Children's Dental Health in Ireland 1984

A survey conducted on behalf of
The Minister for Health
by
University College Cork

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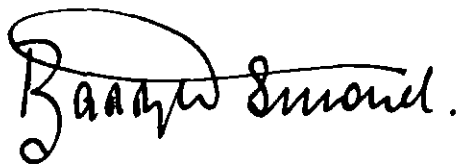
Foreword

The introduction of water fluoridation in the early 1960s was welcomed as a major advance in the area of preventive dentistry, and it has justified itself. More than twenty years later I considered it timely to commission a nationwide study of dental health in children, in order to review the benefits of water fluoridation to the teeth of our children.

I am very pleased to introduce the Report of the National Survey of Children's Dental Health which was carried out in 1984 by University College Cork on my behalf. I invite comment on the findings of the Report which will assist me, and the Government, in taking decisions on the future development of dental services for our children.



Barry Desmond T.D.
Minister for Health

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We are grateful to the dentists and the recorders who went through the different training and calibration exercises and subsequently completed the fieldwork. We would like to thank especially the teachers, parents and children of Faranree National and Secondary Schools in Cork who volunteered to help in the various training and calibration exercises.

The co-operation of the Department of Education, the health boards, the Chairpersons of the Boards of Management, Principals and Teachers of the primary and secondary schools selected, the parents and children themselves, and also that of numerous other persons and groups is greatly appreciated. Without this co-operation the Survey would not have been possible.

The advice and assistance of the Department of Statistics and the Computer Bureau in University College Cork is greatly appreciated.

The authors are indebted to Ms. Pauline Moreau, Department of Health, for assistance in the preparation and editing of the Report.

Finally, the authors want to thank the Steering Committee and the local headquarters team for their advice and support.

Editorial responsibility for this report rests with the Survey Director, Professor D. M. O'Mullane to whom any queries or observations should be addressed.

Chapter 1

Introduction

1.1 Background to the Survey

The Health (Fluoridation of Water Supplies) Act, 1960[1] empowers the Minister for Health to make regulations directing health authorities to make arrangements to fluoridate water supplied to the public by sanitary authorities. Fluoridation commenced in Dublin in 1964 and in Cork in 1965. During the period 1965 to 1972 the domestic water supplies of most of the larger urban communities were fluoridated. In 1981, approximately 60 per cent of the total population of Ireland resided in communities served with fluoridated water supplies[2] while the current figure is 65 per cent.

In compliance with section 4 of the Health (Fluoridation of Water Supplies) Act, 1960[1] a baseline epidemiological study was conducted during the years 1961 to 1963 to determine the prevalence of dental caries in the school population in the Republic of Ireland.[3] Local studies conducted during the late 1960s and throughout the 1970s showed that fluoridation of public piped water supplies was effective in the prevention of dental caries in Ireland.[4, 5] More recent local studies using criteria for the diagnosis of caries similar to those used in the prefluoridation baseline study showed that the prevalence of dental caries in school children had declined, not alone in lifetime residents of fluoridated communities, but also in lifetime residents of non-fluoridated communities,[6] the decline being greatest in the former group. This general decline in the prevalence of dental caries in children during the same period was also reported from other developed countries.

Section 6 of the Health (Fluoridation of Water Supplies) Act, 1960 requires the Minister for Health to arrange, from time to time, surveys into aspects of health of persons who receive fluoridated water. In view of the apparent changing patterns of dental caries in Ireland and in other developed countries, the Minister initiated a survey of Children's Dental Health in Ireland in 1982. Professor D. O'Mullane of the Department of Preventive and Paediatric Dentistry, University College, Cork was invited to direct the Survey.

1.2 Aims of the Survey

The Director had extensive consultations with the professional and administrative staffs of the Department of Health on the aims of the Survey.

1.2.1 *Primary Aims*

It was agreed that the primary aims of the Survey would be:

1. to determine the level of dental caries in Irish school children;
2. to determine the effectiveness of water fluoridation in the prevention of dental caries in Ireland by:—
   (a) comparing the prevalence of dental caries in children resident in fluoridated and non-fluoridated areas in 1984.
   (b) comparing the levels of dental caries in school children in 1984 with those found in the prefluoridation baseline studies conducted in 1961-63.

Since the mid-1960s there has been an increase in the availability of fluoride sources to the public principally through fluoridation of water supplies and increased sales of fluoride toothpastes.[7] One of the most sensitive clinical methods of assessing longterm fluoride intake in groups of children is to monitor levels of enamel opacities, including fluorosis. Hence the third primary aim of the National Survey of Children's Dental Health was:

3. to determine the levels of enamel opacities including fluorosis and other developmental defects in children in fluoridated and non-fluoridated areas in order to provide data to assess current fluoride intake in Irish school children and to provide baseline levels for ongoing monitoring.

1.2.2 *Subsidiary Aims*

The Joint Working Party Report on Dental Services in Ireland highlighted the lack of appropriate information which would permit the rational planning of dental services at a national level. For example, under the Health Act, 1970 dental services for the majority of children in Ireland are the responsibility of the health board (salaried) dental service. While local studies had indicated that there was a high level of untreated dental disease in children in Ireland, the national picture was not known. Also, except in the Eastern Health Board area, oral health care needs of Irish school children, including treatment needs for dental caries, periodontal disease and dentofacial anomalies had not previously been established. Similarly, with two exceptions,[9, 35] no information on the knowledge, attitudes and behaviour of Irish school children or their parents to dental health and dental services was available.

It was decided, therefore, to include a broad subsidiary aim for the Survey as follows:

4. to determine the general oral health status of Irish school children; to provide information for the evaluation of current dental services and the development of such services in the future and to enable comparisons to be made with other countries.

1.3 **Administration**

The decision to conduct the survey was taken by the Minister for Health in October 1982 following which detailed planning commenced. The Director was appointed by the Minister in November 1982. Having decided on the aims of the survey, the strategies which would be adopted to achieve these aims in the form of a detailed protocol were submitted by the Director to the Department of Health. These were agreed in June 1983 allowing decisions to be made on the detailed timetable and budget for the survey. A Steering Committee was formed in October 1983, its purpose being to oversee the general conduct of the survey (Appendix 1).

1.3.1 *The Sample*

Children in infant, second and sixth standard in primary schools and in third year Inter. Cert. standard in second level schools were examined in each of the eight health boards. Sampling within each health board was carried out on a two stage basis. All schools within a health board were first stratified on the basis of their size, nominal fluoridation status and sex ratio. Within each stratum a sample of schools was selected and within each school a sample of children was selected. Selection for age within a school was carried out on the basis of the children's standard (class) in school as follows: infant standard to represent 5-year-olds, second standard to represent 8-year-olds, sixth standard to represent 12-year-olds and third year Inter. Cert. to represent 15-year-olds (Tables 1.1 and 1.2). The four groups will be referred to as 5-, 8-, 12- and 15-year-olds respectively. The numbers of schools selected was such as to ensure that approximately equal numbers of children of each sex and age group were selected from fluoridated and non-fluoridated areas within each of the health boards. To ensure this balance in the final sample, which would facilitate analytical aspects of the study, close monitoring of the numbers examined in the different sub-groups was maintained throughout the survey and some additional schools were selected as required. This procedure was necessary for two reasons:

1. Details of class size were not known precisely when selecting the sample as only school statistics for the previous year (1981-82) were available;
2. The relative proportion of children selected from fluoridated and

TABLE 1.1

Number of Subjects Examined in Each Grouping by Fluoridation Status and Health Board

Age Grouping	*5-year-olds Junior Infant Standard*							*8-year-olds Second Standard*						
Health Board	*Full Fl*	*Part*	*Non Fl*	*School*	*Tabs*	*Rinse*	*Mixed*	*Full Fl*	*Part*	*Non Fl*	*School*	*Tabs*	*Rinse*	*Mixed*
Eastern	139	9	123	4	2	27	1	151	27	83	3	6	39	10
Midland	112	23	89	9	2	46	3	145	31	93	14	2	36	7
Mid-Western	121	13	110	13	–	1	–	115	30	126	19	–	1	–
North-Eastern	89	42	139	39	3	–	2	90	54	125	32	3	2	2
North-Western	69	57	62	15	64	–	2	52	75	29	10	73	3	18
South-Eastern	117	57	93	30	–	–	–	118	67	105	16	–	4	6
Southern	137	27	143	8	6	–	–	141	12	134	17	3	2	–
Western	85	62	77	11	4	–	–	86	61	97	11	–	–	1
All Health Boards	869	290	836	129	81	74	8	898	357	792	122	87	87	44

Age Grouping	*12-year-olds Sixth Standard*							*15-year-olds Inter. Cert.*						
Health Board	*Full Fl*	*Part*	*Non Fl*	*School*	*Tabs*	*Rinse*	*Mixed*	*Full Fl*	*Part*	*Non Fl*	*School*	*Tabs*	*Rinse*	*Mixed*
Eastern	128	20	101	–	2	30	3	133	54	97	5	1	19	2
Midland	78	60	64	9	1	53	5	44	104	56	44	–	54	39
Mid-Western	95	42	114	18	1	4	–	22	112	98	57	6	10	12
North-Eastern	89	57	132	30	3	6	1	49	74	119	77	1	18	–
North-Western	52	90	25	13	63	10	21	12	135	18	24	45	14	41
South-Eastern	91	126	114	16	–	–	2	60	152	41	57	1	–	–
Southern	137	19	95	23	–	10	3	62	37	129	54	1	26	–
Western	79	81	110	14	4	–	–	21	39	110	62	3	1	3
All Health Boards	749	495	755	123	74	113	35	403	707	668	380	58	142	97

TABLE 1.2

Average age on day of examination of subjects examined in each grouping by fluoridation status and health board

Age Grouping	*5-year-olds Junior Infant Standard*							*8-year-olds Second Standard*						
Health Board	*Full Fl*	*Part*	*Non Fl*	*School*	*Tabs*	*Rinse*	*Mixed*	*Full Fl*	*Part*	*Non Fl*	*School*	*Tabs*	*Rinse*	*Mixed*
Eastern	4.6	4.7	4.9	4.5	5.0	4.9	5.0	7.8	8.1	8.0	7.3	7.8	7.9	7.9
Midland	4.9	4.7	5.5	4.9	5.5	5.8	5.7	7.9	7.9	8.0	8.4	7.5	8.3	8.3
Mid-Western	4.7	5.1	4.8	5.1	–	5.0	–	8.1	7.9	8.0	8.2	–	8.3	–
North-Eastern	4.8	5.0	4.7	5.0	5.0	–	4.5	7.9	8.0	7.7	8.2	7.7	8.0	8.5
North-Western	4.7	4.5	4.5	4.7	4.7	–	5.0	7.9	7.8	7.8	7.7	7.8	7.7	8.3
South-Eastern	4.7	4.8	4.6	4.8	–	–	–	7.8	8.0	7.8	7.8	–	7.3	8.0
Southern	4.7	5.0	4.6	4.9	4.8	–	–	7.8	7.8	7.8	7.9	7.3	8.5	–
Western	4.6	4.7	4.9	4.8	5.0	–	–	7.8	7.8	8.1	7.8	–	–	8.0
All Health Boards	4.7	4.8	4.8	4.9	4.7	5.5	5.1	7.9	7.9	7.9	8.0	7.7	8.1	8.2

Age Grouping	*12-year-olds Sixth Standard*							*15-year-olds Inter. Cert.*						
Health Board	*Full Fl*	*Part*	*Non Fl*	*School*	*Tabs*	*Rinse*	*Mixed*	*Full Fl*	*Part*	*Non Fl*	*School*	*Tabs*	*Rinse*	*Mixed*
Eastern	12.0	12.1	11.9	–	12.0	12.2	12.0	14.7	14.7	15.0	14.4	15.0	14.8	15.0
Midland	11.9	12.1	12.0	12.1	13.0	12.2	12.6	15.0	15.1	15.2	14.9	–	15.5	15.0
Mid-Western	12.2	12.0	12.0	12.1	12.0	12.0	–	14.6	14.9	14.7	15.0	15.3	14.6	15.3
North-Eastern	11.6	11.9	11.8	11.7	11.7	11.7	12.0	14.8	15.2	15.2	15.0	16.0	15.1	–
North-Western	11.5	11.9	11.6	11.6	11.8	12.0	11.9	14.8	15.1	15.1	15.1	15.1	14.9	14.8
South-Eastern	11.9	12.0	11.9	11.9	–	–	11.0	14.9	15.0	15.0	15.1	15.0	–	–
Southern	11.7	11.7	11.8	12.0	12.0	12.0	11.0	15.0	15.1	15.0	14.9	15.0	15.3	–
Western	11.8	11.8	12.1	11.9	12.3	–	–	15.2	14.9	15.0	15.1	15.3	15.0	14.7
All Health Boards	11.9	11.9	11.9	11.9	11.9	12.1	11.6	14.8	15.0	15.0	15.0	15.1	15.2	14.9

non-fluoridated communities and the length of residence in such communities were not known until parental consent forms had been returned (see 1.3.2 below).

These two factors also made it difficult to control the number of children examined in each stratum in the four age groups (Table 1.1). It should be noted, therefore, that marginal frequencies for health board, fluoridation status and age are not in proportion to population figures and for this reason summary data for each age group are presented in most tables separately for health board and fluoridation status.

1.3.2 *The Response*

Permission to carry out the survey was obtained from the managers and principals of the schools selected; written consent from the parents of the children selected was also obtained. In all, 142 primary schools and 102 secondary schools were included in the sample. At the first visit of the clinical examiner and recorder, parental consent forms were given to the teacher responsible for the class selected who issued them to the children. The size of the class dictated the number of consent forms issued. The children returned the completed consent forms to the teacher. At the examining team's second visit, clinical examinations were carried out for the children with completed consent forms. In all, 12,150 consent forms were issued to the teachers and 9,473 children were subsequently clinically examined (Table 1.1). The difference is mostly made up of children who were not present even at the second visit of the examining team or who forgot to return the consent form. Refusal to consent was rare. A questionnaire was also issued to a subgroup of the total sample. Parents of 8-year-old children and the 15-year-old children themselves in the Eastern, North-Western, Mid-Western and Southern Health Boards were included in this section of the survey. For this subgroup, only results for those children who had completed clinical examinations and questionnaires were included. This provision also reduced the apparent response rates for the clinical examination.

1.3.3 *The Clinical Examination*

A team of ten dentists and ten dental surgery assistants was recruited from the various health boards (Appendix A). An initial one-week training programme was conducted in December 1983, in collaboration with Dr. Ingolf Moller (Director, European Regional Office, W.H.O.). Following a two-month period during which the teams practised the examination methods, a further training and calibration programme in the diagnostic methods to be used was conducted one week prior to the commencement of the fieldwork which commenced in March 1984 and was completed in June 1984 (Appendix B).

Each team was equipped with an examination kit, including 2% glutaraldehyde sterilisation kit, fibre-optic light, W.H.O. periodontal probes, and sickle probes. A booklet containing detailed instructions to examiners and recorders for the clinical assessments was also issued to each team (Appendix C). Clinical examinations were carried out using a plain mouth mirror and fibre-optic light source. A schematised clinical record card was used to record the data (Appendix D) on the following clinical conditions:

Dentofacial Anomalies (12- and 15-year-olds)
Antero-posterior molar relationship, posterior crossbite, posterior openbite, midline deviation, overjet, open-bite, crowding, spacing and diastema were assessed using criteria similar to those recommended by W.H.O. for use in the International Collaborative Study.[9] The examining dentists also gave their own assessment of the subject's need for orthodontic treatment.

Trauma of Permanent Incisors (8-, 12-, and 15-year-olds)
The criteria used to assess this condition were based on those used in a previous survey of Cork City school children.[10]

Periodontal Disease (12- and 15-year-olds)
The need for treatment of periodontal disease was assessed using the procedures and criteria of the Community Periodontal Index of Treatment Needs (CPITN).[11]

Denture Status (15-year-olds)
Presence of, and need for dentures was recorded.

Enamel Opacities/Fluorosis (8- and 15-year-olds)
The presence of enamel opacities including fluorosis in permanent teeth was assessed using the Developmental Defects of Enamel (DDE) Index[12] and Deans Index.[13] This section of the clinical examination was only carried out in the Eastern, Mid-Western, North-Western and Southern Health Boards.

The DDE Index is based on an assessment of buccal (labial) and lingual (palatal) surfaces of the permanent teeth except third molars. Teeth were examined wet and food debris was removed prior to the examination.

Dental Caries (5-, 8-, 12- and 15-year-olds)
Dental caries was recorded for each surface and each tooth was assigned a treatment need. Radiographs were not taken. A probe was used only to clean tooth surfaces and to confirm diagnosis. The diagnostic criteria for caries were based on those used in the International Collaborative Study[9] and the prefluoridation baseline study.[3] For 5-year-olds missing deciduous canines

and molars are assumed extracted due to caries; in the case of missing incisors, the examiner's clinical judgement was used to decide reason for absence. For 8-year-olds all missing incisors were deemed to have exfoliated naturally; clinical judgement was used to decide the reason for missing canines and molars. For the purposes of calculating DMFS scores, a tooth deemed missing due to caries was assumed to have had three surfaces affected by caries prior to extraction. Caries was only diagnosed when the lesion had reached cavitation level; when any doubt existed a score of sound was given. The stages of dental caries that precede cavitation and other conditions similar to the early stages of caries, such as white or chalk spots, discoloured or rough spots or stained pits and fissures were excluded. In the case of filled surfaces with further decay, a distinction was made between primary decay (cavity not in contact with filling) and secondary decay (cavity in contact with filling).

Assessment of treatment need was also based on the criteria used in the International Collaborative Study.[9] The presence of decay on a surface did not necessarily mean that treatment was indicated e.g. carious surface on a deciduous tooth about to be exfoliated. Need for one, two, three or more surface fillings, pulp treatment, crowns and extractions was recorded.

Fissure Sealants (8-, 12- and 15-year-olds)
Occlusal surfaces of premolars and permanent molars in 8-, 12- and 15-year-olds were examined using a probe and the presence of fissure sealants was recorded.

The full instructions to the dental examiners and recorders and the diagnostic criteria used are included in Appendix C.

1.3.4 *The Questionnaire* (parents of 8-year-olds and 15-year-olds themselves)
With a view to achieving the subsidiary aims of the survey, it was considered important to establish the dental health, knowledge, attitudes and behaviour relevant to dental health and dental services amongst parents of Irish children and amongst Irish teenagers. Questionnaires were completed by the parents of the 8-year-old children and by the 15-year-olds themselves in the Eastern, Mid-Western, North-Western and Southern Health Boards. (Appendices E and F). The questionnaire was pretested by 30 parents and 30 15-year-old children prior to adopting the final draft.

1.3.5 *Data Analysis*
Completed clinical records and questionnaires together with completed

consent forms were returned weekly by each team to survey headquarters in Cork Dental School; duplicate copies of the clinical records were retained by each team. Each clinical record was checked to ensure that demographic details were correctly transferred.

Exposure of subjects to fluoridated water supplies (at home and at school), to fluoride tablets and to fluoride mouthrinsing varied enormously. For the purposes of this investigation seven subgroups were identified as follows:

1. Home water supply fluoridated continuously since birth. Subject may have had exposure to school fluoridation, fluoride tablets or fluoride mouthrinses (Hereafter referred to as "Full Fl" group).

2. Home water supply fluoridated but not continuously since birth. Subject may have had exposure to school fluoridation, fluoride tablets or fluoride mouthrinses ("Part Fl").

3. Home water supply never fluoridated. Present school water supply is not fluoridated. Subject never had fluoride tablets or mouthrinses ("Non Fl").

4. Home water supply never fluoridated. Present school water supply is fluoridated. Subject never had fluoride tablets, or mouthrinses ("School").

5. Home water supply never fluoridated. Present school water supply is not fluoridated. Subject has never had fluoride mouthrinses but has taken fluoride tablets ("Tabs").

6. Home water supply never fluoridated. Present school water supply is not fluoridated. Subject has never had fluoride tablets but has had fluoride mouthrinse ("Rinse").

7. Home water supply never fluoridated. Subject has been exposed to fluoride from more than one of the following sources:
   (i) Present school fluoridated
   (ii) Fluoride tablets
   (iii) Fluoride mouthrinse
   ("Mixed").

As well as the above sources of fluoride most of the participants were likely to have some exposure to fluoride toothpaste since over 95 per cent of the toothpaste sold in Ireland contains fluoride, and in the case of the groups surveyed by the questionnaire, over 80 per cent brushed their teeth regularly (Table 6.4).

Coding for fluoridation status proved a difficult and lengthy task. Particular note should be made of subgroup three (Non Fl) since it is clear that in Ireland, where 65 per cent of the population reside in communities served with fluoridated water, the isolation of a true "control" group of children with no exposure to fluoridation is almost impossible. Invariably, children will spend some time of their summer vacation in a flouridated area or will have consumed beverages (e.g. soft drinks) made with fluoridated water.

Following checking and coding for fluoridation status, data was punched on to a floppy disc. The data was analysed by the Computer Bureau, University College Cork using the P-stat computer package.

1.3.6. *Presentation of Results*

The field work for the Survey of Children's Dental Health was completed in June, 1984 and in November of that year the preliminary results[14] covering the primary aims of the survey were published. These showed that in the past twenty years there had been a major decline in the prevalence of dental caries in children in Ireland and that this decline was greatest in children who had been lifetime residents of communities served with fluoridated water supplies. It was also shown that the level of enamel fluorosis, as defined by Deans Index was very low in Ireland, over 90 per cent having normal enamel, the remainder showing evidence of either questionable, very mild or mild fluorosis. Levels in fluoridated and non-fluoridated communities were similar. In this report these initial results are expanded and information on the other conditions and topics covered in the survey is presented.

1.3.7 *Number and Age of Subjects in the Survey*

A total of 9,473 subjects in all were examined (Table 1.1). In the case of the Full Fl and Non Fl groups, the number examined in each Health Board in each age group was generally satisfactory, except in the case of the North-Western Health Board where the number of children fulfilling the criteria for inclusion in these groups proved difficult. A number of factors contributed to this problem including the extensive fluoride tablet programme which has been in operation in the North-Western Health Board for many years (as evidenced by the large numbers of children in the "Tabs" group in this area). Also, fluoridation of water supplies in Ireland was first implemented in the larger urban areas, followed later by more rural communities such as the North-West. Hence it proved more difficult to find 12- and 15-year-old children who had been life time residents of a flouridated community, e.g. in the North-West: a large number of the children selected in these age groups fall into the "Part Fl" group.

The average age of the subjects on the day of examination is given in Table 1.2. The balance between health boards and the main fluoridation groups is excellent apart from the 5-year-old age group in the Midland Health Board where the average age of the "Non Fl" group is 5.5 years (which is approximately 6 months older than the other 5-year-old groups). Most of this group would be resident in rural communities and the older age of the Junior Infant standard may be due to a particular school entry policy or pattern in the Midland area. When comparing levels of dental disease (which are closely associated with age) found in different surveys, it is essential that the precise age of the subjects on the day on which they were examined be recorded. Unfortunately, this is not always the case.

