



DEPARTMENT
OF HEALTH AND
CHILDREN



children's oral health



in Ireland 2002
preliminary results

North South Survey of Children's Oral Health 2002

A collaborative project involving:

Republic of Ireland

Department of Health and Children

East Coast Area Health Board

Midland Health Board

Mid Western Health Board

North Eastern Health Board

Northern Area Health Board

North Western Health Board

South Eastern Health Board

Southern Health Board

South Western Area Health Board

Western Health Board

Northern Ireland

Department of Health Social Services and Public Safety

Eastern Board

Northern Board

Southern Board

Western Board

WHO Collaborating Centre for Oral Health Services Research University College Cork

Preliminary Report – June 2003

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Executive Summary

This report presents the results of the first contemporaneous North South study of the oral health of children and adolescents on the island of Ireland. The last National Survey of Children's Oral Health in the Republic of Ireland was carried out in 1984. The present study describes the oral health experience of children and adolescents in Ireland today. The results are of interest to the public, to policymakers and to service providers and will be of assistance in the evaluation of current oral health services and the planning of services for the next decade.

This preliminary report focuses on some of the primary aims of the North South Survey of Children's Oral Health which were to:

- Measure levels of oral health and treatment needs in children and adolescents in the Republic of Ireland (RoI) and Northern Ireland (NI) in 2001/'02 and to compare these levels with those reported in regional surveys conducted in the 1990s and with national surveys conducted in 1961/'63 and 1983/'84
- Explore the relationship between disadvantage and oral health using medical card ownership (MC) in RoI and low-income benefits (LIB) in NI as surrogates for disadvantage
- Compare levels of dental caries and enamel opacities including dental fluorosis among children and adolescents in RoI and NI
- Investigate the use of fissure sealants, a treatment designed to prevent dental decay
- Measure the prevalence of accidental injuries to permanent front teeth

For this survey 39 teams of trained and calibrated dentists and dental nurses examined 19,950 children and adolescents in their schools using standardised criteria.

The results show that the oral health of children and adolescents resident in fluoridated communities is better than those who reside in non-fluoridated areas. For example, for every 1,000 15-year-old lifetime residents of fluoridated communities in RoI there are an estimated 2,100 decayed, missing or filled teeth. The corresponding figure for residents of non-fluoridated communities in RoI is 3,200 (1,100 more decayed, missing or filled teeth). For residents in NI, which is non-fluoridated, the figure is 3,600 (1,500 more decayed, missing or filled teeth). Thirty percent of 5-year-old residents of fluoridated communities in RoI have one or more decayed, missing or filled teeth. In the non-fluoridated communities of RoI and NI, forty-seven percent of this age group had dental decay.

Caries levels have declined dramatically since 1961/'63 and have continued to decline since 1984 in both fluoridated and non-fluoridated areas in RoI and NI. This decline is considerably greater amongst lifetime residents of fluoridated communities. However, the decline in caries levels since the 1990s has slowed. In 2002 the decline appears to have come to halt amongst 5-year-olds with some evidence of an increase since the most recent regional surveys in the second half of the 1990s. The latter trend has also been reported in the UK.

Despite the overall decline in decay levels over the last three decades there is little cause for complacency since tooth decay continues to be a very common childhood disease. For example, in 2002 in both RoI and NI over two thirds of 15-year-olds were found to have decay in their permanent teeth. The survey found that in general the oral health of the less well off is worse than that of the rest of the population. Decay levels among dependants of medical card holders (RoI) and those in receipt of low-income benefits (NI) were higher than in the rest of the population. Innovative approaches to further reduce decay levels and address inequalities in oral health are required.

A fissure sealant is a plastic resin which, when applied to the pits and fissures of posterior permanent teeth, protects these vulnerable surfaces from decay. The high percentage of children and adolescents found to have fissure sealants on their teeth in this survey indicates a welcome preventive orientation of our dental services. Among the 12-year-old group 69% of children in ROI and 53% in NI had some sealants on their teeth. However, the less well off were found to have fewer sealants on their teeth and higher decay levels. A more targeted approach to the application of fissure sealants may be required to tackle this inequality.

The prevalence of enamel fluorosis has increased since 1984. It is expected that adherence to the recommendations regarding the level of fluoride in the water and the use of fluoride toothpastes by infants and young children contained within the recent report of the Forum on Water Fluoridation in Ireland (www.fluoridationforum.ie) will address this trend.

For every 1,000 15-year-olds it is estimated that 220 have at least one permanent front tooth damaged accidentally. This figure has not improved since 1984 and a large proportion of traumatised teeth remain untreated.

Further analysis of these and other data gathered in this survey will be presented in the final report, which will be published in 2004.

North South Survey of Children's Oral Health 2002

Preliminary Results

Introduction

This report presents the preliminary results of the North South Survey of Children's Oral Health conducted in Ireland in 2001/'02. The last National Survey of Children's Oral Health in the Republic of Ireland was carried out in 1984. The study is designed to describe the oral health experience of children and adolescents in Ireland today. Life in Ireland has changed considerably since 1984, oral health services and the climate in which they are provided has changed. Our health strategy demands equity, quality, accountability and people centeredness in service delivery¹. The importance of appropriate information to the planning and evaluation for the delivery of such a service is clear.

The results of this study will establish whether children residing in communities with water fluoridation continue to have lower levels of dental caries (decay) than those without. The study is also designed to identify the characteristics of children whose oral health needs are greatest; it looks at the extent to which the services are meeting the needs of these children and others.

A novel aspect of the research is that it is the first time the oral health of a representative sample of children has been measured contemporaneously, north and south of the border, using standardised criteria. The cooperation of the Department of Health Social Services and Public Safety in Northern Ireland (NI) made this approach feasible. As a result it will be possible to compare the oral health of children and adolescents in the Republic of Ireland (RoI) where the water is mainly fluoridated with that of the same age groups in Northern Ireland where the water supplies are not fluoridated. The system for delivery of children's oral health services is different in the two jurisdictions also; the results will indicate the impact of the two different approaches on the oral health treatment needs of children within the two systems.

What will this study tell us?

This preliminary report focuses on some of the primary aims of the North South Survey of Children's Oral Health, namely to:

- Measure levels of oral health and treatment needs in children and adolescents in the Republic (RoI) and Northern Ireland (NI) in 2001/'02 and to compare these levels with those measured in locally conducted surveys conducted in the 1990s and with national surveys conducted in 1983/'84 and 1961 – '63.
- Explore the relationship between disadvantage and oral health using medical card ownership (MC) in RoI and low-income benefits (LIB) in NI as surrogates for disadvantage.
- Compare levels of dental caries and enamel opacities including dental fluorosis among children and adolescents in RoI and NI.

Other conditions included in the clinical oral examination will be presented in the main report. In addition to the data presented here the main report will include: denture status; need for orthodontic treatment; oral hygiene assessment – need for oral hygiene instruction or professional cleaning of the teeth; tooth wear; need for dental treatment and the relationship between body mass index and oral health. The results of the questionnaire which was used to measure levels of oral health related knowledge; attitude, practices, and the level of consumer satisfaction with the services will also be presented in the final report.

Funding and support

For the Republic of Ireland, the Department of Health and Children and the Health Boards funded the survey as part of a contract for epidemiological services. The Oral Health Services Research Centre in University College Cork won the contract to advise and assist the Health Boards in the design and conduct of the survey and provide other epidemiological services through a competitive tender process. The tender was originally advertised in the EU journal in 1998 and the contract was awarded in July 1999. The extension of the fieldwork to Northern Ireland resulted from discussions with the Chief Dental Officer and managers of the Community Dental Service in NI who provided support for the extension of the survey.

The protocol for the survey was developed by the project team in the Oral Health Services Research Centre (Appendix 1) following widespread consultation with the Assistant Chief Executive Officers of the health boards, Principal Dental Surgeons, Dental Examiners for the Survey, Irish Dental Council, Council Members of the Irish Dental Association, Dublin Dental Hospital, Irish Dental Health Foundation and the National Adult Literacy Agency. The staff of the Department of Health and Children and health boards had an important role in the planning and management of the survey. The fieldwork for the survey was conducted by health board dentists and dental nurses (Appendix 2). As part of the process, staff at the Oral Health Services Research Centre trained 39 dentists and 39 dental nurses in survey methods and in the use of computers and computer software for the collection of survey data. Hence, development of new skills for health board staff was an integral part of the survey. Communication was ongoing between the fieldworkers and the OHSRC headquarters team throughout the fieldwork. The OHSRC provided advisory support for both the epidemiological and technical aspects of the data collection. A number of primary schools around the country assisted with the training and calibration of the examining dental teams. The Department of Education and Science provided data for the development of the sampling frame. A 'User Group' (Appendix 3) was established to represent the health boards in the planning, implementation and monitoring of the surveys. This group provided the link between the dental service managers and the survey headquarters team. Regular meetings ensured clear communication between the two. The Northern Ireland component of the survey was facilitated by members of the Community Dental Service and the Department of Health, Social Services and Public Safety (Appendix 4).

Ethical approval and data protection

The Ethics Committee of the Cork Teaching Hospitals reviewed the protocols for training and calibration of the examiners and for the main study. The committee approved the study on the 2nd October 2001. Ethical Approval was also obtained from the Research Ethics Committee of Queen's University, Belfast for the Northern part of the study.

The Office of the Data Protection Commissioner was consulted regarding the direct entry of data to computers. The Data Protection Licenses of the health boards and of University College Cork were extended to include the survey data. The study complied with the requirements of the Data Protection Act 1988, Data Protection (Access Modification)(Health) Regulations, 1989, (S.I. No.82 of 1989), Data Protection (Access Modification)(Social Work) Regulations, 1989, (S.I. No.83 of 1989), Council Directive on the Protection of Individuals with Regard to Processing of Personal Data (Directive 95/46/EC)(W)

Sample

Children were selected randomly on the basis of age, gender, and geographical location of the school attended and whether they attended a school with fluoridated or non-fluoridated water supply. The groups chosen were children in Junior Infants, Second Class, Sixth Class and Junior Certificate in RoI and in Primary 1, Primary 4, Year 1 and in Year 4 in NI. The groups will be referred to as five, eight, twelve and fifteen year olds within this report. These age groups are

comparable with earlier Irish studies and with studies conducted internationally as they include those age groups recommended for study by the World Health Organisation (WHO). Selection of children on the basis of age is essential because dental caries is a cumulative condition, hence levels increase with age. The number and type of teeth present in the mouth also changes with age. For example, children in Junior Infants / Primary 1 are on average five years old, have all their primary (deciduous, milk, or baby teeth), and no second or permanent teeth. Children in 2nd Class / Primary 4 (8-year-olds) have approximately twelve second or permanent teeth plus twelve primary teeth. By the time children are in 6th Class / Year 1 (12-year-olds), the teeth present in the mouth are mainly permanent ones. For Junior Certificate / Year 4 adolescents (15-year-olds), there are usually no primary teeth left and they have their full complement of permanent teeth (except wisdom teeth).

The Department of Education and Science provided information on numbers of children in different classes in schools in the RoI. This allowed the random selection of schools for inclusion in the survey. The primary sampling unit was the school. A cluster sampling technique was used with schools as the clustering unit. Schools were categorised according to health board region and size (to ensure representation of schools of various sizes) and whether they were located in a fluoridated or non-fluoridated areas. Within each Community Care Area, schools were randomly selected to ensure a balance for fluoridation status (where appropriate) and proportionally to the size of the school. A list of children in each class in each year (Junior Infants, 2nd Class, 6th Class and Junior Cert.) was obtained from the selected schools.

The Department of Education for Northern Ireland provided information on numbers of children in different classes in schools in NI. This allowed the random selection of schools for inclusion in the survey. The primary sampling unit was the school. A cluster sampling technique was used with schools as the clustering unit. Schools were categorised according to geographical region, size and an income deprivation index assigned to each school (to allow comparison with RoI within socioeconomic status). Within each geographical region, schools were randomly selected proportionally to the size of the school. A list of children in each class in each year (Primary 1 and 4 and Years 1 and 4) was obtained from the selected schools.

All children within a class were included in the random selection irrespective of whether they had special needs, but teams were told not to include in the selection whole classes that were designated as special needs within a school. Schools designated 'special needs' by the Department of Education and Science were the subject of a separate survey of oral health conducted in 2003 (report in preparation). The required number of children was selected randomly from each year and the consent forms were issued to only those children. In instances where there was a number of different classes within one year e.g. four different 2nd classes in the same school, a class was randomly selected and the children were randomly selected within this class. If insufficient numbers of children were present in the first class selected, another class was randomly selected until the required number of children to issue consent forms was obtained.

The total target sample size required in the Republic of Ireland was 14,400. The sample size was based on the desire to have 120 children per cell in each of the four age groups in 30 community care areas (120 X 4 age groups X 30 Community Care Areas = 14,400). The cell size of 120 would allow reliable estimates of dmft / DMFT by fluoridation or disadvantage (medical card or low income benefit) status. The total sample size had sufficient power to demonstrate a difference in dmft / DMFT level of at least 0.5 in 5, 12 and 15 year olds and at least 0.2 in the 8 year olds between children from fluoridated and non fluoridated areas in the ROI at the 5% level of significance. The target sample size of 2,390 in NI was chosen to demonstrate the same differences in dmft/DMFT (in each age group) between NI (non fluoridated) children and adolescents and those in fluoridated areas in the RoI according to socioeconomic status.

Training and Calibration of the Examining Teams

Before commencing the fieldwork, the teams of dentists and dental nurses were trained and calibrated in standardised methodology to ensure inter- and intra- examiner reliability on the measurement indices used. Thirty-two teams from the RoI and 4 teams from Northern Ireland conducted the fieldwork for the survey. Training took place in groups of 10 teams. Initially for the RoI teams, three training courses were conducted in June 2001 in two schools in Cork: Scoil Aiseirí Chríost, Farranree and Scoil Oilibheir Primary School, Ballyvolane. Further training and the final calibration of the Republic of Ireland teams took place in September 2001 in three schools: Scoil Mhuire Primary School, Tullamore, St. Philomena's National School, Bray, Co. Wicklow and Scoil Aiseirí Chríost, Farranree, Cork City (Three of the four teams from Northern Ireland were trained and calibrated with 8 of the RoI teams in Cork in September 2001). An additional team was recruited from Northern Ireland and trained in Cork in January 2002 to assist in the fieldwork. The principal trainer was involved in the training of the examiners in the 1984 National Survey in the Republic of Ireland and also trained the teams for the subsequent regional surveys in the 1990s. She was assisted by four assistant trainers who were experienced in the survey examination criteria (Appendix 5a). The level of agreement between the examiners and the gold standards in the various indices was calculated and measures of agreement were generated. Additional calibration exercises took place during the training courses between the trainers and the principal examiner to monitor and ensure standardization among the trainers in the training programme.

In December 2001 six examiners from the Republic of Ireland were recalled for further training in Dean's Index and one examiner in the Dental Health Component of the Modified IOTN Index.

A further validation exercise was conducted during the fieldwork to monitor examiner agreement and consistency during the course of the survey.

Training and calibration of the examiners from the participating health boards in the photographic recording of dental fluorosis took place in two separate training courses in October 2001 and January 2002 (Appendix 5b).

During the training sessions the teams were trained in the use of direct data entry on to laptop computers using software written for the survey (Appendix 6a). Systematic instructions on the return of data electronically were also given.

Clinical Examination

The methods and indices used in this study of oral health facilitate the comparison of the results with other national and international surveys. The criteria and indices used are detailed within the report. The children were examined in their schools. Lighting was provided by a portable dental light source ('Daray' lamp). A strict cross infection control protocol was followed.

The Fieldwork

The Department of Education and the Irish Dental Association were notified of the survey following which the examining teams were given details of the schools. The fieldwork was conducted between October 2001 and June 2002. For schools selected in the sample, the examiners contacted the chairpersons of school boards of management and the school principals. They were informed of the nature and aims of the study and were invited to participate. When agreement was received, the examining teams contacted the schools and the required number of children was randomly selected according to software developed for the purpose (Appendix 6b). Consent forms, which complied with the requirement for informed consent and included details of the survey procedures, were issued to the selected children.

The children were asked to give the forms to their parents or guardians for completion. Parents or guardians were asked to indicate whether they were in possession of a Medical Card in the Republic of Ireland or whether they were in receipt of low-income benefits in Northern Ireland. The consent forms also requested details of the water supply to the child's current and any previous home; this information was used to determine the child's lifetime exposure to domestic water fluoridation. Children were asked to return the completed forms to school. The right of children to refuse examination was observed and the teams did not attempt to proceed to examine children who refused examination.

Response Rate

The overall response rate for RoI was 68% (68%, 68%, 68% and 66% in the 5-, 8-, 12- and 15-year-old age groups, respectively). The overall response rate for NI was 53% (56%, 63%, 59% and 43%, respectively).

Statistical Analysis

This preliminary report presents details of the number of children and adolescents examined, the average age of the children in the four school years included in the study, a description of the levels and prevalence of caries, the proportion of caries which was untreated, the proportion with fissure sealants on their teeth, the proportion of those with enamel opacities and dental fluorosis and the proportion with trauma to their teeth. These data are presented according to health board region of residence, fluoridation status and disadvantage status. Data are also presented for Ireland as a whole and for Northern Ireland. Health board and national results for the RoI have been weighted according to the relative population sizes of the community care areas on which they are based. The NI results were not weighted, as the population sizes were not available by board region.

To fulfill the main aims of the study, statistical comparisons are presented for selected results at national level for RoI and for NI as a whole. It would be inappropriate to conduct multiple statistical comparisons at individual health board level, as the study was not powered to conduct comparisons at this level. All statistical comparisons in this report are univariate (2 sample t-tests, chi-squared tests and Fishers exact test) with a 5% level of significance and are two sided.

19,950 children and adolescents were clinically examined 17,838 in the Republic and 2,112 in Northern Ireland

Figure 1
Gender distribution within Rol sample

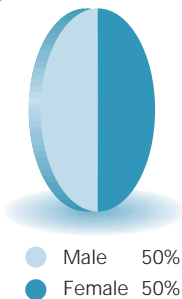
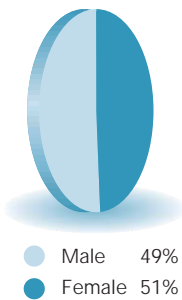


Figure 2
Gender distribution within NI sample



Results

Number of Children Examined

A stratified representative sample of 5-, 8-, 12- and 15-year-old children and adolescents in each of the 10 health board regions in Rol and in NI as a whole was selected to participate in the study. In Rol the dental teams examined 17,836 children and adolescents (Table1). Over 3,000 children and adolescents in each of the 8-, 12- and 15-year-old groups and over 6,000 children in the 5-year-old group. The high numbers in the 5-year-old group were due to a request from the North Eastern Health Board (NEHB) to do a population survey of the 5-year-old group in that area. In NI, 2,112 children and adolescents were examined (Table 1).

An even gender balance was achieved in the sample, which was 50% male in Rol (figure 1) and 49% male in NI (figure 2).

Table 1
Number of children examined in each of the health board areas in Rol and in NI for the National Survey of Children's Dental Health 2001/2002

	AGE GROUP				Total
	5	8	12	15	
ERHA	804	933	855	894	3486
ECAHB	227	248	217	230	922
NAHB	272	356	325	335	1288
SWAHB	305	329	313	329	1276
MHB	308	274	337	260	1179
MWHB	382	402	413	350	1547
NEHB	3310	372	363	346	4391
NWHB	270	242	268	250	1030
SEHB	551	547	592	495	2185
SHB	658	650	700	622	2630
WHB	378	349	358	305	1390
Total Rol	6661	3769	3886	3522	17838
Total NI	831	302	346	633	2112

Fluoridation Status of the Children Examined

As a result of the Health (Fluoridation of Water Supplies) Act 1960, 71% of the population in the Republic of Ireland now has fluoridated domestic water supplies. Previous studies show that this public health measure has been successful in reducing tooth decay in the Irish population.

Although the sample was selected on the basis of school water fluoridation status, the results are presented according to each child's domestic water fluoridation status. Information on the water supply and on fluoride supplements was requested on the consent form. The child's name and home address was entered on the consent form and the parent was asked whether the home was connected to the piped public water supply. The parent was also asked how long they have lived at the address and about any previous addresses. The consent form also contained questions about fluoride mouthrinses and supplements.

Fluoridation status was classified for each child after the examinations. For residences connected to the piped public water supply, information on the fluoride status of the supply was obtained from the local water engineer on an individual address basis when necessary.

