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Impact of reducing water fluoride on dental caries and fluorosis

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Appendix Figure 1: Quarterly mean water fluoride concentration (ppm F) for Dublin and Cork-Kerry from July 2003 to June 2017.

Appendix Table 1: Details of training and calibration 2002 and 2017

Training and calibration before commencement of fieldwork	2002	2017
Dental nurses trained to use direct data entry software on dedicated	N	N
laptop computers	v	v
Video resource "Setting up for School Dental Examinations"	Х	
Small group interactive teaching sessions for dentists		
Group discussion and individual scoring of photographic images of		
caries, dental fluorosis and other developmental defects of enamel	\checkmark	\checkmark
by dentists.		
Use of training and calibration components of the online fluorosis	Y	
training tool ' e-training for Dean's Index' (Whelton et al. 2014)	X	v
School based clinical training	\checkmark	
Final calibration based on clinical scores in school-based		
calibration exercise	V	V
Minimum acceptable level of agreement with benchmark examiners	0.4 'moderate	0.6 'substantial
during calibration exercise	agreement*'	agreement*^'

* (Landis and Koch 1977)

^ Moderate agreement (McHugh 2012)



Appendix Figure 2: Flow of participants through the FACCT study

^ 7 children do not have a caries measurement in 2017: Dublin Full-CWF n=3, Cork-Kerry Full-CWF n= 1, Cork-Kerry No-CWF n=3 (one of whom reported taking F tablets/drops). *11 children were examined in 2017 but not assigned a Dean's Index score: "Dean's Excluded". Dublin Full-CWF n=4, Cork-Kerry Full-CWF n=5, Cork-Kerry Part-CWF n=2



Appendix Figure 3: Flow of participants through the North South Survey 2002

*17 children were examined in 2002 but not assigned a Dean's Index score: "Dean's Excluded" (Dublin Full-CWF n=7, Dublin Part-CWF n=1, Cork-Kerry Full-CWF n=5, Cork-Kerry No-CWF n=4). Dean's index score was missing for 4 children.

Appendix Table 2: Sensitivity analysis of impact of re-classifying Part-CWF 2002

		Par	t-CWF 2002 assu	Part-CWF 2002 assumed to be No-CWF				
		Dublin	Full-CWF	Cork-Ke	rry Full-CWF	Cork-Kerry No-CWF		
Outcome	Year	OR% (95%CI)	P value	OR% (95%Cl)	P value	OR% (95%Cl)	P value	
Caries prevalence ^a	2017 2002	14%→14% Ref	0.350→0.349	25%→24% Ref	0.208→0.206	-23%→-29% Ref	0.179→0.064	
Caries severity ^{a,b}	2017 2002	5%→4% Ref	0.487→0.548	7%→3% Ref	0.424→0.704	-13%→-15% Ref	0.039→0.010	
Fluorosis prevalence ^c	2017 2002	16%→15% Ref	0.312→0.356	-7%→ -4% Ref	0.771→0.859	97%→8% Ref	0.129→0.806	

OR% = odds ratio %: the percentage increase/decrease in odds

95%CI = 95% confidence interval

^a Negative binomial Hurdle Model analysis. Adjusted for medical card ownership, age, age first used toothpaste, age at first visit to the dentist, frequency of toothbrushing (age 8), amount of toothpaste (age 8), rinse method after toothbrushing (age 8), frequency of intake of sweet foods or drinks between meals (age 8).

^b Percentage change in mean d_{3vc}mft(cde)

^c Logistic regression analysis. Adjusted for age, gender, medical card ownership and age first used toothpaste.