Chapter 2

Water Fluoridation, Dental Caries and Enamel Opacities/Fluorosis

2.1 **Introduction**

In this chapter, the results of the three primary aims of the Survey are considered, namely:

- the measurement of the effectiveness of water fluoridation;
- the estimation of the changes in the levels of dental caries in Irish schoolchildren between 1961-63 and 1984; and
- the level of enamel opacities/fluorosis.

Also reported is the caries experience of the small groups of children who had taken fluoride tablets, who had used a fluoride mouthrinse or who had used a combination of these measures. For 8-year-olds data on both deciduous and permanent teeth, both separately and combined, are presented.

2.2 **Effectiveness of Fluoridation**

2.2.1 *All Teeth*

In Table 2.1 and figures 2.1 a, b, c, d, the percentage of children with no known decay experience ("caries free") is presented. In the case of 5-year-olds who had been lifetime residents of flouridated communities ("Full Fl"), 52.1 per cent were free of dental caries compared with 38.5 per cent in the "Non Fl" group; this overall trend is repeated in all eight health boards. The percentage of 8-, 12- and 15-year-olds found to be caries free in their permanent teeth was highest in those children who have resided in fluoridated communities. The frequency distributions of dmft/DMFT scores for the four age groups are presented in Figures 2.1, a, b, c and d. It is seen that in all age groups a sizeable percentage of children experience high levels of dental caries. In the case of 5-year-olds in the "Full Fl" group for example approximately 12 per cent had six or more decayed, missing or filled teeth. The corresponding percentage for 5-year-olds in the "Non Fl" group was 22 per cent approximately. It is interesting that the frequency distributions for DMFT scores for 12- and 15-year-olds in both fluoridated and non-fluoridated areas are bimodal.

TABLE 2.1

Percentage of children with no known caries experience (caries free) in each age grouping by fluoridation status and health board (permanent teeth only in 8-, 12- and 15-year-olds)

Age Grouping	*5-year-olds*		*8-year-olds*		*12-year-olds*		*15-year-olds*	
Health Board	*Full FI* %	*Non FI* %	*Full FI* %	*Non FI* %	*Full FI* %	*Non FI* %	*Full FI* %	*Non FI* %
Eastern	56.8	37.4	72.2	55.4	27.3	14.9	15.8	13.4
Midland	54.5	33.7	75.2	57.0	26.9	25.0	9.1	8.9
Mid-Western	44.6	36.4	60.0	46.8	17.9	10.5	4.5	5.1
North-Eastern	66.3	46.0	73.3	66.4	21.3	15.9	10.2	9.2
North-Western	52.2	40.3	59.6	58.6	21.2	16.0	16.7	5.6
South-Eastern	50.4	37.6	78.8	50.5	30.8	11.4	16.7	4.9
Southern	38.7	30.1	58.2	53.7	13.9	10.5	3.2	4.7
Western	58.8	46.8	75.6	59.8	26.6	18.2	14.3	8.2
All Health Boards	52.1	38.5	69.5	55.7	22.8	14.7	11.9	7.8

FIGURE 2.1a

5-year-old children, percentage frequency distribution of dmft scores.

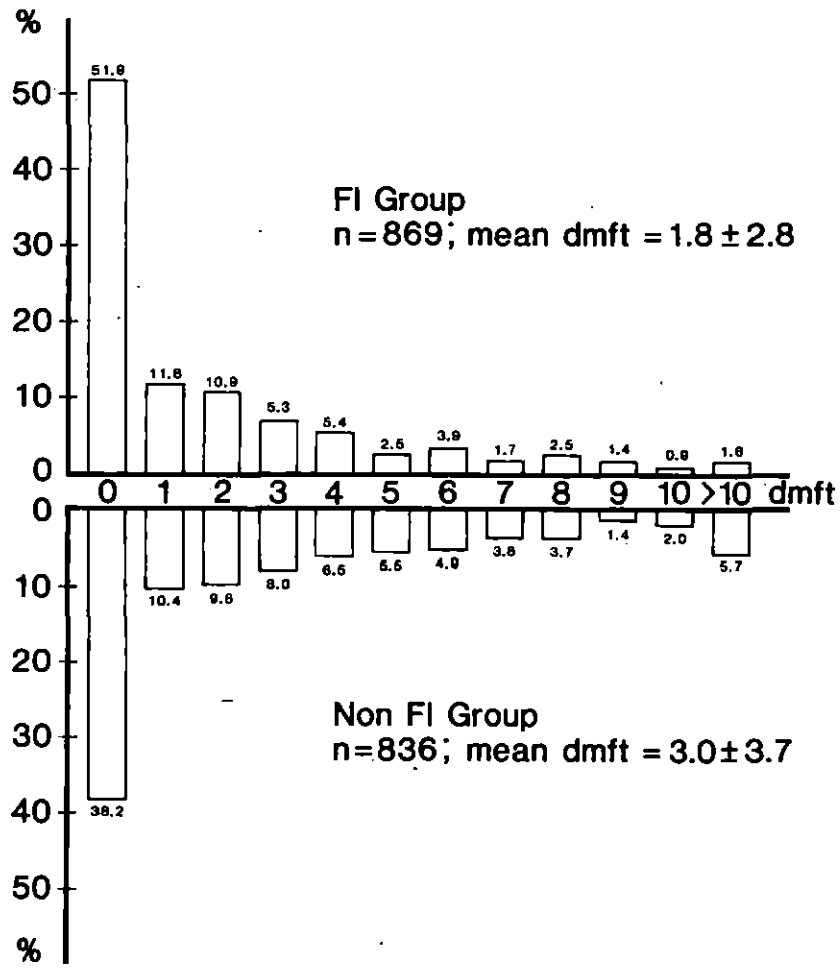


FIGURE 2.1b

8-year-old children, percentage frequency distribution of DMFT scores.

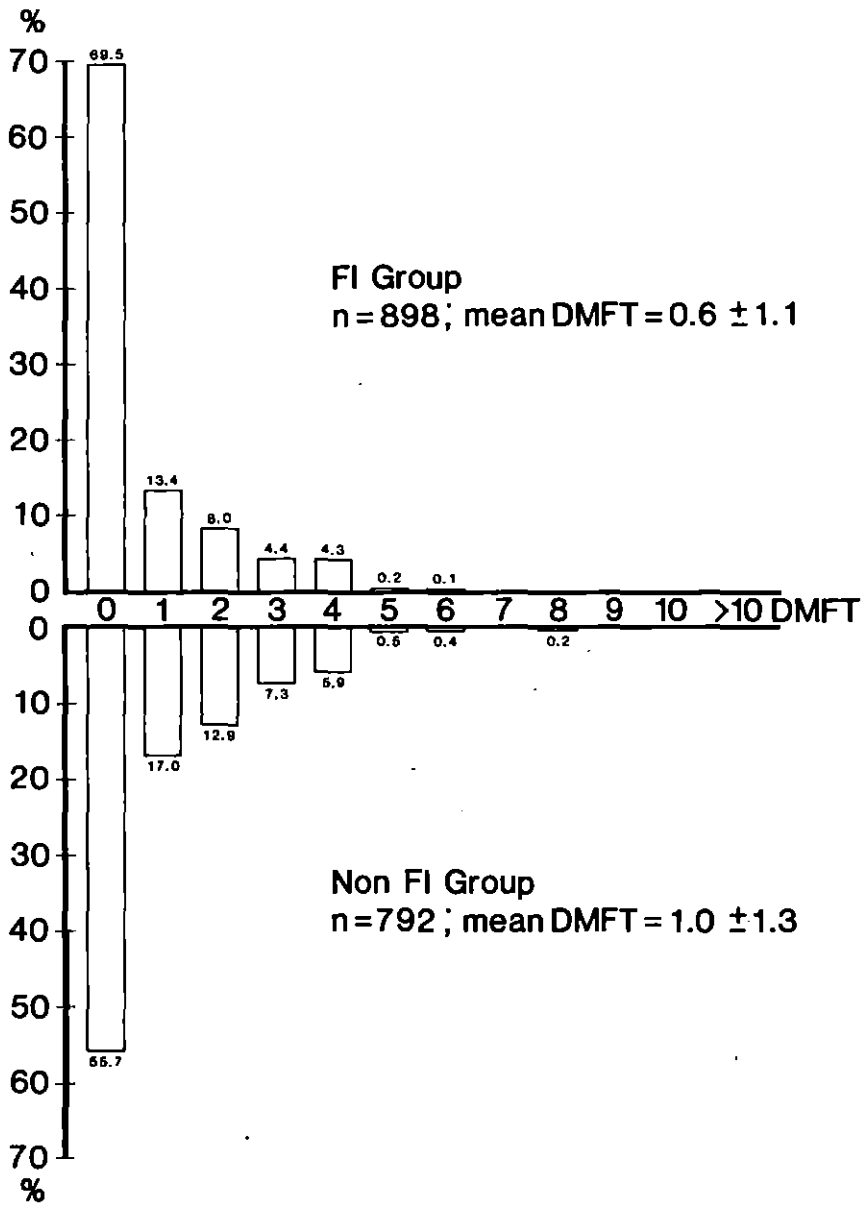


FIGURE 2.1c

12-year-old children, percentage frequency distribution of DMFT scores.

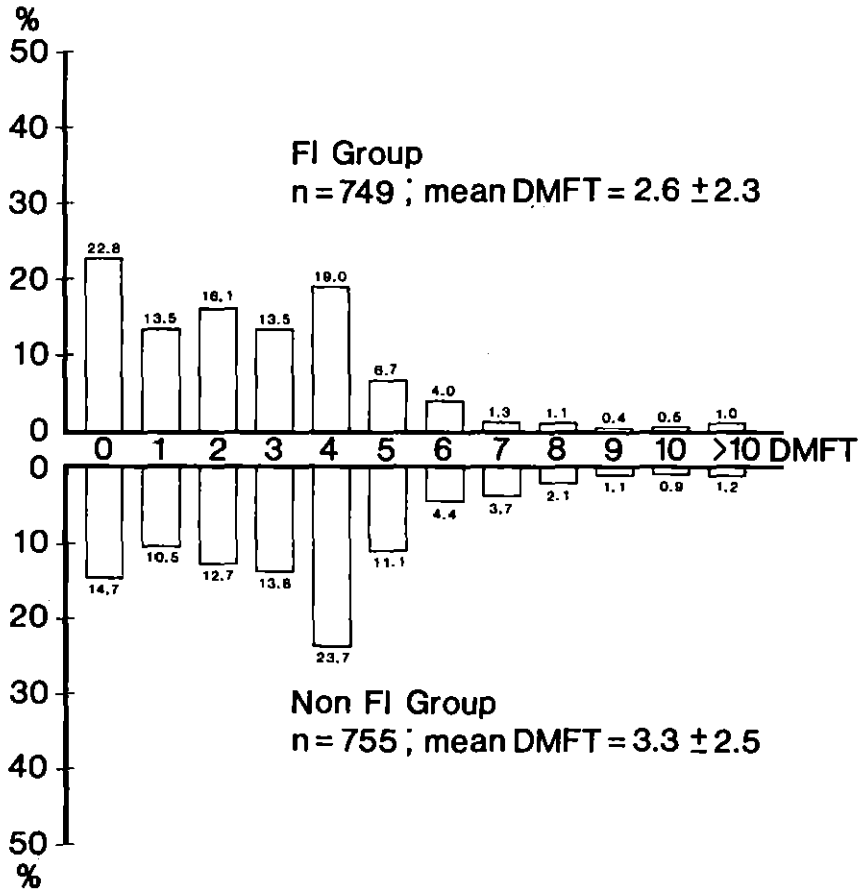
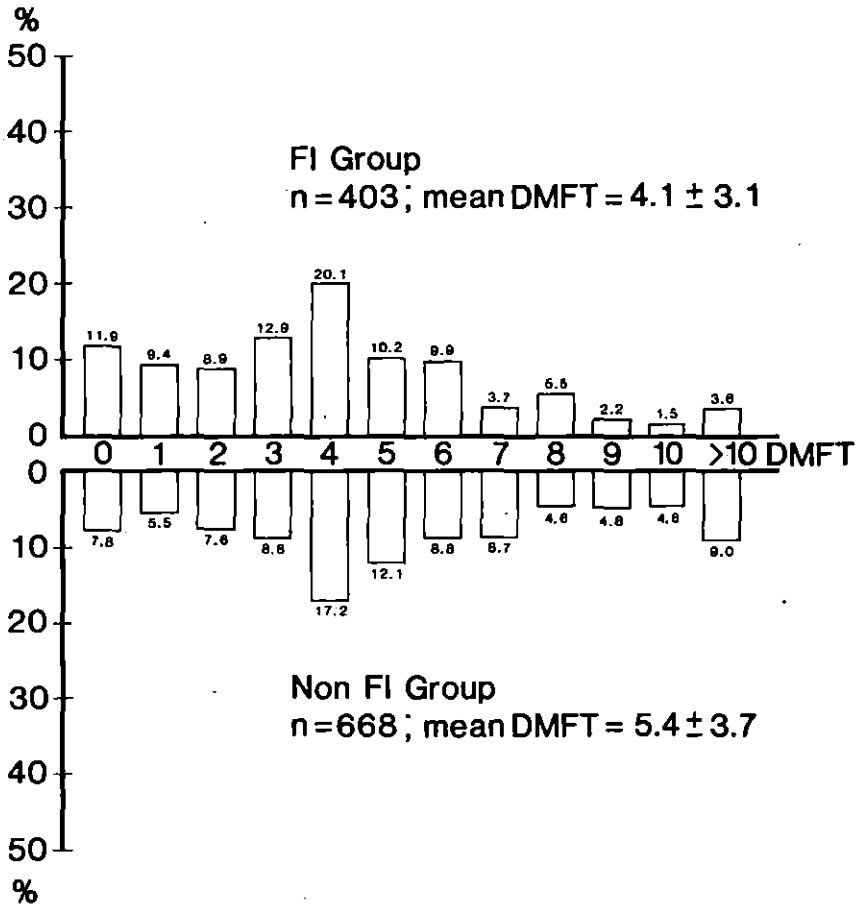


FIGURE 2.1d

15-year-old children, percentage frequency distribution of DMFT scores.



A more common method of expressing decay experience in groups is the mean number of decayed, missing and filled teeth and surfaces (Table 2.2). In all age groups caries experience is lower in those children who had been lifetime residents of a fluoridated community when compared with corresponding children who have resided all their lives in a non-fluoridated community. In 5-year-olds, the mean dmft in the "Full Fl" group was 1.8 compared with 3.0 in the "Non Fl" group, a difference of 40 per cent. On a surface basis the difference was 42 per cent (3.6 versus 6.2). For 8-year-olds, there was also a 40 per cent difference in the mean DMFT and DMFS in the fluoridated group, whilst for deciduous teeth in 8-year-olds, the difference was 23 per cent (3.0 as against 3.9). For older children, the differences were somewhat less, being 21 per cent and 25 per cent for DMFT and DMFS respectively in 12-year-olds and 24 per cent and 30 per cent respectively in 15-year-olds. All these differences are highly significant ($P<0.001$).

There is a wide variation in the level of caries between the eight health boards (Table 2.2, figures 2.2 a, b, c, d). For example, in the case of 5-year-olds in the "Full Fl" group, the mean dmft is over twice as high in the Southern Health Board (2.5) as it is in the North-Eastern Health Board (1.0). For 15-year-olds in the "Full Fl" group the range for mean DMFT is from 2.3 in the North-Western Health Board to 5.4 in the Southern Health Board. It is interesting that a similar geographical variation in the level of caries was also evident in the 1961-63 baseline survey[3] and that the caries experience in children appeared to be generally higher in the Southern Health Board area (Counties Cork and Kerry) at that time also (see table 2.13). There is also wide variation in the apparent effectiveness of water fluoridation between the eight health boards. In the case of 5-year-olds, the percentage difference in mean dmft between "Full Fl" and "Non Fl" groups varies from 55 per cent in the Eastern Health Board to 32 per cent in the Western Health Board. For 12-year-olds, the differences in the effectiveness of fluoridation varied from 38 per cent in the North-Western Health Board to 0 per cent in the Midland Health Board. This level of difference is greater than what would be expected from sampling variation alone, hence other explanations must be considered. In the past 20 years, practical problems in maintaining levels of fluoride in water supplies at 1 PPM have been encountered[2] and there is no doubt that these problems affected the supplies in the different health boards to varying degrees. The two major problems in maintaining the statutory levels of fluoride in the water supplies have been firstly, difficulties encountered in obtaining adequate supplies of fluoride at all times and secondly, the distribution of the fluoride to the different supplies throughout the country, particularly the smaller supplies. The first water supplies to be flouridated were treated with Sodium Fluoride or Sodium Silico-fluoride, both of which

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TABLE 2.2

Mean number of decayed, missing and filled teeth (t/T) and surfaces (s/S) in 5-year-olds (dmft-dmfs) 8-year-olds (dmft and DMFT-DMFS), 12- and 15-year-olds (DMFT-DMFS)

Age Grouping	*5-year-olds*				*8-year-olds*						*12-year-olds*				*15-year-olds*			
Health Board	*Full Fl*		*Non Fl*		*Full Fl*			*Non Fl*			*Full Fl*		*Non Fl*		*Full Fl*		*Non Fl*	
	t	*s*	*t*	*s*	*t*	*T*	*S*	*t*	*T*	*S*	*T*	*S*	*T*	*S*	*T*	*S*	*T*	*S*
Eastern	1.3	2.6	2.9	6.6	2.3	0.5	0.9	3.4	1.0	1.7	2.2	3.5	3.4	5.6	3.7	6.2	4.8	9.1
Midland	1.9	4.0	3.0	7.1	2.7	0.5	0.8	4.0	0.9	1.6	2.5	3.9	2.5	4.7	3.5	6.3	3.9	7.0
Mid-Western	2.3	4.4	4.0	8.5	3.3	1.0	1.3	3.8	1.1	1.6	3.1	5.4	3.7	5.7	4.3	6.3	5.9	10.3
North-Eastern	1.0	2.0	2.1	4.1	3.1	0.5	0.8	3.7	0.6	0.9	2.3	3.5	2.8	4.8	4.1	6.9	5.2	9.4
North-Western	1.7	3.2	3.0	5.4	3.1	0.8	1.0	4.1	1.1	2.2	2.4	4.0	3.9	7.4	2.3	5.2	5.8	10.2
South-Eastern	1.9	3.7	2.8	5.4	3.2	0.4	0.5	3.9	1.2	1.6	2.2	4.4	3.5	6.3	4.0	7.0	5.6	10.2
Southern	2.5	4.7	4.0	7.8	3.5	0.9	1.5	4.5	1.0	1.6	3.3	5.6	4.1	6.9	5.4	9.5	6.8	12.8
Western	1.5	2.9	2.2	4.0	2.7	0.4	0.5	3.5	0.9	1.1	2.3	3.8	3.0	5.3	4.5	7.9	4.8	9.1
All Health Boards	1.8	3.6	3.0	6.2	3.0	0.6	0.9	3.9	1.0	1.5	2.6	4.3	3.3	5.7	4.1	7.0	5.4	10.0

Full Fluoride

FIGURE 2.2a

5-year-old children, decayed (d) missing (m) and filled (f) teeth in fluoridated (left hand bar) and non-fluoridated (right hand bar) groups.

FIGURE 2.2b

8-year-old children, decayed (D) missing (M) and filled (F) teeth in fluoridated (left hand bar) and non-fluoridated (right hand bar) groups.

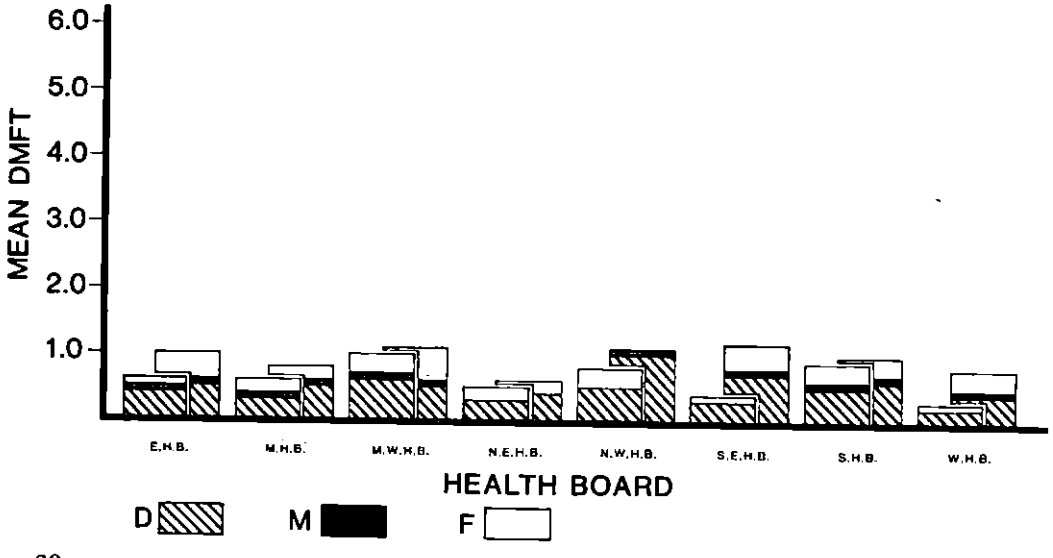


FIGURE 2.2c

12-year-old children, decayed (D) missing (M) and filled (F) teeth in fluoridated (left hand bar) and non-fluoridated (right hand bar) groups.