Fluoridation status was classified as follows:

Not recorded: There was insufficient information on the record to determine the fluoridation status of the domestic water supply.

Full: The child had a fluoridated domestic water supply in the home since birth.

None: The child has had no exposure to fluoridated water in the home since birth and has never used fluoride mouthrinses or supplements.

Part: The child had fluoridated water in the home (but not continuously since birth).

Rinse only: The child's home address had never had a fluoridated water supply but the parent reported that the child had taken a fluoride mouthrinse or participated in a school fluoride mouthrinse scheme.

Mixed Fluoride Supplements: Children in this group had reported taking fluoride supplements and may also have used fluoride mouthrinse

Schools attended by fifteen year olds tend to be located in large towns, most of which have fluoridated water supplies. The samples in this case were drawn from the schools and as with the other age groups the fluoridation status was determined post hoc by referring to the water supply of the home address/s as provided with the completed consent form. A tally of numbers in the 'Full' and 'Non' fluoride groups was maintained as the survey progressed. A top up sample was drawn where cell sizes were insufficient or likely to be insufficient.

The distribution of the sample according to these fluoridation categories is shown in Table 2 and Figure 3 for RoI and Table 2 and Figure 4 for NI.

In this report where results are presented according to fluoridation status, data are presented for the "full fluoride" and "non fluoridated" groups only. This is because the other groups mainly contained only small numbers of subjects.

Table 2

Distribution of children examined in the Republic and Northern Ireland according to the fluoridation status of their domestic water supply

Republic of Ireland Fluoridation status	5	8	12	15	All
Not Recorded	170	40	33	32	275
Non	2160	814	747	632	4353
Rinse only	26	314	587	389	1316
Mixed FI Supp	20	30	62	67	179
Part	668	363	367	342	1740
Full	3617	2208	2090	2060	9975
Total	6661	3769	3886	3522	17838
Northern Ireland Fluoridation status	5	8	12	15	All
Not Recorded	7	2	0	3	12
Non	669	209	201	396	1475
Rinse only	16	15	7	28	66
Mixed FI Supp	136	64	131	202	533
Part	2	1	7	3	13
Full	1	11	0	1	13
Total	831	302	346	633	2112

Figure 3
Percentage distribution of RoI sample according to fluoridation status

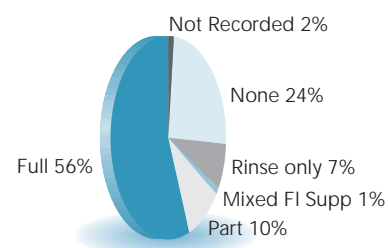
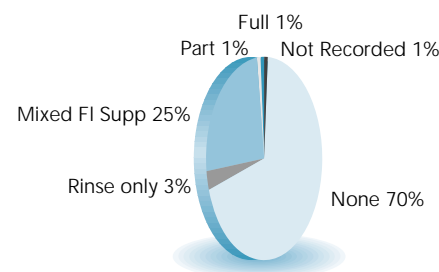


Figure 4
Percentage distribution of NI sample according to fluoridation status



Levels of disadvantage among the sample

One of the major objectives of health services is to ensure equitable delivery of care to all groups. The sample was monitored to ensure adequate representation of the less well off. Medical card ownership by the parents or guardians of the children and adolescents in the sample was used as a surrogate for disadvantage in RoI. Parents were asked to indicate whether they had a medical card on the consent form, which was returned to the school prior to the clinical examination. For the general population under age 70 in RoI, medical card issue is based on a means test unless the applicant has a disability. Medical cards are issued to low-income applicants. In NI disadvantage was classified according to whether the parents or guardians of the children or adolescents in the sample were in receipt of any low-income benefits. The numbers of children examined in both jurisdictions, whose families were classified in this way are shown according to fluoridation status in Table 3.

Twenty four per cent of the total sample examined in RoI had medical cards. This figure is likely to be similar to the proportion of children in the entire population who are dependants of medical card holders. The General Medical Service (GMS) payments board estimated that in 2001 31% of the entire population of RoI was eligible for medical card benefits². In NI 38% of the sample were in receipt of low-income benefits. This difference in disadvantage percentages between RoI and NI arises because of the use of different measures of disadvantage in the two regions. A measure of disadvantage applicable in the two regions would be useful, however none was available for this study and NI / RoI comparisons according to disadvantage must bear this difference in mind. In the final report data will be compared according to social class based on parents occupational classification.

Table 3

Distribution of children examined in the Republic and Northern Ireland according to their level of disadvantage as classified by their parents' ownership of a Medical Card (MC, MC = less well off, RoI) or receipt of low income benefits (LIB, LIB = less well off, NI) within age group and fluoridation status.

AGE GROUP												
			5		8		12		15		Total	
Region	FI Status		n	%	n	%	n	%	n	%	n	%
RoI	Non	No MC	1769	82	654	80	576	77	456	72	3455	79
		MC	381	18	157	19	170	23	175	28	883	20
	Full	No MC	2662	74	1654	75	1618	77	1492	72	7426	74
		MC	945	26	541	25	470	22	560	27	2516	25
TOTAL												
		No MC	5053	76	2858	76	2975	77	2546	72	13432	75
		MC	1550	23	874	23	896	23	954	27	4274	24
NI	Non	No LIB	407	61	119	57	117	58	261	66	904	61
		LIB	259	39	86	41	76	38	129	33	550	37
TOTAL												
		No LIB	495	60	161	53	207	60	406	64	1269	60
		LIB	327	39	135	45	127	37	212	33	801	38

Age of the children and adolescents examined in the survey

Children in Junior Infants, 2nd and 6th Class and Junior Certificate year comprised the sampling frame in RoI. In NI the sampling frame consisted of children in Primary 1, Primary 4, Year 1 and Year 4. The children are referred to as 5-, 8-, 12- and 15-year-olds, throughout the report. Their actual age on the date of examination was recorded and the mean age of the children examined in the different classes are presented in Table 4. As many oral conditions are age-related, it is important to ensure that the mean age of the children in groups under comparison is similar. As can be seen in Table 4, the mean age of the children according to gender, fluoridation status and disadvantage was comparable.

Table 4

Mean age according to gender, fluoridation status and disadvantage as indicated by family ownership of a Medical Card (RoI) or low income benefits (LIB) (NI) of children and adolescents examined in RoI and NI

		AGE GROUP			
		5	8	12	15
RoI	Female	5.3	8.3	12.3	15.1
	Male	5.4	8.4	12.4	15.2
NI	Female	5.4	8.4	12.2	15.2
	Male	5.4	8.3	12.2	15.2
RoI	Full FI	5.3	8.4	12.4	15.1
	No FI	5.4	8.4	12.4	15.2
NI	No FI	5.4	8.4	12.2	15.2
RoI	MC	5.3	8.4	12.5	15.2
	No MC	5.4	8.4	12.4	15.2
NI	LIB	5.4	8.3	12.2	15.2
	No LIB	5.4	8.4	12.2	15.2
RoI	Total	5.3	8.4	12.4	15.2
NI	Total	5.4	8.4	12.2	15.2

The mean age on the date of examination was similar for gender, fluoridation and disadvantage. This is important because dental caries is a cumulative condition increasing with age.

For every 1,000
15- year-olds without
fluoridated domestic
water there are an
estimated 3,200
decayed, missing or
filled permanent teeth.
This figure is 2,100
(1,100 teeth less)
among those who had
domestic water
fluoridation since birth

Dental Caries – Introduction

Children were examined for tooth decay, which had extended through the enamel and into dentine in their teeth. Tooth decay levels in children are best described using a measurement called the DMFT index. This measurement counts the number of teeth, which are decayed (D), missing (i.e. extracted due to decay) (M), or filled due to decay (F). Data for 5-year-old children refer to primary teeth only, and by convention are referred to by lower case letters (dmft). The figures for eight, twelve and fifteen year-olds refer to permanent teeth only, and are referred to by upper case letters (DMFT). The data are presented as *mean dmft* (five year olds), and *mean DMFT* (eight, twelve and fifteen year olds) per child. Where for example the mean DMFT for fifteen year olds in fully fluoridated areas is reported as 2.1, this indicates that on average, fifteen year olds in these areas have 2.1 permanent teeth that which are decayed, missing due to decay, or filled. Another way of looking at it is to say that among every 1,000 fifteen year olds there are an estimated 2,100 teeth affected by dental caries. Some of these teeth may be decayed but untreated, they may have been restored (filled), or they may have been taken out (missing). Similarly, in non-fluoridated areas the mean DMFT for fifteen year olds is 3.2, indicating that among every 1,000 fifteen year olds living in non-fluoridated areas there are an estimated 3,200 permanent teeth which are decayed, missing or filled.

The way in which an index is used impacts on the measurements made, in this study WHO criteria³ were used for recording caries at the level of cavitation into dentine (cavitation level). A ball tipped CPITN probe was used to remove plaque and to help confirm diagnosis of cavitation. These criteria allow historical comparison with surveys in the Republic of Ireland conducted previously. In this study caries visible into dentine, which had not cavitated but appeared as a definite shadow under the enamel (visual caries) was coded differently to cavitated caries. This approach allows the data to be analysed either without visual caries (historical method used in earlier surveys) or with visual caries (method currently used in UK and NI⁴). In this report the notation 'cavitated' and 'visual' caries will be used to indicate the level at which the data are presented.

One of the main aims of this survey is to measure the impact of fluoridation on the oral health of children. Of the total population of 3.8 million in RoI 71% reside in fluoridated communities. In NI public water supplies are not fluoridated. Accordingly, levels of dental caries among children in the Republic and Northern Ireland in 2002 are reported. Figures are reported according to fluoridation status for those who have had fluoridated water in the home since birth and for those who have never had access to fluoridated water in the home since birth. Data are given for each health board, for the three Eastern Regional Health Authority (ERHA) boards; East Coast Area Health Board (ECAHB), Northern Area Health Board (NAHB), South Western Area Health Board (SWAHB) and for the Eastern Regional Health Authority as a whole; for the Midland (MHB); Mid Western (MWHB); North Eastern (NEHB); North Western (NWHB); South Eastern (SEHB); Southern (SHB); Western (WHB); for the Republic of Ireland (RoI) and for Northern Ireland (NI).

Following the results showing caries levels in 2002, changes in dental caries levels since the 1960s are illustrated for all areas.

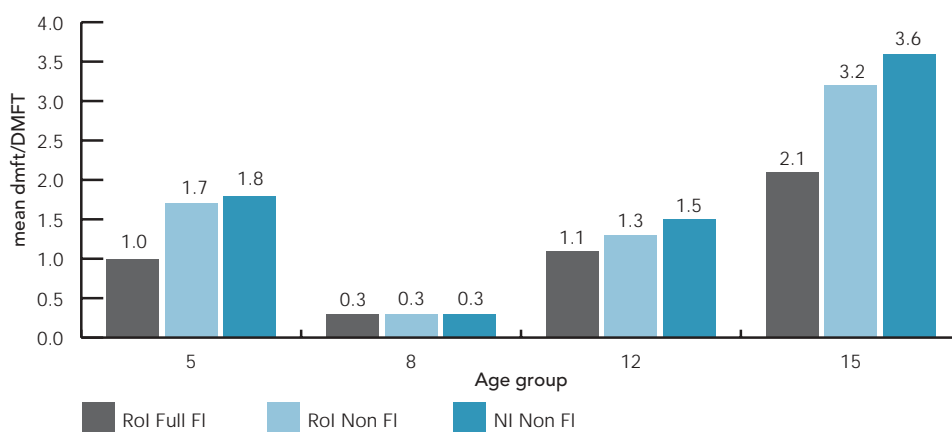
The next series of tables and figures will focus on another main aim of the survey, which was to provide information on inequalities in oral health. Medical Card ownership by the parents of the children and adolescents examined in the survey is taken as a surrogate for disadvantage. In Northern Ireland children whose parents are in receipt of any low income benefits (LIB) are also classified as disadvantaged. The number of decayed, missing and filled teeth and the percentage of these teeth with untreated disease are shown. Data are presented within age group for fluoridated and non-fluoridated groups separately.

The number of households without water fluoridation in the ERHA region is very small, hence data are not presented for the non- fluoridated ('non fluo') category for ERHA. In the WHB

school based fluoride mouthrinse schemes are very common, as a result the numbers in the non-fluoridated 12- and 15-year-old groups were too small to allow presentation of meaningful data.

Northern Ireland does not have community water fluoridation, therefore data for Northern Ireland are confined to the tables showing figures for non fluoridated groups.

Figure 5 Decay experience, mean number of decayed (cavitated), missing and filled teeth (dmft, primary teeth 5-year-olds; DMFT, permanent teeth 8-, 12-, 15-year-olds) among children and adolescents with fluoridated ('RoI Full FI') and non fluoridated ('RoI Non FI') domestic water supplies in RoI and in NI ('NI Non FI', non fluoridated) in 2002



Levels of Cavitated Dental Decay in Ireland

The level of cavitated dental caries in 2002 among 5-, 8-, 12- and 15-year-old children and adolescents in the RoI as a whole according to whether their home water supply had been fluoridated since birth (Full FI) or whether they never lived at an address with a fluoridated supply (Non FI) and in NI as a whole is shown in Figure 5.

In the RoI as a whole, five-year-old children with full water fluoridation had on average 1.0 decayed, missing or filled primary or milk teeth (mean dmft). For eight, twelve and fifteen year olds with full domestic water fluoridation, the corresponding figures for permanent teeth were 0.3, 1.1 and 2.1 respectively (mean DMFT). As children grow older, their caries levels increase as the number of permanent teeth in the mouth increases and the teeth are exposed to cariogenic (decay producing) foods over longer time periods. In non-fluoridated areas the pattern is similar, but with higher levels of caries at all ages. On average, five year olds in non-fluoridated areas had 1.7 decayed, missing or filled primary teeth, while eight, twelve and fifteen year olds had on average 0.3, 1.3 and 3.2 permanent teeth respectively affected by caries. For 5- ($p<0.0001$), 12- ($p<0.0005$) and 15-year-old ($p<0.0001$) age groups dental caries levels were statistically significantly lower amongst children with lifetime exposure to fluoridated domestic water supplies. In the case of 8-year-olds the difference did not reach statistical significance ($p=0.3420$). Caries levels in the permanent dentition in both fluoridated and non-fluoridated groups are relatively low at age 8. As children enter their teens there is a greater increase in caries levels among residents of non-fluoridated communities and the difference between fluoridated and non-fluoridated groups becomes more pronounced as seen in the 12- and 15-year-old groups. The mean dmft/DMFT scores for 5-, 8-, 12-, and 15-year-olds in NI were 1.8, 0.3, 1.5 and 3.6 respectively. These scores were statistically significantly higher than those for children and adolescents resident in fluoridated communities in RoI, except in the case of 8-year-olds, for whom as in RoI, caries levels in the permanent dentition were relatively low. For 5-, 8-, 12- and 15-year-olds the p values for the significance of the difference between the two groups were $p<0.0001$, $p=0.6631$, $p<0.0005$ and $p<0.0001$ respectively. Except for 15-year-olds, caries levels amongst the non-fluoridated group were similar in RoI and NI. In the case of 15-year-olds caries levels were significantly lower among the non-fluoridated group in RoI (mean DMFT 3.2 in RoI vs 3.6 in NI, $p=0.0459$).

For 5, 12 and 15-year-old age groups dental caries levels were statistically significantly lower amongst children with lifetime exposure to fluoridated domestic water supplies.

In 2002 Caries levels among 5-year-olds with water fluoridation in RoI were 44% lower than those in NI.

Mean DMFT scores among 15-year-olds with water fluoridation in RoI were 42% lower than those for the same age group, with no fluoridation in NI.

Figure 6 illustrates the dmft/DMFT data according to fluoridation status within each of the 10 health board regions for all four age groups. There was considerable regional variation in dental caries levels. Mean dmft levels among 5-year-olds (Fig 6a) in non-fluoridated areas ranged from 1.6 to 1.9 and were highest in the SEHB and the NWHB regions (1.9) with similarly high caries levels in NI 5-year-olds (mean dmft 1.8). For fluoridated 5-year-old groups, the range of mean dmft was wider 0.6 – 1.6 with the lowest levels in the ECAHB region and the highest in the SEHB & NWHB region. In fluoridated areas dmft levels were lower. The difference between scores ranged from 16% lower in the SEHB to 52% lower in the WHB. Overall, caries levels among 5-year-olds with water fluoridation in RoI were 44% lower than those in NI.

Caries levels in the permanent teeth of 8-year-old children (Fig 6b) were very low in both fluoridated (mean DMFT 0.3, range 0.2-0.5) and non-fluoridated groups (mean DMFT 0.3, range 0.2-0.4) with little difference between the two or with NI (mean DMFT 0.3).

The ECAHB again had the lowest caries levels (0.8) in the 12-year-old fluoridated group (Fig 6c) and the MWHB, SEHB and SHB had the highest (1.5). Interestingly as with the 5-year-old group there was a wide range in the percentage differences between DMFT scores among children in the fluoridated and non-fluoridated groups. The mean DMFT was 22% higher among children in the fluoridated group in the NWHB and 34% lower among children in the fluoridated group in the SHB when compared with DMFT scores of the children in the non-fluoridated groups in the same region. Mean caries scores among 12-year-olds with fluoridated water were 30% lower in the RoI group than in non-fluoridated NI.

The DMFT scores in RoI ranged from 1.9 – 2.4 among adolescents (Fig 6d) with fluoridated water supplies in the 10 health board regions. In contrast to the younger age groups there was wider variation in mean DMFT scores amongst the non-fluoridated groups (2.5 – 3.7) in the RoI. The range in differences between fluoridated and non-fluoridated groups was 12% in the MHB to 49% in the MWHB. Mean DMFT scores among 15-year-olds with water fluoridation in RoI were 42% lower than those for the same age group, with no fluoridation in NI (mean DMFT 3.6).

The source of this wide variation in the apparent effectiveness of water fluoridation requires urgent consideration to facilitate optimisation of the fluoridation of water supplies in all regions. Research is currently underway which will assess the quality of the scheme in different regions. The findings of that work may shed light on the source of this variation. Further multivariate analysis of the current data will also be undertaken in an effort to understand the source of the variation.

The percentage of children and adolescents with no caries (Figure 7) in their primary (5-year-olds) or permanent (8-, 12- and 15-year-olds) dentition is another outcome of interest and is a useful measure in the monitoring of trends in oral health. For all four age groups the figures reflect the trends illustrated by the mean dmft/DMFT data. Over two thirds (69.5%) of 5-year-olds (Fig 7a) with fluoridated water had no caries at cavitation level (cavitated dmft = 0) in their primary teeth compared with only half (52.5%) of those without water fluoridation. These figures show that a high proportion of RoI 5-year-olds experience decay in their primary teeth by the time they are in their first year in school. Decay in the primary dentition is undesirable because:

There is danger of infection and damage to the underlying permanent dentition.

Early loss of primary teeth can result in a loss of space for the permanent teeth resulting in crowding and a need for orthodontic treatment.

Young children can pose a challenge for dental treatment necessitating the use of general anesthesia.

In NI the percentage of 5-year-olds caries free in the primary dentition (52.5%) was similar to non-fluoridated areas in RoI.

