Fewer teeth with dentinal caries (D_{3vc}MFT) in 12-year-old children with community water fluoridation in the Republic of Ireland

#3357

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Background

Water fluoridation commenced in the Republic of Ireland (RoI) in 1964. Approximately 71% of the population receive a fluoridated water supply (community water fluoridation). In response to evidence that levels of fluorosis increased in Ireland between 1984 and 2002, fluoride levels in water were lowered in 2007 from 0.8-1.0ppm to 0.6-0.8ppm. The Fluoride And Caring for Children's Teeth (FACCT) study is a 6-year research programme to evaluate the impact on caries and fluorosis of lowering the fluoride levels in water in 2007 alongside the provision of guidance in 2002 for parents on the use of fluoride toothpaste. Data collected in 2013/2014 for 12-year-old children in counties Cork and Kerry, RoI are presented here.

Aim: To determine the association between dentinal caries (D_{3vc}MFT) and water fluoridation (0.6ppm at least) in 12-year-old children in counties Cork and Kerry, RoI.

Methods

The Clinical Research Ethics Committee of the Cork University Teaching Hospitals, UCC, granted ethical approval for the study. A stratified cluster random sample of 12-year-old children categorised, as having lifetime exposure to community water fluoridation('Full-Fl') or not ('Non-Fl') were examined and D_{3vc}MFT recorded. Categorisation was based on the child's complete residential history (Fig. 1). Parents/guardians provided demographic, socioeconomic, oral hygiene and dietary information including whether the children were breastfed in the early years (Fig. 2). Multivariate regression analyses (Poisson model, negative binomial model (NBRM)), and the Hurdle model (logit and zero-truncated negative binomial models) were used to analyse the relationship between D_{3vc}MFT and water fluoridation, while controlling for age, gender, socio-economic status and behaviour variables including whether the child was breastfed. Socio-economic status was determined from whether the family had a means tested Medical/GP visit card. Variables were considered significant at $p \le 0.05$.

Figure 1: Excerpt from residential history form. Parents/guardians indicated all home addresses and each 12-year-old was individually categorised Full-Fl or Non-Fl

Figure 2: Excerpt from questionnaire, questions to determine, tooth-brushing (Q 6), being breast fed (Q 14) and economically disadvantaged (Q 30)

Results

In total 47% (n=469) of the 998, 12-year-old children examined and individually categorised as 'Full-Fl' or 'Non-Fl' had a D_{3vc}MFT>0 (Fig. 3).
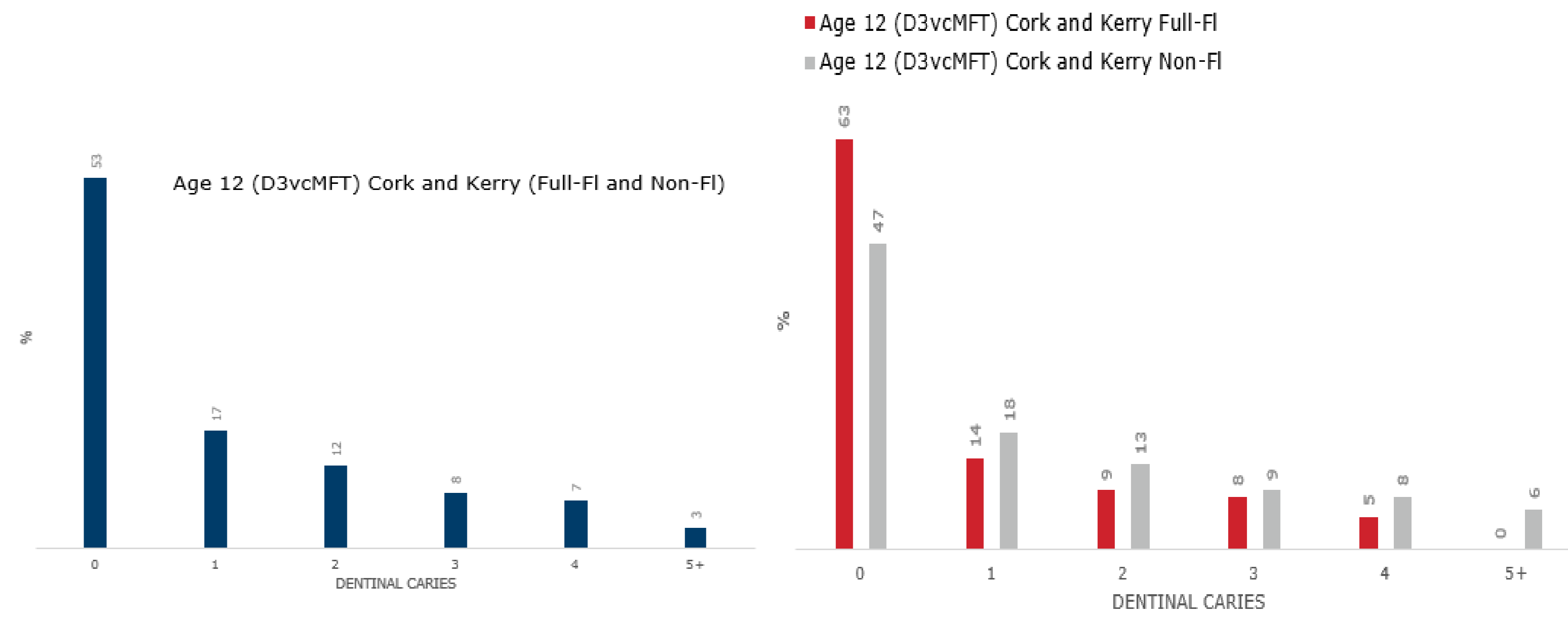