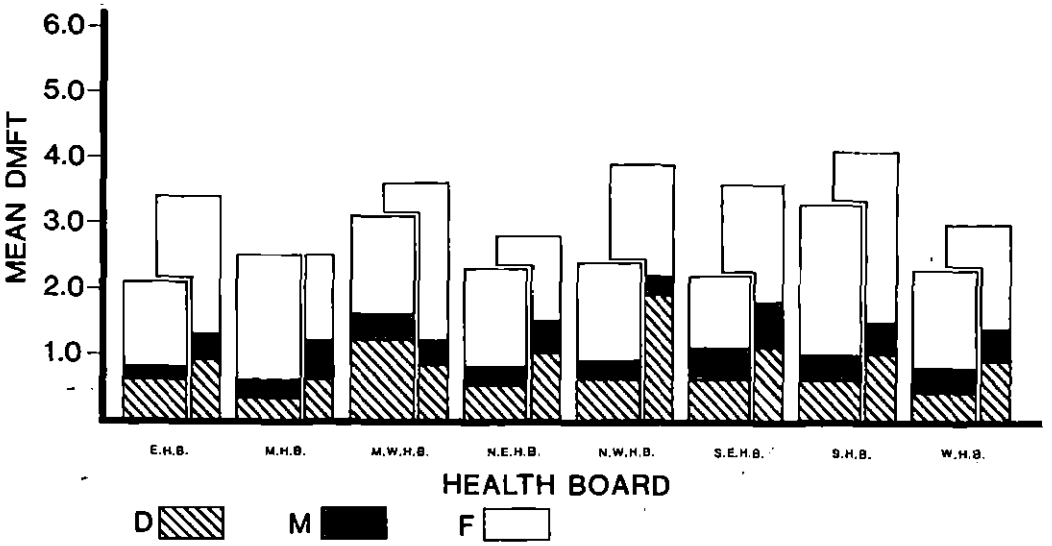
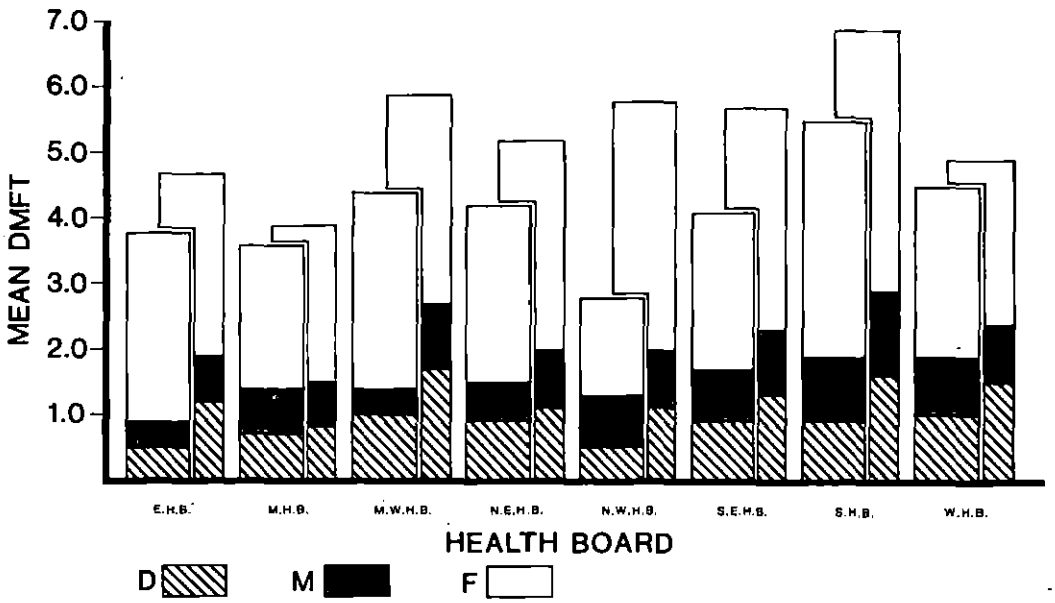


FIGURE 2.2d

15-year-old children, decayed (D) missing (M) and filled (F) teeth in fluoridated (left hand bar) and non-fluoridated (right hand bar) groups.



are salts in powder form. Flouride in liquid form (hydrofluosilicic acid) became available in large quantities in Ireland as a by-product of the super-phosphate fertiliser industry. In tests, the liquid proved to have considerable advantages over the salts: simplicity of plant installation and operation, lower capital and running costs and ease of maintaining accurate levels of fluoride in the water were some of the factors taken into account. Hence in the late 1960s, most water supplies changed over to the liquid method of fluoridation and any new schemes installed equipment for addition of fluosilicic acid. However, in 1974, a major supply problem arose when the main supplier of the liquid indicated that the demand for super-phosphate fertiliser was declining and a continuing supply of hydroflousilicic acid could not be guaranteed. Though arrangements were made to import adequate supplies from Holland, some initial practical difficulties in the shipping and storage arrangements meant that there was approximately a nine month period in 1975 when adequate supplies of hydrofluosilicic acid were not available. There were some interruptions in supply also between 1980 and 1982 due to industrial disputes both in Ireland and in Holland. In general, however, adequate supplies are now readily available.

The problems of distribution of hydrofluosilicic acid arose because of the inaccessibility of many of the smaller waterworks in towns and villages; the large supply tanker was unable to travel through the narrow roads to reach them. This problem was eventually solved by the purchase of a small and more versatile tanker.

One further problem also needs to be taken into account. Under the Health (Fluoridation of Water Supplies) Act, 1960, the regulations made by the Minister provide that the fluoride concentration in the water shall be maintained at 0.8 to 1.0 parts per million (PPM) of water. The regulation also provide for the fluoride content of the water to be determined by means of a daily colorimetric test and in addition by a monthly distillation test. The results of these tests indicate that in a number of supplies the level was less than 0.8 PPM for long periods. The relationship between these results and the effectiveness of water fluoridation expressed in terms of percentage difference in mean dmft/DMFT between health boards is not clear. For example, in the case of 12-year-olds, the percentage difference in mean DMFT levels was least in the Midland Health Board area (0 per cent) and greatest in the North-Western Health Board area (38 per cent). In the former, there are 11 water supplies which have been fluoridated at least since 1976, that is when the 12-year-olds in the present survey were 4-year-olds. The results of the monthly distillation tests for these 11 supplies for the eight year period from 1977 to 1984 inclusive shows that out of 1056 tests, (i.e. 8 years

× 12 tests × 11 supplies) 292 or only 28 per cent were considered satisfactory, that is the fluoride levels were between 0.8 PPM and 1.0 PPM. These figures, though a rather crude estimate of the daily fluoride levels in the fluoridated areas of the Midland Health Board, nevertheless indicate that they were less than satisfactory for the eight years prior to the clinical examinations of the present study. In the North-Western Health Board, of the eight water supplies fluoridated at least since 1977, only in 160 (21 per cent) of the 768 tests were the fluoride levels between 0.8 PPM and 1.0 PPM. These figures would suggest, therefore, that the level of fluoride in the water supplies was poorly maintained also in the North-Western Health Board for the period 1977 to 1984. However, the data available on the fluoride levels in the different water supplies are not sufficiently detailed to warrant conclusions on the contribution of breaks in the maintenance of satisfactory fluoride levels in the drinking water to the apparent reduced effectiveness of water fluoridation in some health boards. The information now being collected from each water supply in each health board will allow such relationships to be properly established in the future.

2.2.2 *Anterior Teeth*

The benefits of fluoridation of water supplies were especially evident in anterior teeth, i.e. incisors and canines, confirming results reported from numerous previous surveys. The percentage of children affected by dental caries in their anterior teeth is lower in lifetime residents of fluoridated communities ("Full Fl") for all four age groups examined (Table 2.3). The benefits of water fluoridation in anterior teeth is particularly striking in the case of the 15-year-olds. Of the 403 children examined in the "Full Fl" group only 12.4 per cent had evidence of caries in their anterior teeth. In contrast 28.4 per cent of the 668 examined in the "Non Fl" group had one or more of their anterior teeth affected by dental caries.

Mean dmft(s) and DMFT(S) scores in anterior teeth of life-time residents of fluoridated and non-fluoridated communities in each health board are presented in Table 2.4. The mean dmft in 5-year-old children was 0.4 in the "Full Fl" group compared with 0.8 in the "Non Fl" group, a difference of 50 per cent (<0.001). A similar difference is seen in mean dmfs scores, 0.7 as against 1.3. There were few anterior lesions found in the permanent anterior teeth of 8-year-olds. In the case of 12-year-olds, the mean DMFT was 0.2 in the "Full Fl" group compared with 0.4 in the "Non Fl" group. The effectiveness of fluoridation of the water supplies in anterior teeth is particularly noticeable in the case of 15-year-old children; the difference between the "Full Fl" and "Non Fl" groups being 71 per cent in the case of DMFT (0.2 as against 0.7) and 70 per cent in the case of DMFS (0.3 as against 1.0).

TABLE 2.3

Percentage of children affected by anterior caries (incisors and canines)

Health Boards	*5-year-olds*		*8-year-olds*		*12-year-olds*		*15-year-olds*	
	Full FI (N = 869)	*Non FI (N = 836)*	*Full FI (N = 898)*	*Non FI (N = 792)*	*Full FI (N = 749)*	*Non FI (N = 755)*	*Full FI (N = 403)*	*Non FI (N = 668)*
Eastern	12.9	28.4	0.7	1.2	4.7	11.9	8.3	17.5
Midland	16.1	20.2	0.0	1.1	10.3	12.5	11.4	23.2
Mid-Western	23.1	28.2	0.0	1.6	16.8	14.9	9.1	35.7
North-Eastern	5.6	15.8	0.0	0.0	2.2	10.6	10.2	21.0
North-Western	7.2	29.0	0.0	3.4	15.4	28.0	0.0	22.2
South-Eastern	13.7	25.8	1.7	2.9	9.9	21.0	18.3	21.9
Southern	23.4	37.8	0.7	3.7	16.1	24.2	21.0	46.5
Western	16.5	18.2	0.0	0.0	6.3	14.5	14.3	24.5
All Health Boards	15.6	25.8	0.4	1.6	10.1	16.0	12.4	28.4

Table 2.4

Mean number of anterior teeth (t) and surfaces (s) affected by caries in 5-year-olds (dmft-dmfs) 8-, 12- and 15-year-olds (DMFT-DMFS)

Health Board	*5-year-olds*				*8-year-olds*				*12-year-olds*				*15-year-olds*			
	Full Fl		*Non Fl*		*Full Fl*		*Non Fl*		*Full Fl*		*Non Fl*		*Full Fl*		*Non Fl*	
	t	*s*	*t*	*s*	*T*	*S*	*T*	*S*	*T*	*S*	*T*	*S*	*T*	*S*	*T*	*S*
Eastern	0.2	0.4	0.8	1.9	0.0	0.0	0.0	0.0	0.2	0.4	0.3	0.5	0.1	0.2	0.3	0.8
Midland	0.4	0.7	0.4	0.6	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.3	0.2	0.2	0.4	0.5
Mid-Western	0.6	1.2	1.2	2.1	0.0	0.0	0.0	0.0	0.3	0.5	0.3	0.4	0.2	0.2	0.8	1.3
North-Eastern	0.1	0.2	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.3	0.4	0.6
North-Western	0.1	0.1	0.8	1.2	0.0	0.0	0.1	0.1	0.2	0.4	0.6	0.6	0.0	0.0	0.3	0.4
South-Eastern	0.4	0.8	0.7	1.0	0.0	0.0	0.0	0.0	0.2	0.3	0.5	0.7	0.4	0.5	0.7	1.0
Southern	0.6	1.0	1.2	1.9	0.0	0.0	0.1	0.1	0.3	0.4	0.7	0.8	0.3	0.5	1.2	1.6
Western	0.4	0.8	0.6	0.7	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.6	0.1	0.2	0.6	0.9
All Health Boards	0.4	0.7	0.8	1.3	0.0	0.0	0.0	0.0	0.2	0.3	0.4	0.5	0.2	0.3	0.7	1.0

2.2.3 *Posterior Teeth*

As measured by mean dmft/DMFT levels, the percentage differences between "Full Fl" and "Non Fl" groups for premolars and molars were 36 per cent, 33 per cent, 20 per cent and 19 per cent for 5-, 8-, 12- and 15-year-olds respectively (Table 2.5). The corresponding figures for dmfs/DMFS scores were 41 per cent, 36 per cent, 23 per cent and 25 per cent.

It is important when interpreting the relative effectiveness of fluoridation of water supplies in anterior and posterior teeth to take account of the overall level of caries found in these two tooth groups. For example, the proportion of the total caries experience attributable to anterior teeth in Irish schoolchildren is very low being approximately 25 per cent for deciduous teeth and less than 10 per cent for permanent teeth (see Tables 2.3, 2.4). Hence, whilst the apparent effectiveness of fluoridation is greatest in anterior teeth, the clinical significance of this reduction in terms of teeth and surfaces saved from caries is low.

2.2.4 *Smooth Surfaces and Interproximal Surfaces*

The beneficial effects of fluoridation were also especially apparent in smooth surfaces, i.e. all surfaces excluding occlusal surfaces of posterior teeth and palatal surfaces of upper incisors and molars and buccal surfaces of lower molars. For example, the prefalence of smooth surface caries was over 50 per cent lower in the "Full Fl" group both in 5-year-olds and in 15-year-olds (Table 2.6).

This tendency for fluoridation to be especially beneficial in particular surfaces is also apparent when caries in interproximal surfaces only is considered (Table 2.7). This is particularly evident in 15-year-olds; lifetime residents of fluoridated communities had 59 per cent less caries in interproximal surfaces than residents of non-fluoridated communities.

2.2.5 *Individual Teeth*

There is a wide variation in the proportion of the total caries experience contributed by different teeth in the dentition. In Table 2.8 the contribution of the first and second deciduous molar teeth is presented. It is seen that the mean number of decayed, missing and filled first deciduous molars in the "Full Fl" group was 0.61 of which 0.24 (39 per cent) was contributed by the upper teeth and 0.37 (61 per cent) was contributed by the lower teeth. The contribution of left and right teeth was the same. The mean dmft for second deciduous molars was 0.80, the lower teeth contributing 0.45 (55 per cent) in this case. The overall mean dmft for 5-year-old children was 1.8 (Table 2.2) of which 1.4 (78 per cent) was contributed by deciduous molars (Table 2.5). A similar pattern emerges for 5-year-olds in non-fluoridated areas, second deciduous molars and lower teeth being more at risk.

Table 2.5

Mean number of posterior teeth (t) and surfaces (s) affected by caries in 5-year-olds (dmft-dmfs), 8-year-olds (dmft and DMFT-DMFS), 12- and 15-year-olds (DMFT-DMFS)

Health Board	*5-year-olds*				*8-year-olds*						*12-year-olds*				*15-year-olds*			
	Full Fl		*Non Fl*		*Full Fl*			*Non Fl*			*Full Fl*		*Non Fl*		*Full Fl*		*Non Fl*	
	t	*s*	*t*	*s*	*t*	*T*	*S*	*t*	*T*	*S*	*T*	*S*	*T*	*S*	*T*	*S*	*T*	*S*
Eastern	1.1	2.3	2.1	4.7	2.2	0.5	0.9	3.3	1.0	1.7	2.0	3.2	3.1	5.1	3.6	5.9	4.4	8.3
Midland	1.5	3.3	2.6	6.5	2.5	0.5	0.8	3.7	0.8	1.6	2.3	3.7	2.3	4.4	3.4	6.2	3.5	6.5
Mid-Western	1.7	3.2	2.8	6.4	3.1	0.9	1.3	3.6	1.1	1.6	2.8	4.8	3.3	5.3	4.2	6.0	5.0	9.0
North-Eastern	0.9	1.8	1.7	3.6	2.9	0.5	0.8	3.5	0.6	0.9	2.3	3.5	2.6	4.5	3.9	6.5	4.8	8.8
North-Western	1.6	3.1	2.2	4.2	3.0	0.7	1.0	3.8	1.0	2.1	2.2	3.6	3.3	6.8	2.8	5.2	5.5	9.8
South-Eastern	1.5	2.9	2.1	4.4	3.0	0.4	0.5	3.6	1.1	1.6	2.1	4.1	3.0	5.5	3.6	6.4	4.9	9.2
Southern	1.9	3.8	2.7	5.9	3.3	0.9	1.5	4.1	0.9	1.4	3.0	5.2	3.5	6.1	5.1	9.0	5.6	11.2
Western	1.0	2.1	1.6	3.3	2.5	0.4	0.5	3.3	0.9	1.1	2.1	3.6	2.7	4.7	4.4	7.7	4.2	8.1
All Health Boards	1.4	2.9	2.2	4.9	2.8	0.6	0.9	3.6	0.9	1.4	2.4	4.0	3.0	5.1	3.9	6.7	4.8	9.0

Table 2.6

Mean number of smooth surfaces affected by caries in 5-year-olds (dfs) and 8-, 12- and 15-year-olds (DFS)

Health Board	*5-year-olds*		*8-year-olds*		*12-year-olds*		*15-year-olds*	
	Full FI	*Non FI*	*Full FI*	*Non FI*	*Full FI*	*Non FI*	*Full FI*	*Non FI*
Eastern	0.9	4.0	0.2	0.4	0.6	1.0	0.8	2.2
Midland	2.0	3.8	0.1	0.3	0.5	0.7	0.8	1.1
Mid-Western	1.9	3.8	0.1	0.2	1.0	0.8	0.5	2.0
North-Eastern	0.8	1.9	0.1	0.1	0.2	0.6	0.9	1.8
North-Western	1.1	2.7	0.1	0.7	0.6	2.3	0.2	1.6
South-Eastern	2.0	3.2	0.1	0.2	0.8	1.3	1.0	1.9
Southern	2.4	4.2	0.2	0.2	0.6	1.2	1.2	3.1
Western	1.3	2.3	0.0	0.0	0.5	1.0	1.1	2.3
All Health Boards	1.6	3.3	0.1	0.2	0.6	1.0	0.9	2.2

Table 2.7

Mean number of interproximal surfaces affected by caries in 5-year-olds (dfs) and 8-, 12- and 15-year-olds (DFS)

Health Board	*5-year-olds*		*8-year-olds*		*12-year-olds*		*15-year-olds*	
	Full FI	*Non FI*	*Full FI*	*Non FI*	*Full FI*	*Non FI*	*Full FI*	*Non FI*
Eastern	0.6	2.3	0.1	0.2	0.4	0.7	0.6	1.6
Midland	1.2	2.3	0.0	0.2	0.4	0.5	0.7	0.8
Mid-Western	1.2	2.3	0.1	0.1	0.7	0.7	0.3	1.6
North-Eastern	0.5	1.4	0.0	0.1	0.2	0.5	0.7	1.4
North-Western	0.7	1.6	0.1	0.5	0.4	1.7	0.2	1.3
South-Eastern	1.3	2.1	0.1	0.1	0.6	1.1	0.8	1.6
Southern	1.4	2.7	0.1	0.2	0.4	1.0	0.9	2.5
Western	0.9	1.5	0.0	0.0	0.4	0.7	0.8	1.7
All Health Boards	1.0	2.1	0.1	0.1	0.4	0.8	0.7	1.7

Table 2.8

The mean number of upper and lower deciduous molars affected by caries in 5-year-old children. All Health Boards

	Full Fl		*Non Fl*	
	1st deciduous molar	*2nd deciduous molar*	*1st deciduous molar*	*2nd deciduous molar*
Upper (U.)	0.24	0.36	0.40	0.51
Lower (L.)	0.37	0.45	0.62	0.71
U. right	0.11	0.18	0.20	0.26
U. left	0.13	0.18	0.20	0.25
L. right	0.18	0.22	0.32	0.34
L. left	0.19	0.23	0.31	0.37
Mean dmft	0.61	0.80	1.02	1.23
Overall mean dmft for all teeth	1.8		3.0	

As expected first permanent molars were almost the sole contributors to the total DMFT of 8-year-olds in fluoridated and non-fluoridated areas, with only a few second premolars being affected (Table 2.9). The contribution from lower first molars was slightly higher than the upper, 0.32 as against 0.28 in the fluoridated group, and 0.50 as against 0.41 in the non-fluoridated group. The contributions from left and right tooth groups were almost identical.

Caries in first permanent molars again dominates the caries experience of 12-year-olds, accounting for 81 per cent in the "Full Fl" group and 77 per cent in the "Non Fl" group (Table 2.10). Upper and lower and left and right tooth groups contribute equally.

Caries in premolars and second molars begins to make a contribution to the caries experience of 15-year-olds, though the first permanent molars continue to be the major source (Table 2.11); these contribute 2.67 (65 per cent) to the total DMFT of 4.1 in the fluoridated group and 3.0 (55 per cent) to the total of 5.4 in the nonfluoridated group. Again the contribution of upper and lower, and left and right tooth groups was similar.

2.3 Dental Caries in 1961-63 and in 1984

2.3.1 *Introduction*

Details of the pre-fluoridation baseline survey conducted in 1961-63 were

Table 2.9

Mean number of upper and lower premolars and permanent molars affected by caries in 8-year-olds. All Health Boards

	Full FI		*Non FI*	
	2nd premolar	*1st molar*	*2nd premolar*	*1st molar*
Upper (U.)	0.001	0.28	0.001	0.41
Lower (L.)	0.001	0.32	0.001	0.50
U. right	0.001	0.14	0.001	0.22
U. left	–	0.14	–	0.20
L. right	–	0.15	–	0.24
L. left	0.001	0.17	0.001	0.26
Mean DMFT	0.002	0.61	0.003	0.91
Mean DMFT for all permanent teeth	0.6		1.0	

published in a series of reports;[3] the original raw data are not available. Data are presented separately on a tooth basis (dmft/DMFT) for each of the 26 counties in Ireland. In this report the prefluoridation baseline figures are based on the average dmft scores for 4- and 5-year-olds and on the average DMFT scores for 7- and 8-year-olds, 11- and 12-year-olds, and 14- and 15-year-olds (Table 2.12). Averaging the 1961-1963 scores in this manner was necessary since the mean dmft/DMFT scores reported are only available in discrete age groups. For example, the average age of the 4-year-olds is likely to be 4.5 and of the 5-year-old age group it is likely to be 5.5. Hence the average age of these age groups combined would be 5.0 years, a reasonable approximation to the average age of the 5-year-old age group included in the 1984 survey (Table 1.2). Hence the only major difference likely in the two surveys is the wider age range of the children in the 1961-1963 baseline survey.

2.3.2 *The 1961-63 Prefluoridation Baseline Survey*

The pre-fluoridation baseline survey was carried out by the Medical Research Council of Ireland on behalf of the Minister for Health during the period May 1961 to December 1963, using criteria similar to those adopted in a survey concluded ten years previously.[15]

The system of grading the degree of caries followed that used by the British Ministry of Health in similar surveys at that time. Radiographs were not used. Six grades of caries were recognised:

Table 2.10

Mean number of upper and lower premolars and permanent molars affected by caries in 12-year-olds. All Health Boards

	Full FI				*Non FI*			
	1st premolar	*2nd premolar*	*1st molar*	*2nd molar*	*1st premolar*	*2nd premolar*	*1st molar*	*2nd molar*
Upper (U.)	0.04	0.04	1.05	0.05	0.05	0.08	1.29	0.09
Lower (L.)	0.00	0.03	1.06	0.11	0.01	0.04	1.26	0.13
U. right	0.02	0.02	0.53	0.02	0.03	0.05	0.64	0.04
U. left	0.02	0.02	0.52	0.03	0.02	0.03	0.65	0.05
L. right	0.00	0.01	0.53	0.06	0.01	0.01	0.64	0.07
L. left	0.00	0.01	0.53	0.05	0.00	0.02	0.61	0.06
Mean DMFT	0.04	0.06	2.11	0.16	0.06	0.12	2.54	0.23
Overall mean DMFT for all permanent teeth			2.6				3.3	

Table 2.11

Mean number of upper and lower premolars and permanent molars affected by caries in 15-year-olds. All Health Boards

	Full FI				*Non FI*			
	1st premolar	*2nd premolar*	*1st molar*	*2nd molar*	*1st premolar*	*2nd premolar*	*1st molar*	*2nd molar*
Upper (U.)	0.09	0.16	1.32	0.35	0.21	0.26	1.48	0.42
Lower (L.)	0.03	0.09	1.34	0.49	0.05	0.17	1.52	0.64
U. right	0.05	0.08	0.66	0.18	0.10	0.13	0.75	0.21
U. left	0.04	0.08	0.67	0.18	0.11	0.13	0.73	0.22
L. right	0.01	0.04	0.67	0.23	0.03	0.08	0.76	0.30
L. left	0.02	0.04	0.67	0.26	0.02	0.09	0.76	0.33
Mean DMFT	0.13	0.25	2.67	0.85	0.26	0.44	3.00	1.06
Mean DMFT for all permanent teeth	4.1				5.4			

Table 2.12

Number of subjects examined in 1961-63 and percentage of children in 1961-63 and in 1984 with no known caries experience in their deciduous teeth (5-year-olds) and in their permanent teeth (8-, 12- and 15-year-olds)

Age	*5-year-olds*				*8-year-olds*				*12-year-olds*				*15-year-olds*			
Health Board	*1961-63*		*1984*		*1961-63*		*1984*		*1961-63*		*1984*		*1961-63*		*1984*	
	n	*%*	*Full Fl %*	*Non Fl %*	*n*	*%*	*Full Fl %*	*Non Fl %*	*n*	*%*	*Full Fl %*	*Non Fl %*	*n*	*%*	*Full Fl %*	*Non Fl %*
Eastern	1,210	13	57	37	2,944	27	72	55	2,469	4	27	15	1,020	1	16	13
Midland	1,110	19	54	34	2,390	30	75	57	1,645	6	27	25	981	2	9	9
Mid-Western	981	12	45	36	1,856	31	60	47	1,804	5	18	10	1,083	2	4	5
North-Eastern	1,293	19	66	46	2,604	37	73	66	2,401	6	21	16	1,204	3	10	9
North-Western	1,024	21	52	40	1,923	40	60	59	1,904	9	21	16	1,026	4	17	6
South-Eastern	1,750	12	50	38	3,235	30	79	50	2,483	7	31	11	1,291	2	17	5
Southern	1,266	13	39	30	2,044	27	58	54	1,660	4	14	10	971	1	3	5
Western	1,119	19	59	47	2,177	40	76	60	1,924	10	27	18	1,126	3	14	8
All Health Boards	9,753	15	52	38	19,173	34	69	56	16,290	6	23	15	8,702	2	12	8

Grade 1: Discolouration without destruction of enamel believed to be caused by caries;
Grade 2: Pitting of enamel;
Grade 3: Deep pitting reaching into dentine;
Grade 4: Cavity into dentine;
Grade 5: Large cavity penetrating deeply into dentine, generally of a few years standing and with pulp involvement;
Grade 6: Cavity with definite and unmistakable evidence of periapical infection, fistula on buccal gingiva or possibly on palatal mucosa in case of upper molar involvement.