Figure 6 Mean number of decayed (cavitated), missing and filled teeth (dmft, primary teeth 5-year-olds; DMFT, permanent teeth 8-, 12-, 15-year-olds) among children and adolescents with fluoridated ('Full') and non fluoridated ('Non') domestic water supplies in the 10 health board regions, ERHA, NI and RoI in 2002

(Data excluded where numbers are less than 30)

Figure 6a: 5-year-olds

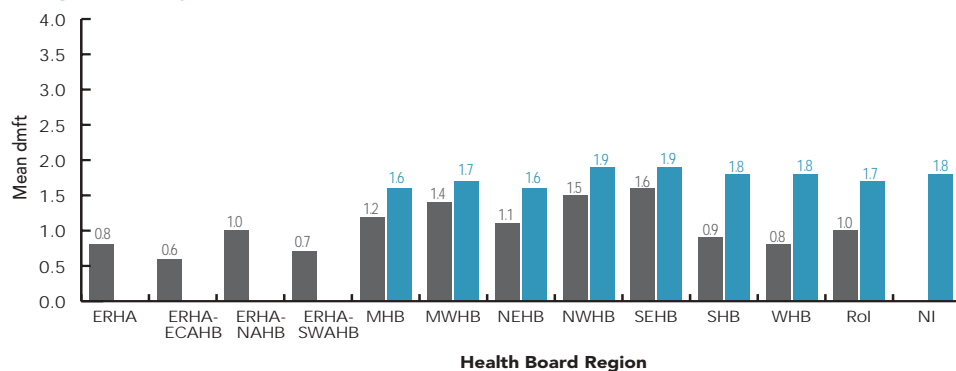


Figure 6b: 8-year-olds

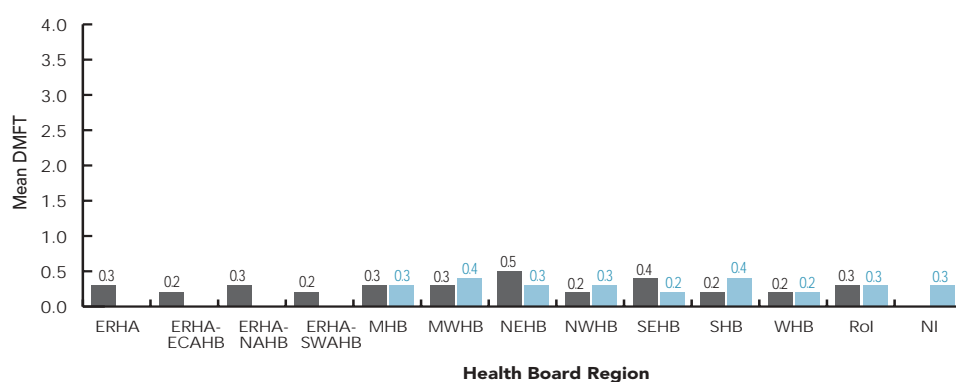


Figure 6c: 12-year-olds

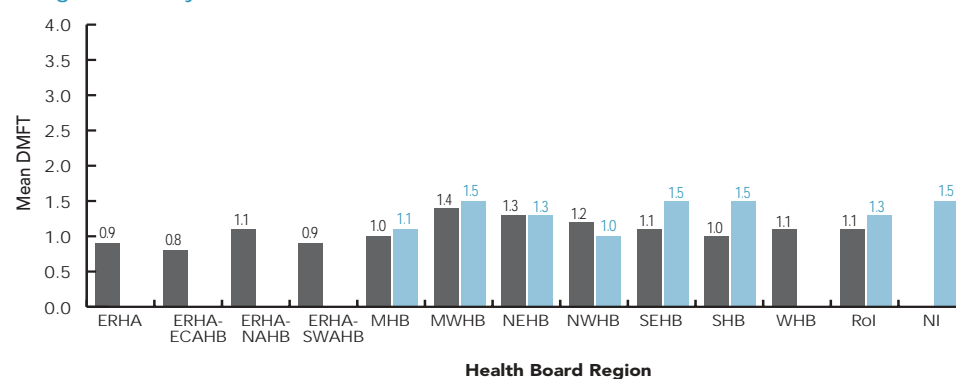
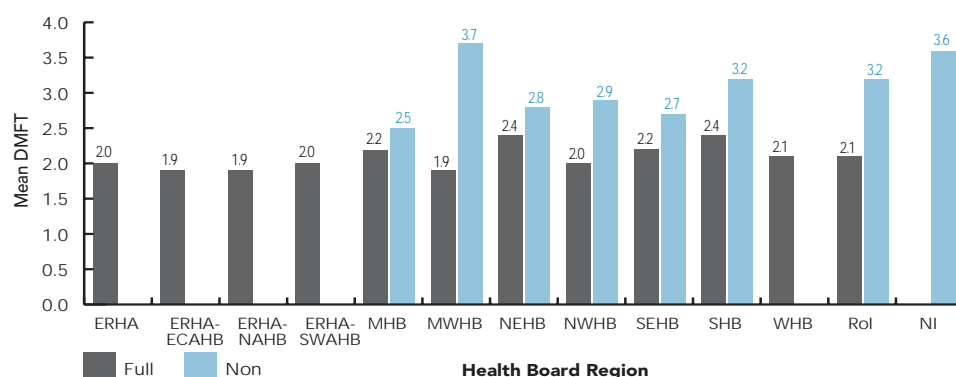


Figure 6d: 15-year-olds



One in every six (16%) children already have decay in their permanent teeth by age 8.

Over 80% of 8-year-olds (Fig 7b) in fluoridated and non-fluoridated areas are caries free in the permanent dentition, the converse is that 18% of children in non fluoridated and 16% in fluoridated areas already have caries at cavitation level by age 8 even though the permanent teeth have been in the mouth for a relatively short period of time. In NI 80% of 8-year-olds were caries free, i.e. 20% had caries in their permanent teeth. Approximately half of the 12-year-old group (Fig 7c) had no cavitated caries in their permanent teeth, 54% among the fluoridated group, 49% among the non-fluoridated RoI group and 46% for NI children.

The difference between the fluoridated and non-fluoridated groups is more pronounced among the 15-year-olds (Fig 7d) with one third (33%) of adolescents in the fluoridated group free of cavitated caries and approximately one quarter (26%) of the non-fluoridated group in RoI and one quarter (24%) in NI with no cavitated caries in the permanent dentition.

Progress towards Oral Health Goals for 2000

The Dental Health Action Plan in RoI, formed in response to the Irish Government Health Strategy "Shaping a Healthier Future" published in 1994, set a goal for the year 2000 that "twelve year old children in optimally fluoridated areas will have on average no more than one decayed, missing or filled permanent tooth, and in less than optimally fluoridated areas no more than two decayed, missing or filled permanent teeth." In fluoridated areas in 2002 the goal was being approached, as twelve-year-old children had on average 1.1 decayed, missing or filled permanent teeth. In non-fluoridated areas, decay levels were well within the set goal, as the number of decayed, missing or filled permanent teeth was on average 1.3, well below the goal of 2.0.

The goal for 5-year-olds for the year 2000 set in the Dental Health Action Plan in 1994 was that 85% of 5-year-olds in optimally fluoridated areas and 60% of those in non-fluoridated areas should be caries free. At 70% and 53% (rounding up) caries free respectively, this goal was not achieved and new caries preventive programs are needed if progress is to be made towards this goal.

Figure 7 Percentage of children and adolescents with no caries (at cavitation level) in their primary teeth (5-year-olds) or permanent teeth (8-, 12- and 15-year-olds) according to fluoridation status ('Full' and 'Non') and health board region, Nationally (RoI) and Northern Ireland (NI)

(Data excluded where numbers are less than 30)

Figure 7a: 5-year-olds

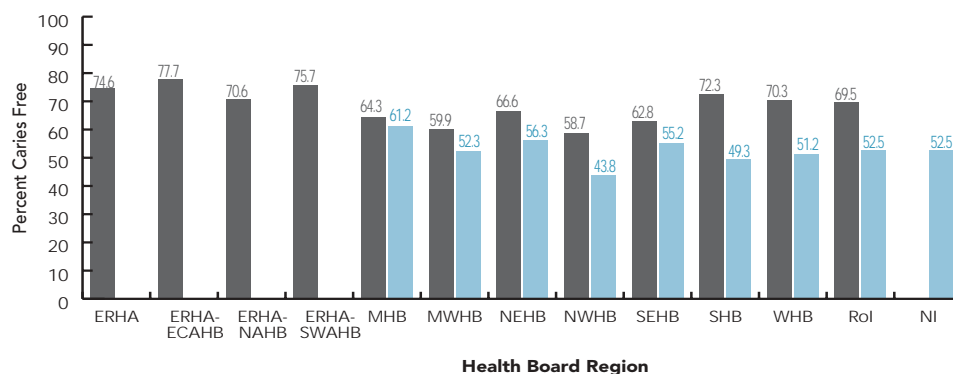


Figure 7b: 8-year-olds

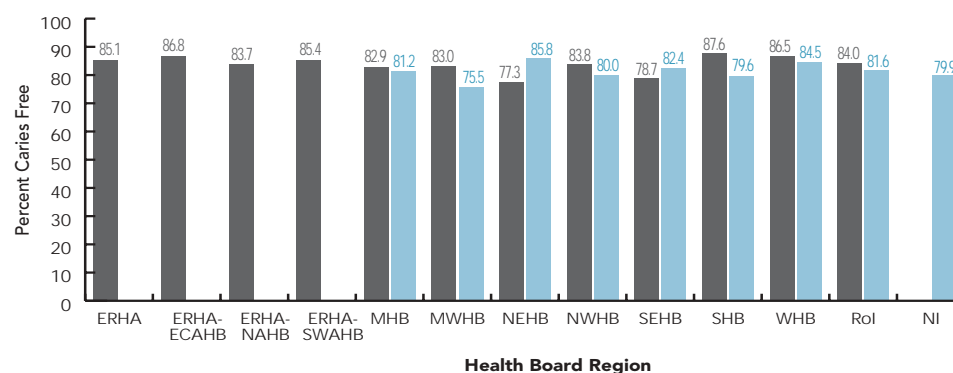


Figure 7c: 12-year-olds

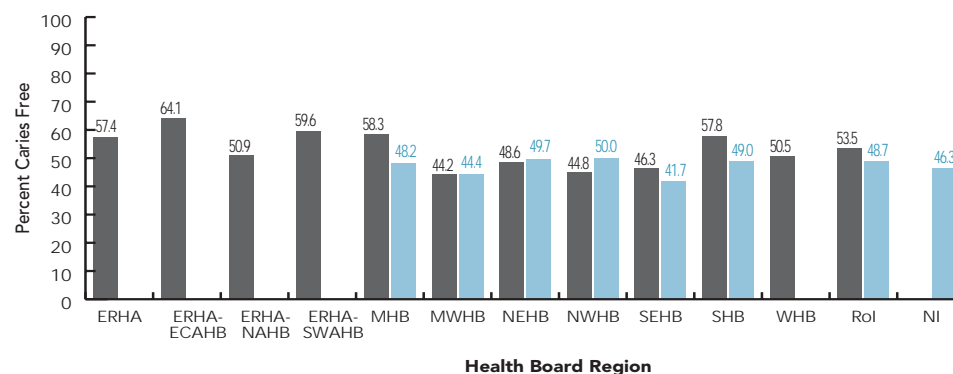


Figure 7d: 15-year-olds

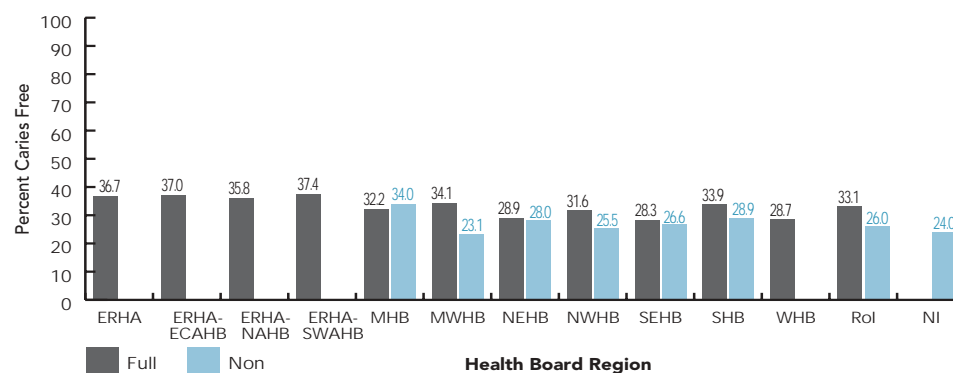


Figure 8 Mean number of primary teeth (dmft, 5-year-olds) and permanent teeth (DMFT, 8-, 12- and 15-year-olds) which were decayed (cavitated), missing or filled due to decay among children and adolescents in the 1960s and living in fluoridated areas in 1984, 1990s and 2002

(Data excluded where numbers are less than 30)

Figure 8a: 5-year-olds

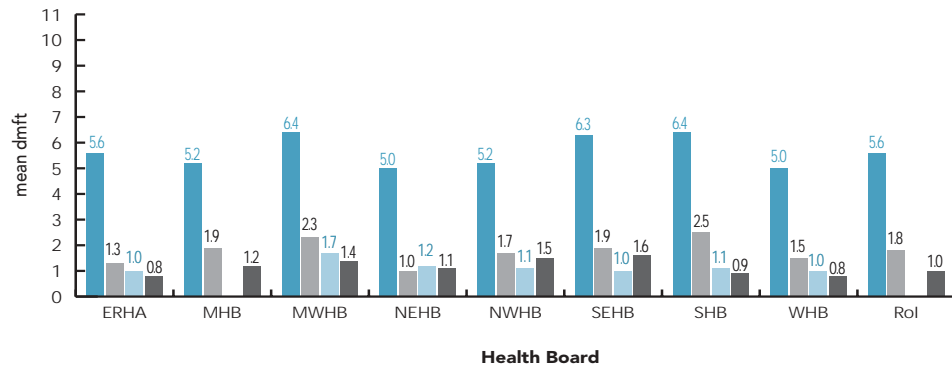


Figure 8b: 8-year-olds

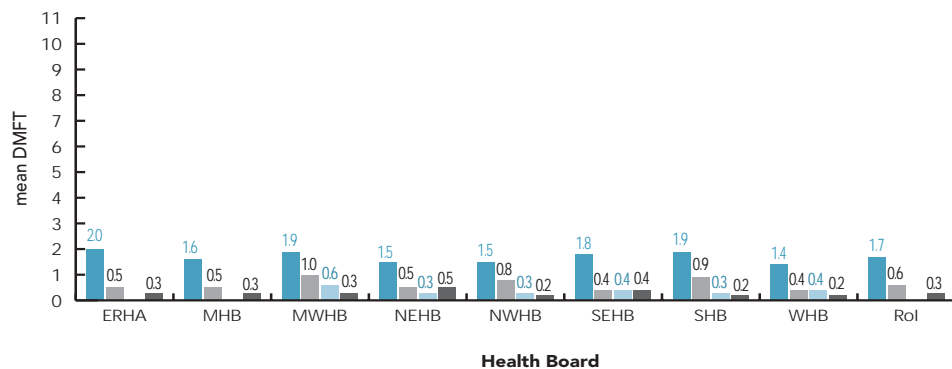


Figure 8c: 12-year-olds

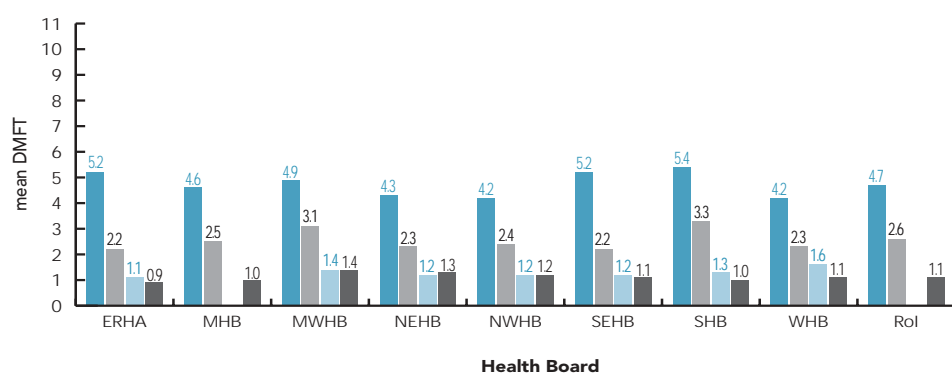


Figure 8d: 15-year-olds

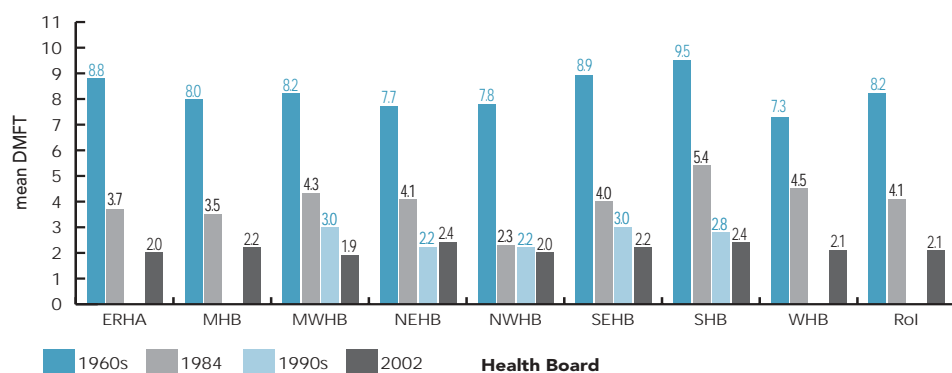


Figure 9 Mean number of primary teeth (dmft, 5-year-olds) and permanent teeth (DMFT 8-, 12- and 15-year-olds) which were decayed (cavitated), missing or filled due to decay among children and adolescents living in non fluoridated areas in the 1960s, 1984, 1990s and 2002 in RoI and NI

(Data excluded where numbers are less than 30)

Figure 9a: 5-year-olds

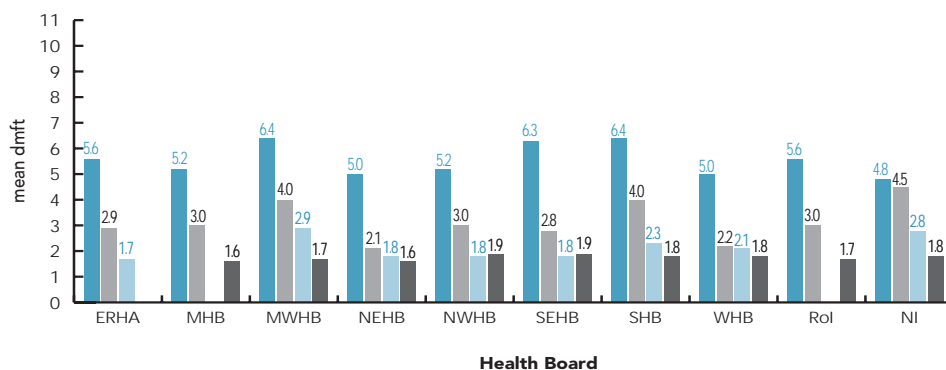


Figure 9b: 8-year-olds

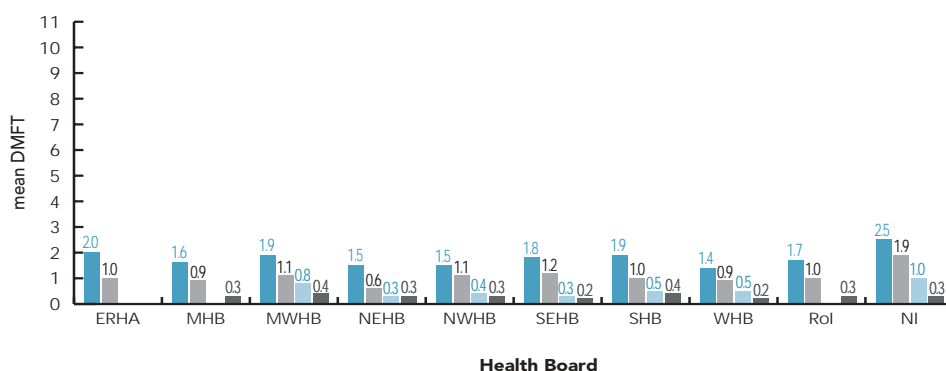


Figure 9c: 12-year-olds

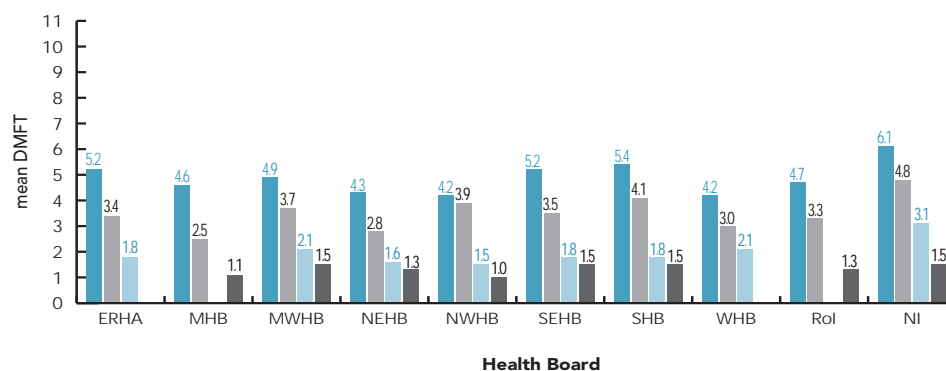
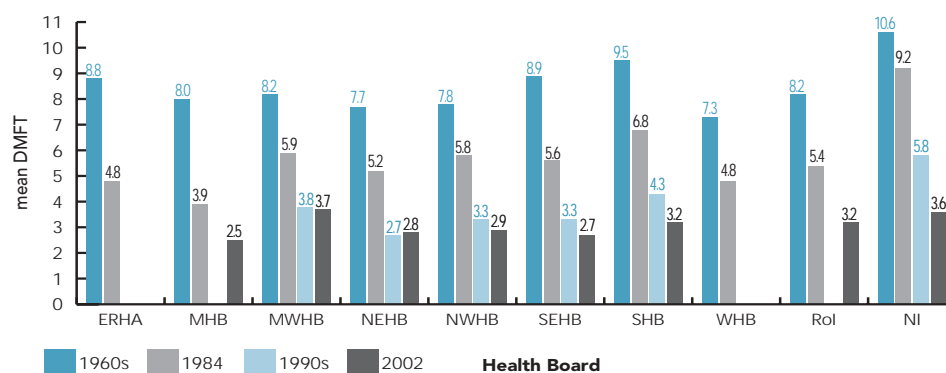


Figure 9d: 15-year-olds



The decline in caries levels in the permanent teeth of 8-, 12- and 15-year-olds has continued into the 1990s for both those with and without water fluoridation.