Appendix Table 3: Characteristics at baseline (2014) for all children who consented in phase 1 (Consented 2014), children who were followed-up and examined in phase 2 (Examined 2017) and children who consented in phase 1 but were not examined in phase 2 (Lost to follow-up 2017)

		Dublin		Cork-Kerry						
Characteristic	Consented 2014	Consented 2014Examined 2017Lost to follow-up 		Consented 2014	Examined 2017	Lost to follow-up 2017				
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)				
Gender	Gender									
Female	542 (50)	413 (52)	129 (43)	993 (51)	795 (52)	198 (45)				
Male	546 (50)	376 (48)	170 (57)	969 (49)	731 (48)	238 (54)				
Missing	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	1 (<1)				
Total	1088 (100)	789 (100)	299 (100)	1963 (100)	1526 (100)	437 (100)				
Age* (phase 1)	5.2 (0.4)	5.2 (0.4)	5.2 (0.4)	5.3 (0.4)	5.4 (0.4)	5.3 (0.4)				
Economic disadvant	tage									
MC/GP card	424 (39)	275 (35)	149 (50)	652 (33)	467 (31)	185 (42)				
No MC/GP card	646 (59)	504 (64)	142 (47)	1273 (65)	1032 (68)	241 (55)				
Missing	18 (2)	10 (1)	8 (3)	38 (2)	27 (2)	11 (3)				
Total	1088 (100)	789 (100)	299 (100)	1963 (100)	1526 (100)	437 (100)				

*mean (SD). Percentages may not sum to 100 due to rounding.

MC/GP card=Medical card or GP visit card

Total number 3051 rather than 3054 as reported in Appendix Figure 2 because parents/caregivers of three children consented and completed residential history only. No demographic information is available for these three children.

Numbers for phase 2 differ slightly from those reported in Appendix Figure 2 because by necessity, demographic variables and the county variable for phase 1 (age 5) rather than phase 2 (age 8) were used to generate this table.

Numbers examined 2017 include all children (all F status categories) who had a caries or fluorosis examination in phase 2 (total n=2315).

Appendix Table 4: Negative binomial hurdle model analyses of the association between year of examination and the prevalence and severity of dental caries among 8-year-olds in Dublin (Full-CWF)

	Dublin Full-CWF (d _{3vc} mft(cde))								
		Prevalence (n=1291)				Severity (n=699)			
Explanatory Variable		OR (%)	95% CI	p-value	Mean (%)	95% CI	p-value		
Voor	2017	14%	(-13%, 49%)	0.350	5%	(-9%, 21%)	0.487		
Tear	2002	Ref							
Madical card	Yes	71%	(29%, 127%)	<0.001	23%	(7%, 40%)	0.003		
	No	Ref							
Age (in years)		15%	(-14%, 55%)	0.347	1%	(-13%, 18%)	0.877		
Frequency of	Once/day or less	51%	(17%, 94%)	0.001	16%	(2%, 33%)	0.021		
(age 8)	Twice/day or more	Ref							
Amount of	Pea-sized [^] or less	-1%	(-25%, 31%)	0.956	7%	(-8%, 24%)	0.388		
(age 8)	> Pea-sized	Ref							
Rinse method after	Glass	12%	(-15%, 47%)	0.421	6%	(-8%, 22%)	0.393		
(age 8)	Other [◊]	Ref							
Sweet food/drinks	≥ 4 times/ day	130%	(51%, 252%)	<0.001	34%	(10%, 63%)	0.004		
between meals	2-3 times/day	69%	(33%, 116%)	<0.001	13%	(-1%, 30%)	0.072		
(age 8)	Once/day or less	Ref							
	≤ 4 years old	151%	(79%, 252%)	<0.001	76%	(44%, 114%)	<0.001		
Age at first visit	5-6 years old	88%	(37%, 159%)	<0.001	46%	(20%, 77%)	<0.001		
to the dentist	≥ 7 years old	76%	(24%, 150%)	0.002	21%	(-2%, 49%)	0.082		
	Never	Ref							
Age first used	≤ 24 months	-47%	(-61%, -27%)	< 0.001	-3%	(-16%, 12%)	0.675		
toothpaste*	> 24 months^	Ref							

Ref = Reference group/category

OR% = odds ratio %: the percentage increase/decrease in odds

Mean % = the percentage change in mean $d_{3vc}mft(cde)$

95%CI = 95% confidence interval

^Recommended from 2002 onwards

^oOther = using toothbrush to rinse/cupping hands to rinse/rinsing directly from the tap *Grouped responses for age at first toothbrushing in 2002 (prior to introduction of toothbrushing guidance, collected at age 8) and age first used toothpaste in 2014 (collected at age 5)

Year of examination adjusted for the effect of the other explanatory variables is the main explanatory variable. The OR (%) and Mean (%) for the other explanatory variables represents the association between each explanatory variable and the prevalence and severity of dental caries controlled for the effect of the other explanatory variables.