Grades 1 and 2 could not be estimated with assurance by the visual and tactile procedures and the estimate of Grade 3 was not deemed to be capable of accurate assessment within the survey procedure employed. Only lesions coming within Grades 4, 5 and 6 were recorded and this was done as one single group referred to as decayed, missing and filled teeth (dmft/DMFT). A standard system of recording was adopted to indicate teeth present, the extent of caries or filling in an affected tooth, teeth lost by reason of caries, and also those lost for other reasons. Up to the age of 5, it was assumed that any missing deciduous teeth were lost through caries. The reports of the 1961-63 survey state "it will be understood that the survey, in aiming at recording only such lesions as could reliably be established by this procedure, has not disclosed the maximum number of incipient lesions of the grades omitted which special examination techniques must otherwise have discovered. Consequently, it will be understood that the figures recorded must necessarily be an understatement of the incidence of the disease to be found in the school child population, of which the sample is representative".

The diagnostic criteria for caries used in this 1984 survey are clearly similar to grades 4, 5 and 6 in the pre-fluoridation baseline survey. A study which in fact assesses the comparability of the diagnostic criteria for caries used in the 1961-63 baseline survey and those used in the 1984 study was conducted in 1981.[6] A group of 45 children, aged 12-13 years with a high level of untreated caries, were examined by an examiner from the 1961-63 survey and an examiner from the International Collaborative Study, (ICS)[9] conducted in the Eastern Health Board Area in 1979-80; the same criteria were used for caries as in the present study. (In fact this latter examiner acted as roving epidemiologist in the 1984 survey). The mean DMFT was 2.5 for the baseline examiner and 3.1 for the ICS examiner. This result would suggest a slight underestimation of caries levels in the 1961-63 survey when compared with the 1984 survey.

The sampling procedure adopted in the 1961-63 survey was very similar to the 1984 survey (see 1.3.1). In both studies the sampling frame was based on the records of the Department of Education, the children examined being confined to those who were present in school on the day of examination. An important difference however is that in the case of the 1961-63 survey, the samples selected were representative of counties whereas samples representative of health boards were selected for the 1984 survey; this accounts for the extremely large number examined in the former study (Table 2.12). No specific lighting system was used in the 1961-63 survey; the recording teams were instructed to select an examination site making best use of the light sources available.

2.3.3 *Caries Levels in 1961-63 and in 1984*

The percentage of 5-year-old children with no caries in their deciduous teeth has increased from 15 per cent in 1961-63, to 52 per cent in lifetime residents of fluoridated communities in 1984 (Table 2.12).

There is also an increase in caries free 5-year-old children from non-fluoridated communities in 1984 to 38 per cent. The percentage of children with no caries in their permanent teeth also increased in both fluoridated and non-fluoridated groups. In 1961-63, these were 34 per cent, 6 per cent and 2 per cent in 8-, 12- and 15-year-olds respectively. In the "Full Fl" groups, the percentages caries free in these three age groups were 69 per cent, 23 per cent and 12 per cent respectively and in the "Non Fl" groups these figures were 56 per cent, 15 per cent and 8 per cent respectively. It is important to reemphasise that in the case of 8-year-olds, caries in deciduous teeth is not included; the percentages given in Table 2.12 for 8-year-olds relate to children who have no caries in their permanent teeth. The marked decline in the prevalence of caries between 1961-63 and 1984 is clearly illustrated also when the mean dmft/DMFT scores are compared (Table 2.13). For 5-year-old children the prevalence has declined by 68 per cent (5.6 compared with 1.8) in the "Full Fl" group and 46 per cent (5.6 compared with 3.0) in the "Non Fl" group. For permanent teeth, substantial reductions between 1961-63 and 1984 are also evident in 8-, 12- and 15-year-old children in both the "Full Fl" and the "Non Fl" groups.

2.4 Caries Levels in Subjects with Varying Exposure to Fluoridation and Fluorides

In all, seven subgroups with varying exposure to fluoride either in water supplies at home and/or at school, to fluoride tablets and/or to fluoride mouthrinsing were identified in this study. The numbers examined in the different subgroups and their average age on the day of examination were

Table 2.13

Mean number of decayed missing and filled teeth in 5-year-olds (dmft), 8-, 12- and 15-year-olds (DMFT) in 1961-63 and in 1984

Age	*5-year-olds*			*8-year-olds*			*12-year-olds*			*15-year-olds*		
Health Board	*1961-1963*	*1984*		*1961-1963*	*1984*		*1961-1963*	*1984*		*1961-1963*	*1984*	
		Full Fl	*Non Fl*		*Full Fl*	*Non Fl*		*Full Fl*	*Non Fl*		*Full Fl*	*Non Fl*
Eastern	5.6	1.3	2.9	2.0	0.5	1.0	5.2	2.2	3.4	8.8	3.7	4.8
Midland	5.2	1.9	3.0	1.6	0.5	0.9	4.6	2.5	2.5	8.0	3.5	3.9
Mid-Western	6.4	2.3	4.0	1.9	1.0	1.1	4.9	3.1	3.7	8.2	4.3	5.9
North-Eastern	5.0	1.0	2.1	1.5	0.5	0.6	4.3	2.3	2.8	7.7	4.1	5.2
North-Western	5.2	1.7	3.0	1.5	0.8	1.1	4.2	2.4	3.9	7.8	2.3	5.8
South-Eastern	6.3	1.9	2.8	1.8	0.4	1.2	5.2	2.2	3.5	8.9	4.0	5.6
Southern	6.4	2.5	4.0	1.9	0.9	1.0	5.4	3.3	4.1	9.5	5.4	6.8
Western	5.0	1.5	2.2	1.4	0.4	0.9	4.2	2.3	3.0	7.3	4.5	4.8
All Health Boards	5.6	1.8	3.0	1.7	0.6	1.0	4.7	2.6	3.3	8.2	4.1	5.4

already presented in Tables 1.1 and 1.2. The numbers examined in some of the subgroups are low, especially when looked at on a health board basis. It should also be noted that those included in the different smaller subgroups may not be fully representative of that group as a whole, since participating in a fluoride mouthrinsing programme for example was not included as one of the stratifying factors used to select the sample. The mean dmft/DMFT scores for males and females separately for all health boards combined are presented (Table 2.14). As in previous studies the overall level of caries in females tends to be higher than that in males.

Children whose only apparent exposure to fluoridated water was in the school they were attending at the time of the examination had dmft/DMFT levels very similar to those who had resided all their lives in a non-fluoridated community and who attended a school with a non-fluoridated water supply. While this result could be expected for 5-year-olds, since most of the subjects in this group would have been attending school for less than one year, the results for the older groups are not in line with previous studies which have investigated the effectiveness of school-fluoridation.[16] It should be borne in mind however that school lunches are rarely served in Irish schools, hence the contribution of fluoridated school water supplies to fluoride intake is likely to be less than in other countries. Also the level of fluoride in the water in specific school fluoridation programmes is generally higher than the 1 PPM permitted in Ireland in domestic water supplies.

The mean dmft for 5-year-old subjects whose sole apparent exposure to flouride was either by tablets or mouthrinses was similar at 3.1 and 3.2 respectively. This in turn was no different to that of children in the "Non Fl" group whose mean dmft was 3.0. For older children however, the mean DMFT was considerably lower in the "Rinse" group when compared with the "Tablet" group. Also for 8- and 12-year-olds, caries levels in the "Rinse" group and in the "Full Fl" group are similar. For all age groups, results for males and females are similar. These results confirm previous findings on the effectiveness of fluoride mouthrinsing in Irish school-children.[17]

The numbers included in the "Mixed" group are low and do not warrant detailed comment.

2.5 Treatment Need

Having examined each surface of each tooth the examiner recorded the need for treatment of each tooth. The costings shown in Table 2.15 are based on the current (1986) schedule of fees in the Social Welfare Dental Benefit Scheme.

Table 2.14

Mean dmft/DMFT per child for the different flouride subgroups

Age		5-year-olds			8-year-olds			12-year-olds			15-year-olds		
Fluoridation Status		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Full	*n*	439	430	869	407	490	897	308	441	749	138	264	402
	dmft/DMFT	1.9	1.7	1.8	0.6	0.6	0.6	2.6	2.6	2.6	4.0	4.1	4.0
Part	*n*	155	135	290	192	165	357	228	267	495	400	307	707
	dmft/DMFT	2.3	2.2	2.3	0.7	1.0	0.8	2.4	3.0	2.7	4.7	5.2	4.9
None	*n*	448	388	836	396	396	792	403	350	753	318	350	668
	dmft/DMFT	3.0	3.0	3.0	1.0	0.9	1.0	3.3	3.4	3.3	4.8	6.0	5.4
School	*n*	51	78	129	59	63	122	54	69	123	189	191	380
	dmft/DMFT	2.7	3.2	3.0	1.1	0.9	1.0	2.5	3.5	3.1	5.1	5.2	5.2
Tablets	*n*	37	44	81	43	44	87	37	37	74	23	35	58
	dmft/DMFT	2.5	3.6	3.1	0.6	1.0	0.8	3.2	3.7	3.5	6.2	6.6	6.4
Mouthrinse	*n*	39	35	74	41	46	87	46	67	113	70	72	142
	dmft/DMFT	3.6	2.7	3.2	0.8	0.4	0.6	1.9	2.8	2.5	4.9	6.0	5.5
Mixed	*n*	1	7	8	13	31	44	16	19	35	28	69	97
	dmft/DMFT	2.0	2.6	2.5	0.8	0.5	0.6	1.9	2.9	2.5	3.5	4.3	4.0

Table 2.15

Estimated mean cost of treatment in Irish pounds

Health Board	*5-year-olds*		*8-year-olds*		*12-year-olds*		*15-year-olds*	
	Full FI	*Non FI*	*Full FI*	*Non FI*	*Full FI*	*Non FI*	*Full FI*	*Non FI*
	IR£	*IR£*	*IR£*	*IR£*	*IR£*	*IR£*	*IR£*	*IR£*
Eastern	15.6	31.9	23.0	35.9	14.7	18.6	13.2	23.3
Midland	13.9	19.8	17.8	21.4	8.6	10.6	17.9	13.5
Mid-Western	17.0	21.6	22.1	22.1	21.0	19.1	16.8	29.7
North-Eastern	8.6	13.6	11.1	13.3	9.4	13.3	13.0	14.3
North-Western	13.1	20.5	21.5	28.7	9.5	19.2	9.5	25.7
South-Eastern	14.5	19.8	21.1	26.0	17.6	19.1	15.7	16.8
Southern	19.3	24.5	27.0	28.8	19.0	23.0	16.4	33.2
Western	12.6	16.8	18.9	25.6	8.8	16.3	16.9	26.4
All Health Boards	14.8	21.4	20.8	24.4	14.4	17.4	14.8	23.9

An examination fee of £5.10 for each subject is included in the costing. In this report the need for dentures, orthodontic treatment or periodontal treatment apart from extraction due to periodontal disease is not included in the costings. Depending on the number of surfaces involved for fillings or the need for a crown, codes were used to designate treatment required to remove carious lesions (primary or secondary), to repair trauma or replace unsatisfactory fillings in consideration of both function and aesthetics. In the case of pulp treatments (root fillings), a fee of £10.05 for three intra-oral radiographs was included in the costings. For 8-year-olds, cost of treatment of permanent teeth and of deciduous canines and molars is included.

For the country as a whole the average cost of treating 5-year-old lifetime residents of fluoridated communities was estimated to be £14.8 per capita compared with £21.4 per capita for lifetime residents of non-fluoridated communities, a difference of 31 per cent ($P<0.01$). The corresponding percentage differences for 8-, 12- and 15-year-old children are 15 per cent, 17 per cent and 38 per cent respectively; all these differences are statistically significant.

There is a wide variation between health boards in the cost of treatment. For example, in the case of 5-year-olds, the average cost of treatment per child in the non-fluoridated areas of the Eastern Health Board was £31.9, over twice the average cost of treatment of a child in a non-fluoridated area in the North-Eastern Health Board. (£13.60).

It is essential when interpreting these results to take account of the fact that the costings do not include the cost of treatment already provided (e.g. successful fillings). Hence the costings shown in Table 2.15 may be a reflection not only of the effectiveness of fluoridation for example, but also of the extent to which the treatment need is being met in the different age groups and health boards, and in fluoridated and non-fluoridated areas. In the case of caries, a reasonable measure of unmet need is the proportion of total dmft/DMFT attributable to d/D. There is a wide variation in this proportion between age groups, health boards and fluoridated and non-fluoridated communities. (Table 2.16 a, b, c, d.)

2.6 Enamel Opacities/Fluorosis

When using Dean's Index to assess the prevalence of fluorosis in 8- and 15-year-old children it was found that 94 per cent or more of subjects were regarded as having normal enamel i.e. no evidence of dental fluorosis. The remainder of the subjects showed some evidence principally of the questionable grade with only a small percentage showing the very mild or mild grades of fluorosis. (Table 2.17). There was no significant difference in the prevalence of fluor-

Table 2.16a

Dental Caries. 5-year-olds. The decayed (d), missing due to caries (m) and filled (f) components of mean dmft

	Full Fl				*Non Fl*			
Health Board	*d*	*m*	*f*	*dmft*	*d*	*m*	*f*	*dmft*
Eastern	1.0	0.3	0.0	1.3	2.6	0.2	0.1	2.9
Midland	1.6	0.2	0.1	1.9	2.5	0.4	0.1	3.0
Mid-Western	1.9	0.4	0.1	2.3	2.9	0.9	0.3	4.0
North-Eastern	0.6	0.2	0.3	1.0	1.7	0.3	0.2	2.1
North-Western	1.1	0.3	0.3	1.7	2.6	0.3	0.1	3.0
South-Eastern	1.8	0.1	0.0	1.9	2.6	0.0	0.2	2.8
Southern.	2.0	0.2	0.2	2.5	3.4	0.5	0.1	4.0
Western	1.1	0.3	0.1	1.5	2.0	0.1	0.1	2.2
All Health Boards	1.4	0.3	0.1	1.8	2.5	0.4	0.1	3.0
% of total dmft	78	17	5		83	13	4	

Table 2.16b

Dental Caries. 8-year-olds. The decayed (D), missing due to caries (M) and filled (F) components of mean DMFT

	Full Fl				*Non Fl*			
Health Board	*D*	*M*	*F*	*DMFT*	*D*	*M*	*F*	*DMFT*
Eastern	0.4	0.1	0.1	0.5	0.5	0.1	0.4	1.0
Midland	0.3	0.1	0.2	0.5	0.5	0.1	0.2	0.9
Midwest	0.6	0.1	0.3	1.0	0.5	0.1	0.5	1.1
North-Eastern	0.3	0.0	0.2	0.5	0.4	0.0	0.2	0.6
North-Western	0.5	0.0	0.3	0.8	1.0	0.1	0.0	1.1
South-Eastern	0.3	0.0	0.1	0.4	0.7	0.1	0.4	1.2
Southern	0.5	0.1	0.3	0.9	0.6	0.1	0.3	1.0
Western	0.2	0.0	0.1	0.4	0.4	0.1	0.3	0.9
All Health Boards	0.4	0.0	0.2	0.6	0.6	0.1	0.3	1.0
% of total DMFT	67	0	33		60	10	30	

Table 2.16c

Dental Caries. 12-year-olds. The decayed (D), missing due to caries (M) and filled (F) components of mean DMFT

Health Board	*Full FI*				*Non FI*			
	D	*M*	*F*	*DMFT*	*D*	*M*	*F*	*DMFT*
Eastern	0.6	0.2	1.3	2.2	0.9	0.4	2.1	3.4
Midland	0.3	0.3	1.9	2.5	0.6	0.6	1.3	2.5
Mid-Western	1.2	0.4	1.5	3.1	0.8	0.4	2.4	3.7
North-Eastern	0.5	0.3	1.5	2.3	1.0	0.5	1.3	2.8
North-Western	0.6	0.3	1.5	2.4	1.9	0.3	1.7	3.9
South-Eastern	0.6	0.5	1.1	2.2	1.1	0.7	1.8	3.5
Southern	0.6	0.4	2.3	3.3	1.0	0.5	2.6	4.1
Western	0.4	0.4	1.5	2.3	0.9	0.5	1.6	3.0
All Health Boards	0.6	0.4	1.6	2.6	0.9	0.5	1.9	3.3
% of total DMFT	23	15	62		27	15	58	

Table 2.16d

Dental Caries. 15-year-olds. The decayed (D), missing due to caries (M) and filled (F) components of mean DMFT

Health Board	*Full FI*				*Non FI*			
	D	*M*	*F*	*DMFT*	*D*	*M*	*F*	*DMFT*
Eastern	0.5	0.4	2.9	3.7	1.2	0.7	2.8	4.8
Midland	0.7	0.7	2.2	3.5	0.8	0.7	2.4	3.9
Mid-Western	1.0	0.4	3.0	4.3	1.7	1.0	3.2	5.9
North-Eastern	0.9	0.6	2.7	4.1	1.1	0.9	3.2	5.2
North-Western	0.5	0.8	1.5	2.3	1.1	0.9	3.8	5.8
South-Eastern	0.9	0.8	2.4	4.0	1.3	1.0	3.4	5.6
Southern	0.9	1.0	3.6	5.4	1.6	1.3	4.0	6.8
Western	1.0	0.9	2.6	4.5	1.5	0.9	2.5	4.8
All Health Boards	0.7	0.6	2.8	4.1	1.3	1.0	3.1	5.4
% of total DMFT	17	15	68		24	19	57	

Table 2.17

Percentage of 8- and 15-year-old children with different grades of dental flourosis (Dean's Index)

Age	Normal		Questionable		Very Mild		Mild	
	Non Fl	Full Fl	Non Fl	Full Fl	Non Fl	Full Fl	Non Fl	Full Fl
8 years	98.1	94.0	1.9	5.0	0	1.0	0	0
15 years	99.4	94.7	0.6	4.0	0	0.9	0	0.4

osis between subjects living in areas with no fluoridation and full fluoridation ($P>0.05$). The prevalence of fluorosis is less in this study than that reported recently by Driscoll et al. (1983)[19] and Segreto et al. (1984)[20] who also used Dean's Index in optimally fluoridated areas of the United States.

When using the DDE Index to determine the prevalence of enamel opacities/defects it was found that at least 52 per cent of 8-year-old children had at least one tooth with defective enamel. In this group at least 11 per cent of the teeth had defective enamel (Table 2.18).

There was no significant difference in the overall prevalence of enamel opacities/defect between subjects living in non-fluoridated and fluoridated areas. However there was a significant difference ($P<0.001$) in the prevalence of diffuse opacities (codes 1.3, 1.4, DDE Index) between subjects living in the two areas. For example 8.8 per cent of children in the "Non Fl" group had one or more teeth affected by white diffuse patchy opacities compared with 16.8 per cent in the "Full Fl" group. Diffuse opacities are similar in appearance to the questionable, very mild and mild scores for Dean's Index. Higher scores were obtained for diffuse opacities with the DDE Index as opposed to the scores recorded using Dean's Index both in non fluoridated and fluoridated areas. This probably is due to the fact that when using Dean's Index a positive diagnosis of fluorosis must be made before a score is given whereas with the DDE Index all opacities seen are recorded and no aetiology has to be assigned.

More children and fewer teeth were affected in 15-year-olds though the distribution of the different types of defects was similar to 8-year-olds (Table 2.19)

There was no significant difference ($P>0.05$) between fluoridated and non-fluoridated areas in the prevalence of opacities/defects on the labial surfaces of maxillary incisors both in 8-year-old and 15-year-old children (Table 2.20).

Table 2.18

Percentage of children (8-year-olds) and teeth affected by various types of opacities/ hypoplasia. (D.D.E. Index)

D.D.E. Code	*"Non Fl"*		*"Full Fl"*	
	Children	*Teeth*	*Children*	*Teeth*
White opacities				
Demarcated single	38.5	6.6	41.0	6.6
Demarcated multiple	7.2	1.0	7.8	1.3
Diffuse lines	3.8	0.7	7.2	1.6
Diffuse patchy	8.8	1.7	16.8	4.0
Yellow opacities				
Demarcated single	9.4	1.1	8.3	1.1
Demarcated multiple	1.1	0.1	1.1	0.1
Diffuse lines	0.0	0.0	0.0	0.0
Diffuse patchy	1.1	0.1	1.5	0.1
Hypoplasia				
Pits	2.4	0.2	1.1	0.1
Grooves horizontal	0.5	0.1	1.3	0.2
Grooves vertical	0.3	0.0	0.4	0.0
Missing enamel	2.1	0.2	1.5	0.1
Any Defect	52.4	11.2	56.0	14.8

This would indicate that enamel opacities due to ingestion of fluoride (fluorosis) are not a public health problem in Ireland. These levels of enamel opacities/defects are similar to those recently reported in New Zealand.[21]

From these results, the following conclusions may be drawn:

(a) The prevalence of enamel opacities/fluorosis is similar in children living in non-fluoridated and fluoridated areas.
(b) The prevalence of dental fluorosis is negligible in Ireland.
(c) Though the prevalence of diffuse opacities (DDE Index) is higher in children living in fluoridated as opposed to non-fluoridated areas, this cannot be regarded as representing a public health problem.