Trends in caries levels among 5-year-olds are a cause for concern. In fluoridated areas the decline appears to have come to a halt with some evidence of an increase since the most recent regional surveys in the second half of the 1990s

Changes in caries levels over time

Caries levels in ROI and NI have changed dramatically since the early 1960s in both fluoridated and non-fluoridated areas. The changes are illustrated here (Figures 8 and 9). Data are available from 1963/4⁵, 1984⁶ and for the 1990s^{7 8 9 10 11 12 13} for seven of the (original) eight health board regions. The 1963/4 data are from the statutory pre-fluoridation surveys, which were carried out in all areas of the country at the time. These data are therefore not broken down by fluoridation status. The 1984 data are from the National Survey of Children's Dental Health, and are presented for non-fluoridated and fully-fluoridated groups, which are comparable with the similar groupings in the present survey. Similarly for the 1990s data are presented according to fluoridation status. The 1990s regional surveys were carried out as a result of individual requests from health boards at different times. The WHB survey was carried out in 1991, NEHB and SHB in 1995, EHB in 1993 and again in 1997, the results for the 1997 survey are presented here, the MWHB survey was carried out in 1997, the NWHB in 1997/'98 and the SEHB in 1998/'99. Comparisons are not available for the three constituent boards of ERHA, because at the time of the surveys, ERHA was a single administrative unit, the Eastern Health Board (EHB). Data are therefore presented for the EHB or ERHA as a whole for these comparisons. All four age groupings were not included in every regional survey. For NI the 1963 data is taken from a survey of Belfast schools¹⁴ carried out at that time. The 1980s data is from the NI sample in the 1983 OPCS decennial UK Child Oral Health Survey¹⁵. In 1990 the Oral Health Services Research Centre directed a survey in NI¹⁶ using the same examination criteria used in the 1984 National Survey of Children's Oral Health and the results of that survey are used for the 1990s comparison. The examination criteria used in the 1990s and 2001/2002 surveys for caries at cavitation level are identical (except for the NI 1990 survey in which the criteria were identical except for the use of a sharp probe in NI). In the 1984 and 1961/'63 surveys a sharp probe was used to confirm a diagnosis of cavitation. The use of sharp probes was abandoned in the later studies and replaced with a probe with a 0.5 mm ball tip, which was used to confirm cavitation. This change is likely to have a small impact on caries levels as slightly less caries would be confirmed with a 0.5 mm probe than with a sharp probe. The impact of the change has not been quantified but is likely to be minor. In all studies identical standardised criteria were used for contemporaneous measurement of all conditions across fluoridated and non-fluoridated groups.

Figures 8 and 9 show results for the 2001/'02 survey compared with those of the 1990s surveys^{7 8 9 10 11 12 13} the 1984 survey⁶, and with results of the pre-fluoridation surveys of 1961/'63⁵. The data show that for both children and adolescents with (figure 8) and without (figure 9) water fluoridation, decay levels were much lower in 2002 than they were in 1984 ($p < 0.0001$ all groups) and in 1961/'63 in all age groups.⁵ Changes since the 1990s are more variable and time since the last survey must be taken into account when interpreting the results. For example there was a 10-year gap between the 1991 WHB survey and the current survey whereas for the SEHB the gap has only been 3 years. Clearly, there has been little time over which changes in caries levels could occur in the SEHB, this also applies to the NWHB where there was a 4-year interval since the previous survey.

In recent years, the general trend for caries levels among 5-year-olds in England and Wales¹⁷ has been a slight decrease (4%) between 1997/1998 and 1999/2000 and a slight increase (3%) between 1999/2000, and 2001/'2002. The data shown here appear to show a similar pattern of caries 'bottoming out' among 5-year-olds in fluoridated areas where levels reported in 2001/2002 are higher in the NWHB (mean dmft 1.5) and SEHB (mean dmft 1.6) than those reported in the NWHB in 1997/'98 (mean dmft 1.1) and SEHB in 1998/'99 (mean dmft 1.0). In other health board regions there was a decrease ranging from 0.2 – 0.3 dmft. In non-fluoridated areas mean dmft scores in the NWHB and SEHB were similar to the levels reported in their recent 1990s studies. There was an increase of 0.1 dmft from a mean dmft of 1.8 to 1.9 in both regions. Among the other health board regions there was a decrease in caries levels ranging from 0.2 dmft in the NEHB (mean dmft of 1.8 in 1995 and 1.6 in 2002), to 1.2 dmft in the

MWHB (mean dmft of 2.9 in 1997 and 1.7 in 2002). In NI (figure 9) mean dmft levels among 5-year-olds continued to decline from the 1960s (mean dmft 4.8) through the 1980s (mean dmft 4.5) and 1990s (mean dmft 2.8) up to recent times (mean dmft 1.8). It must be noted that there was an 11-year interval since the last study referenced here for NI. Hence these data would not show a more recent trend towards leveling off of caries levels in NI if it were taking place in the late 1990s.

The decline in caries levels in the permanent teeth of 8-, 12- and 15-year-olds has continued into the 1990s for both those without (Figure 8) and, to a lesser extent, for those with (Figure 8) water fluoridation. One exception is the NEHB, which has seen little improvement in the caries levels since 1995, particularly in fluoridated areas where in all three age groups there has been an apparent increase in caries levels since 1995.

Future monitoring of changes in caries levels is important in light of the current data. There is evidence to suggest a trend towards bottoming out of caries levels since the 1990s among 8- and 12-year-olds as well as 5-year-olds, particularly in fluoridated areas (Figure 8). The achievement of further reductions in dental caries levels among Irish children will depend on the introduction of effective preventive approaches targeted at those at greatest risk of caries. The final report of this survey will include information collected by questionnaire on oral health knowledge, attitudes and behaviour, the perceived availability, accessibility and acceptability of services as well as demographic information. The inclusion of these data in a multivariate analysis will provide information on the profile of children with high caries levels, these and other data from this survey will be used in planning oral health promotion initiatives, policies and services designed to achieve further improvements in the oral health of Irish children and adolescents.

Teeth are healthier in children who get fluoride in their water supply and decay levels are much lower in 2002 than they were in 1984 in both fluoridated and non-fluoridated areas. There has also been a dramatic decline in dental caries levels since the 1960s.

Fluoride has contributed to improvements in oral health in non-fluoridated as well as fully fluoridated areas. The use of fluoridated toothpaste is almost universal in 2002; over 95% of toothpaste sold in Ireland contains fluoride.¹⁸ These toothpastes were introduced to the market in the early 1970s. Another factor is the consumption in non-fluoridated areas of foods and drinks, which contain fluoride incorporated into the food during processing with fluoridated water in urban areas (the "halo effect"). Research is currently underway to develop methods of measurement of dietary fluoride intake levels amongst Irish children in both fluoridated and non-fluoridated areas.

Visual and cavitated caries - The impact of examination criteria on recorded caries and treatment need levels.

World Health Organisation (WHO) examination criteria have been used in RoI in the 1984 survey, the regional surveys conducted in the 1990s and in the 2002 survey. In the 1960s the criteria used were similar to both the current WHO criteria and to the criteria used in the UK up to the 1990s. These criteria dictate that only dental caries at cavitation level should be recorded. That is, it must be possible to confirm a cavitation to dentine by placing a probe in the cavity. It has always been acknowledged that indices for caries record a stage of the disease rather than the absolute presence or absence of the disease. It was decided that cavitation level was a stage at which examiner calibration and reproducibility could be easily achieved. In recent years the reduction in the prevalence of the disease and the greater availability and accessibility of treatment services has had an impact on the value of this method of measurement. Non cavitated dentine caries, where the caries is visible as a shadow under the enamel, was previously ignored in many systems for recording caries and as a result, not recorded in the dmft/DMFT index. It was measured in the treatment need as recorded using

Future monitoring of changes in caries levels is important in light of the current data

Figure 10 Mean number of decayed (visual + cavitated), missing and filled teeth (vdmft, primary teeth 5-year-olds; VDMFT, permanent teeth 8-, 12- and 15-year-olds) among children and adolescents with fluoridated ('Full') and non fluoridated ('Non') domestic water supplies in the 10 health board regions, ERHA, NI and RoI in 2002
(Data excluded where numbers are less than 30)

Figure 10a: 5-year-olds

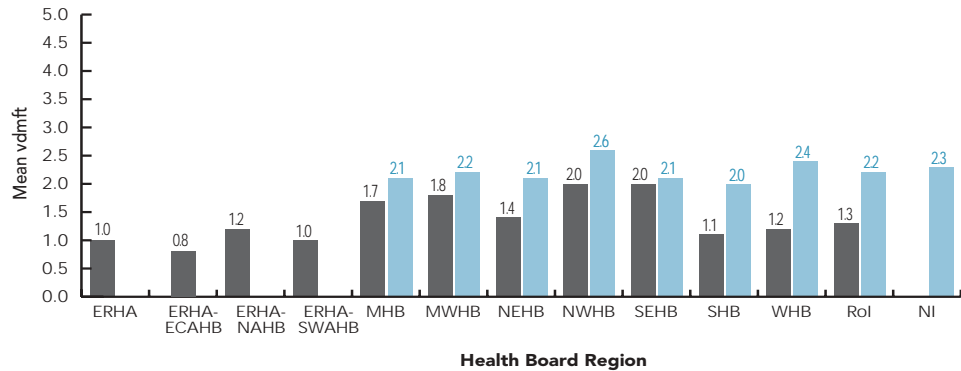


Figure 10b: 8-year-olds

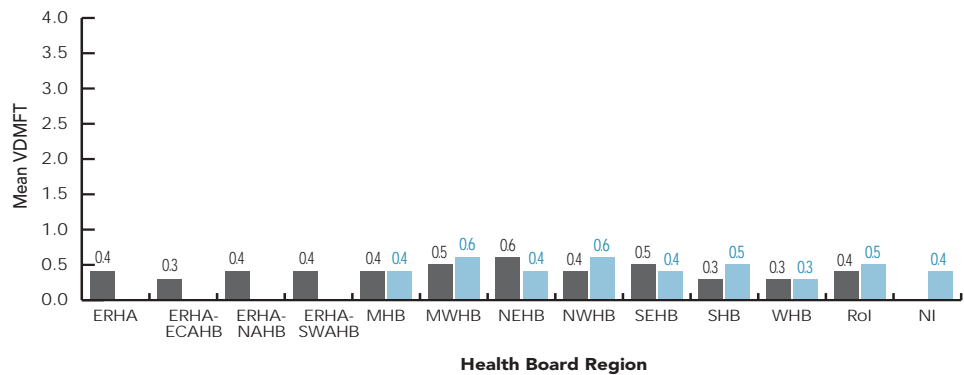


Figure 10c: 12-year-olds

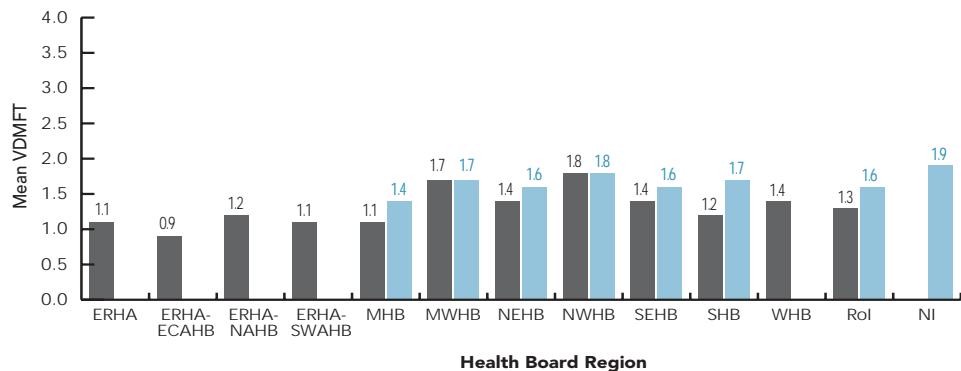
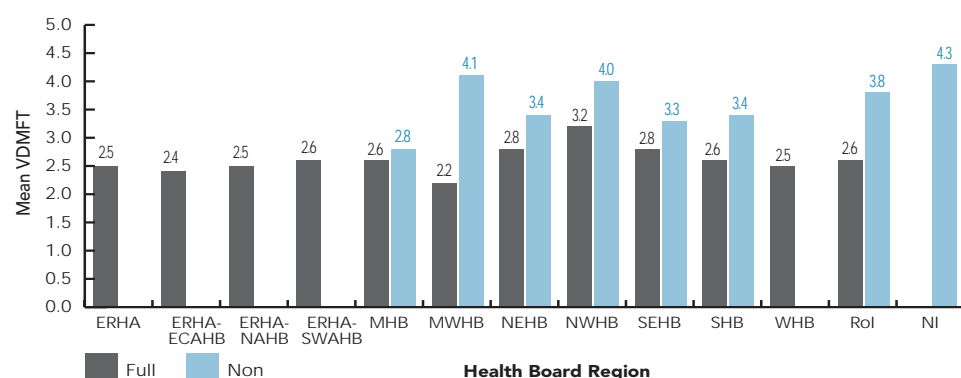


Figure 10d: 15-year-olds



WHO criteria, but not in the reported figures for caries levels. However, if a child or adolescent with visual caries had a course of dental treatment the visual caries would have been filled thus increasing the 'F' component of the DMFT. This filling would then have been counted in the dmft/DMF index. Hence, as caries levels have come down and access to treatment has increased the impact of the exclusion of visible but not cavitated dentine caries is likely to be expressed as an apparently higher dmft/DMF in areas with good services and a lower dmft/DMF score in areas with less access to services. Accordingly, the British Association for the Study of Community Dentistry amended its criteria in the 1990s and now include visible, non cavitated dentine caries (visual caries) in its dmft/DMF count. Since the mid 1990s, surveys of oral health in Ireland have followed suit. The original criteria have been maintained to allow retrospective comparison of disease levels and 'visual caries' have also been recorded but coded separately to allow analysis of the data both with and without the inclusion of caries at the 'visual' level. Data are therefore presented for the dmft/DMF at the 'cavitation' level and at 'visual' (+ 'cavitation') level. Where 'visual caries' is referred to in this report, it is implied that the data include caries at both 'visual' and 'cavitation' level. Figure 10 shows caries at visual + cavitation level. Comparing the data with Figure 6, the increase in mean dmft/DMFT due to the addition of the visual component is evident. For 5-year-olds the dmft increases by 0.5, 0.3 and 0.5 in RoI Non Fluoridated, RoI Full Fluoridated and NI groups, respectively. Among 8-, 12- and 15-year-olds the DMFT also increases, the greatest increase being in the 15-year-old group with the inclusion of visual caries adding 0.6 to the DMFT in the non-fluoridated RoI group and the NI group and 0.5 to the fluoridated RoI group.

Inequalities and Oral Health

Since the 'Black Report' on inequalities in health was published in the UK¹⁹, the association between disadvantage and ill health has been widely acknowledged. As with general health, there are many reports of poorer oral health among the less well off. In this study, ownership of a medical card was used as a surrogate for disadvantage in RoI. Medical cards are issued following means testing of the applicant. They are also issued on the basis of disability; in addition the entire population over 70 are eligible to hold one. For the vast majority of the age groups in the study, ownership of a medical card by the parents or guardians is an indication of low income. In NI children and adolescents were classed as disadvantaged if their family reported being in receipt of any state low income benefits. Notwithstanding the lack of comparability of these two classification systems, it is useful to compare the pattern of caries and untreated disease between dependants of medical cardholders and others in the RoI and between those with any low-income benefit and others in NI. Comparisons between data for disadvantaged children in RoI with those in NI should be interpreted with caution. The LIB surrogate for disadvantage includes a greater proportion of the sample in NI than the MC surrogate for disadvantage in RoI.

Dental caries levels in disadvantaged and non disadvantaged groups

The data presented in Figures 11 and 12 include visual plus cavitated dentine caries in the vdmft/VDMFT, which is presented according to MC/LIB status within fluoridation status. Data are presented only where there were at least 30 children or adolescents in a sub group. Figure 11 presents the mean vdmft/VDMFT data according to disadvantage (MC yes, MC no) for children and adolescents with a fluoridated water supply. Figure 12 shows the mean vdmft/VDMFT for children and adolescents with a non-fluoridated water supply. In both figures it is clear that in the majority of regions and for most age groups in fluoridated and non-fluoridated areas, caries levels tend to be higher amongst the less well off (MC yes). The statistical significance of the difference in caries scores at the visual plus cavitated diagnostic threshold is shown in Table 5. In the RoI apart from 12- and 15-year-old residents of non-fluoridated communities caries levels are statistically significantly higher among the less well off. In NI a similar pattern is observed with the exception of 12-year-olds.