Appendix Table 5: Negative binomial hurdle model analyses of the association between year of examination and the prevalence and severity of dental caries among 8-year-olds in Cork-Kerry (Full-CWF)

	Cork-Kerry Full-CWF (d _{3vc} mft(cde))							
		F	Prevalence (n=66	63)		Severity (n=369)		
Explanatory Variable		OR (%)	95% CI	p-value	Mean (%)	95% CI	p-value	
Voor	2017	25%	(-12%, 78%)	0.208	7%	(-9%, 27%)	0.424	
real	2002	Ref						
Madical cord	Yes	45%	(-1%, 110%)	0.053	34%	(14%, 58%)	0.001	
	No	Ref						
Age (in years)		58%	(7%, 132%)	0.021	-8%	(-24%, 11%)	0.376	
Frequency of	Once a day or less	47%	(3%, 110%)	0.033	13%	(-4%, 33%)	0.138	
(age 8)	Twice a day or more	Ref						
Amount of	Pea-sized [^] or less	-9%	(-37%, 31%)	0.605	-1%	(-17%, 18%)	0.912	
(age 8)	> Pea-sized	Ref						
Rinse method after	Glass	38%	(-5%, 99%)	0.090	14%	(-3%, 35%)	0.119	
(age 8)	Other [◊]	Ref						
Sweet food/drinks	≥ 4 times per day	73%	(-9%, 229%)	0.092	26%	(-4%, 66%)	0.094	
between meals	2-3 times per day	52%	(10%, 112%)	0.012	12%	(-5%, 31%)	0.168	
(age 8)	Once a day or less	Ref						
	≤ 4 years old	82%	(7%, 210%)	0.027	87%	(40%, 150%)	< 0.001	
Age at first visit	5-6 years old	77%	(6%, 193%)	0.028	79%	(35%, 136%)	< 0.001	
to the dentist	≥ 7 years old	9%	(-36%, 86%)	0.757	31%	(-4%, 78%)	0.087	
	Never	Ref						
Age first used	≤ 24 months	-20%	(-49%, 25%)	0.332	-17%	(-31%, 1%)	0.061	
toothpaste*	> 24 months^	Ref						

Ref = Reference group/category OR% = odds ratio %: the percentage increase/decrease in odds

Mean % = the percentage change in mean $d_{3vc}mft(cde)$

95%CI= 95% confidence interval

^Recommended from 2002 onwards

*Other=using toothbrush to rinse/cupping hands to rinse/rinsing directly from the tap *Grouped responses for age at first toothbrushing in 2002 (prior to introduction of toothbrushing guidance, collected at age 8) and age first used toothpaste in 2014 (collected at age 5)

Year of examination adjusted for the effect of the other explanatory variables is the main explanatory variable. The OR (%) and Mean (%) for the other explanatory variables represents the association between each explanatory variable and prevalence and severity of dental caries controlled for the effect of the other explanatory variables.

Appendix Table 6: Negative binomial hurdle model analyses of the association between year of examination and the prevalence and severity of dental caries among 8-year-olds in Cork-Kerry (No-CWF)

