person in a noisy room, even when wearing a hearing aid - by region, sex, age group, and level of affluence, 2015

% of persons

	Hearing what is said in a conversation with one other person in a noisy room, even if using a hearing aid				
	No difficulty	**Some difficulty**	**A lot of difficulty**	**Cannot do at all**	***Unweighted sample***
State					
State	82	14	3	<0.5	*10,323*
Sex					
Male	80	16	4	<0.5	*4,626*
Female	84	13	2	<0.5	*5,697*
Age group					
15-24	91	6	2	<0.5	*290*
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Affluent	83	14	2	<0.5	*2,227*
Average	82	14	3	<0.5	*1,993*
Disadvantaged	81	15	3	1	*2,134*
Very Disadvantaged	81	14	5	<0.5	*1,907*

APPENDIX VII

The National Physical and Sensory Disability Database (NPSDD) is a collection of information that outlines the dedicated health services currently used or required by people with physical/sensory disability.

Number of People in Ireland registered Deafness and Hearing loss in the physical and sensory disability database,2006 to 2015

Deafness & Hearing Loss	
2006	1,591
2007	1,634
2008	1,618
2009	1,575
2010	1,448
2011	1,376
2012	1,298
2013	1,336
2014	1,316
2015	1,346

(Department of Health, 2015)