Figure 11 Mean number of decayed (visual + cavitated), missing and filled teeth (vdmft, primary teeth 5-year-olds; VDMFT, permanent teeth 8-, 12- and 15-year-olds) among child and adolescent dependents of medical card holders (MC Yes) and others (less deprived, MC No) with fluoridated water supplies in the 10 health board regions, ERHA and RoI in 2002

(Data excluded where numbers are less than 30)

Figure 11a: 5-year-olds

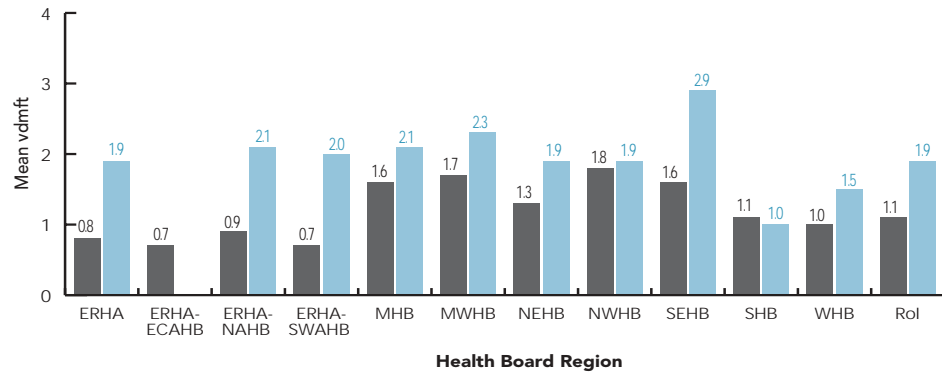


Figure 11b: 8-year-olds

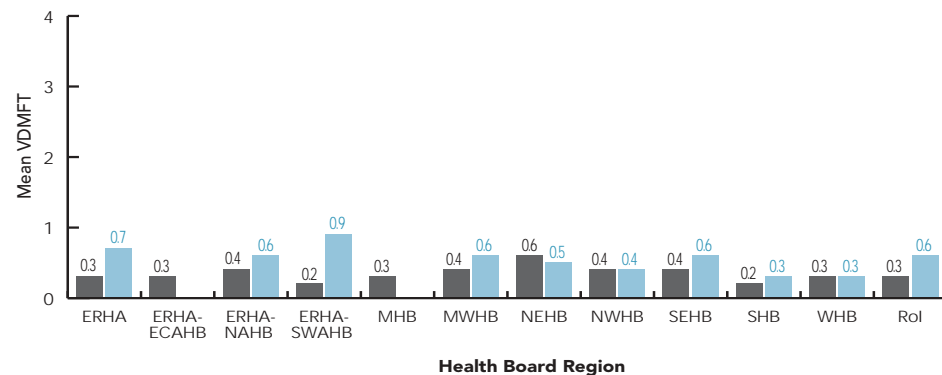


Figure 11c: 12-year-olds

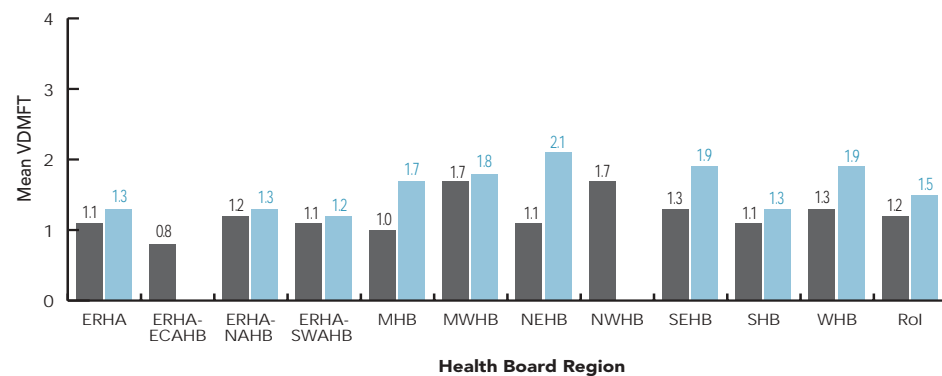


Figure 11d: 15-year-olds

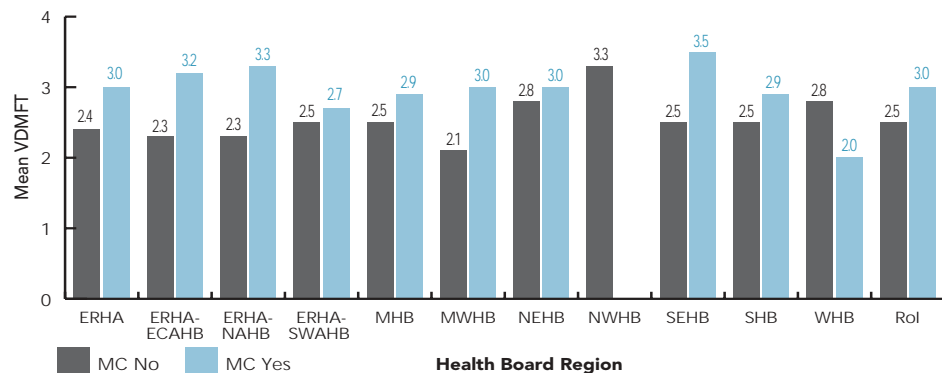


Figure 12 Mean number of decayed (visual + cavitated), missing and filled teeth (vdmft, primary teeth 5-year-olds; VDMFT, permanent teeth 8-, 12- and 15-year-olds) among child and adolescent dependents of medical card holders (MC Yes) and others (less deprived, MC No) with non-fluoridated water supplies in the 7 health board regions, RoI and NI in 2002

(Data excluded where numbers are less than 30)

Figure 12a: 5-year-olds

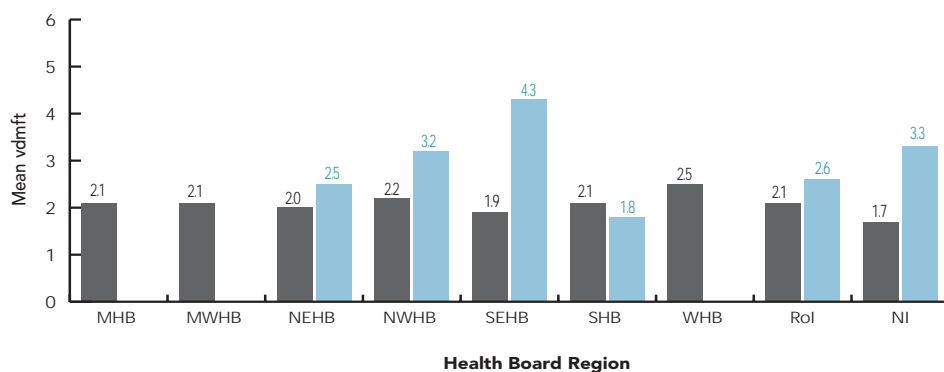


Figure 12b: 8-year-olds

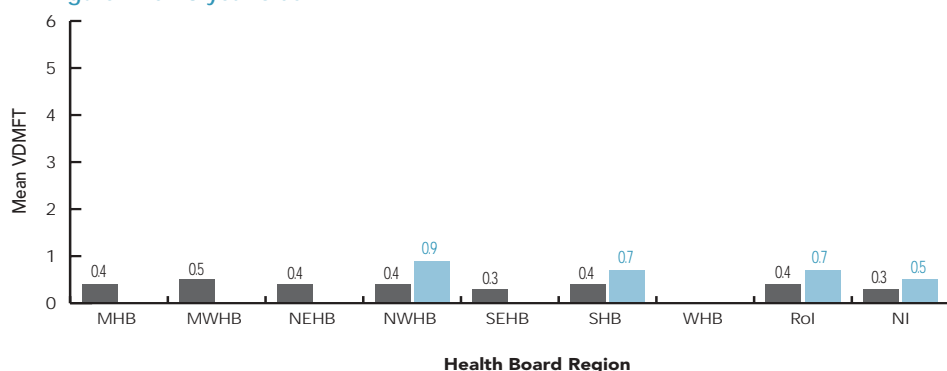


Figure 12c: 12-year-olds

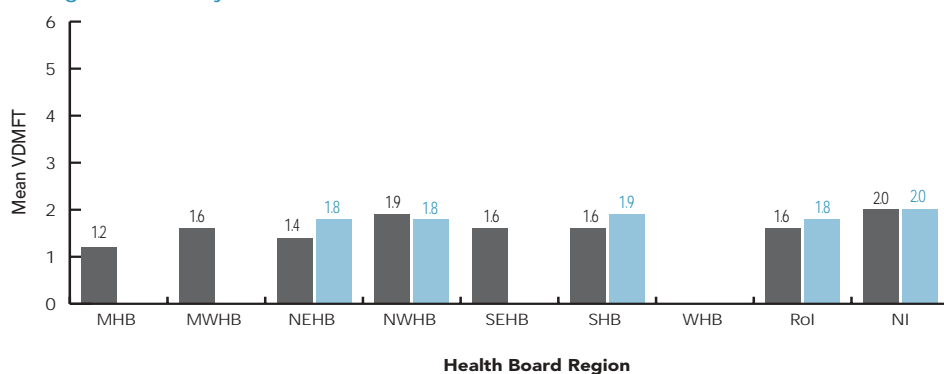
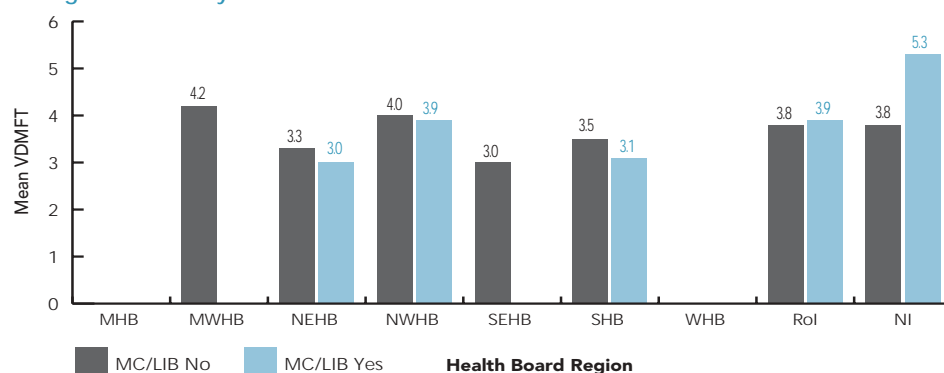


Figure 12d: 15-year-olds



The data generally support the published literature, which asserts that the oral health of the less well off is worse than that of the rest of the population.

Table 5

Statistical significance (p) of difference in visual (+cavitated) vdmft/VDMFT scores in RoI between non medical card holders and medical card holders within Fluoridated and Non-Fluoridated groups and in NI between those with low income benefit and others

	RoI Full FI	RoI Non FI	NI
	p	p	p
5	<0.0001	0.0038	<0.0001
8	<0.0001	0.0020	0.0179
12	0.0003	0.1218	0.8863
15	0.0030	0.8561	0.0004

Table 6 summarises the percentage difference in visual dmft/DMFT scores in RoI between non-medical cardholders and medical card holders (disadvantaged) within Fluoridated and Non Fluoridated groups and in NI between those with low income benefit and others. Taking the RoI as a whole, the relative differences in dmft/DMFT according to MC status are most pronounced amongst 5- and 8-year-olds. Among 12-year-olds, the differences are smaller and among NI 12-year-olds there is no difference in caries levels according to disadvantage (LIB yes, LIB no). For 15-year-olds without water fluoridation there is no difference in caries levels according to MC status and for those with water fluoridation the difference is 14.2% (Table 6). The trend towards decreasing differences in DMFT according to disadvantaged status, as children get older, seen in RoI, is not seen in NI. The data generally support the published literature, which asserts that the oral health of the less well off is worse than that of the rest of the population.

Table 6

Percentage difference in visual (+cavitated) vdmft/VDMFT scores in RoI between non medical card holders and medical card holders within Fluoridated and Non Fluoridated groups and in NI between those with low income benefit and others

	RoI Full FI	RoI Non FI	NI
	% diff	% diff	% diff
5	40.1	19.6	50.0
8	43.1	42.9	49.1
12	21.6	15.2	-2.0
15	14.2	1.6	28.1

Untreated dental caries in disadvantaged and non-disadvantaged groups

Equity in the provision of oral health services is a goal of the Irish Health Board Dental Service. The data were analysed to determine whether the need for treatment for dental caries varied according to Medical Card status. The common measure used to compare treatment need amongst groups is the percentage of dmft/DMFT attributable to the 'D' component. In this case 'vd' as a percentage of vdmft and 'VD' as a percentage of VDMFT are used. The data are presented in Figures 13 (fluoridated sample) and 14 (non fluoridated sample). Over 80% of caries in 5-year-olds in RoI is untreated, ranging from 81.5% in dependants of medical cardholders to 84.2% in the non-disadvantaged group, in non-fluoridated areas. The percentages in fluoridated areas are within this range. The high unmet treatment need for caries among 5-year-old children is consistent with the usual pattern of service delivery in the Health Board Dental Service in RoI which does not generally include provision of routine care to 5-year-old children. The pattern of unmet treatment need does not vary according to medical card status or fluoridation status. In NI unmet treatment need among children whose family receives some state benefits, is slightly lower (72.2% VDMFT untreated in low income group compared with 76.0% in rest of sample in NI). Routine treatment is available on demand without charge to all children in general dental practice in Northern Ireland.

Figure 13 Untreated caries as a proportion of total caries experience (vd/vdmft x100, primary teeth, for 5-year-olds, VD/VDMFTx100, permanent teeth, for 8-, 12- and 15-year-olds) among children and adolescents with fluoridated water supplies

(Data excluded where numbers are less than 30)

Figure 13a: 5-year-olds

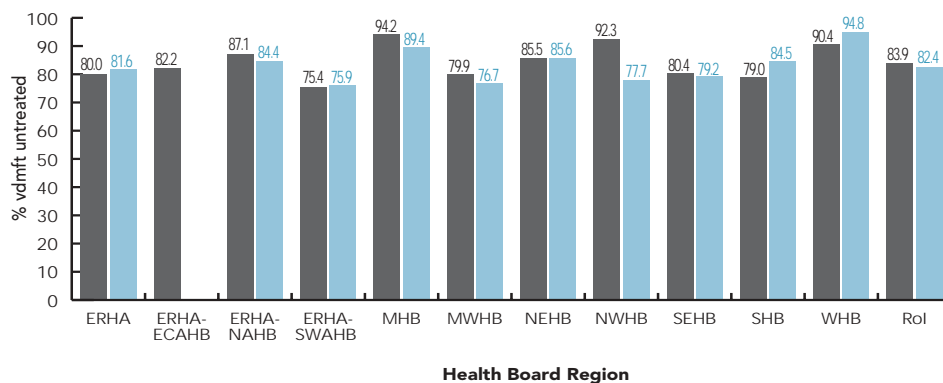


Figure 13b: 8-year-olds

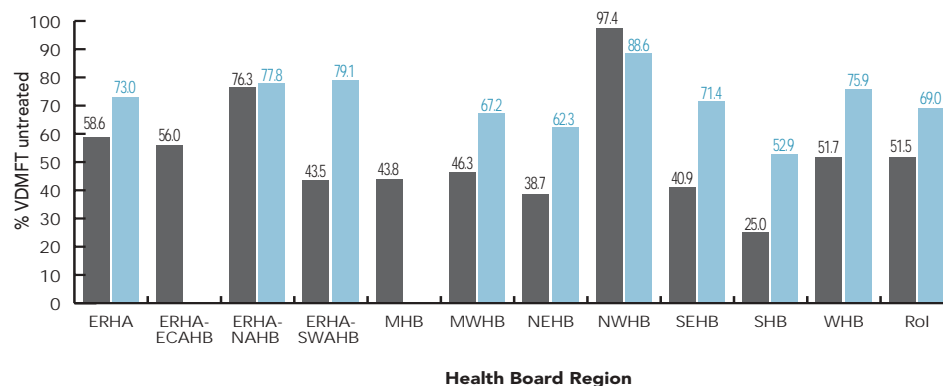


Figure 13c: 12-year-olds

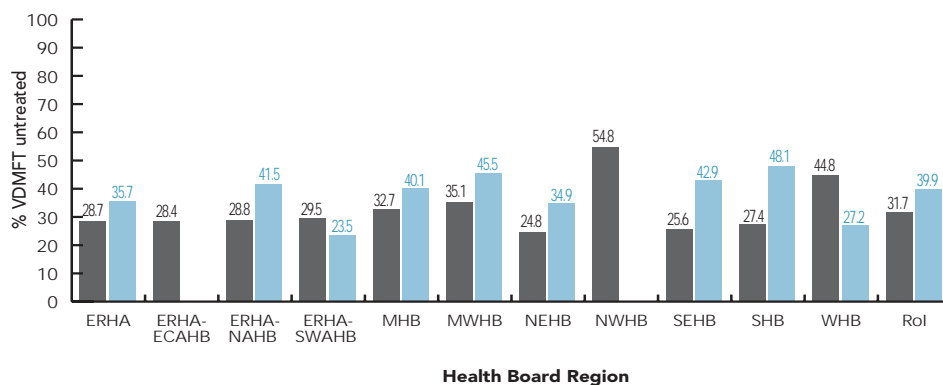


Figure 13d: 15-year-olds

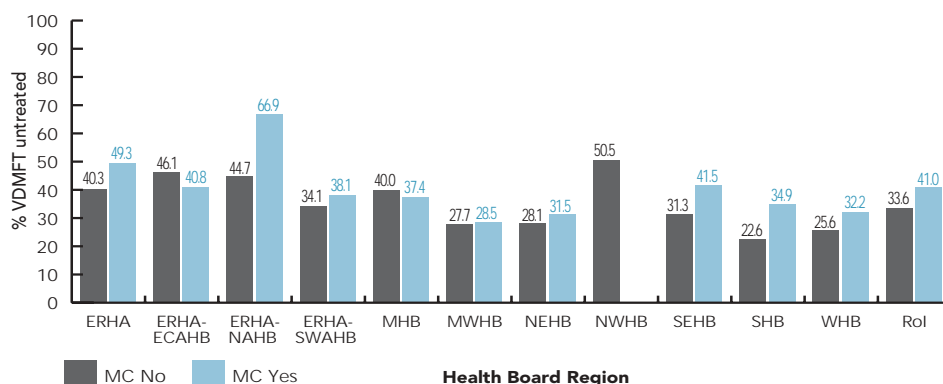


Figure 14 Untreated caries as a proportion of total caries experience (vd/vdmft x100, primary teeth, for 5-year-olds, VD/VDMFTx100, permanent teeth, for 8-, 12- and 15-year-olds) among children and adolescents with non-fluoridated water supplies

(Data excluded where numbers are less than 30)

Figure 14a: 5-year-olds

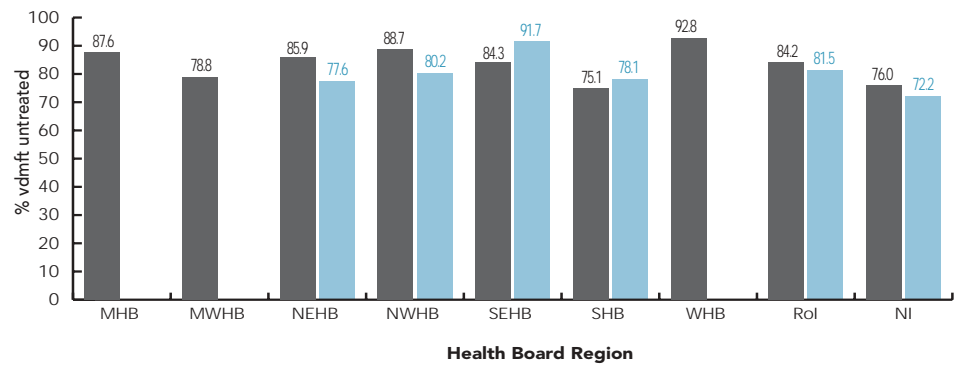


Figure 14b: 8-year-olds

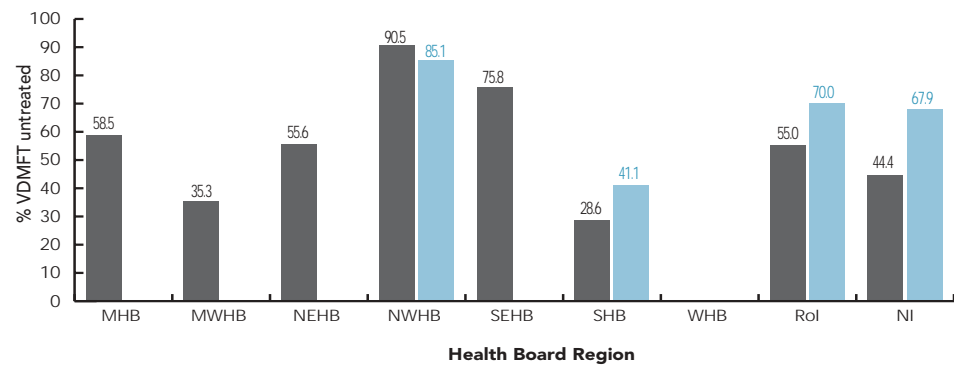


Figure 14c: 12-year-olds

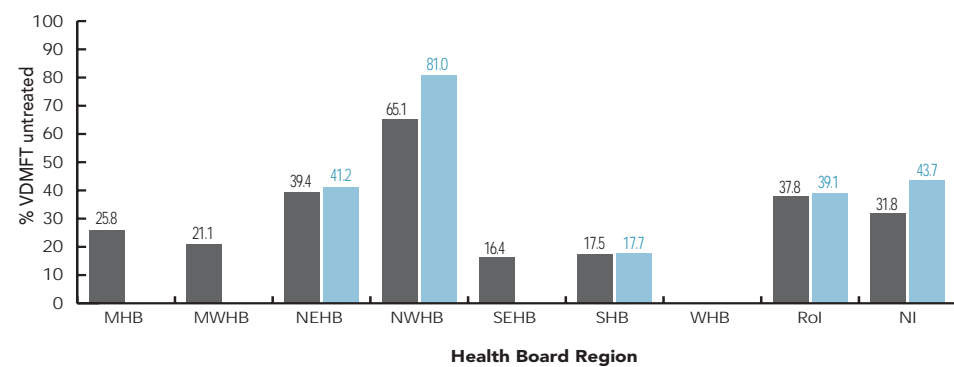
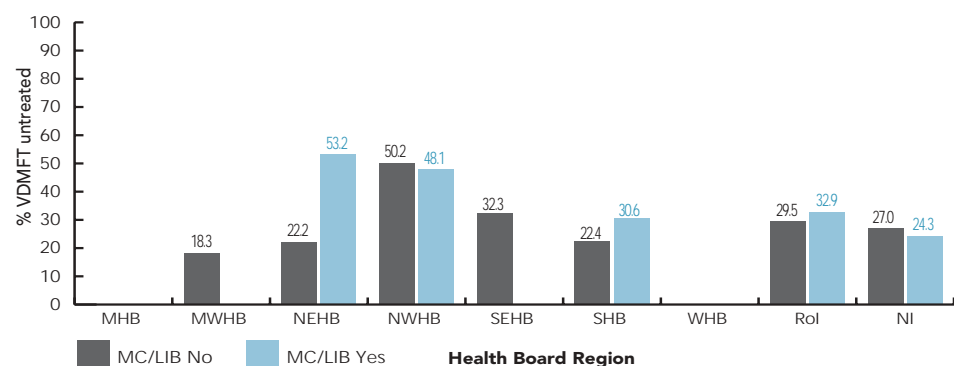


Figure 14d: 15-year-olds



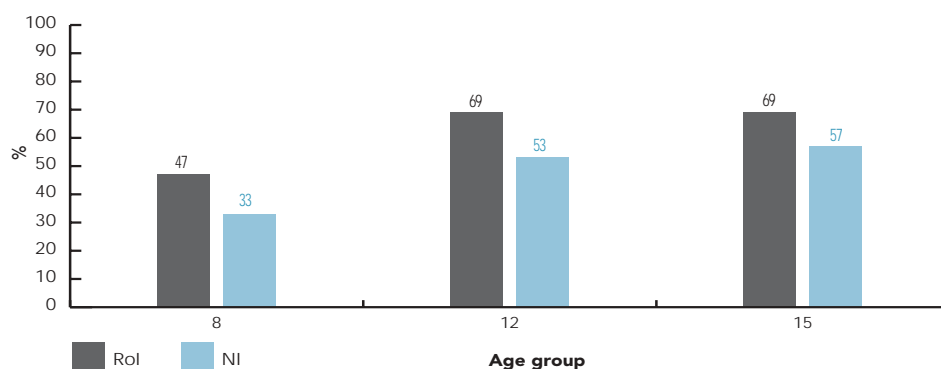
One might expect to find little unmet treatment need among 8-year-old children, as this is one of the target groups for Health Board Dental Services. However, the timing of the data collection for the survey relative to the provision of services to this age group would have impacted on the proportion of caries treated at the time of the fieldwork. Although there is little difference in the proportion of untreated caries in fluoridated and non-fluoridated groups, there is a difference in the proportion of untreated caries according to medical card ownership. For example in fluoridated areas 52% of caries is untreated among those without a medical card and 69% among dependants of medical card holders. In non-fluoridated areas 70% of caries is untreated among medical cardholders and 55% of caries among others. The timing of the survey is unlikely to have impacted on the relative proportions of medical cardholders and non-medical cardholders who had received treatment at the time of the survey. These differences therefore require further exploration. In NI the percentages are 68% and 44% again with greater unmet treatment among the less well off (LIB yes).