2.7 General Comment

In the past 20 years, there has been a major decline in the prevalence of caries in Irish schoolchildren. It is clear also from the results of this survey that this decline is greatest in younger children and in those who have been

Table 2.19

Percentage of children (15-year-olds) and teeth affected by various types of opacities/ hypoplasia (D.D.E. Index)

D.D.E. Code	*"Non FI"*		*"Full FI"*	
	Children	*Teeth*	*Children*	*Teeth*
White opacities				
Demarcated single	51.7	4.5	48.0	4.0
Demarcated multiple	9.6	0.5	10.0	0.5
Diffuse lines	3.5	0.3	7.8	0.6
Diffuse patchy	9.6	0.9	14.4	1.8
Yellow opacities				
Demarcated single	12.0	0.6	15.7	0.7
Demarcated multiple	1.16	0.0	1.7	0.1
Diffuse lines	0.0	0.0	0.0	0.0
Diffuse patchy	1.16	0.1	1.7	0.1
Hypoplasia				
Pits	6.4	0.3	6.1	0.6
Grooves horizontal	2.9	0.4	9.6	0.7
Grooves vertical	0.0	0.0	0.9	0.1
Missing enamel	2.9	0.1	3.5	0.2
Any Defect	63.0	7.5	63.0	9.0

Table 2.20

Percentage of 8- and 15-year-old children with labial surfaces of maxillary incisors affected by enamel opacities/hypoplasia (D.D.E. Index)

	8-year-olds			*15-year-olds*		
	Nil %	*Opacities* %	*Hypoplasia* %	*Nil* %	*Opacities* %	*Hypoplasia* %
No FI	71	28	1	70	26	4
Full FI	67	31	2	63	32	5

lifetime residents of a fluoridated community. Whilst the differences between caries levels in lifetime residents of fluoridated and non-fluoridated communities are statistically significant in each group examined, they are not as great as would be expected from other studies, particularly in older age groups.[22] A number of explanations can be postulated to explain this apparent reduced effectiveness. Firstly, it is clear that the 35 per cent of the population who reside in non-fluoridated communities in Ireland are sometimes exposed to the benefits of fluoridated water supplies. For example, many of the soft drinks consumed by children in non-fluoridated communities in Ireland are manufactured in towns and cities supplied with fluoridated water. Also many of these children spend part of their vacation and occasional weekends in fluoridated areas. Hence at this stage it is not feasible to isolate a true 'control' group of children in Ireland.

It could be argued that a reasonably valid control group are residents of Northern Ireland where the water supplies are not fluoridated and where, as in the Republic of Ireland, fluoride toothpastes were also introduced in the early 1970's. During 1963 a representative sample of schoolchildren in Belfast was examined for dental caries using criteria similar to those being used in the U.K. at the time[23] and similar to those adopted in the pre-fluoridation baseline surveys in the Republic of Ireland in 1961-63. In 1983 a survey of childrens dental health in the United Kingdom included examination of a representative sample of children in Northern Ireland.[24] The results of these various surveys for 8-, 12- and 15-year-olds are presented in Table 2.21.

In 1963 the mean DMFT was a little higher in Northern Ireland (Belfast) than it was in the Republic of Ireland in 1961-63, the figures for 8-year-olds for example being 2.0 as against 1.7. Even allowing for this slight discrepancy

Table 2.21

Dental caries experience in 8-, 12- and 15-year-old children in Northern Ireland in 1963 (Belfast) and in 1983, and in the Republic of Ireland in 1961-63 and in 1984.

Age	*Northern Ireland*		*Republic of Ireland*	
	Mean DMFT		*Mean DMFT*	
	1963	*1983*	*1961-63*	*1984 (full fl)*
8	2.0	1.5	1.7	0.6
12	5.5	4.4	4.7	2.6
15	9.4	8.5	8.2	4.1

at baseline the caries experience in 8-, 12- and 15-year-old residents in the Republic of Ireland in 1984 in fluoridated areas is considerably less than that in corresponding age groups in 1983 in Northern Ireland. For example, in the case of 15-year-olds the mean DMFT in the Republic of Ireland in 1984 was 4.1 in lifetime residents of fluoridated communities compared with a mean of 8.5 in Northern Ireland in 1983. It is possible that various sociological, dietary and other factors account for part of this difference of 52 per cent but it is reasonable to suggest that the major contributing factor is the fluoridation of the water supplies in the Republic of Ireland.

The general decline in the prevalence of dental caries in the past 20 years in children from all areas in Ireland could also be a contributing factor to the apparent reduced effectiveness of water fluoridation when expressed in percentage terms. It would seem reasonable to suggest that a preventive agent could be less effective when the condition being prevented is less prevalent. The general decline in the prevalence of dental caries in both fluoridated and non-fluoridated areas is also likely to be explained in part by the widespread use of fluoride toothpastes in Ireland. Though details of toothpaste usage by different population groups are not known, sales in 1981 amounted to 543,000 litres, which represented a 27 per cent increase in toothpaste sales per head of the population since 1971. As part of the survey, the parents of 8-year-old children, and 15-year-old children themselves, completed a questionnaire to ascertain their dental knowledge, attitudes and behaviour. It was found that 90 per cent of 8-year-olds and 84 per cent of 15-year-olds brushed their teeth at least once a day (Table 6.4). Obviously the majority would be using a fluoride toothpaste. Numerous studies have confirmed the effectiveness of fluoride toothpastes in the prevention of dental caries but few have estimated the extent to which the effects of both water fluoridation and fluoride toothpastes combined are additive.[16] What evidence there is suggests that the effectiveness of those two regimens combined, though mathematically predictable, is not fully additive,[25] which no doubt also contributes to the apparent reduced effectiveness of water fluoridation in the present study. It would seem important at this stage to establish the relative cost-effectiveness of the various methods of delivering fluoride to the community; this ratio has certainly altered in the past 20 years with apparent increase in costs (e.g., increased volume of water to be fluoridated not matched by an increase in the population size served) and an apparent reduced effectiveness as seen in this study.

Factors other than the increased availability of fluorides in the environment such as changing patterns of sugar consumption and of oral hygiene practices must also be taken into account when considering the decline in caries in the past 20 years. During the period 1962 to 1982 there has been a slight

increase in the overall consumption of sugar[26] although recent figures suggest that there has been a decrease in total sucrose consumption from 45.4 kg per person per year in 1976 to 40.6 kg per person per year in 1981 while at the same time glucose consumption has increased from 6.8 to 8.3 kg per person per year.[27] The extent to which the patterns of frequency of sugar intake have changed over the past 20 years is not known since no baseline figures are available. The relationship between reported snacking habits and DMFT levels was not clear cut in this study (see Table 6.3). However, this is not unexpected since current snacking habits may be quite different to those being practised during the initiation and progression of the carious lesions present in the mouth. Longitudinal studies to investigate the relationship currently existing between the frequency of sugar intake and the incidence of dental caries in children resident in fluoridated and non-fluoridated areas would seem appropriate at this time. In particular, the snacking habits and other relevant characteristics of those children who do not develop caries (e.g., 50 per cent of 5-year-olds) would also seem to be worthwhile at this stage and could lead to further improvement in the scientific development of dental health education.

No obvious explanation can be put forward to explain the wide variation in caries levels between health boards. Whilst some of this variation will be attributable to between-examiner variation, the results of the calibration studies prior to the commencement of the fieldwork and of the reproductibility and validation studies conducted during the fieldwork, indicate that examiner variability cannot account for the extent of the variation found. It is interesting that similar variation was evident in the 1961-63 survey. Also the ranking of health boards from the point of view of mean dmft/DMFT tends to be similar for 1961-63 and for 1984. For example, the Southern Health Board had the highest DMFT in 12- and 15-year-olds in 1961-63 and again in 1984. The large standard deviations associated with the mean dmft(s) and DMFT(S) scores would account to some extent for the high degree of variation. However, analysis of variance indicates that some of the larger differences between health boards are real. It is clear therefore that further investigation into the wide geographical variation in caries levels in Ireland is required.

The increased availability of fluoride in the environment in Ireland in the past 20 years[7] has without doubt been a major factor in the decline in the prevalence of caries. The extent to which this increased availability of fluoride results in an unacceptable increased intake of fluoride by individuals can be measured retrospectively by estimating levels of enamel opacities/fluorosis in different groups of children (Tables 2.17 to 2.20). The results of the present survey suggest that there is no excessive intake of fluoride by the

population of Ireland. However it would seem appropriate at this time, in order to be in a position to respond to international debate on this matter, to initiate longitudinal laboratory studies to measure daily fluoride intake in various groups of children. Urinary and blood levels of fluoride should be included in these studies.

In the diagnosis of dental disease radiographs were not used. It is important therefore, when interpreting the results of this survey, to make allowance for the fact that the level of dental disease particularly untreated interproximal caries is underestimated.

Whilst it would be desirable to report composite national mean dmft/DMFT for the four age groups included in this survey, a number of difficulties emerge when attempting to calculate such figures. In particular, since the total number of children countrywide in the seven fluoridation categories is not known (Table 2.14) the weight to be allocated to the mean dmft/DMFT scores obtained in each of these groups cannot be determined. Also the representativeness of the children selected in some of the smaller groups (e.g. "rinse") is unknown. If such problems are ignored the mean dmft for children in Ireland in 1984 whose average age was just less than 5 years was 2.5. The corresponding unweighted mean DMFT values for children aged 8, 12 and 15 years approximately were 0.8, 2.9 and 5.0 respectively.

Chapter 3

Periodontal Disease

3.1 Introduction

Over the past three to four years many reports of epidemiological surveys which have made use of the Community Periodontal Index of Treatment Needs (CPITN) have been published. The method of presenting the results has varied making it difficult to compare the findings of one study with another. A joint WHO/FDI working group discussed the current status of CPITN at a meeting in Prague in September 1985, during which this and other problems encountered when using the CPITN were discussed. It was agreed that whilst different researchers may wish to break down and present CPITN data in a different way, each survey report should include at least four basic sets of results. These are presented in this report.

3.2 Proportion of Population affected by Periodontal Disease

Of the 2,342 12-year-old dentate subjects assessed for periodontal disease, 1,130 or 48 per cent were recorded as healthy (H) having been allocated a maximum score of zero (Table 3.1), 26 per cent of this group had bleeding (B) or Code 1 as highest code, whilst 25 per cent had calculus or Code 2 as highest code. Pocketing was extremely rare in this group; only 8 (0.3 per cent) of the 2,342 examined having a highest code of 3 or shallow pocketing (P_1). Of the 2,454 15-year-olds assessed 43 per cent were regarded as periodontally healthy (Table 3.2) whilst 21 per cent were recorded as having bleeding on probing in one or more sextants. The percentage of 15-year-olds affected by supra- or subgingival calculus (35 per cent) was slightly higher than for 12-year-olds (25 per cent). Pocketing was also extremely rare in 15-year-olds, only 17 of the 2,454 (1 per cent) examined having a maximum score of 3 or shallow pocketing (P_1).

The variation between health boards in the percentages affected by the different conditions was extremely wide. For example, only 3 per cent of 12-year-olds (Table 3.1) were recorded as having bleeding as a maximum score in the Midland Health Board compared with 51 per cent in the Mid-Western Health Board. The percentage of 12-year-olds affected by supra- or subgingival calculus (C) was also lowest in the Midland Health Board, even though, with the exception of this health board, the percentages affected are reasonably consistent (range 19 per cent – 37 per cent). In the

Table 3.1

Community Periodontal Index of Treatment Needs (CPITN). The number and percentage of dentate subjects aged 12 in eight Health Boards with maximum score of H (healthy), B (bleeding), C (calculus), P_1 (shallow pocketing), or P_2 (deep pocketing)

Health Board	*H*		*B*		*C*		P_1		P_2		*Total*	
	No	*%*	*No*	*%*	*No*	*%*	*No*	*%*	*No*	*%*	*No*	*%*
Eastern	113	40	94	33	77	27	0	0	0	0	284	100
Midland	247	91	7	3	16	6	0	0	0	0	270	100
Mid-Western	36	13	141	51	97	35	0	0	0	0	274	100
North-Eastern	183	57	33	10	102	32	0	0	0	0	318	100
North-Western	179	66	25	9	66	24	2	1	0	0	272	100
South-Eastern	219	63	53	15	76	22	1	0	0	0	349	100
Southern	58	20	117	41	107	37	5	2	0	0	287	100
Western	95	33	139	48	54	19	0	0	0	0	288	100
All Health Boards	1130	48	609	26	595	25	8	0	0	0	2342	100

Table 3.2

Community Periodontal Index of Treatment Needs (CPITN). The number and percentage of dentate subjects aged 15 in eight Health Boards with maximum score of H (healthy), B (bleeding), C (calculus), P_1 (shallow pocketing) or P_2 (deep pocketing)

Health Board	*H*		*B*		*C*		P_1		P_2		*Total*	
	No	*%*	*No*	*%*	*No*	*%*	*No*	*%*	*No*	*%*	*No*	*%*
Eastern	119	38	105	34	87	28	0	0	0	0	311	100
Midland	232	68	42	12	63	18	4	1	0	0	341	100
Mid-Western	39	12	116	37	160	51	1	0	0	0	316	100
North-Eastern	194	57	14	4	130	38	0	0	0	0	338	100
North-Western	148	51	12	4	122	42	7	2	0	0	289	100
South-Eastern	193	62	34	11	84	27	0	0	0	0	311	100
Southern	57	18	108	35	139	45	5	2	0	0	309	100
Western	72	30	88	37	79	33	0	0	0	0	239	100
All Health Boards	1054	43	519	21	864	35	17	1	0	0	2454	100

case of 15-year-olds, the percentage given bleeding (B) as a highest score again varied widely (range 4 per cent – 37 per cent). As with 12-year-olds, the percentage affected by supra- or subgingival calculus was also lowest among 15-year-olds in the Midland Health Board (18 per cent). All examiners were consistent in recording an extremely low level of pocketing in both 12- and 15-year-olds. The variation in the levels of bleeding (B) and calculus (C) between health boards is likely to be due in large part to examiner variation. In the calibration exercises conducted prior to the fieldwork, a number of difficulties were encountered in the case of Codes 1 (B) and 2 (C) of the CPITN (Appendix B). In particular, the technique of allowing a number of examiners to examine the same child with a view to establishing inter-examiner reliability proved difficult since the periodontal tissues, once assessed using the periodontal probe, were inevitably altered for any subsequent assessment. Despite the wide variation found between health boards in the levels of bleeding and calculus, the figures for all health boards combined probably give a valid estimate of the treatment need for periodontal disease amongst 12-year-old and 15-year-old children in Ireland. The fact that this estimate lacks precision is probably a reflection of the somewhat subjective nature of the criteria used to measure levels of bleeding and, to a lesser extent, calculus using CPITN. It is clear also that the level of awareness of the presence of these conditions amongst the examining dentists varied considerably, no doubt reflecting the situation in real life amongst practising dentists.

In Table 3.3 the average number of sextants affected by the different codes is presented. As expected from Tables 3.1 and 3.2, the majority of sextants are clinically healthy.

3.3 Nature of Treatment Required

According to the CPITN the treatment required for the two age groups investigated in this study (Table 3.4) was confined to improvement in personal oral hygiene (TN1) (52 per cent of 12-year-olds and 57 per cent of 15-year-

Table 3.3

Community Periodontal Index of Treatment Needs (CPITN). Mean number of sextants per person affected by the different codes. 12- and 15-year-olds; all Health Boards combined. (X = excluded sextants)

Age Group	*H*	*B*	*C*	P_1	P_2	*X*
12	4.5	0.8	0.4	0.0	0.0	0.4
15	4.6	0.7	0.6	0.0	0.0	0.0

Table 3.4

Community Periodontal Index of Treatment Needs (CPITN). Percentage of subjects in the different categories of treatment need (TN) in 12- and 15-year-olds; all Health Boards

Age Group	*TN1*	*TN2*	*TN3*
	%	%	%
12	52	26	0
15	57	36	0

olds) and improvement in personal oral hygiene combined with scaling (TN2) (26 per cent of 12-year-olds and 36 per cent of 15-year-olds). Complex periodontal treatment (TN3) was not required in either age group.

The CPITN measures the treatment needs of the population by interpreting the highest scoring sextant of the six sextants as the treatment need for individuals. It is necessary however, to quantify the prevalence of periodontal disease by examining also the extent to which other sextants are affected. Tables 3.5 and 3.6 present the CPITN results in a manner which also shows the prevalence of the scores H, B, C, P_1, P_2 and X amongst the sextants, each score being considered by its frequency of occurrence. The minimum number of occurrences of any one score is 0 and the maximum number of occurrences is 6, i.e., when all sextants are affected by the code in question.

In Table 3.5 it is evident that the majority of 12-year-olds had little or no periodontal disease as assessed by the CPITN, therefore, it follows that treatment needs are low for this age group. Two per cent of 12-year-olds were in need of periodontal treatment for all sextants and 37 per cent required no treatment whatsoever, i.e. they had six healthy sextants. The overall severity of disease was mild, i.e. the most extensive treatment was scaling (judged by the presence of calculus) of four sextants for 1 per cent of 12-year-olds. However, it is important to note that three quarters (74 per cent) of 12-year-olds did not have any calculus and 61 per cent did not have any bleeding on probing in any sextant either. One per cent had gingival bleeding on probing in five of the six sextants. A high percentage of 12-year-olds had at least one sextant excluded (X) i.e., assessment of the gingiva could not be made because of the absence or state of eruption of index teeth or the presence of orthodontic bands; 20 per cent of children had at least one sextant excluded for such reasons.

Due to the increased age, it might be expected that the treatment needs for

Table 3.5

Community Periodontal Index of Treatment Needs (CPITN). Percentage of subjects having from 0 to 6 sextants scoring H, B, C, P_1, P_2 or X (excluded sextant) for 12-year-olds

Sextants	*H*	*B*	*C*	P_1	P_2	*X*
	%	%	%	%	%	%
0	2	61	74	100	100	80
1	4	16	17	0	0	9
2	8	11	6	0	0	6
3	12	6	2	0	0	2
4	17	3	1	0	0	2
5	20	1	0	0	0	0
6	37	0	0	0	0	0

15-year-old children would be greater than those for 12-year-olds. However, it can be seen in Table 3.6 that 1 per cent of 15-year-olds did not have any healthy (H) sextant and this percentage is similar in the 12-year-old group. A higher proportion of 15-year-olds have six healthy sextants, i.e. 41 per cent show no signs of disease; the lower percentage (37 per cent) in this cell in the 12-year-old group may be explained by the higher incidence of cancelled sextants (X) in the 12-year-old group, (20 per cent), as opposed to 3 per cent cancelled sextants in the 15-year-old group. A slight increase in severity is seen in the older age group in that 35 per cent of 15-year-olds had calculus

Table 3.6

Community Periodontal Index of Treatment Needs (CPITN). Percentage of subjects having from 0 to 6 sextants scoring H, B, C, P_1, P_2 or X (excluded sextant), for 15-year-olds

Sextants	*H*	*B*	*C*	P_1	P_2	*X*
	%	%	%	%	%	%
0	1	63	64	99	100	96
1	5	16	22	1	0	2
2	7	11	7	0	0	1
3	9	6	4	0	0	0
4	15	3	1	0	0	0
5	22	1	1	0	0	0
6	41	0	0	0	0	0

in at least one sextant whereas only 26 per cent of 12-year-olds had calculus. Interestingly, when calculus is present it is commonly present in one sextant only. Another indication of the trend towards an increasing treatment need in the 15-year-old group is the emergence of 1 per cent who have pocketing (P_1) less than 3.5 mm deep in at least one sextant.

A revealing feature of this type of analysis of the CPITN is that for both age groups, when a score is allocated to an individual i.e., the highest score in any sextant, in general only one or two sextants are affected by this score. Therefore, in relation to evaluation of time required to provide the treatment appropriate to this score, care must be taken not to overestimate the treatment need.

Few epidemiological studies using the CPITN have been conducted on children and adolescents. Assessments of periodontal treatment needs in subjects aged 7, 12 and 17 years in Espoo, Finland were included in a study of adolescents by Nordblad *et al* 1986.[28] Of the 12-year-olds, 2 per cent were given a code of 0, 74 per cent a code of 1, 23 per cent a code of 2 and 1 per cent a code of 3. The corresponding percentages for Ireland were 48 per cent, 26 per cent, 25 per cent and 0 per cent. Hence (Table 3.1), a quarter of both populations have supra/or subgingival calculus as a maximum score and few if any are affected by pocketing. Bleeding on gentle probing was considerably higher in the Finnish group. A national survey of periodontal treatment need in the Philippines included groups aged 15-19 years from various regions. Of the 616 subjects in this age group 87 per cent and 80 per cent were in TN1 and TN2 groups respectively, in comparison with Irish figures for 15-year-olds of 57 per cent and 36 per cent (Table 3.5).

Previous studies of periodontal disease in children and adolescents in Ireland are rare and the results are difficult to compare with the present study due to the fact that different indices of periodontal disease have been used.[29]

In general, therefore, it is reasonable to conclude that the bulk of the treatment need for periodontal disease in Irish schoolchildren is oral hygiene instruction, approximately 50 per cent of 12- and 15-year-olds requiring this form of care. Scaling of the teeth and oral hygiene instruction is required for one quarter of 12-year-olds and one third of 15-year-olds.

Chapter 4

Dentofacial Anomalies

4.1 Introduction

Dentofacial anomalies were recorded using the WHO method for measuring occlusal traits.[9] Information was recorded in two main categories; first, occlusal anomalies, covering inter-arch measurements such as anteroposterior molar relationships, overjet and overbite; second, space anomalies, covering intra-arch measurements such as crowding and spacing. Examinations were carried out for 12- and 15-year-olds. The number of students examined and the percentage of anomalies present by health board are presented in Tables 4.1 and 4.2.

4.2 Results – Occlusion

4.2.1 *Antero-posterior Molar Relationship*

Disto- or mesial-occlusion was found in 34.8 per cent of all 12-year-olds examined. (Table 4.1). Variation between health boards ranged from 48 per cent in the North-Western to 23 per cent in the Midland. For 15-year-olds, an average of 40.6 per cent was recorded for all health boards (Table 4.2). There was, however, a very wide range between health boards (55 per cent in the North-Western to 13.8 per cent in the Western Health Board).

4.2.2 *Posterior Cross-Bite*

As Table 4.1 shows, 14.0 per cent of 12-year-olds examined had a posterior cross-bite with a narrow range of 10.7 per cent to 18.1 per cent between health boards. For 15-year-olds (Table 4.2) results were very similar, with an average for health boards of 16.9 per cent.

4.2.3 *Posterior Open Bite*

Posterior open bite was found to be a comparatively rare occlusal anomaly, with an average for all health boards of only 4.5 per cent at age 12 (Table 4.1) and 4.9 per cent at age of 15 years (Table 4.2). There was some variation between health boards with a range of 1.6 to 9.4 per cent at age 12 and 1.2 to 8 per cent at age 15.