Figure 3: Proportion of 12-year-olds with dentinal caries (D_{3vc}MFT 0 – 5+)

In the NBRM (Table 1), being categorised as 'Full-Fl' rather than 'Non-Fl' decreased the expected number of D_{3vc}MFT by 32%, holding all other variables constant; brushing twice/day or more at 12-years-old and having been breastfed also decreased the expected number of D_{3vc}MFT. Being categorised as economically disadvantaged (children's parents/guardians had a Medical/GP visit card) increased the expected number of D_{3vc}MFT by 43.5%, holding all other variables constant.

Table 1: Negative binomial regression analysis; percentage change in expected number of teeth with dentinal caries (D3vcMFT)

Variable	%	p-value	Description
Full-Fl	-32.0	0.001	Having always (vs never) resided in an area with water fluoridation decreases the expected number of D_{3vc}MFT by 32.0%, holding all other variables constant
2/day+ tooth brushing	-26.0	0.013	Brushing teeth twice/day (vs less often or never) at age 12 decreases the expected number of D_{3vc}MFT by 26.0%, holding all other variables constant
Breast fed	-22.6	0.023	Having been breastfed (vs not breastfed) decreases the expected number of D_{3vc}MFT by 22.6%, holding all other variables constant
Economic disadvantage	+43.5	0.003	Parents having a Medical/GP visit card (a measure of economic disadvantage) increases the expected number of D_{3vc}MFT by 43.5%, holding all other variables constant

In the first part of the Hurdle model (Table 2), being in the Full-Fl group decreased the odds of having any dentinal caries by 45.1%; having been breastfed decreased the odds of having any dentinal caries by 29.2%; Being categorised as economically disadvantaged (children's parents/guardians had a Medical/GP visit card) increased the odds of having decayed teeth by 49.2%, holding all other variables constant. No variables were significant in the second part of the model (when D_{3vc}MFT>0).

Table 2: Part 1 of Hurdle Model; percentage change in having dentinal caries, (D3vcMFT > 0)

Variable	%	p-value	Description
Full-Fl	-45.1	0.000	Having always (vs never) resided in an area with water fluoridation decreases the odds of having dentinal caries by 45.1%, holding all other variables constant
Breast fed	-29.2	0.037	Having been breastfed (vs not breastfed) decreases the odds of having dentinal caries by 29.2%, holding all other variables constant
Economic disadvantage	+49.2	0.032	Parents having a Medical card/GP visit (a measure of economic disadvantage) increases the odds of having dentinal caries by 49.2%, holding all other variables constant

Conclusion

Exposure to water fluoridation at a concentration of at least 0.6ppm is associated with less likelihood of having any dentinal caries in 12-year-old children.