Mean values, cell sizes and standard deviations are tabulated for caries data in Appendix 7.

Presence of fissure sealants

Another treatment commonly provided by the Health Board Dental Service is fissure sealants. Figure 15 shows the prevalence of fissure sealants for 8-, 12- and 15-year-old children and adolescents in the RoI and NI. A child was considered to have sealants if there was evidence of either a complete or incomplete fissure sealant on one or more teeth.

Figure 15 Percentage of 8-, 12 and 15-year-old children and adolescents in RoI and NI with at least one fissure sealant on their permanent teeth



In the RoI 47% of 8-year-olds had some fissure sealants on their teeth. In NI the percentage of 8-year-olds with fissure sealants was 33%. In RoI these results are considered reasonable as the study may have been completed before all children in that class scheduled for treatment had been seen.

In the RoI 69% of 12 year-olds and the same proportion of 15-year-olds had some fissure sealants on their teeth. These percentages were 53% and 57% for 12- and 15-year-olds in NI respectively. This finding is interesting because of the differences in the system of delivery of dental care in the two regions. In NI the oral health care services are largely demand led; the Community Dental Service (CDS) encouraging parents to register their children with a general dental practitioner (GDP) for oral health care services. In the RoI the service is closer to a needs led service; in most areas the Health Board (HB) Dental Service screen children up to age 12 in primary school and subsequently call those for whom consent has been obtained, to attend health board dental clinics for treatment. Whilst in many areas the HB services target 1st or 2nd, 6th and sometimes 4th classes, other children up to age 16 are also eligible for services. Differences in the method of service delivery may account for the higher prevalence of fissure sealants among children and adolescents in the RoI.

Teeth have two types of surface, smooth surfaces which are particularly well protected from tooth decay by fluoride and pitted or fissured chewing surfaces which benefit from the clinical application of a plastic adhesive resin called fissure sealant. This sealant protects these vulnerable surfaces from decay.

Figure 16 Percentage of 8-, 12 and 15-year-old children and adolescents in the 10 health board regions, ERHA, RoI and NI with at least one fissure sealant on their permanent teeth

Figure 16a: 8-year-olds

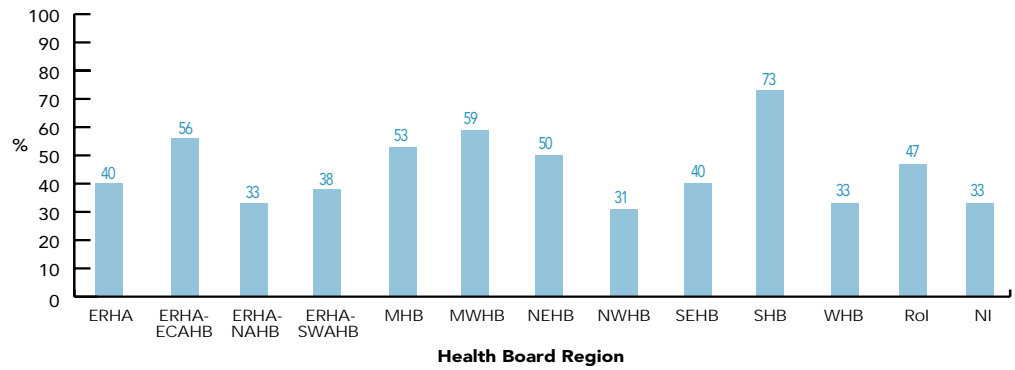


Figure 16b: 12-year-olds

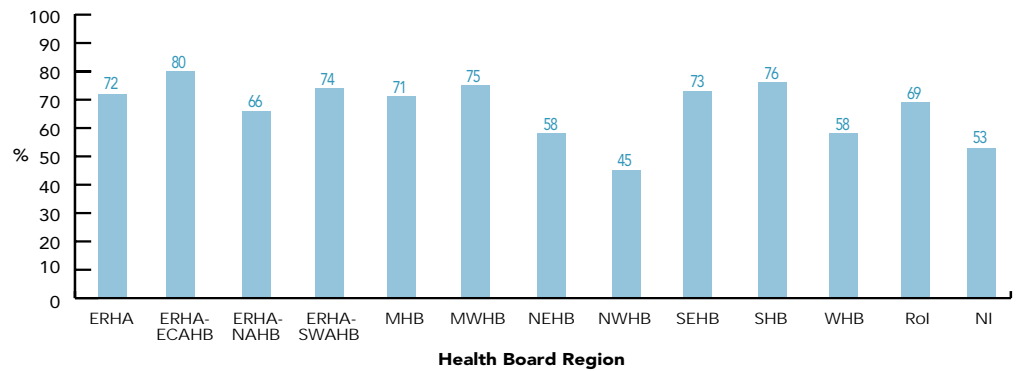
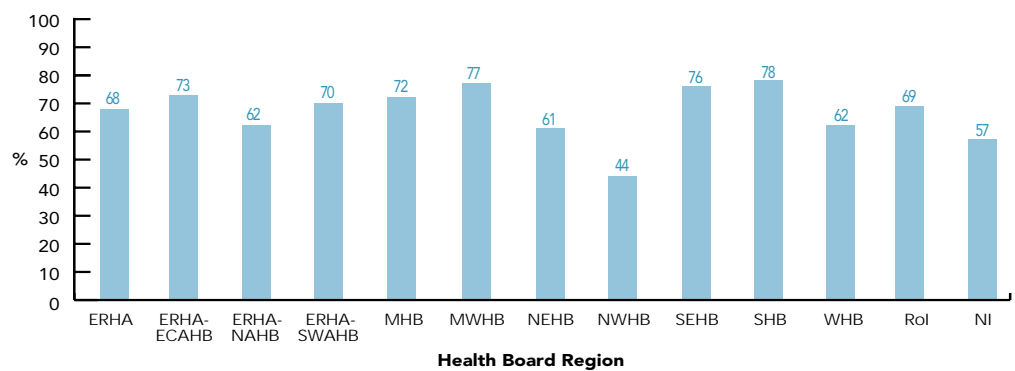


Figure 16c: 15-year-olds



There was considerable variation amongst the health boards (figure 16a-c) in the proportion of 8-year-olds who had fissure sealants on their teeth. However as the prevalence among this group is closely linked to the timing of the survey, it is not possible to draw inferences from the variation. In the older age groups there was less variation, in most regions in the RoI at least 58% of 12-year-olds and at least 61% of 15-year-olds had some fissure sealants on their teeth. The notable exception was the NWHB where fewer fissure sealants were observed. Forty five percent of 12- year-olds and 44% of 15-year-olds had some fissure sealants on their teeth. The most likely explanation for this disparity would appear to be the difficulties encountered in filling the dental posts in Donegal (NWHB) where there was a consistent difficulty in recruiting dentists in the years prior to the survey.

In the Republic of Ireland dependents of Medical Card Holders experience more decay and are less likely to have fissure sealants on their teeth

Figure 17 Percentage of 8-, 12 and 15-year-old children and adolescents in RoI and NI with at least one fissure sealants on their permanent teeth by disadvantage status (MC Yes = disadvantaged / LIB Yes = disadvantaged) and health board region of residence

(Data excluded where numbers are less than 30)

Figure 17a: 8-year-olds

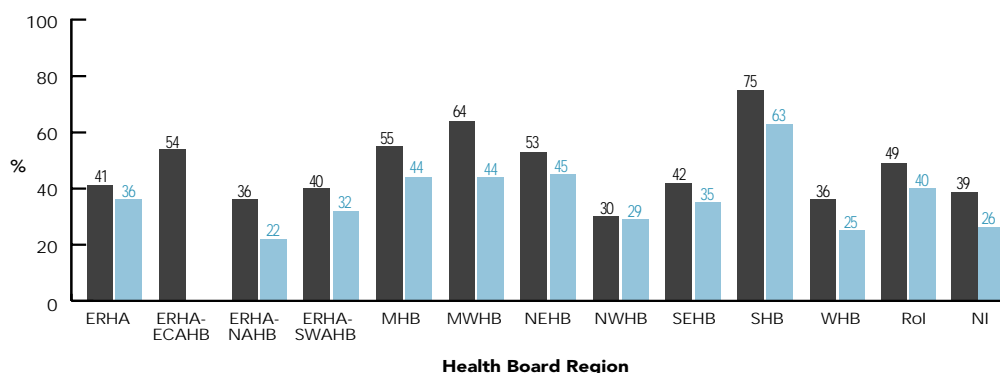


Figure 17b: 12-year-olds

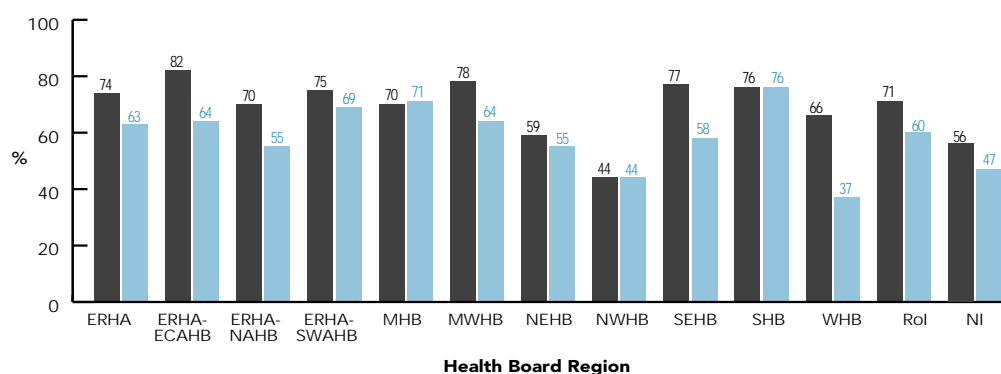
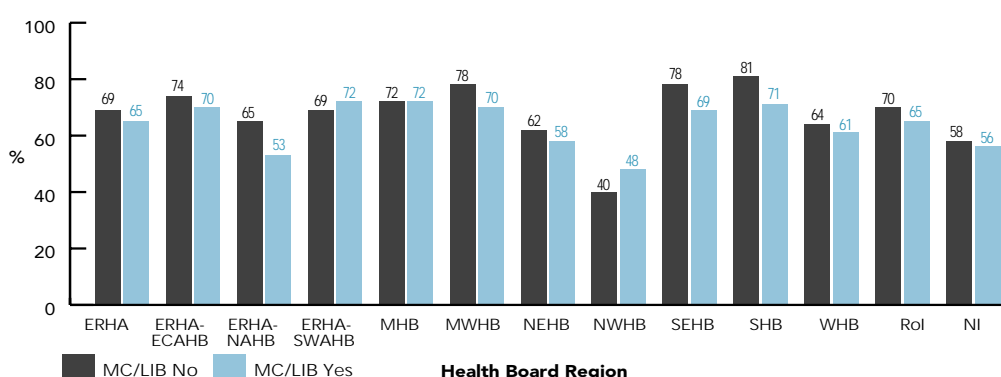


Figure 17c: 15-year-olds



Enamel fluorosis results from the ingestion of excessive fluoride during tooth development. Enamel fluorosis has an extensive range of clinical signs.

The data were also analysed to determine whether there was equity in the delivery of fissure sealants to children and adolescents. Figures 17a-c show the prevalence of fissure sealants according to disadvantage as indicated by ownership of a medical card (RoI) or receipt of low-income benefits (NI). Compared with the rest of the sample, there were fewer children with at least one fissure sealant on their teeth among the MC holders in RoI ($p < 0.0001$ for 8- and 12-year-olds, $p = 0.0001$ for 15-year-olds). In NI for those on LIB the difference was statistically significant for the 8-year-old group only ($p = 0.022$). The difference was not significant for 12- and 15-year-olds. The exception was the 15-year-old group where there appeared to be greater equity in the distribution of fissure sealants. It is usual for the public dental service in RoI to screen and invite children to attend for treatment regardless of Medical Card status or disadvantage. Lower uptake of services among the more disadvantaged group may account for the difference seen in the 8- and 12-year-old group in RoI. Such findings should be addressed in the design of programmes for the delivery of care to disadvantaged groups. Alternative methods of delivery of care for these groups may reduce this inequality. Pilot studies to evaluate the impact of such interventions on treatment levels are recommended.

Although fissure sealants provide protection against decay in pits and fissures of teeth whilst they are in place, once the sealants wear away or are lost, the teeth are vulnerable once again. Maintenance of this preventive treatment on an ongoing basis would be a worthwhile service objective.

Enamel Fluorosis

Measurement of enamel fluorosis is a recognised method of monitoring intake of fluoride from different sources. In this study fluorosis was recorded using an index called the Dean's Index²⁰ using natural light. This index classifies fluorosis by six grades (Figure 18), namely, Normal (no fluorosis), Questionable, Very Mild, Mild, Moderate and Severe. The permanent teeth of eight, twelve and fifteen year old children were examined for such fluorosis. Results are shown in Figure 18. In all three age groups 80% or over of the children were in the normal or questionable categories. In fully fluoridated areas a score of normal was given to 76% of eight year olds, 71% of twelve year olds and 61% of fifteen year olds. In non-fluoridated areas these percentages were 90%, 82% and 81% respectively. In NI the percentage of 8-, 12- and 15-year-olds with normal enamel was 90%, 78% and 83% respectively. In all age groups the percentage of children with scores at the higher end (mild and moderate) was low. There was a statistically significant difference in the distribution of Dean's Index scores between fluoridated and non-fluoridated groups in RoI for the three age groups (all $p < 0.0001$), with the prevalence of fluorosis being higher among the fluoridated groups. Comparing the fluoridated groups in RoI with the non-fluoridated groups in NI the difference in the distribution of Dean's Index scores was statistically significant for 8- and 15-year-olds ($p = 0.0001$, $p < 0.0001$ respectively). Again the prevalence of fluorosis was higher in the fluoridated RoI. For 12-year-olds the levels of fluorosis tended to be higher in the fluoridated group in RoI than in NI but the difference was not statistically significant ($p = 0.15$). Levels of fluorosis among 8- and 12-year-old children in the non-fluoridated groups in RoI and NI were not different statistically ($p = 0.73$, $p = 0.83$ respectively). However the distribution of Dean's Index scores was statistically significantly different among the non-fluoridated RoI 15-year-old group when compared with the non-fluoridated NI group ($p < 0.0001$). In the National Survey of Children's Oral Health in 1984, fluorosis was measured in four of the eight health board regions for 8- and 15-year-olds. At that time, among 8-year-olds in fluoridated regions 95% had normal enamel, 4.1% had questionable fluorosis and 0.9% had fluorosis at the Dean's 'Mild' level. The figures for 15-year-olds were 96.3% 'Normal', 3.0% 'Questionable', 0.5% 'Very Mild' and 0.2% had 'Mild' fluorosis. The prevalence of fluorosis among 8- and 15-year-olds in RoI has increased since 1984 ($p < 0.0001$ for both groups). Studies on the level at which the public perceive fluorosis to be a problem are currently being designed. The relative contribution of fluoride toothpastes and water fluoridation to enamel fluorosis in Ireland should be studied further. Recent research suggests a significant relationship between patterns of toothpaste usage in infancy and prevalence of

Figure 18 Dean's Index of Fluorosis, percentage of 8, 12 and 15-year-old children and adolescents with a score of 'Normal', 'Questionable', 'Very Mild', 'Mild', 'Moderate' or 'Severe' fluorosis on their permanent dentition according to fluoridation status in Rol and NI

Figure 18a: 8-year-olds

* ▼ statistically significant difference between pairs of groups marked with same symbol

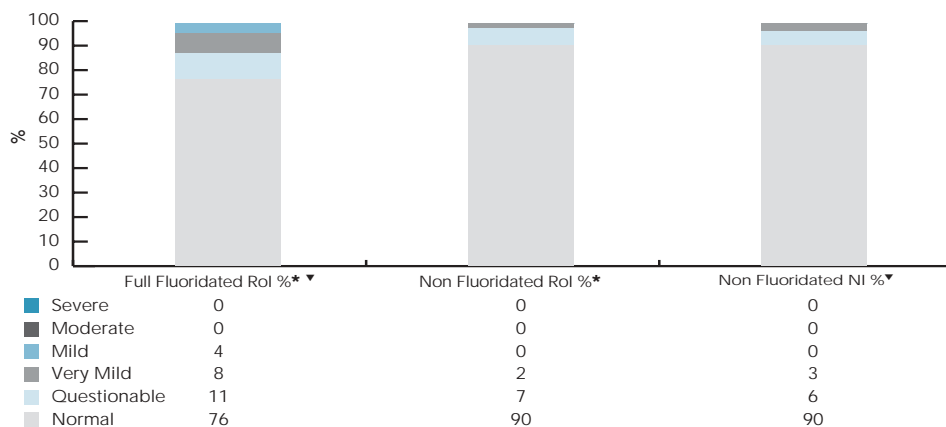


Figure 18b: 12-year-olds

* statistically significant difference between pairs of groups marked with same symbol

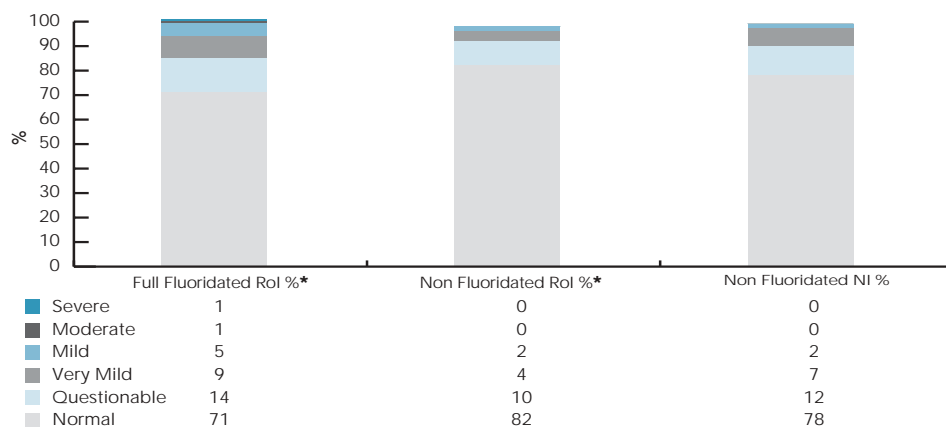
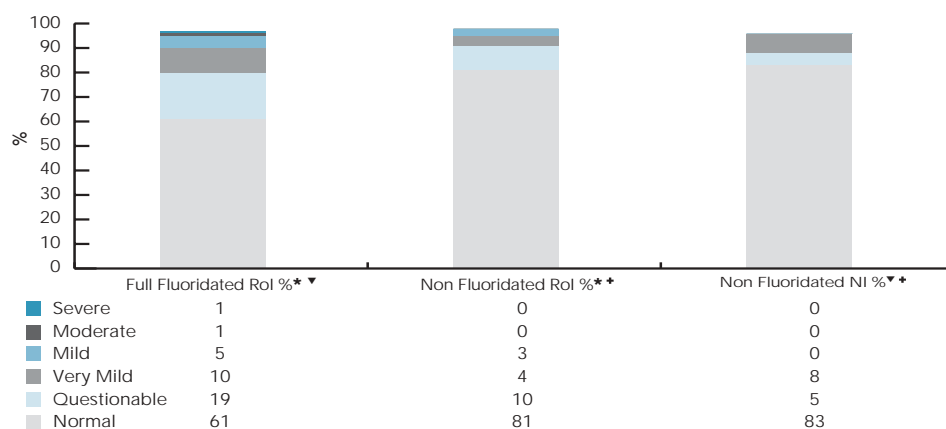


Figure 18c: 15-year-olds

* ▼+ statistically significant difference between pairs of groups marked with same symbol



DEAN'S INDEX OF FLUOROSIS SCORES



NORMAL



QUESTIONABLE



VERY MILD



MILD



MODERATE



SEVERE

fluorosis at age eight years amongst children in counties Sligo and Leitrim^{21 22}. These findings support those of international research^{23 24} which indicate that early use of fluoride toothpaste in infants leads to excessive ingestion and absorption of fluoride at a time when the enamel of the permanent teeth is forming, leading to fluorosis of the permanent incisor teeth. It is important to disseminate the recommendations of the Forum on Water Fluoridation (2002, www.fluoridationforum.ie) regarding the rational use of fluoride toothpaste. The report recommends:

- The continued use of fluoride toothpaste in fluoridated and non-fluoridated areas because of the additive benefit from the combination of fluoridated water and fluoride toothpaste.
- Parents should be advised not to use toothpaste when brushing their children's teeth until the age of 2 years. Prior to this age parents can brush their children's teeth with a toothbrush and tap water. Professional advice on the use of fluoride toothpaste should be sought where a child below 2 years of age is considered to be at high risk of developing dental decay.
- Parents should supervise children aged 2 to 7 years when brushing their teeth and should ensure that only a small, pea-sized amount of fluoride toothpaste is used and that swallowing of the paste is avoided.