Table 4.1

Dentofacial Anomalies – Number and Percentage by Health Board – Age 12

Health Board	*n*	*OCCLUSION*						*SPACE*		
		Ant. Post. Molar Rel.	*Posterior Cross Bite*	*Posterior Open Bite*	*Midline Deviation*	*Overjet*	*Overbite*	*Crowding*	*Spacing*	*Diastema*
		%	%	%	%	%	%	%	%	%
Eastern	284	41.5	12.0	5.0	12.0	17.3	23.9	32.7	10.6	19.0
Midland	270	23.0	11.5	4.0	18.1	19.6	21.5	31.5	11.5	16.7
Mid-Western	274	32.1	14.2	4.0	32.8	13.9	8.0	29.9	24.5	21.5
North-Eastern	318	33.9	10.7	1.6	19.8	18.2	17.6	28.6	7.2	20.8
North-Western	273	48.0	11.0	2.2	3.7	27.8	13.6	37.7	18.3	16.8
South-Eastern	349	36.1	16.6	6.3	32.1	18.6	35.8	25.2	20.9	18.9
Southern	287	38.7	18.1	9.4	22.6	24.4	28.9	35.9	24.4	21.3
Western	288	25.0	18.0	3.5	7.3	11.5	14.2	27.8	4.9	6.9
All Health Boards	2343	34.8	14.0	4.5	18.9	18.9	20.9	30.9	15.3	17.8

Table 4.2

Dentofacial Anomalies – Number and Percentage by Health Board – Age 15

Health Board	*n*	*OCCLUSION*						*SPACE*		
		Ant. Post Molar Rel.	*Posterior Cross Bite*	*Posterior Open Bite*	*Midline Deviation*	*Overjet*	*Overbite*	*Crowding*	*Spacing*	*Distema*
		%	%	%	%	%	%	%	%	%
Eastern	311	43.4	17.7	7.0	13.2	13.2	16.0	22.5	14.8	18.6
Midland	341	36.7	18.5	6.7	18.2	17.0	15.8	29.9	19.1	11.1
Mid-Western	317	44.5	24.9	4.4	37.5	12.6	4.7	25.2	33.1	20.2
North-Eastern	338	31.1	9.8	1.2	21.7	15.4	18.9	17.2	9.8	18.9
North-Western	289	55.0	9.3	2.4	5.2	29.8	17.6	23.9	34.6	14.2
South-Eastern	311	44.4	20.3	8.0	28.6	11.6	31.8	14.1	26.0	20.2
Southern	309	52.1	18.8	6.5	22.3	15.2	25.6	22.0	30.4	18.4
Western	239	13.8	15.5	2.1	11.3	7.5	15.5	15.1	5.0	5.9
All Health Boards	2455	40.6	16.9	4.9	20.2	15.4	18.3	21.5	21.8	16.3

4.2.4 *Mid-line Deviation*
At age 12, mid-line deviation ranged from a high of 32.8 per cent in the Mid-Western Health Board (Table 4.1) to a low of 3.7 per cent in the North-Western. The average for all health boards was 18.9 per cent. Similar variation is found in 15-year-olds (Table 4.2) and the average for all health boards was 20.2 per cent.

4.2.5 *Overjet*
For all health boards the percentage of 12-year-olds affected by overjet was 18.9 per cent (Table 4.1) and 15.4 per cent for 15-year-olds (Table 4.2). At age 12, the variation between health boards ranged from 27.8 per cent in the North-Western to 11.5 per cent in the Western. At age 15, variation ranged between 29.8 per cent in the North-Western and a low of 7.5 per cent in the Western Health Board.

4.2.6 *Overbite*
Overbite was found in approximately 20 per cent of both 12- and 15-year-olds. Distribution between health boards was fairly even (Tables 4.1 and 4.2) with the exception of the Mid-Western Health Board where the prevalence of this condition was apparently below average and the South-Eastern Health Board where the prevalence was apparently above average.

4.3 Results – Space

4.3.1 *Crowding*
Together with anomalies relating to antero-posterior molar relationships crowding of teeth was the most common anomaly seen among children. It was found that 30.9 per cent of the 12-year-olds (Table 4.1) and 21.5 per cent of 15-year-olds had crowding. Variation between health boards was minimal at age 12; at age 15 it ranged from 14.1 per cent in the South-Eastern Health Board to 29.9 per cent in the Midland.

4.3.2 *Spacing*
The percentage of all 12-year-olds with a spacing anomaly was 15.3 per cent (Table 4.1) and 21.8 per cent for 15-year-olds (Table 4.2). Again, a considerable variation between health boards was found.

4.3.3 *Diastema*
The average for all health boards at age 12 was 17.8 per cent (Table 4.1) and 16.3 per cent at age 15 (Table 4.2). No recordings were made for diastemata for other positions in the dentition as their clinical significance is low.

The most commonly occurring anomalies of occlusion were irregularities in

antero-posterior molar relationships. This confirmed a similar finding in the WHO International Collaborative Study (1985).[9] Results for this present study however were lower with a national average of 34.8 per cent at age 12 and 40.6 per cent at 15 compared with 53.8 per cent recorded for 13-14-year-olds in the Eastern Health Board in the WHO study. Crowding was found to be the most common anomaly of space, and this again is largely in line with findings in the WHO study for the Eastern Health Board area. Variation in examiner diagnosis may contribute to the variation in diagnosis for all categories of dentofacial anomalies recorded between health boards, even though such discrepancies were not apparent in the calibration exercises.

4.4 Dentofacial Anomalies in Fluoridated and Non-Fluoridated Areas

It has often been suggested that the prevalence of dentofacial anomalies may be higher in fluoridated areas because of reduction in tooth loss. This was investigated by comparing 12- and 15-year-old lifetime residents of fluoridated areas with lifetime residents of non-fluoridated areas. Aggregate percentages for all health boards are presented in Table 4.3. It can be seen that apart from antero-posterior molar relationships and overjet only minor differences in prevalence exist for any of the anomalies recorded at either age between fluoridated and non-fluoridated areas in any of the health boards.

4.5 Orthodontic Treatment Needs

4.5.1 *Dental Examiners' Assessment of Treatment Need*

A decision concerning the need for orthodontic treatment depends largely on clinical judgement and is probably the most subjective dental assessment reported in the study. Because of this, no attempt was made to standardize decisions on orthondontic treatment needs between examiners. Examiners assessed treatment need on the basis of (a) no treatment needed, (b) treatment completed, (c) patient under treatment and (d) treatment required. This was assessed for both 12- and 15-year-olds.

For all health boards, 58.3 per cent of 12-year-olds and 62.5 per cent of 15-year-olds were diagnosed as not requiring orthodontic care (Tables 4.4 and 4.5). Variation in diagnosis between health boards was considerable.

An average of 33.2 per cent of 12-year-olds and 23.6 per cent of 15-year-olds were assessed as requiring orthodontic treatment. This treatment requirement was lower than the level recorded for 13 and 14-year-olds in Dublin in the WHO International Collaborative Study[9] (51.4 per cent) but was largely in line with findings from most of the other study areas in the WHO investigat-

Table 4.3

Dentofacial Anomalies in Fluoridated and Non-flouridated Areas (All Health Boards)

	12 year olds		*15 year olds*	
	Full FI (n = 749)	*Non FI (n = 754)*	*Full FI (n = 403)*	*Non FI (n = 666)*
	%	%	%	%
Antero-Post. Molar Relationship	36.8	33.2	43.2	34.1
Posterior Cross Bite	14.8	12.9	16.4	18.3
Posterior Open Bite	5.1	4.9	4.2	4.7
Midline Deviation	20.3	20.2	21.1	17.4
Overjet	20.6	18.0	18.4	11.1
Overbite	21.8	19.9	20.3	16.2
Crowding	33.5	29.6	22.3	19.5
Spacing	15.4	15.1	20.8	17.3
Diastema	18.0	17.6	18.1	15.8

ion. The percentage of those receiving orthodontic care was very low in all areas for both age groups. Only 5.9 per cent of 12-year-olds and 4.2 per cent of 15-year-olds for all health boards were receiving treatment. In the Southern Health Board only 3.1 per cent of 12-year-olds, and in the South-Eastern Health Board only 0.6 per cent of 15-year-olds were receiving care. Figures for treatment completed are also very low, with an average of only 2.6 per cent of 12-year-olds in all health boards and 9.7 per cent of 15-year-olds having had treatment completed. However, this very low level of treatment provision is not unusual when viewed from an international perspective. The figure from the International Collaborative Study[9] (1985) show similar low levels of orthodontic treatment being provided and completed.

4.5.2 *Assessment by Dentists of Treatment Need for Orthodontics and Student's Self-Assessment*

In the questionnaire which was completed by 15-year-olds in four health boards, students were asked to make an assessment of their need for orthodontic treatment. They were asked if (a) they considered their teeth were alright as they were; (b) they would prefer them straightened; or (c) did not

Table 4.4

Orthodontic Treatment Need
Number and Percentage by Health Board – Age 12

Health Board		*Not Needed*	*Treatment Needed*	*Under Treatment*	*Completed*
	n	%	%	%	%
Eastern	284	49.3	42.9	5.6	2.1
Midland	270	58.1	36.3	4.8	0.7
Mid-Western	274	64.9	29.2	3.6	2.1
North-Eastern	318	68.2	24.8	6.3	0.6
North-Western	273	46.9	39.6	12.5	1.1
South-Eastern	349	69.6	18.6	6.8	4.8
Southern	287	52.6	39.7	3.1	4.5
Western	288	52.4	39.2	4.5	3.8
All Health Boards	2343	58.3	33.2	5.9	2.6

Table 4.5

Orthodontic Treatment Need
Number and Percentage by Health Board – Age 15

Health Board		*Not Needed*	*Treatment Needed*	*Under Treatment*	*Completed*
	n	%	%	%	%
Eastern	311	45.0	35.4	7.0	12.5
Midland	341	63.3	29.3	1.5	5.8
Mid-Western	317	65.9	23.0	5.0	6.0
North-Eastern	338	75.4	13.1	5.3	5.9
North-Western	289	55.7	26.6	8.7	9.0
South-Eastern	311	70.4	11.9	0.6	17.0
Southern	309	58.6	27.8	3.6	10.0
Western	239	64.8	21.6	1.3	12.1
All Health Boards	2455	62.5	23.6	4.2	9.7

know. The results are presented in contingency tables (Tables 4.6, 4.7, 4.8, 4.9 and 4.10), where the student's perception of need is set beside the dental examiner's assessment.

In Table 4.6, the aggregate results are presented for all health boards. A total of 1178 students were examined and of these, 752 students thought their teeth were alright as they were. In 601 (79.9 per cent) of these cases the dental examiner *agreed* that no treatment was required, but felt treatment was required in 151 (20.1 per cent) cases. Three hundred and twenty four students felt that they would prefer to have their teeth straightened. The dental examiner disagreed with this assessment in 174 (53.7 per cent) cases

Table 4.6

Dentist's assessment/student's self assessment of orthodontic treatment needs (All Health Boards)

Dentist's perception of orthodontic treatment needed / *Student's perception alignment of teeth*	*Treatment not needed*	*Treatment needed*	*Total*
Alright as they are	601	151	752
Prefer straightened	174	150	324
Don't know	69	33	102
Total	844	334	1178

Table 4.7

Dentist's assessment/student's self assessment of orthodontic treatment needs (Eastern Health Board)

Dentist's perception of orthodontic treatment needed / *Student's perception alignment of teeth*	*Treatment not needed*	*Treatment needed*	*Total*
Alright as they are	132	53	185
Prefer straightened	47	37	84
Don't know	4	10	14
Total	183	100	283

Table 4.8

Dentist's assessment/student's self assessment of orthodontic treatment needs (Mid-Western Health Board)

Student's perception alignment of teeth / *Dentist's perception of orthodontic treatment needed*	*Treatment not needed*	*Treatment needed*	*Total*
Alright as they are	166	28	194
Prefer straightened	43	34	77
Don't know	27	10	37
Total	236	72	308

Table 4.9

Dentist's assessment/student's self assessment of orthodontic treatment needs (North Western Health Board)

Student's perception alignment of teeth / *Dentist's perception of orthodontic treatment needed*	*Treatment not needed*	*Treatment needed*	*Total*
Alright as they are	146	31	177
Prefer straightened	39	41	80
Don't know	23	5	28
Total	208	77	285

Table 4.10

Dentist's assessment/student's self assessment of orthodontic treatment needs (Southern Health Board)

Student's perception alignment of teeth / *Dentist's perception of orthodontic treatment needed*	*Treatment not needed*	*Treatment needed*	*Total*
Alright as they are	157	39	196
Prefer straightened	45	38	83
Don't know	15	8	23
Total	217	85	302

but agreed in 150 (46.3 per cent) cases. Of the 102 students who had no opinion on their orthodontic need, the dental examiner felt treatment was not required in 69 (67.6 per cent) cases and was required in the remaining 33 (32.4 per cent). If the dentists' perception of orthodontic requirements is examined, 334 students out of a total of 1178 were assessed as requiring orthodontic treatment. Of these, 151 (45 per cent) did not themselves feel any treatment was required, 150 (45 per cent) agreed and 33 (10 per cent) did not know. If the cases assessed by the dentist as *not* requiring treatment are examined, further substantial disagreement exists between the dentists' assessment and the students' self assessment. Out of a total of 844 15-year-olds assessed, 601 (71 per cent) agreed with that assessment but 174 students (20.6 per cent) felt they would prefer to have their teeth straightened. This pattern of disagreement is very similar throughout the four health boards examined (Tables 4.7, 4.8, 4.9 and 4.10).

It is clear from this section that considerable disagreement exists between the clinical assessment of orthodontic treatment required and the patient's self-assessment. This indicates that there is an urgent need to develop objective clinical criteria for estimating need for orthodontic treatment in population groups.

Chapter 5

Accidental Damage to Teeth

5.1 Introduction

During the dental examination, the examiners assessed each permanent incisor in 8-, 12- and 15-year-old children for evidence of accidental damage. For each incisor with evidence of such damage, the dentist recorded the type of damage sustained and any treatment which the child received for that damage. In this chapter, the prevalence of traumatic injury and the treatment provided is presented. Only children who at least had one erupted permanent incisor were included in the study.

5.2 Prevalence of Traumatic Injury

Table 5.1 shows the number and percentage of children who had sustained trauma presented by sex and age group for all health boards combined.

Generally, it can be seen that in the country as a whole the proportion of children with some accidental damage to teeth increases with age; from these figures the greatest increase appears to occur between the ages of 8 and 12 years. It is also notable that traumatic injury was far more common among boys than among girls.

Table 5.1

Number and Percentage of Children with at least one permanent incisor affected by trauma (by age and sex)

	Number examined		*Number with Trauma*		*% with injuries*		
Age	*M*	*F*	*M*	*F*	*M*	*F*	*M & F*
8	1148	1230	74	42	6.4	3.4	4.9
12	1091	1249	231	153	21.2	12.2	16.4
15	1166	1287	237	166	20.3	12.9	16.4

Similar trends were reported in the U.K.[24] and in a previous study in Ireland.[10] However, the prevalence of trauma reported in this present study tends to be consistently lower than that found for both males and females in the U.K. study. The difference was greatest for 15-year-old males with a prevalence of 33 per cent reported in the U.K. compared with 20.3 per cent in Ireland. Prevalence levels for males were very similar to those found in a representative sample of Cork City school-children in 1971[10] but levels for females were considerably lower at all ages in 1984.

It might be argued that many of the minor enamel fractures recorded are of little clinical significance from the point of view of the treatment required which may involve no more than trimming of enamel edges. It is of interest therefore to determine the prevalence of injuries that involve at least exposure of dentine and more severe injuries. These findings are presented in Table 5.2.

It can be seen that when fractures involving enamel only are excluded, 1.7 per cent of 8-year-olds, 6.4 per cent of 12-year-olds and 8.7 per cent of 15-year-olds have at least one permanent incisor affected by trauma. As in Table 5.1, the prevalence appears to increase up to the age of 12 years and then levels off. Results for 8- and 15-year-olds are very similar to those reported previously among Irish children,[30] but levels for 12-year-olds were lower in 1984.

5.3 Mean Number of Traumatized Teeth Per Child

In Table 5.3, the mean number of teeth affected among those showing evidence of trauma is presented; means per child are 1.2 at age 8 and 1.3 at age 12 and 15 years.

It is seen that the average child who has suffered some traumatic damage to his teeth will have between one and two traumatized incisors present, irrespective of age or type of damage sustained.

Table 5.2

Prevalence of trauma to permanent incisors (excluding discolouration and enamel fractures)

Age	*Number examined*	*Number with Trauma*	*% with injuries*
8	2378	41	1.7
12	2340	151	6.4
15	2453	214	8.7

Table 5.3

Mean number of permanent incisors affected among those showing evidence of trauma

Age	*Number with Trauma*	*Mean No. Teeth Affected*
8	116	1.2
12	384	1.3
15	403	1.3

5.4 Type of Accidental Injury and Treatment

The type of accidental damage recorded ranged from enamel fracture or discolouration to the actual loss of a tooth and the type of treatment recorded for traumatic injury ranged from minor restorations to the replacement of a missing tooth by a denture. Results are presented in Table 5.4 for all eight permanent incisors together and in Table 5.5 for upper permanent central incisors separately, these being most at risk to traumatic damage. The results are presented in terms of how many incisors there were in each category per thousand incisors seen by the examining dentist.

The prevalence of each type of damage was generally higher for each year of age except in the case of enamel fractures where the prevalence was lower in 15-year-olds compared with 12-year-olds (Tables 5.4 and 5.5). Similarly, the presence of each type of treatment for traumatic injury increased with age.

Table 5.4

Type of Accidental Injury Sustained per 1,000 Incisors (All permanent incisors)

	8 years	*12 years*	*15 years*
No Evidence	991.7	973.9	972.5
Discolouration	0	0.6	1.7
Fracture (Enamel)	5.4	15.7	12.6
Fracture (Enamel & Dentine)	1.7	4.6	4.7
Fracture (Involving Pulp)	0.1	0.6	1.1
Missing due to trauma	0.1	0.5	0.9
Acid Etch Restoration	1.0	3.3	4.3
Other Permanent Restoration	0	0.8	1.3
Denture Provided	0.1	0.1	0.9

Table 5.5

Type of Accidental Injury Sustained per 1,000 Incisors (Upper Central Incisors)

	8 years	*12 years*	*15 years*
No Evidence	975.7	923.5	928.5
Discolouration	0	2.4	4.5
Fracture (Enamel)	14.8	44.0	27.8
Fracture (Enamel & Dentine)	5.8	12.4	12.3
Fracture (involving Pulp)	0.4	2.1	3.1
Missing due to trauma	0.2	1.7	2.5
Acid Etch Restoration	2.9	11.3	14.3
Other Permanent Restoration	0	2.1	4.1
Denture Provided	0.2	0.4	3.1

Of the different types of damage sustained, the most commonly recorded was fracture involving enamel only. Among 12-year-olds for example, 15.7 per 1,000 of all incisors were recorded as having fractured enamel while 44.0 per 1,000 upper central incisors were injured in this way. As expected, compared with all incisors, the upper central incisors had suffered more damage in each of the recorded categories. Of the different types of treatment recorded, the most frequently completed were acid etch restorations, particularly on upper central incisors. For example, among 15-year-olds, per 1,000 upper central incisors examined, (Table 5.5) 14.3 acid etch restorations had been completed with 4.1 crowns and 3.1 dentures. For 15-year-olds, 71.7 teeth from each 1,000 upper permanent central incisors examined showed some evidence of trauma; 21.5 (30 per cent) of these teeth had been treated in some way (acid etch, other permanent restoration or denture). When discolouration injuries and enamel fractures are excluded, the percentage treated rises to 55 per cent.

5.5 Traumatic Injury and Overjet

A higher level of traumatic injury might be expected among children whose teeth protrude.[31] In this study protrusion was considered to be present when the overjet was in excess of 5mm. Only trauma of upper incisors in 12- and 15-year-olds is considered in this section.

A higher proportion of children with an increased overjet have traumatic injuries to their incisors compared with those who do not (Table 5.6).

Table 5.6

Traumatic Injury and Overjet (upper permanent central incisors)

Age	*No Overjet*			*Overjet*		
	No Trauma	*Trauma*	*%*	*No Trauma*	*Trauma*	*%*
12	1646	252	15.3	360	82	22.8
15	1812	265	14.6	304	72	23.6

Results are comparable to those reported previously when[31] it was found that 23.7 per cent of 11-/12-year-olds and 23.5 per cent of those aged 15 years and over with similar overjet showed evidence of trauma. Further analysis of the present results[32] shows that the severity of injury is not related to protrusion but that males with overjet are more susceptible to injury than females of the same age.

In order to prevent injuries to permanent incisor teeth, it has been suggested that protective mouthpieces be worn on specific occasions, i.e. when playing contact sports.[31] Ideally, preventive measures are best applied to the total population at risk while the risk is present. If this is impracticable, as in the case of injuries to permanent incisors, it is reasonable to isolate some of the factors that predispose to these injuries and to apply preventive measures only when and where they are most likely to be effective. These factors include protrusion of permanent incisors, lip incompetence, accident proneness and the playing of contact sports.[31]

Orthodontic treatment may have a role to play in the prevention of protrusive injuries even though the correction of protrusive malocclusions generally does not occur before the age of 12 years, and the incidence of traumatic injury usually reaches its peak by that age. However, the partial correction of overjet in the mixed dentition stage for the more severe cases (i.e. protrusion without lower lip protection), should be of value. Also the wearing of protective mouthguards when playing contact sports especially by those with increased overjet is likely to be effective in preventing a large number of traumatic injuries to teeth.

Chapter 6

The Relationship Between Sociological Variables and Dental Caries Levels

6.1 Introduction

The level of oral health in a population is a result of a complex combination of many variables. With a view to estimating the effect of sociological variables on oral health, parents of 8-year-old children and 15-year-old children themselves in the Eastern, Mid-Western, North-Western and Southern Health Boards were asked a series of questions (Appendices E and F).

Because of the very low levels of periodontal disease found in the groups included in this survey, it was decided to confine oral health in this section to dental caries. The results are presented in three sections:

- The relationship between mean DMFT and oral health knowledge, attitudes and behaviour and also perceived availability, accessability and acceptability of dental services presented;
- Demographic and sociological characteristics of 8- and 15-year-old children with low and high levels of caries are investigated. For this purpose, a logistic regression model was fitted to the data using demographic factors and responses to questions as independent variables and mean DMFT as the dependant variable;
- Finally, the extent to which different demographic and sociological variables are inter-related is presented. In this section an attempt is made to predict the responses to questions using one, two or all three of the following independent variables: sex, social status of the father and health board. Some respondents did not answer all the questions, hence there is some variation in the n values in the different tables.

6.2 Social Variables and Dental Caries Experience

6.2.1 *Oral Health Knowledge and Mean DMFT*

Parents of 8-year-old children and 15-year-old children themselves were presented with a number of statements concerning oral health. Whether the

respondent agreed or disagreed with a statement was an indication of their state of knowledge regarding factors affecting oral health. The statements were as follows (Appendices E and F):

1. A person should go to the dentist even when there seems to be no problems with the teeth or gums.
2. Drinking water which contains fluoride has no effect on the teeth.
3. Eating sweet foods and sweet drinks regularly can be harmful to a child's teeth.
4. Thorough toothbrushing with a toothpaste can reduce the chances of getting cavities in teeth.
5. Caring for the gums in childhood has little effect on gum disease later on.