	Cork-Kerry No-CWF (d _{3vc} mft(cde))							
			Prevalence (n=94	41)	Severity (n=622)			
Explanatory Variable		OR (%)	95% CI	p-value	Mean (%)	95% CI	p-value	
Year	2017	-23%	(-48%, 13%)	0.179	-13%	(-24%, -1%)	0.039	
	2002	Ref						
Medical card	Yes	15%	(-21%, 67%)	0.467	17%	(3%, 32%)	0.012	
	No	Ref						
Age (in years)		-15%	(-42%, 24%)	0.394	-3%	(-15%, 11%)	0.664	
Frequency of	Once a day or less	50%	(9%, 108%)	0.013	9%	(-2%, 21%)	0.111	
(age 8)	Twice a day or more	Ref						
Amount of	Pea-sized [^] or less	27%	(-12%, 82%)	0.199	-6%	(-18%, 7%)	0.342	
(age 8)	> Pea-sized	Ref						
Rinse method after	Glass	39%	(1%, 91%)	0.044	2%	(-9%, 13%)	0.771	
(age 8)	Other [◊]	Ref						
Sweet food/drinks	≥ 4 times per day	125%	(17%, 334%)	0.016	30%	(8%, 57%)	0.006	
between meals	2-3 times per day	83%	(35%, 148%)	<0.001	17%	(5%, 30%)	0.004	
(age 8)	Once a day or less	Ref						
	≤ 4 years old	136%	(52%, 266%)	<0.001	87%	(50%, 132%)	<0.001	
Age at first visit	5-6 years old	280%	(143%, 494%)	<0.001	76%	(42%, 118%)	<0.001	
to the dentist	≥ 7 years old	108%	(30%, 232%)	0.002	51%	(20%, 91%)	0.001	
	Never	Ref						
Age first used	≤ 24 months	-10%	(-37%, 30%)	0.587	-6%	(-17%, 6%)	0.324	
toothpaste*	> 24 months^	Ref						

Ref = Reference group/category OR% = odds ratio %: the percentage increase/decrease in odds

Mean % = the percentage change in mean $d_{3vc}mft(cde)$

95%CI= 95% confidence interval

^Recommended from 2002 onwards

°Other=using toothbrush to rinse/cupping hands to rinse/rinsing directly from the tap

* Grouped responses for age at first toothbrushing in 2002 (prior to introduction of toothbrushing guidance, collected at age 8) and age first used toothpaste in 2014 (collected at age 5)

Year of examination adjusted for the effect of the other explanatory variables is the main explanatory variable. The OR (%) and Mean (%) for the other explanatory variables represents the association between each explanatory variable and prevalence and severity of dental caries controlled for the effect of the other explanatory variables.

Appendix Table 7: Multivariate logistic regression analyses of the association between year of examination and prevalence of dental fluorosis among 8-year-olds in Dublin (Full-CWF) and Cork-Kerry (Full-CWF and No-CWF)

		Fluorosis (very mild or higher)									
		Dublin Full-CWF		Cork-Kerry Fu	III-CWF	Cork-Kerry No-CWF					
		n=1338	3	n=678		n=979					
Explanatory variable		OR% (95%CI)	P- value	OR% (95%CI)	P- value	OR% (95%CI)	P- value				
Year	2017	16% (-13, 56)	0.312	-7% (-41, 48)	0.771	97% (-18, 373)	0.129				
	2002	Ref		Ref		Ref					
Age (in years)		-16% (-42, 21)	0.337	45% (-14, 143)	0.164	-40% (-74, 36)	0.221				
Gender	Female	55% (16, 108)	0.003	6% (-34, 70)	0.801	44% (-22, 166)	0.244				
	Male	Ref		Ref		Ref					
Medical card	Yes	6% (-24, 48)	0.736	-5% (-44, 60)	0.845	62% (-17, 215)	0.157				
	No	Ref		Ref		Ref					
Age first used toothpaste*	≤ 24 months	29% (-13, 91)	0.211	94% (-10, 315)	0.090	-6% (-55, 100)	0.882				
	>24 months^	Ref		Ref		Ref					

OR% = odds ratio %: the percentage increase/decrease in odds

95%CI= 95% confidence interval

* Grouped responses for age at first toothbrushing in 2002 (prior to introduction of toothbrushing guidance, collected at age 8) and age first used toothpaste in 2014 (collected at age 5)

^Recommended from 2002 onwards

Year of examination adjusted for the effect of the other explanatory variables is the main explanatory variable. The OR (%) for the other explanatory variables represents the association between each explanatory variable and prevalence of fluorosis controlled for the effect of the other explanatory variables.

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