Adherence to these guidelines is expected to minimize the occurrence of dental fluorosis and at the same time maintain the important caries preventive benefits experienced to date. There is a need for constant monitoring of dental fluorosis in Ireland. In particular the impact of the reduction in the level of fluoride in public water supplies from the present level (between 0.8 and 1.0 ppm) to between 0.6 and 0.8 ppm, with a target value of 0.7 ppm should be monitored.

Developmental Defects of Enamel

Fluorosis is not the only cause of visual changes in the enamel. There are several types of developmental defects of enamel. All such defects (including fluorosis) were categorised and measured using the Developmental Defects of Enamel Index (DDE index)²⁵ using natural light for the anterior teeth. On posterior teeth the DDE index was recorded using a portable dental light source. Results are presented here (Table 7). As a general rule of thumb, dental fluorosis usually falls into the 'diffuse opacities' category. Over one third of children had at least one opacity on their permanent teeth. The prevalence was highest among 15-year-olds where 62%, 50% and 52% of adolescents in the fluoridated RoI, non fluoridated RoI and NI groups respectively had at least one opacity on their teeth. Diffuse opacities were the most common type found in fluoridated and non fluoridated areas in RoI and in NI. Pairwise statistical analyses (Chi Squared Test for large numbers and Fishers Exact Test for sparse tables) of the difference in the prevalence of opacities according to type within age group were carried out between:

RoI fluoridated groups and RoI non-fluoridated groups
RoI fluoridated groups and NI non-fluoridated groups
RoI non-fluoridated groups and NI non-fluoridated groups

The statistically significant differences are indicated in Table 7. Based on the work of Dean²⁶ a higher prevalence of diffuse opacities is to be expected among children in fluoridated areas. Diffuse opacities were generally more prevalent among children and adolescents with a lifetime's exposure to fluoridated water when compared with the non-fluoridated RoI and NI groups ($p < 0.0001$). The 8-year-old group was the exception, where the prevalence of diffuse opacities was the same between the fluoridated RoI group and the non-fluoridated NI group. However the results for Dean's Index (Figure 18a) for this age group show that the prevalence of fluorosis in the non-fluoridated NI group is lower than that of the fluoridated RoI group and is in fact similar to that of the non-fluoridated RoI group. Demarcated opacities are associated

with local changes at the time of tooth development, for example trauma or infection in the primary dentition. The prevalence of these opacities was similar among all groups. The prevalence of hypoplasia and combinations of opacities was low in all groups. Further exploration of these data will be presented in the final report.

Table 7

Percentage of children and adolescents in RoI and NI with opacities recorded on their teeth according to age group, fluoridation status and type of opacity

◆ ● ▲ statistically significant ($p < 0.05$) difference between pairs of groups marked with same symbols

Age 8			
	Fluoridated RoI	Non Fluoridated RoI	Non Fluoridated NI
Any Opacity	52◆	35◆▲	51▲
Demarcated	15	15	17
Diffuse	41◆	22◆▲	41▲
Hypoplastic	1◆●	2◆	4●
Demarcated and Diffuse	4◆	1◆▲	4▲
Demarcated and Hypoplastic	0	0	1
Diffuse and Hypoplastic	1●	0▲	2●▲
All three	0	0	0

Age 12			
	Fluoridated RoI	Non Fluoridated RoI	Non Fluoridated NI
Any Opacity	58◆●	42◆	47●
Demarcated	17	19	20
Diffuse	49◆●	29◆	34●
Hypoplastic	3	2	4
Demarcated and Diffuse	5◆	2◆	4
Demarcated and Hypoplastic	0	0	1
Diffuse and Hypoplastic	1	1	2
All three	0	0	0

Age 15			
	Fluoridated RoI	Non Fluoridated RoI	Non Fluoridated NI
Any Opacity	62◆●	50◆	52●
Demarcated	18	19	22
Diffuse	52◆●	37◆	40●
Hypoplastic	2◆●	2◆	6●
Demarcated and Diffuse	5◆	3◆▲	6▲
Demarcated and Hypoplastic	0◆	1◆	1
Diffuse and Hypoplastic	3◆	2◆	2
All three	0●	0▲	1●▲

Trauma to Front Teeth

During the dental examination, the examiners assessed each permanent incisor in the 8-, 12- and 15-year-old children for evidence of damage. For each incisor with evidence of trauma, the dentists recorded the type of trauma sustained and any treatment which the child received for that trauma. Results are presented by age group and gender, as reported studies demonstrate that males tend to experience more dental trauma than females^{6,27}.

Prevalence of traumatic injury

Table 8 shows the number and percentage of children who had sustained trauma, presented by age group and gender in the Republic and Northern Ireland.

Table 8

Number and percentage of children and adolescents (8-, 12- and 15-year-olds) in the Republic and Northern Ireland with at least one permanent incisor affected by trauma by gender

Region	Gender	Age Group					
		8		12		15	
		n	%	n	%	n	%
RoI	Males	140	7.7	420	23.0	482	28.4
	Females	82	4.3	293	16.2	275	16.5
	Total	222	5.9	713	19.5	757	22.3
NI	Males	16	10.2	34	20.9	50	16.2
	Females	3	2.1	19	10.4	43	13.3
	Total	19	6.3	53	15.4	93	14.7

As damage to teeth is necessarily a cumulative condition, one would expect to see a continuing increase in prevalence with increasing age, and this trend is demonstrated in Table 8. As with previous studies there is a tendency for males to experience more trauma than females.

The pattern is similar in Northern Ireland but the prevalence is lower in NI with 16.2 % of males and 13.3% of females aged 15 years of age having evidence of trauma as compared to 28.4 % of males and 16.5 % of females of the same age group in the RoI.

Many of the minor enamel fractures recorded are of less clinical significance than more extensive fractures from the point of view of treatment required. Furthermore, it can be difficult to differentiate enamel fractures from wear. Also without clinical investigation, discolouration poses a challenge to assessment of treatment need due to trauma. Consequently reports of dental trauma frequently exclude enamel trauma and discolouration. Table 9 reports the number and percentage of children in each of the age groups (8, 12 and 15 year olds) who had sustained dental trauma (excluding discolouration and enamel fractures) presented by gender in the Republic and Northern Ireland.

Table 9

Number and percentage of children and adolescents (8-, 12- and 15-year-olds) in the Republic and Northern Ireland with at least one permanent incisor affected by trauma (excluding enamel fractures and discolouration) by gender

Region	Gender	Age Group					
		8		12		15	
		n	%	n	%	n	%
RoI	Males	36	2.0	142	7.6	198	11.7
	Females	24	1.2	98	5.2	109	6.9
	Total	60	1.6	240	6.4	307	9.3
NI	Males	4	2.6	12	7.4	22	7.1
	Females	0	0	5	2.8	18	5.6
	Total	4	1.3	17	4.9	40	6.3

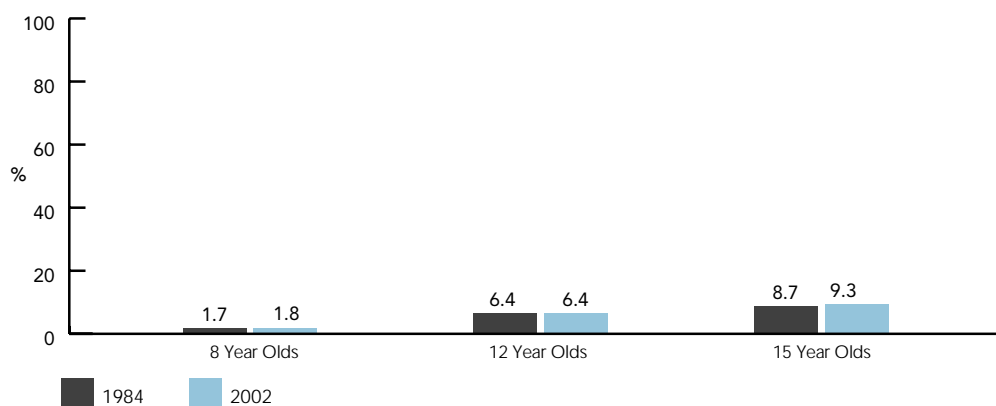
It can be seen that when fractures involving enamel only and discolouration are excluded, 11.7 % of 15-year-old males in RoI and 7.1% of 15-year-old males in NI have at least one permanent incisor affected by trauma.

Changes in the prevalence of trauma in the Republic of Ireland since the 1984 National Study

Accidental trauma to the front teeth was measured in the National Survey of Children's Dental Health in 1984⁶ using similar criteria. Figure 19 reports the percentage of children with experience of trauma to their permanent incisors (excluding discolouration and enamel fractures) by age group in the RoI in 1984 and 2002. This Table reports that the prevalence of trauma has not changed in the RoI since the last National Survey of Children's Dental Health in 1984⁶. It is a cause for concern that the prevalence of trauma has not changed over 18 years. The causes of dental trauma should be further investigated to allow the targeting of efforts to reduce the occurrence of dental trauma.

The percentage of children and adolescents with trauma to their teeth has not improved since 1984.

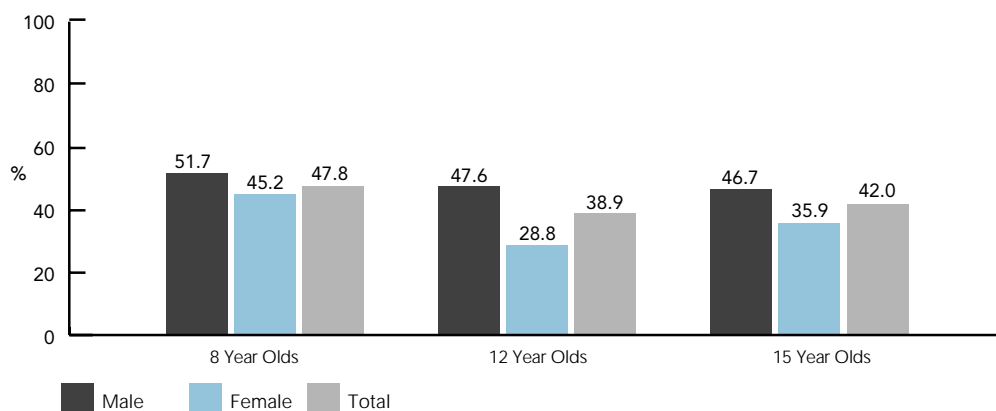
Figure 19 Percentage of 8-, 12- and 15-year-old children and adolescents who have at least one traumatised permanent incisor (excluding discolouration and enamel fractures) in 1984 and 2002 in the RoI



Children with traumatised permanent incisors who require treatment

Although some traumatised teeth had been restored, Figure 20 shows the prevalence of unrestored trauma at the dentinal level of involvement by age group and gender in the RoI. Sample sizes are too small to present the results for Northern Ireland. The percentage of children with dental trauma who are considered to have a treatment need for their trauma is very high. 42% of all 15 year olds examined who have had experience of trauma of their permanent incisors at dentinal level still required treatment.

Figure 20 Percentage of 8-, 12- and 15-year-old children and adolescents in the Republic of Ireland affected by trauma who have at least one traumatised permanent incisor untreated



Comparison with the National Children's Dental Health Survey in 1984

Table 10 reports the total number of children examined in each age group, percentage of children with at least one permanent incisor affected by trauma (excluding enamel fractures and discolouration) and percentage of children with traumatised teeth which were untreated in each age group in the NSCDH, 1984⁶ and the 2002 survey in the Republic of Ireland.

Table 10

Number and percentage of children and adolescents (8-, 12- and 15-year-olds) with at least one permanent incisor affected by trauma (excluding enamel fractures and discolouration) and percentage of children with traumatised teeth that were untreated in each of the age groups in 1984 and in 2002

Age group	Year of study	Number of children examined	% of children with traumatic injury	% of children with traumatised teeth untreated
8	1984	2378	1.7	30.4
	2002	3726	1.6	47.8
12	1984	2340	6.4	37.2
	2002	3859	6.4	38.9
15	1984	2453	8.7	47.4
	2002	3482	9.3	42.0

Again comparison of the 2002 figures with the National Survey of Children's Dental Health in 1984 shows that the percentage of children with traumatised teeth which are untreated still remains high for all age groups in 2002.

Concluding comment

This report presents the preliminary results of the clinical oral examination of the North South Survey of Children's Oral Health 2002. These and additional clinical data will be further analysed along side the demographic, questionnaire and photographic data recorded in the survey. The findings of these analysis will be presented in the final report in 2004.

Appendix 1

Project group - University College Cork

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Ms. Rita Hinchion	Dept. of Epidemiology and Public Health

Appendix 2

Survey Teams, Republic and Northern Ireland

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Northern Area Health Board	Dr. Joe Glackin Dr. Siobhan Bell Dr. Sarah McKeon	Ms. Deirdre O'Neill Ms. Naomi Bergin Ms. Cora Carty
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Midland Health Board	Dr. Joe Hynes Dr. Orla O'Connor-Hogan	Ms. Denise Todd Ms. Caroline Gallagher
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North Western Health Board	Dr. Kevin Kennedy Dr. Ciaran Rattigan	Ms. Anne Harkin Ms. Barbara Lowry
South Eastern Health Board	Dr. Louise Lowry Dr. Pamela Gartland Dr. Maeve Keller Dr. Margueretta Kelly	Ms. Clair Mahony Ms. Helen Geoghegan Ms. Liz Joyce Ms. Geraldine O'Keeffe-Mackey
Southern Health Board	Dr. John Jones Dr. Mary Ita Creedon Dr. Ger Breen Dr. Gerry Buckley Dr. Orla Harding-Smith	Ms. Joanne McGrath Ms. Anne Sheahan Ms. Johann Oregan-Moran Ms. Siobhan Sheehy Ms. Mary Murphy Ms. Mary O'Driscoll
Western Health Board	Dr. Bob McNulty Dr. Antonia Hewson Dr. Matt Walsh Dr. Seamus O'Donnadhcha	Ms. Winnie O'Flaherty Ms. Breege Barrett Ms. Celia Naughton
Northern Ireland	Dr. Doreen Jenkinson Dr. Anne-Marie McKenna Dr. Martin Smith Dr. Anne Stevens Dr. Colette McCaul	Ms. Lorna Ritchie Ms. Leona Hill Ms. Phillipa Heron Ms. Margaret Boyd Ms. Christina Quinn Ms. Aine McGuigan

Appendix 3

User Group Members Rol – Children's Survey

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 Dr. Anne O'Neil, Principal Dental Surgeon, NAHB
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 Dr. Mary O'Farrell, Principal Dental Surgeon, NEHB
 Dr. Mary O'Connor, Principal Dental Surgeon, SHB
 Dr. John Jones, Principal Dental Surgeon, SHB
 Dr. Michael Thornton, Principal Dental Surgeon, SHB

Appendix 4

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 Dr. Michael Donaldson, SpR Dental Public Health, Fieldwork Co-ordinator NI

Dental Directors

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 Dr. Will Maxwell
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Clinical Directors Community Dental Services NI

Dr. Aileen Sweeney
 Dr. Borghild Breistein
 Dr. Patricia Stewart
 Dr. Solveig Noble
 Dr. John Finnerty
 Dr. Julia Kirk
 Dr. Ray Parfitt
 Dr. Grainne Lynn
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Appendix 5a) Principal Trainer and Assistant Trainers

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Dr. Helen Whelton, Principal Investigator, Director, Oral Health Services Research Centre and Senior Lecturer in Dental Public Health and Preventive Dentistry, University College Cork

Assistant Trainers

Dr. Evelyn Crowley, Senior Research Fellow, University College Cork
 Dr. Margie Houlihan, Senior Dental Surgeon - Admin, Mid Western Health Board
 Dr. Cora McCarthy, Senior Dental Surgeon – Admin, Mid Western Health Board
 Dr. Imelda Counihan, Senior Dental Surgeon – Admin, Mid Western Health Board

Dental Nurses assisting trainers

Ms. Theresa O'Mahony, University College Cork
 Ms. Michelle Geraghty, Mid-Western Health Board
 Ms. Geraldine Darcy, Mid-Western Health Board
 Ms. Deirdre McNamera, Mid-Western Health Board

Appendix 5b) List of Photographers and Time Keepers

Health Board/Health Authority	Photographer	Time Keeper
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Mid-Western Health Board	Dr. Cora McCarthy Dr. Adrian O'Neill Dr. Imelda Counihan Dr. Margie Houlihan	Ms. Deirdre Mc Namara Ms. Agnes Franklin Ms. Geraldine Darcy Ms. Michelle Geraghty
North Western Health Board	Ms. Anne Harkin Dr. Ciaran Rattigan	Dr. Kevin Kennedy Ms. Barbara Lowry
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Trainers	Dr. Judith Cochran Ms. Eileen MacSweeney Dr. Evelyn Crowley Mr. John Roche	

Appendix 6a) Direct Data Entry Software

Developer: JacSoftware Ltd, The Old Barracks, Watergrasshill, Co. Cork

Manual compiled and training provided by Dr. Evelyn Crowley, University College Cork

Appendix 6b) Random Number Generator Software

Developer: Stephen Spelman Engineering Ltd., Bohillane, Ladysbridge, Co. Cork

Manual compiled and training provided by Dr. Evelyn Crowley, University College Cork

Appendix 7a

Mean number of decayed (cavitated), missing and filled teeth among 5-year-olds (dmft) , 8-,12- and 15-year olds (DMFT) by age
Weighted data