Ninety two per cent of the parents of the 565 8-year-old males agreed with statement 1, 4 per cent disagreed and 4 per cent did not know. The mean DMFT of these groups were 0.9, 0.6 and 0.8 respectively (Table 6.1). The corresponding figures for females were similar. In the case of 15-year-olds, 79 per cent of the 1,173 who answered the question agreed with the statement, 13 per cent disagreed and 7 per cent did not know. The mean DMFT of the group agreeing with the statement was lower at 4.3 than for the other two groups which were 5.0 and 4.7 respectively. Statement 1 did not prove to be of much value in discriminating between parents or subjects with different levels of knowledge of oral health. This is especially true in the case of 8-year-olds since 93 per cent of the 1,105 parents agreed with the statement. Statements 3 and 4 also lacked discriminating power, close to 90 per cent or more agreeing with the statements. Hence the mean DMFT of those disagreeing or who did not know is based on a small number of subjects and must be interpreted with caution. Statements 2 and 5 did present a reasonable level of knowledge as evidenced by the percentage distribution of replies between the "agree", "disagree" and "don't know" groups. However, there is no evidence that a parent's/subject's knowledge of oral health matters had any effect on health outcome as measured by mean DMFT. There were no differences between males and females either in the percentages giving the different responses to the statements or in the mean DMFT of the groups. This similarity between males and females in the responses to the different questions was evident throughout, hence results for males and females will be combined for the remainder of this section except where important differences emerge.

6.2.2 *Attitudes to Oral Health and Mean DMFT*

Seventy two per cent of the parents of 8-year-olds replied that if their child had an aching back tooth, they would prefer to have it filled (Table 6.2) and

Table 6.1

Oral health knowledge and mean DMFT

		8-year-olds							15-year-olds						
			Agree		Disagree		Don't Know			Agree		Disagree		Don't Know	
		n	%	*DMFT*	%	*DMFT*	%	*DMFT*	*n*	%	*DMFT*	%	*DMFT*	%	*DMFT*
Statement 1:	*Male*	565	92	0.9	4	0.6	4	0.8	587	72	4.9	18	4.7	10	4.3
	Female	540	94	0.9	3	0.9	3	0.8	586	87	5.8	8	5.6	5	5.7
	Total	1,105	93	0.9	4	0.7	3	0.8	1,173	79	4.3	13	5.0	7	4.7
Statement 2:	*Male*	540	17	0.9	43	0.9	40	0.8	584	10	4.2	41	4.8	48	4.9
	Female	514	19	1.0	40	0.9	41	0.8	582	11	5.8	45	5.8	44	5.7
	Total	1,054	18	0.9	42	0.9	40	0.8	1,166	11	5.0	43	5.3	46	5.2
Statement 3:	*Male*	558	95	0.8	3	0.4	2	1.8	587	94	4.8	4	5.1	2	4.1
	Female	529	96	0.9	3	1.1	1	1.0	590	95	5.8	4	6.4	1	4.7
	Total	1,087	96	0.8	3	0.7	1	1.5	1,177	94	5.3	4	5.8	2	4.3
Statement 4:	*Male*	556	89	0.8	3	0.7	8	0.9	586	89	4.9	3	5.5	8	4.0
	Female	522	89	0.9	5	1.0	6	1.0	588	88	5.7	4	6.7	8	6.7
	Total	1,078	89	0.8	4	0.9	7	0.9	1,174	88	5.3	3	6.2	8	5.3
Statement 5:	*Male*	558	25	0.9	59	0.8	16	0.9	584	19	5.4	59	4.5	22	4.9
	Female	522	26	0.9	58	0.9	16	1.0	587	27	6.1	55	5.5	19	6.3
	Total	1,080	25	0.9	59	0.8	16	0.9	1,171	23	5.8	57	5.0	21	5.5

Table 6.2

Oral Health Attitudes and Mean DMFT: Preferences for Treatment of Aching Permanent Back or Front Tooth

	8-year-olds						*15-year-olds*					
	Fill			*Extract*			*Fill*			*Extract*		
	%	*DMFT*	*F/ DMFT*	*%*	*DMFT*	*F/ DMFT*	*%*	*DMFT*	*F/ DMFT*	*%*	*DMFT*	*F/ DMFT*
Back Tooth	72	0.9	0.3	24	1.0	0.2	56	5.2	0.7	44	5.4	0.5
Front Tooth	85	0.9	0.3	11	0.1	0.2	86	5.5	0.6	14	4.5	0.5

24 per cent would prefer to have it extracted. The remaining 4 per cent did not know which option they would choose. The mean DMFT in the groups opting for filling and extraction were very similar at 0.9 and 1.0. In the case of 15-year-olds, there was a surprising drop in the percentage opting for the filling of an aching back tooth when compared with the parents of 8-year-olds from 72 per cent to 56 per cent. Again the mean DMFT of the "Fill" and "Extract" groups were very similar 5.2 as against 5.4. The relationship between the option chosen and the pattern of treatment received is indicated by the proportion of the total mean DMFT that is attributable to fillings (F).[33] It would be expected that this proportion would be higher in the group who indicated they would opt for filling. In the case of 8-year-olds, the F/DMF ratios are very similar being 0.3 in the "Fill" group and 0.2 in the "Extract" group. For 15-year-olds, the proportion of the DMFT attributable to F is higher in the group opting for filling of an aching back tooth (0.7 versus 0.5).

The percentages opting for a conservative approach to the extraction of an aching front tooth were higher than for back teeth. This is especially true in the case of 15-year-olds where 86 per cent of this group opted for filling of an aching front tooth compared with 56 per cent of the same group when asked to choose treatment for an aching back tooth.

Attitudes to false teeth were also used to measure general attitudes to oral health. However 95 per cent or more in both age groups were of the opinion that natural teeth were better. The numbers in the remaining 5 per cent were not adequate to make reliable comparisons in mean DMFT. In the case of 8-year-olds, the relationship between the mother's and father's level of tooth loss and the children's mean DMFT was investigated. Fifteen per cent of

mothers were edentulous and the mean DMFT of their 8-year-old children was 1.2. The mean DMFT of the children of the remaining 85 per cent of mothers was also 1.2. Twelve per cent of the fathers were edentulous and the mean DMFT of this groups children was 1.0, the same as for the children of the remaining 88 per cent.

6.2.3 *Oral Health Behaviour and Mean DMFT*

The extent to which the parent's and subject's reported behaviour affected mean DMFT scores was measured using three variables: frequency of intake of sweet foods and snacks between meals (Table 6.3); frequency of toothbrushing (Table 6.4) and frequency of visits to the dentist and reasons for such visits (Table 6.5 and 6.6).

Fifty two per cent of the parents of the 1,123 8-year-old children claimed that their child had sweet foods or sweet drinks between meals no more than once a day, 38 per cent 2-3 times a day and 6 per cent 4 or more times. The mean DMFT for these three groups were very similar at 0.9, 0.9 and 1.0 respectively. For 15-year-olds, the mean DMFT at 5.0 was lower in the 35 per cent who claimed to have sweet foods and drinks between meals only once a day or never than in the remaining two groups for which the mean DMFT was 5.5.

A total of 1,086 parents of 8-year-olds responded to the question on frequency of toothbrushing (Table 6.4). Forty seven per cent claimed that their children brushed their teeth at least twice a day. Forty three per cent claimed that toothbrushing was done once a day. The remaining 10 per cent brushed less than once a day. The mean DMFT of these three groups was almost identical.

Similarly, in the case of 15-year-olds, frequency of toothbrushing is not related to mean DMFT.

Table 6.3

Oral health behaviour and mean DMFT: Frequency of snacks between meals

Frequency	*8-year-olds (n = 1, 123)*		*15-year-olds (n = 1, 036)*	
	%	*Mean DMFT*	*%*	*Mean DMFT*
Never/once a day	52	0.9	35	5.0
2-3 times a day	38	0.9	43	5.5
4 or more times a day	6	1.0	8	5.5

Table 6.4

Oral health behaviour and mean DMFT: Frequency of toothbrushing

Frequency	*8-year-olds (n = 1, 086)*		*15-year-olds (n = 1, 182)*	
	%	*Mean DMFT*	*%*	*Mean DMFT*
2 times a day or more	47	0.9	50	5.3
Once a day	43	0.9	34	5.3
Less than once a day	10	1.0	15	5.0

Table 6.5

Oral health behaviour and mean DMFT: Visits to the dentist

Last dental visit	*8-year-olds (n = 1, 092)*		*15-year-olds (n = 1,145)*	
	%	*Mean DMFT*	*%*	*Mean DMFT*
Within previous 6 months	38	1.1	34	6.0
Between 6-12 months	23	1.0	20	5.9
1-3 years ago	19	0.8	25	5.1
Primary school	–	–	18	4.2
Never	19	0.6	2	5.3

Of the 1,092 parents of 8-year-old children who answered the question regarding the child's last visit to the dentist, 38 per cent replied that they had made such a visit in the previous 12 months, and 23 per cent between the previous 6 and 12 months. Nineteen per cent claimed that their last visit was between one and three years ago and 19 per cent also claimed that their child had never visited a dentist. The mean DMFT tends to decline the less often the children visited the dentist. A number of explanations can be put forward to explain this phenomenon. For example, it could be claimed that children with a high caries rate are self-selected groups in that they tended to visit the dentist more often. Another explanation could be that children who visited the dentist more frequently were more likely to have had doubtful lesions filled, that is, lesions, about which it was difficult to decide

whether it had reached cavitation level or not, and which were excluded from the definitions of caries in this survey, would have a higher probability of being filled for children attending the dentist more often. The relative contribution of these two explanations to the fact that children who visit the dentist more often have a higher DMFT is difficult to assess. A similar phenomenon is evident in the case of 15-year-olds in that the 18 per cent whose last visit to the dentist was when they were in primary school (which would be at least two years previously) had the lowest DMFT level at 4.2. Again this group is probably self-selected for a number of reasons, some of which it could be hypothesised could have led to a lower caries experience at age 15 years.

6.2.4 *Availability of Dental Services and Mean DMFT*

Seventy eight per cent of the 1,039 parents of 8-year-olds who answered the question agreed with the statement "If my child has a toothache, there is a dentist available to treat him/her locally"; the mean DMFT of the children of these parents was 0.9 which was very similar to the mean DMFT (0.8) of the children of the parents who disagreed with the statement (Table 6.6). The breakdown of the components of the DMFT was also very similar. The percentages agreeing and disagreeing with statement 2 and the mean DMFT values and their components were almost identical to those for statement 1. Of the 999 parents who responded to statement 3 that there were enough dentists working locally, 54 per cent agreed and 36 per cent disagreed. The mean DMFT and the mean of its components was similar in both groups.

The responses of 15-year-olds to the three statements (Table 6.6) were very similar except that the percentages in the "Don't Know" group were generally greater and their mean DMFT tended to be less than for the other two groups. There were no significant differences in the proportion of the DMFT attributable to the decayed (D), missing (M) or filled (F) components. Availability of dental services as measured by the perceived waiting period for an appointment did not appear to be closely related to mean DMFT or the means of its components (Table 6.7) though in the case of 15-year-olds caries experience was somewhat higher (mean DMFT = 5.8) for the group who perceived the waiting period to be one week or less. Over 60 per cent of both the parents of 8-year-olds and 15-year-olds themselves perceived the waiting period for appointment to be four weeks or less.

6.2.5 *Accessibility of Dental Services and Mean DMFT*

Accessibility of dental services was measured by obtaining responses to three statements designed to measure perceived barriers to obtaining dental care. Whilst 72 per cent of the parents of 8-year-olds and 60 per cent of 15-year-olds agreed that finance was a barrier to obtaining dental care (statement 1), caries experience was no different from the groups who did not perceive

Table 6.6

Availability of dental services and mean DMFT: Responses to statements:
1. If in pain, there is a dentist to treat my child/me locally
2. If not in pain, there is a dentist to treat my child/me locally
3. There are enough dentists working locally

Statement	*Agree*					*Disagree*					*Don't know*				
	%	*D*	*M*	*F*	*DMFT*	*%*	*D*	*M*	*F*	*DMFT*	*%*	*D*	*M*	*F*	*DMFT*
								8-year-olds							
1 (n = 1,039)	78	0.5	0.1	0.3	0.9	18	0.5	0.1	0.2	0.8	4	0.8	0.0	0.3	1.1
2 (n = 973)	77	0.5	0.1	0.3	0.9	19	0.6	0.1	0.2	0.9	4	0.6	0.0	0.2	0.8
3 (n = 999)	54	0.5	0.1	0.3	0.9	36	0.5	0.0	0.3	0.8	10	0.6	0.0	0.2	0.8
								15-year-olds							
1 (n = 1,173)	79	1.2	0.9	3.3	5.4	14	1.2	0.8	2.9	5.0	8	1.5	0.6	2.6	4.7
2 (n = 1,164)	75	1.1	0.9	3.4	5.5	14	1.3	0.8	2.9	5.0	11	1.4	0.7	2.2	4.3
3 (n = 1,158)	55	1.0	0.9	3.4	5.3	28	1.3	1.0	3.2	5.6	17	1.3	0.6	2.8	4.8

Table 6.7

Availability of dental services and mean DMFT: Perceived waiting period for an appointment

Perceived waiting period	*8-year-olds (n = 1,108)*					*15-year-olds (n = 1,180)*				
	%	*D*	*M*	*F*	*DMFT*	*%*	*D*	*M*	*F*	*DMFT*
1 week or less	36	0.5	0.0	0.3	0.8	31	1.3	1.0	3.5	5.8
1 week to a month	31	0.5	0.1	0.3	0.8	33	0.9	0.8	3.5	5.2
1 – 6 months	11	0.7	0.0	0.2	0.9	8	0.9	0.8	3.4	5.1
Over 6 months	6	0.8	0.1	0.2	1.1	2	1.4	0.7	2.3	4.5
Don't know	15	0.6	0.1	0.1	0.9	26	1.5	0.8	2.5	4.9

such a barrier (Table 6.8). Similarly though between a half and one third of the respondents in the 8- and 15-year-old groups agreed that travelling to and waiting at the dentist and also availability of appointment were factors affecting their decision to visit the dentist, this perception had little or no effect on oral health outcome as measured by mean DMFT. The pattern of treatment received as measured by decayed (D), missing (M) and filled (F) components did not appear to be influenced by the respondents' perception of potential barriers to dental care.

Approximately 25 per cent of parents of respondents agreed with all three statements and 10 per cent disagreed. There was no difference in the mean DMFT of these two groups in either age group.

6.2.6 *Acceptability of Dental Services and Mean DMFT*

The perceived friendliness of dentists was used as a measure of acceptability of dental services. Of the 1,094 parents of 8-year-olds who responded to the question, 52 per cent claimed that their dentist was "very friendly" and 37 per cent opted for "reasonably friendly". Only 6 per cent found their dentist to be unfriendly (Table 6.9). A similar breakdown is evident in the responses from the 1,182 15-year-olds who answered the question. No apparent trend emerges in decay experience or its treatment in the different groups in either age group.

A further measure of acceptability of dental services is the extent to which fear of pain is perceived as a reason for not visiting the dentist.[9] Those subjects who had not been to the dentist in the previous 12 months were asked

Table 6.8

Accessibility of dental services and mean DMFT: Responses to statements:
You would attend the dentist more often if . . .
1. good dental care cost less
2. travelling to, and waiting at, the dentists took less time
3. an appointment could be obtained at a suitable time

Statement	*Agree*					*Disagree*					*Don't know*				
	%	*D*	*M*	*F*	*DMFT*	*%*	*D*	*M*	*F*	*DMFT*	*%*	*D*	*M*	*F*	*DMFT*
								8-year-olds							
1 (n = 863)	72	0.5	0.1	0.2	0.8	22	0.4	0.0	0.3	0.9	6	0.5	0.0	0.4	0.9
2 (n = 759)	59	0.5	0.1	0.3	0.8	36	0.5	0.0	0.3	0.8	4	0.4	0.0	0.4	0.7
3 (n = 821)	65	0.5	0.1	0.2	0.9	28	0.4	0.0	0.4	0.8	6	0.5	0.0	0.5	1.0
								15-year-olds							
1 (n = 1,127)	60	1.1	0.8	3.5	5.3	28	1.1	1.0	3.3	5.4	12	1.4	0.9	2.7	5.0
2 (n = 1,091)	51	1.2	0.8	3.2	5.2	41	1.1	1.0	3.5	5.6	8	1.2	0.9	2.7	5.0
3 (n = 1,109)	65	1.2	0.9	3.2	5.3	25	1.0	0.9	3.7	5.5	10	1.4	0.8	2.8	5.0

Table 6.9

Acceptability of dental services and mean DMFT: Perceived friendliness of dentists

	8-year-olds (n = 1,094)					*15-year-olds (n = 1,182)*				
	%	*D*	*M*	*F*	*DMFT*	*%*	*D*	*M*	*F*	*DMFT*
Very friendly	52	0.5	0.1	0.3	0.9	49	1.1	0.8	3.5	5.4
Reasonably friendly	37	0.6	0.1	0.2	0.8	39	1.2	0.9	3.2	5.3
A little or quite unfriendly	6	0.5	0.1	0.4	1.0	8	1.7	1.1	2.8	5.6
Don't know/no opinion	5	0.9	0.1	0.1	1.0	3	1.0	0.2	0.9	2.2

the best reasons for not doing so. In the case of 15-year-olds, the most common reason given for not attending (50 per cent) was that they perceived that they had no problem or need for treatment. The mean DMFT of that group was 4.5 which was slightly lower than the mean DMFT of the total sub-group who had not been to the dentist in the past 12 months (4.8). Fear of pain was the next most common reason given for not attending (10 per cent) and the mean DMFT for this group was 5.9, considerably higher than the group as a whole. It is interesting that only 3 per cent of parents of 8-year-olds gave fear of pain as the reason for their child not attending the dentist in the past 12 months.

6.2.7 *Social Class and Mean DMFT*

Using the father's occupation as the indicator of social class, it was found that social classes AB (professional, managerial) had a lower mean DMFT than classes DE (unskilled, unemployed) (Table 6.10). This gradient is particularly evident in the case of 15-year-olds; the mean DMFT for class AB was 4.5 compared with 5.6 for classes DE. Children of farmers (F) had the highest mean DMFT in 15-year-olds.

6.3 Sociological and Demographic Characteristics of Children with Low and High Levels of Dental Caries

6.3.1 *Introduction*

There is growing interest in the fact that whilst there is a major decline in the prevalence of dental caries in children in developed countries, a considerable number of children continue to experience high levels of caries. More detailed analysis of the data from this survey for example revealed that in the case

Table 6.10

Social class and mean DMFT

Social Class	*8-year-olds (n = 1,046)*		*15-year-olds (n = 1.105)*	
	%	*DMFT*	*%*	*DMFT*
AB	8	0.7	13	4.5
C_1	18	1.0	22	5.0
C_2	27	0.9	21	4.9
DE	28	0.9	17	5.6
F	19	0.9	27	5.9

of 15-year-olds, the frequency distribution for DMFT was bimodal with modes at 0-1 and 6.[34] Researchers in different countries are attempting to identify characteristics of these low and high risk groups with a view to predicting future levels of dental caries in groups and individuals. Such work if successful will be of considerable use to policy makers, since, for example, it would permit the high risk groups to be given priority for preventive dental services hence improving the cost-effectiveness of services. In this section social and demographic characteristics of children with low and high levels of dental caries are considered. Using stepwise logistic discriminant analysis, the 25 per cent of 15-year-old children with the lowest DMFT values ($\leqslant 3$) was contrasted with the 25 per cent with the highest DMFT levels ($\geqslant 3$) from the point of view of responses to the different sociological questions. Sex affiliation, health board and fluoridation status ("Full Fl" and "Non Fl") were included as demographic variables. The analysis was confined to 15-year-olds because of the more pronounced bimodal distribution of dental caries in this group.

6.3.2 *Profile of 15-Year-Old Children with Low and High Levels of Dental Caries*

The following list of seven characteristics, given in order of importance of their contribution to the total variance of the mean DMFT, best describes the profile of 15-year-old children with low and high levels of dental caries.

	Low DMFT	High DMFT
	The child . . .	The child . . .
1.	. . . had one visit the last time he/she went to the dentist	. . . had more than one visit the last time he/she went to the dentist
2.	. . . perceives his/her teeth to be healthy	. . . perceives his/her teeth to be unhealthy
3.	. . . is male	. . . is female
4.	. . . visited the dentist 1-5 times in last three years	. . . visited dentist 6 or more times in last three years
5.	. . . last visited the dentist when in primary school	. . . last visited the dentist within the last two years
6.	. . . has been a lifetime resident of a fluoridated community	. . . has been a lifetime resident of a non-fluoridated community
7.	. . . last visited the dentist for a check-up following a note from his/her dentist	. . . last visited the dentist because he/she had trouble with his/her teeth

This profile is interesting for many reasons. Factor 1 is to a large extent predictable in that at the last visit to the dentist a diagnosis of low treatment need was made and hence the low DMFT group had been previously selected by the response to this question. Tables 6.11 and 6.12 are presented to illustrate the nature of the results that emerge from the analysis undertaken. It is seen that for lifetime residents of a fluoridated community 74 per cent of the group with a low DMFT value required only one visit the last time they went to the dentist (Table 6.11). The corresponding figure in the high DMFT groups is considerably less at 31 per cent. There is some attenuation of this effect in the corresponding low and high DMFT groups from the non-fluoridated area, 67 per cent as against 42 per cent.

The ability of the second factor, the child's perception of its current state of dental health, to discriminate between subjects with low and high levels of dental caries is not as efficient as the first factor (Table 6.11). In the "Full Fl" group, 74 per cent of the low DMFT group rightly perceived their teeth to be good indicating that the discriminating power of this factor is equal to the first factor. For the high caries group however, the range of the percent-

Table 6.11

Profile (%) of 15-year-old children in "Full Fl" and Non Fl" areas in the Eastern, Mid-Western, North-Western and Southern Health Boards with low and high levels of dental caries.

1. Number of visits the last time he/she went to dentist
2. Perception of state of health of his/her teeth

Flouridation Status		*Low DMFT*	*Medium DMFT*	*High DMFT*
1. No. of visits				
		%	%	%
Full Fl	1	74	47	31
	1+	26	53	69
Non Fl	1	67	55	42
	1+	33	45	58
2. Perception of Dental Health				
Full Fl	Good	74	63	59
	Bad	26	37	41
Non Fl	Good	66	60	46
	Bad	34	40	54

ages falling into the good and the bad categories (59 per cent and 41 per cent) indicates that perception of dental health was very inaccurate for this group.