AGE												
	5						8					
	n	Full dmft	std	n	Non dmft	std	n	Full DMFT	std	n	Non DMFT	std
ERHA	723	0.75	1.79	36	1.19*	2.23*	836	0.25	0.71	20		
ERHA-ECAHB	182	0.60	1.35	23			190	0.24	0.67	15		
ERHA-NAHB	270	0.95	2.01	1			348	0.27	0.72	3		
ERHA-SWAHB	271	0.69	1.82	12			298	0.24	0.72	2		
MHB	174	1.17	2.06	103	1.60	2.55	143	0.32	0.79	75	0.29	0.64
MWHB	189	1.43	2.44	153	1.72	2.39	219	0.32	0.75	106	0.44	0.84
NEHB	1565	1.14	1.54	1165	1.60	1.65	136	0.51	1.05	156	0.28	0.77
NWHB	86	1.45	2.58	139	1.85	2.35	78	0.19	0.48	106	0.28	0.54
SEHB	288	1.58	2.70	210	1.86	3.05	270	0.39	0.87	83	0.21	0.55
SHB	353	0.88	1.92	247	1.82	2.23	331	0.24	0.82	232	0.42	0.94
WHB	239	0.84	1.89	107	1.75	1.90	195	0.21	0.64	36	0.22	0.48
RoI	3617	1.01	2.09	2160	1.71	2.10	2208	0.29	0.77	814	0.32	0.77
NI				669	1.8	2.87				209	0.27	0.62

Appendix 7b

Mean number of decayed (visual + cavitated), missing and filled teeth among 5-year-olds (vdmft) , 8-,12- and 15-year olds (VDMFT)
Weighted data

AGE												
	5						8					
	n	Full vdmft	std	n	Non vdmft	std	n	Full VDMFT	std	n	Non VDMFT	std
ERHA	723	1.02	2.04	36	1.56*	2.72*	836	0.36	0.85	20		
ERHA-ECAHB	182	0.83	1.64	23			190	0.28	0.78	15		
ERHA-NAHB	270	1.20	2.18	1			348	0.42	0.87	3		
ERHA-SWAHB	271	0.98	2.12	12			298	0.35	0.86	2		
MHB	174	1.70	2.60	103	2.12	2.83	143	0.40	0.85	75	0.37	0.73
MWHB	189	1.79	2.72	153	2.24	2.66	219	0.47	0.91	106	0.62	1.01
NEHB	1565	1.43	1.66	1165	2.06	1.83	136	0.59	1.14	156	0.40	0.88
NWHB	86	1.95	2.85	139	2.58	2.74	78	0.43	0.85	106	0.63	0.95
SEHB	288	1.98	2.99	210	2.14	3.31	270	0.47	0.92	83	0.38	0.84
SHB	353	1.05	2.08	247	1.99	2.52	331	0.27	0.86	232	0.51	0.99
WHB	239	1.19	2.31	107	2.42	2.11	195	0.30	0.79	36	0.27	0.50
RoI	3617	1.32	2.33	2160	2.19	2.34	2208	0.38	0.88	814	0.49	0.91
NI				669	2.31	3.19				209	0.37	0.75

* unweighted data

group, fluoridation status ('full' and 'non') and health board region of residence

GROUP											
12						15					
Full			Non			Full			Non		
n	DMFT	std	n	DMFT	std	n	DMFT	std	n	DMFT	std
750	0.94	1.33	12			803	1.96	2.28	17		
163	0.76	1.29	5			171	1.88	2.09	13		
322	1.05	1.35	1			327	1.92	2.36	2		
265	0.93	1.31	6			305	2.03	2.31	2		
140	0.96	1.34	48	1.11	1.28	134	2.17	2.35	33	2.46	2.23
224	1.38	1.52	101	1.53	1.54	145	1.90	2.05	71	3.73	3.32
142	1.26	1.50	139	1.30	1.63	129	2.39	2.47	139	2.84	2.20
66	1.22	1.31	115	1.00	1.50	79	1.97	2.15	119	2.91	3.17
268	1.14	1.38	59	1.54	0.75	302	2.23	2.23	48	2.69	2.62
321	1.00	1.62	245	1.52	1.87	284	2.39	2.61	191	3.21	3.19
179	1.09	1.55	28			184	2.11	2.17	14		
2090	1.05	1.44	747	1.29	1.69	2060	2.12	2.32	632	3.21	3.09
			201	1.49	1.74				396	3.64	3.52

FT) by age group, fluoridation status ('full' and 'non') and health board region of residence

GROUP											
12						15					
Full			Non			Full			Non		
n	VDMFT	std	n	VDMFT	std	n	VDMFT	std	n	VDMFT	std
750	1.10	1.45	12			803	2.51	2.64	17		
163	0.86	1.36	5			171	2.42	2.41	13		
322	1.21	1.49	1			327	2.49	2.83	2		
265	1.13	1.43	6			305	2.58	2.56	2		
140	1.10	1.39	48	1.36	1.52	134	2.63	2.62	33	2.79	2.49
224	1.72	1.77	101	1.67	1.60	145	2.22	2.31	71	4.11	3.62
142	1.44	1.68	139	1.56	1.74	129	2.82	2.76	139	3.35	2.44
66	1.83	1.79	115	1.84	1.78	79	3.18	2.81	119	3.96	3.73
268	1.44	1.46	59	1.63	0.77	302	2.78	2.55	48	3.31	2.96
321	1.17	1.80	245	1.67	2.04	284	2.62	2.82	191	3.43	3.34
179	1.44	1.77	28			184	2.45	2.44	14		
2090	1.28	1.61	747	1.63	1.84	2060	2.60	2.63	632	3.77	3.37
			201	1.94	1.92				396	4.25	3.74

Appendix 7c

Mean number of decayed (cavitated), missing and filled teeth among 5-year-olds (dmft) , 8-, 12- and 15-year olds (DMFT) by age Republic of Ireland as a whole (RoI) and Northern Ireland (NI) Weighted data

Fluoridation Status - FULL

AGE												
	5						8					
	Medical Card						Medical Card					
	No			Yes			No			Yes		
	n	dmft	std	n	dmft	std	n	DMFT	std	n	DMFT	std
ERHA	553	0.57	1.47	170	1.36	2.55	661	0.21	0.63	167	0.46	0.95
ERHA-ECAHB	159	0.52	1.34	23			161	0.22	0.64	22		
ERHA-NAHB	196	0.68	1.57	74	1.73	2.85	279	0.24	0.63	68	0.44	1.02
ERHA-SWAHB	198	0.51	1.46	73	1.25	2.52	221	0.18	0.64	77	0.53	0.92
MHB	133	0.97	1.76	41	1.67	2.89	114	0.27	0.70	29		
MWHB	148	1.35	2.45	41	1.86	2.53	154	0.28	0.68	64	0.46	0.91
NEHB	1134	1.01	1.55	422	1.57	2.51	94	0.56	1.15	42	0.40	0.84
NWHB	55	1.20	2.08	31	1.66	3.30	46	0.16	0.36	30	0.17	0.65
SEHB	200	1.27	2.55	88	2.31	3.00	189	0.34	0.85	80	0.50	0.95
SHB	274	0.88	1.88	78	0.83	2.15	251	0.23	0.77	79	0.25	0.98
WHB	165	0.71	1.67	74	1.05	2.35	145	0.24	0.69	50	0.12	0.48
Rol	2662	0.85	1.89	945	1.45	2.64	1654	0.26	0.73	541	0.39	0.90

Fluoridation Status - NON

AGE												
	5						8					
	Medical Card						Medical Card					
	No			Yes			No			Yes		
	n	dmft	std	n	dmft	std	n	DMFT	std	n	DMFT	std
ERHA	32	1.03*	2.12*	4			18			2		
ERHA-ECAHB	21			2			14			1		
ERHA-NAHB	1			0			2			1		
ERHA-SWAHB	10			2			2			0		
MHB	80	1.54	2.43	23			68	0.32	0.67	7		
MWHB	136	1.69	2.40	17			84	0.40	0.84	21		
NEHB	962	1.51	1.78	196	2.06	2.79	127	0.25	0.71	29		
NWHB	93	1.40	1.75	45	2.58	3.46	70	0.19	0.54	35	0.38	0.57
SEHB	180	1.66	2.71	30	3.67	3.22	68	0.17	0.46	15		
SHB	208	1.91	2.29	37	1.65	2.48	192	0.36	0.91	39	0.56	1.25
WHB	78	1.75	2.20	29			27			9		
Rol	1769	1.60	2.11	381	2.05	3.01	654	0.28	0.75	157	0.45	0.95
NI	407	1.26	2.18	259	2.66	3.54	119	0.22	0.60	86	0.36	0.65

Mean value and standard deviation not given where n<30

* unweighted data

group, medical card status ('No','Yes'), fluoridation status ('Non','Full'), health board region of residence,

GROUP											
12 Medical Card						15 Medical Card					
No			Yes			No			Yes		
n	DMFT	std	n	DMFT	std	n	DMFT	std	n	DMFT	std
617	0.91	1.33	133	1.09	1.34	612	1.91	2.24	190	2.21	2.48
141	0.72	1.31	22			138	1.76	1.94	32	2.58	2.65
255	1.04	1.35	67	1.08	1.40	250	1.87	2.25	77	2.15	2.76
221	0.90	1.31	44	1.02	1.36	224	2.02	2.41	81	2.06	2.10
109	0.86	1.29	31	1.42	1.53	98	2.09	2.23	36	2.29	2.74
169	1.36	1.55	53	1.39	1.54	112	1.81	2.01	32	2.61	2.29
96	1.05	1.35	46	1.75	1.76	87	2.36	2.34	39	2.57	2.88
46	1.14	1.21	20			52	1.94	2.22	25		
195	1.05	1.28	73	1.42	1.64	211	2.08	2.13	90	2.62	2.51
260	0.99	1.69	61	0.98	1.39	214	2.30	2.45	70	2.63	3.10
126	0.90	1.21	53	1.58	2.14	106	2.52	2.15	78	1.48	2.25
1618	0.99	1.40	470	1.22	1.59	1492	2.09	2.25	560	2.31	2.56

GROUP											
12 Medical Card						15 Medical Card					
No			Yes			No			Yes		
n	DMFT	std	n	DMFT	std	n	DMFT	std	n	DMFT	std
11			1			10			7		
5			0			7			6		
1			0			1			1		
5			1			2			0		
39	1.01	1.22	9			20			13		
85	1.46	1.49	15			57	3.84	3.04	13		
94	1.17	1.59	45	1.52	1.75	101	2.90	2.19	38	2.23	3.22
77	1.11	1.50	38	0.86	1.62	70	3.00	3.23	49	2.84	3.30
53	1.53	0.90	6			39	2.46	2.38	9		
198	1.44	1.77	47	1.79	2.57	149	3.31	3.53	42	2.91	2.84
576	1.23	1.64	170	1.48	2.01	456	3.27	3.17	175	3.21	3.26
117	1.56	1.86	76	1.50	1.60	261	3.18	3.15	129	4.60	4.05

Appendix 7d

Mean number of decayed (visual), missing and filled teeth among 5-year-olds (vdmft) , 8-, 12- and 15-year olds (VDMFT) by age Republic of Ireland as a whole (RoI) and Northern Ireland (NI) Weighted data

Fluoridation Status - FULL

AGE												
	5						8					
	Medical Card						Medical Card					
	No			Yes			No			Yes		
	n	vdmft	std	n	vdmft	std	n	VDMFT	std	n	VDMFT	std
ERHA	553	0.75	1.68	170	1.9	2.82	661	0.29	0.75	167	0.74	1.16
ERHA-ECAHB	159	0.73	1.65	23			161	0.25	0.71	22		
ERHA-NAHB	196	0.85	1.74	74	2.12	3.01	279	0.38	0.82	68	0.63	1.10
ERHA-SWAHB	198	0.69	1.65	73	1.95	2.95	221	0.23	0.68	77	0.91	1.21
MHB	133	1.56	2.41	41	2.08	3.24	114	0.32	0.76	29		
MWHB	148	1.69	2.71	41	2.32	2.94	154	0.41	0.84	64	0.64	1.10
NEHB	1134	1.31	1.70	422	1.87	2.67	94	0.62	1.20	42	0.53	1.06
NWHB	55	1.82	2.42	31	1.93	3.56	46	0.39	0.67	30	0.35	1.09
SEHB	200	1.58	2.86	88	2.88	3.23	189	0.44	0.90	80	0.56	1.00
SHB	274	1.05	2.04	78	0.97	2.30	251	0.24	0.80	79	0.34	1.07
WHB	165	1.04	2.07	74	1.53	2.85	145	0.29	0.78	50	0.29	0.85
Rol	2662	1.12	2.13	945	1.87	2.89	1654	0.33	0.82	541	0.58	1.07

Fluoridation Status - NON

AGE												
	5						8					
	Medical Card						Medical Card					
	No			Yes			No			Yes		
	n	vdmft	std	n	vdmft	std	n	VDMFT	std	n	VDMFT	std
ERHA	32	1.31*	2.49*	4			18			2		
ERHA-ECAHB	21			2			14			1		
ERHA-NAHB	1			0			2			1		
ERHA-SWAHB	10			2			2			0		
MHB	80	2.09	2.80	23			68	0.41	0.77	7		
MWHB	136	2.08	2.63	17			84	0.51	0.95	21		
NEHB	962	1.98	2.00	196	2.50	3.01	127	0.36	0.82	29		
NWHB	93	2.21	2.45	45	3.18	3.55	70	0.42	0.88	35	0.87	1.14
SEHB	180	1.91	2.95	30	4.34	3.48	68	0.33	0.80	15		
SHB	208	2.09	2.59	37	1.83	2.86	192	0.42	0.97	39	0.73	1.25
WHB	78	2.51	2.44	29			27			9		
RoI	1769	2.09	2.37	381	2.60	3.26	654	0.40	0.87	157	0.70	1.14
NI	407	1.67	2.52	259	3.34	3.83	119	0.27	0.66	86	0.53	0.85

Mean value and standard deviation not given where n<30

* unweighted data

group, medical card status ('No','Yes'), fluoridation status ('Non','Full'), health board region of residence,

GROUP											
12 Medical Card						15 Medical Card					
No			Yes			No			Yes		
n	VDMFT	std	n	VDMFT	std	n	VDMFT	std	n	VDMFT	std
617	1.08	1.44	133	1.26	1.53	612	2.38	2.54	190	3.02	2.98
141	0.81	1.38	22			138	2.30	2.27	32	3.21	2.99
255	1.18	1.47	67	1.30	1.65	250	2.26	2.56	77	3.26	3.52
221	1.12	1.43	44	1.15	1.48	224	2.52	2.68	81	2.73	2.31
109	0.98	1.32	31	1.67	1.61	98	2.50	2.47	36	2.86	3.10
169	1.68	1.79	53	1.76	1.84	112	2.13	2.26	32	3.02	2.62
96	1.13	1.47	46	2.12	1.95	87	2.81	2.74	39	2.98	2.96
46	1.68	1.56	20			52	3.27	2.97	25		
195	1.29	1.39	73	1.91	1.65	211	2.49	2.27	90	3.49	3.10
260	1.13	1.86	61	1.31	1.58	214	2.52	2.68	70	2.92	3.29
126	1.25	1.50	53	1.91	2.30	106	2.77	2.33	78	1.99	2.64
1618	1.20	1.56	470	1.53	1.79	1492	2.53	2.52	560	2.95	2.97

GROUP											
12 Medical Card						15 Medical Card					
No			Yes			No			Yes		
n	VDMFT	std	n	VDMFT	std	n	VDMFT	std	n	VDMFT	std
11			1			10			7		
5			0			7			6		
1			0			1			1		
5			1			2			0		
39	1.24	1.53	9			20			13		
85	1.61	1.57	15			57	4.21	3.36	13		
94	1.42	1.75	45	1.77	1.78	101	3.33	2.39	38	2.97	3.62
77	1.89	1.68	38	1.79	2.08	70	4.04	3.32	49	3.91	4.48
53	1.59	0.93	6			39	3.03	2.63	9		
198	1.60	1.96	47	1.92	2.71	149	3.53	3.67	42	3.14	3.12
576	1.56	1.79	170	1.84	2.15	456	3.80	3.33	175	3.86	3.86
117	2.01	2.00	76	1.97	1.83	261	3.78	3.46	129	5.26	4.12

Appendix 7e

Mean number of teeth affected by visual + cavitated caries among 5- (vdt, primary teeth), 8-, 12- and 15-year-olds (VDT, permanent teeth) with fluoridated (Full) and non fluoridated (Non) domestic water supplies in the 10 health board regions, ERHA, NI and RoI in 2002 - Weighted data

AGE GROUP								
	5		8		12		15	
	Fluoride Status		Fluoride Status		Fluoride Status		Fluoride Status	
	None	Full	None	Full	None	Full	None	Full
Health Board								
ERHA		0.82		0.24		0.33		1.09
ERHA-ECAHB		0.70		0.16		0.26		1.11
ERHA-NAHB		1.03		0.32		0.38		1.28
ERHA-SWAB		0.73		0.21		0.33		0.92
MHB	1.83	1.58	0.22	0.21	0.38	0.37	0.92	1.03
MWHB	1.80	1.41	0.30	0.25	0.31	0.66	0.75	0.60
NEHB	1.74	1.22	0.23	0.27	0.64	0.43	0.99	0.83
NWHB	2.19	1.69	0.55	0.40	1.30	1.00	1.96	1.53
SEHB	1.84	1.60	0.25	0.26	0.30	0.46	1.07	0.97
SHB	1.51	0.84	0.16	0.09	0.29	0.36	0.83	0.68
WHB	2.26	1.10	0.07	0.18		0.55		0.69
RoI	1.82	1.09	0.29	0.22	0.63	0.43	1.13	0.93
NI	1.71		0.22		0.70		1.10	

Mean number of teeth missing due to caries among 5- (mt, primary teeth), 8-, 12- and 15-year-olds (MT, permanent teeth) with fluoridated (Full) and non fluoridated (Non) domestic water supplies in the 10 health board regions, ERHA, NI and RoI in 2002

AGE GROUP								
	5		8		12		15	
	Fluoride Status		Fluoride Status		Fluoride Status		Fluoride Status	
	None	Full	None	Full	None	Full	None	Full
Health Board								
ERHA		0.15		0.02		0.06		0.09
ERHA-ECAHB		0.04		0.01		0.06		0.04
ERHA-NAHB		0.15		0.02		0.09		0.15
ERHA-SWAB		0.21		0.02		0.04		0.07
MHB	0.22	0.08	0.02	0.03	0.19	0.12	0.02	0.20
MWHB	0.16	0.21	0.00	0.01	0.05	0.10	0.30	0.14
NEHB	0.25	0.16	0.03	0.06	0.14	0.10	0.27	0.13
NWHB	0.38	0.26	0.00	0.00	0.11	0.23	0.56	0.12
SEHB	0.10	0.25	0.00	0.04	0.10	0.05	0.12	0.17
SHB	0.22	0.08	0.00	0.00	0.12	0.06	0.10	0.16
WHB	0.08	0.04	0.00	0.00		0.10		0.12
RoI	0.25	0.15	0.01	0.02	0.12	0.08	0.30	0.13
NI	0.36		0.00		0.16		0.25	

Mean mean number of teeth filled due to caries among 5- (ft, primary teeth), 8-, 12- and 15-year-olds (FT, permanent teeth) with fluoridated (Full) and non fluoridated (Non) domestic water supplies in the 10 health board regions, ERHA, NI and RoI in 2002

AGE GROUP								
	5		8		12		15	
	Fluoride Status		Fluoride Status		Fluoride Status		Fluoride Status	
	None	Full	None	Full	None	Full	None	Full
Health Board								
ERHA		0.05		0.10		0.70		1.33
ERHA-ECAHB		0.10		0.12		0.54		1.28
ERHA-NAHB		0.02		0.07		0.73		1.05
ERHA-SWAB		0.04		0.12		0.77		1.58
MHB	0.07	0.04	0.14	0.16	0.80	0.60	1.86	1.41
MWHB	0.27	0.17	0.32	0.20	1.32	0.96	3.06	1.48
NEHB	0.08	0.05	0.13	0.26	0.79	0.91	2.09	1.86
NWHB	0.02	0.00	0.08	0.03	0.42	0.60	1.45	1.53
SEHB	0.20	0.13	0.12	0.17	1.24	0.93	2.13	1.65
SHB	0.26	0.12	0.35	0.18	1.26	0.75	2.50	1.77
WHB	0.08	0.06	0.20	0.13		0.79		1.64
RoI	0.12	0.08	0.19	0.14	0.88	0.77	2.33	1.54
NI	0.24		0.15		1.08		2.90	

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The study of oral diseases and conditions among the population we serve allows us to develop appropriate dental services suited to the needs of our children and adolescents. Fulfilling the aims of the survey required the clinical examination of almost 20,000 children and adolescents over a six-month period. The scale of the survey required contributions from a large number and wide variety of people from many different disciplines and sectors of society. We would like to thank everybody who contributed to the survey and to the production of this report.

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