In Table 6.12 results for factors 4, 5 and 7 are presented. Twenty one per cent of the group wih a low level of dental caries in fluoridated areas had six or more visits to the dentist in the past three years, less than half the figure (44 per cent) in the high DMFT group. In the non-fluoridated area, 12 per cent of the low DMFT group had visited the dentist six or more times in the past three years compared with 33 per cent in the high group. It is noteworthy that the percentages claiming to have had no visit to the dentist in the past three years were considerably higher in the non-fluoridated group for low, medium and high DMFT groups. This could be related to the fact that a higher proportion of the "Full Fl" group resides in urban areas and perhaps reflects the pattern found in adults that attendance at the dentist in Ireland is more common in urban communities (30). This pattern also emerges when the period of time since the last visit to the dentist is considered (part 2 of Table 6.12) where the percentage who claimed they had not

Table 6.12

Profile (%) of 15-year-old children in "Full Fl" and "Non Fl" areas in the Eastern, Mid-Western, North-Western and Southern Health Boards with low and high levels of dental caries

4. Number of visits to dentist in past three years
5. How long since last visit to the dentist
7. Reasons for last visit to the dentist

Flouridation Status		*Low DMFT*	*Medium DMFT*	*High DMFT*
	4. No of visits	%	%	%
Full Fl	6 or more	21	29	44
	1 – 5	65	52	39
	None	14	19	17
Non Fl	6 or more	12	21	33
	1 – 5	55	52	42
	None	33	26	25
	5. Last visit			
Full Fl	0 – 12 months	61	60	70
	1 – 2 years	11	16	16
	3 years	16	9	11
	Primary School	12	14	3
Non Fl	0 – 12 months	37	50	63
	1 – 2 years	20	20	16
	3 years	9	10	6
	Primary School	34	20	15
	7. Reasons for last visit			
Full Fl	Trouble	28	44	38
	Note from Dentist	8	7	9
	Check-up	64	49	53
Non Fl	Trouble	40	39	49
	Note from Dentist	29	27	22
	Check-up	31	34	28

visited the dentist since they were in primary school is considerably higher in the nonfluoridated group. The ability of the period of time since the last visit to the dentist to discriminate between low and high caries children is seen primarily in the non-fluoridated group; 57 per cent (20 + 37) of the low DMFT group had visited the dentist in the past two years, whereas 79 per cent (63 + 16) of the high DMFT group had done so. The range of corresponding percentages in the "Full Fl" group was narrow, 72 per cent (61 + 11)

as against 86 per cent (70 + 16). Finally the reason for the last visit to the dentist, the seventh factor in the overall profile, is marginally effective in discriminating between low and high DMFT groups. In the "Full Fl" group the reason for their last visit was for a check-up or as a result of a note from the dentist for 72 per cent (64 + 8). In the high DMFT group this percentage was 62 per cent (53 + 9). The corresponding figures in the non-fluoridated areas were 60 per cent (31 + 29) and 50 per cent (28 + 22).

6.3.3 *Discussion*

When interpreting the results in this section it is important to emphasise that a number of the variables are confounded and in many instances it is difficult to separate them out. An important example of this confounding effect was found in the relationship between fluoridation status and levels of dental caries. It was found that fluoridation status and health board are confounded when related to DMFT scores. In other words, if fluoridation status were to be replaced with area of residence, the Eastern Health Board would be part of the profile of the low DMFT group and the Southern Health Board would be part of the high DMFT group, both again occupying position 6. The reason for this important confounding effect is partly explained by the fact that the proportion of total 15-year-olds in the "Full Fl" group is considerably greater in the Eastern Health Board than that in the other three health boards included in this analysis (Table 1.1). This in fact reflects the true state of affairs in that the percentage of the population in the Eastern Health Board area which is resident in a fluoridated community is over 90 per cent as compared with 66 per cent for the country as a whole. Because of the low level of caries in the Eastern Health Board in both fluoridated and non-fluoridated groups, residence in the health board area can be regarded as a predictor of low DMFT. High levels of caries in Southern Health Board groups also allows residence in this health board area to be used as a predictor of high DMFT.

The results presented in this and in the previous section are disappointing in that the instruments used to assess dental knowledge, attitude, and behaviour in this survey were not clearly related to dental caries experience as measured by total DMFT. These findings confirm those for 13-/14-year-olds in the International Collaborative Study for which it was concluded that "social, behavioural and attitudinal factors were of little importance in the overall DMFT".[9] In the International Collaborative Study a stepwise regression analysis similar to the present study was carried out using F/DMFT as the health outcome for the Irish sample (Eastern Health Board). The results were less successful than those found in the present study. Only 13 per cent of the total variance of F/DMFT in the Irish sample was explained

by the six variables included in the International Collaborative Study, whereas the characteristics included in the profiles reported here explained 35 per cent of the total variance. These different results suggest that further analysis of the present data could be worthwhile when attempting to explain the wide range of caries experience in different groups of Irish children.

6.4 Inter-Relationships Between Demographic and Sociological Variables

In this section, an attempt is made to establish if any relationship exists between demographic variables and the responses made to the different questions. Results will only be presented for questions where a clear trend emerges. The approach used to isolate the best predictors was to use a loglinear model with sex of the individual, social status of the father and health board of residence as the independent variables. In general, this model is efficient in that it highlights the more meaningful relationships. For both the 8-year-old and 15-year-old groups, the response to whether the parent/child would prefer to have a bad back or front tooth filled or extracted was best predicted by the social status of father. Ninety seven per cent of the parents of 8-year-olds in social class AB opted for filling compared with only 63 per cent of class DE. Seventy six per cent of the farming (F) group opted for filling. A similar social gradient was found in response to the option regarding a bad front tooth though the range 97 per cent to 82 per cent was not as wide. Social status was also a factor in the choice of options by the 15-year-olds, 68 per cent of class AB choosing filling compared with 51 per cent of class DE; the figure for the farming group was 49 per cent.

Dental behaviour as measured by frequency of sweet snacks between meals was not related to any of the three independent variables. In the case of social class for example, 64 per cent of class AB in the 15-year-old group claimed to have sweet foods and drinks between meals in comparison with 63 per cent in class DE. In the case of frequency of toothbrushing, there was considerable variation between the sexes and the four health boards (Table 6.13). Only 75 per cent of 15-year-old males brushed their teeth at least once a day compared with 95 per cent of females. In the Eastern Health Board, 94 per cent claimed to brush their teeth at least once a day compared with only 80 per cent in the Southern Health Board. It is worth noting that whilst no relationship was found between frequency of toothbrushing and mean DMFT, a greater percentage of children brush their teeth at least once a day in the health board with the lowest mean DMFT, the Eastern Health Board.

Another measure of dental behaviour was the length of time since the subject's last visit to the dentist for which social status was the best predictor

Table 6.13

Relationship between sex of the individual, health board of residence and frequency (%) of toothbrushing 15-year-olds

Frequency	*Sex*		*Health Board*			
	M	*F*	*East*	*West*	*North-W.*	*South*
	%	%	%	%	%	%
At least once a day	75	95	94	84	82	80
Less than once a day	25	5	6	16	18	20

(Table 6.14). For 8-year-olds, 71 per cent of class AB visited the dentist within the previous 12 months compared with only 52 per cent of group DE. The figures for 15-year-olds are very similar. This social gradient in dental attendance patterns mirrors that recorded for adults in 1979.[35]

Whether a subject visits a private dentist or a health board clinic is also strongly correlated with social class. In the case of 15-year-olds, when asked if their last visit to the dentist was to a private dentist or to the school clinic, 76 per cent in social class AB claimed it was to the former. The corresponding percentage for social class DE was 27 per cent with the remaining 73 per cent claiming that their last visit was to a school clinic. This breakdown perhaps reflects eligibility for dental services since 15-year-olds in social class AB would not normally be entitled to dental services from the health boards. This is supported by the previous finding that a high percentage of 15-year-olds in social class DE have not been to the dentist since they were in primary school.

Social class is also a good predictor of frequency of visits to the dentist. In the case of 15-year-olds, 44 per cent of class AB visited the dentist at least six times in the previous three years compared with 24 per cent of the DE group. The percentage of the latter group who had no visit in the previous three years or who did not know was 35 per cent whilst only 12 per cent of class AB fell into this category. These are interesting figures since they seem to conflict with earlier results where on the one hand frequency of visits to the dentist was positively related to mean DMFT and on the other hand social class AB was associated with a lower DMFT. This apparent conflict suggests that to interpret frequency of visits to the dentist with mean DMFT as a cause and effect relationship grossly oversimplifies this complex phenomenon.

Table 6.14

Relationship between social class and length of time since last visit to the dentist (%)

Social Class	*8-year-olds*			*15-year-olds*			
	Less than 1 year	*1 year or more*	*Total*	*Less than 1 year*	*1 year or more*	*Primary School*	*Total*
AB	71	29	100	75	13	12	100
C_1	74	26	100	62	15	23	100
C_2	61	39	100	54	18	28	100
DE	52	48	100	52	16	32	100
F	63	37	100	47	19	34	100

Chapter 7

General Conclusions

POLICY OPTIONS FOR DELIVERY OF DENTAL SERVICES

The Survey has shown clearly that there has been a significant decline in the prevalence of dental caries in Irish school children in the past 20 years. This decline is most marked in younger children and particularly in children who have been lifetime residents in a community served by fluoridated water. In the pre-fluoridation survey carried out in 1961-63, only 15 per cent of 5-year-olds were free of caries. In 1984, 38 per cent of 5-year-olds living in non-fluoridated areas and 52 per cent of 5-year olds living in fluoridated areas were caries-free. Among 8-year-olds examined in 1961-63, 34 per cent had no caries in their permanent teeth; the 1984 Survey found that 56 per cent of 8-year-olds living in non-fluoridated areas and 69 per cent of those living in fluoridated areas had no caries in their permanent teeth. In the pre-fluoridation survey, two per cent of 15-year-olds were caries-free while the 1984 Survey found that 8 per cent of 15-year-olds living in non-fluoridated areas and 12 per cent who lived in fluoridated areas were caries-free.

A comparison of levels of dental decay in Northern Ireland where public water supplies are not fluoridated and in the Republic of Ireland where 65 per cent of the population receive fluoridated water confirms that water fluoridation has made a major contribution to the reduced prevalence of dental caries in Republic of Ireland school children.

An increased occurrence of enamel opacities/fluorosis in children is an indicator of increased intake of fluoride. With this in mind the Survey examined the prevalence of enamel opacities/fluorosis in Irish school children and concluded that the prevalence of fluorosis is negligible in Ireland. It also found that the prevalence of enamel opacities and fluorosis was similar in children living in fluoridated areas and in non-fluoridated areas.

The decision taken in 1960 to introduce fluoridation of domestic piped water supplies in Ireland is clearly vindicated by the findings of this study.

The level of dental caries in 5-, 8-, 12- and 15-year-old children is substantially lower in those who have been lifetime residents of fluoridated communities than in other groups of children. The logistical problems encountered in adding fluoride to water supplies, such as the supply and distribution of fluosilicic acid have now been largely overcome, hence the benefits of fluoridation in the prevention of dental caries in Ireland are likely to be enhanced in future years. In comparing levels of dental caries in 1961-1963 with those in 1984 a dramatic decline is evident, this decline being greatest in younger children in fluoridated areas. However, a substantial decline was also found in children resident in non-fluoridated areas. A number of reasons can be put forward for this latter phenomenon. The introduction of fluoride toothpastes to Ireland in the early 1970's is likely to be an important factor. Also, the occasional exposure of children from non-fluoridated areas to the benefits of fluoridation through consumption of products made in fluoridated areas and through occasional visits to these areas is also likely to have made a contribution.

On the basis of the evidence presented in this report it is clear that the successes recorded in the prevention of dental caries in children over the past 20 years could be repeated if not surpassed in the next 20 years. For example, the fact that most of the dental caries in children up to the age of 15 years in Ireland in 1984 is confined to first permanent molars in both fluoridated and non-fluoridated areas has clear implications when choosing future preventive strategies. Clearly, the use of fissure sealants is an option to consider in this regard especially since up to 60 per cent of the total caries experience in permanent teeth in Irish children is contributed by first permanent molars and only occlusal surfaces are involved in 50 per cent of the first permanent molars affected by caries.[36] There is little doubt that a programme of sealing occlusal surfaces would be effective; the cost-effectiveness of such a programme, however, could be questioned for three main reasons:

1. Some of the sealed surfaces would not have decayed in the first place: the evidence presented in this study (Table 2.11) suggests that on average 3 out of 4 first permanent molars in residents of non-fluoridated communities have decayed by the age of 15 years; the corresponding average in fluoridated areas was 2.7. Further analysis of the data recorded in this study has also revealed that the distribution of dental caries in children is tending to become bimodal with a large proportion having little or no caries and a sizeable proportion continuing to have extensive caries. A major research priority at this stage is the isolation of the high risk caries group so that preventive measures such as fissure sealing can be especially applied to that group.

2. Some of the sealed surfaces would need to be included in the cavity design for interproximal caries. hence the effort of sealing is wasted. Again further analysis of the data could help in assessing the magnitude of this problem which is likely to be greater in residents of non-fluoridated communities.
3. The technique of fissure sealing though precise, is nevertheless fairly simple. It could be argued that dentists are overtrained for such a technique and that trained operating auxiliaries could carry out a public health programme of fissure sealing much more cost effectively than dentists. Clearly this task of fissure sealing should be included in future discussions on the introduction of new grades of auxiliaries in this country.

Field studies on fissure sealing and other preventive strategies in selected areas in Ireland designed to answer the queries raised above are a priority at this stage.

Evidence from this and other studies show that fluoride mouthrinsing is an effective alternative to water fluoridation in areas not served with fluoridated water. The combined use of fissure sealants and fluoride mouthrinsing in nonfluoridated areas would seem to have considerable merit. Again carefully designed field studies to measure the cost-effectiveness of this and other combinations of procedures are indicated at this stage.

There was no evidence of a clinical relationship between social, attitudinal and behavioural characteristics and dental caries levels. These findings support other studies, and perhaps indicate the inadequacies of cross-sectional designs when attempting to isolate a relationship between a cumulative condition such as dental caries and parameters that clearly change with time. Longitudinal studies are indicated if one is serious about establishing cause and effect relationships such as that between dietary patterns and dental caries.

The prevalence of periodontal disease in children up to the age of 15 in Ireland is very low. Whilst some problems were encountered in measuring the early stages of periodontal disease, that is gingivitis and calculus, there was general consensus amongst all the examiners that pathological pocketing was rare amongst Irish children, suggesting that improvement in personal oral hygiene and occasional scaling comprises almost the total treatment need for periodontal disease in children in this country. Employment of auxiliaries with a major role in dental health education could have a major impact in this regard and should be considered when debating the categories of dental auxiliaries to be introduced in this country.

Perhaps the most interesting result from an orthodontic point of view was the conflict between need for treatment as perceived by the patient and the dentist. This conflict was notable in those children who were regarded as needing orthodontic treatment by their dentist; a large proportion of these regarded their teeth as being 'alright as they are'. Considerable further work is required in designing realistic methods for measuring orthodontic treatment needs in population groups. The results of this study, though interesting in that it estimates the need as perceived by eight dentists currently practising in the health board dental service nevertheless gives little information on the nature and extent of the treatment required. Without this type of information, agencies responsible for funding an orthodontic service will be in the difficult position of not knowing the extent of the financial commitment required to provide a reasonable service.

Whilst the decline in dental caries in the last 20 years is welcome, the extent to which caries is being treated is less than satisfactory. Up to 80 per cent of the decay in deciduous teeth in 5-year-olds is untreated. In 12- and 15-year-olds the untreated figure is approximately 25 per cent. At this time when the resources available to health boards are scarce, a policy decision on the treatment of dental caries in deciduous teeth is required. For permanent teeth it is interesting that it would cost one million pounds to make all 12-year-olds in the state dentally fit, apart from orthodontic treatment. For this modest investment the state of oral health of children leaving the National School system in Ireland could be as good if not better than that of 12-year-olds in all other developed countries. The finding that many 15-year-olds who no longer have entitlement to public dental services do not seek further treatment privately is corroborated by studies in many other countries. It is clear that an extension of eligibility for dental services to adolescents would help to preserve the dental health status of this group into adulthood. Accidental injury of permanent incisor teeth continues to be a phenomenon experienced by about one in eight children in Ireland. Prevention in this case is difficult since the circumstances surrounding each accident are as varied as the activities young children engage in.[10] The fact that boys with prominent teeth are particularly at risk is of little help in formulating a preventive strategy. Clearly children with prominent permanent incisors should have orthodontic treatment for a number of reasons including the danger of accidental injury. The wearing of mouthguards by all persons engaged in organised contact sports irrespective of orthodontic status is to be encouraged.

The extent to which the decline in the prevalence of dental caries affects future treatment needs in adults is difficult to assess. A survey of adult dental health in Ireland is now a priority given the almost total absence of

adult dental data in Ireland. The aims of this survey must include assessment of the effectiveness of water fluoridation on adults and of the overall pattern of dental treatment needs of adults in Ireland. With regard to the latter, it is almost certain that the decline in dental caries in children and adolescents reported in this and other recent studies will affect dental treatment needs in the whole population. Evidence collected from other countries such as Norway which have experienced similar changes in dental caries in children suggests an overall reduction in dental treatment needs. The initial interpretation that these changes in children would result in a reduction in tooth loss and thereby increase the need for periodontal care in adults is now being questioned. Indeed recent data entering the W.H.O. dental data bank suggest a decline in the prevalence of periodontal disease in developed countries.

On the other hand other studies report an increase in the prevalence of periodontitis in middle and older age groups. Given the present low overall demand for dental care by adults in Ireland relative to other developed countries, it is not clear what impact any reduction in levels of dental need might have on future demand patterns.

The wide geographic variation in the level of dental caries in Ireland is worth noting. The lowest level was found in the Eastern side of the country, generally conforming to the pattern found in the 1961-63 survey. Elucidation of the factors responsible for this variation is important from the point of view of selecting future preventive strategies. Replication of the level of caries found in the Eastern side of the country on a country-wide basis would represent a further major overall reduction in dental caries levels.

Perhaps the most important policy decision that emerges from this survey is the need for regular monitoring of oral health status. The major changes recorded in children in Ireland in the past 20 years indicate clearly that changes having major policy implications can occur within a short period of time. It would be important to emphasise however that such monitoring does not require frequent national surveys of the extent reported here. Rather, each community care area through the Principal Dental Officer could arrange to conduct regular small 'pathfinder' surveys every five years using the same criteria as used in the present National Survey. Only caries, periodontal disease, enamel opacities and perhaps dentofacial anomalies would need to be monitored in this way. Approximately 100 children in age groups 5, 8, 12 and 15 years in each health board would be included. The small amount of data from these 3,200 children could be processed centrally and form the basis of a five yearly report on the dental health status of children in Ireland.

The data presented in this report point to one of the most outstanding success stories in the field of public health in Ireland. The decline in the prevalence of dental caries, following the introduction of fluoridation of water supplies in the mid 1960's and the introduction of fluoride toothpaste in the early 1970's has led to a high proportion of children in Ireland now having little or no dental decay. There are clear opportunities for further successes in the prevention of dental diseases in the next 20 years given modest resources to implement further preventive strategies.

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Appendix A

PERSONNEL

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* The members of the survey team wish to record their sorrow at the untimely death of Mr. Devey who played a major part in the planning and organisation of the survey. We extend our deepest sympathy to his widow and family.

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Appendix B

Calibration and Training of the Dentists and Recorders

An examining team consisting of a dentist and recorder was recruited from each of the eight health boards with one extra team from the Eastern and Southern Health Boards. Both teams from the Southern Health Board participated in the fieldwork in that Board and also acted as substitutes in case of illness or where a team fell behind schedule (in fact no such contingency arose). The extra team from the Eastern Health Board had extensive previous experience in dental epidemiology having acted as field workers in the International Collaborative Study.[9] (The dentist from the Mid-Western Health Board had also trained in the ICS methods). With a view to monitoring examiner agreement during the course of the fieldwork, the extra team from the Eastern Health Board acted as the "roving team" checking the diagnostic standards of the teams in each health board.

The initial training programme was conducted over a period of one week in December 1983 in the University Dental School, Cork, and in Farranree Primary and Secondary schools. Since none of the survey group had previous practical experience of the CPITN or the DDE Index it was decided to invite Dr. Ingolf Moller, Director, European Regional Office, W.H.O. to participate in this training session. At the outset the aims of the Survey were clearly outlined and the general principles of dental epidemiology were discussed. Examiners trained initially on themselves and their recorders after which children of different ages were examined in Farranree Schools. During the final day a trial calibration exercise was carried out during which 23 subjects were examined by each of the five dentists and by Dr. Moller. The inter-examiner reliability for caries proved very satisfactory from the outset both for the total dmft/DMFT and for the decayed (d/D) components. Some disagreement between Dr. Moller and the examiners and between the examiners themselves was evident in the case of both the DDE Index and the CPITN.

Following a two-month period during which the teams practised the examination methods, a further three-day calibration exercise was held in the same venues one week prior to the commencement of the fieldwork. During this programme the exact procedures which were to be followed

during the fieldwork were rehearsed. For the final calibration exercise particular attention was paid to the CPITN and the DDE Index. In the case of the latter, twenty patients who had been attending the Children's Clinic in the Cork Dental School and who had various levels of enamel opacities were examined by each of the examiners from the Eastern, Mid-Western, North-Western and Southern Health Boards, the areas selected for inclusion in this part of the clinical examination. The results for dental caries were very satisfactory. Correlation co-efficients for total dmft/DMFT scores and for the decayed (d/D) components were greater in all cases than 0.95 when the scores allocated to the same subjects by one of the two ICS trained examiners were compared with other examiners.

Agreement between examiners in the diagnosis of enamel opacities also proved generally satisfactory. No standard method of measuring inter-examiner reliability in the use of the DDE Index has been established to date. For this reason the maximum scores for "type" and "number" of opacities allocated to the nine subjects by the four examiners during the final calibration session are given in Table 1 of Appendix B. The scores are given separately for all surfaces and for the labial surfaces of maxillary incisors. This breakdown is given in order to take account of the results presented in Tables 2.18, 2.19 and 2.20. In the case of subject 1, for example, all four examiners agreed that at least one surface had an enamel opacity. Examiners A, B and C agreed that the maximum code for type of defect was 1 (white/cream) whereas Examiner D gave a maximum type code of 2 (yellow/brown). The maximum code given for number of defect was 1 according to examiners A, C and D. All four examiners were in agreement on the maximum codes allocated to the labial surfaces of the maxillary incisors of Subject 1. In general the overall level of agreement between examiners was good apart from subject seven who was examined by three examiners.

As with the DDE Index, little information is available on methods of measuring inter-examiner reliability when using the CPITN. In fact calibration of the examiners when using the CPITN proved difficult especially in the case of codes 1 and 2. For example, the technique of allowing a number of examiners to examine the same child with a view to establishing inter-examiner reliability was unreliable since the periodontal tissues, once assessed using the periodontal probe, were inevitably altered for any subsequent assessment. The results of the calibration exercises for some of the 15-year-olds on whom periodontal treatment needs were assessed are seen in Table 2, Appendix B.

To help read this table, the allocation of CPITN codes for subject 8 will be described in detail. Subject 8 was examined by five examiners i.e., examiners

numbered B, C, D, F and H. For this subject, examiner B gave four sextants a code of 0, two sextants a code of 1, and zero sextants a code of 2. Examiner C gave five sextants a code of 0, zero sextants a code of 1 and one sextant a code of 2. Examiner D gave five sextants a code of 0, one sextant a code of 1 and zero sextants a code of 2. Examiners F and H gave three sextants each a code of 0 and three sextants each a code of 1.

A number of noteworthy points emerged from the calibration exercise for the CPITN. Firstly the range of pathology present in the group of 15-year-olds was very limited and provided a restricted training opportunity. For all ten clinical examiners this was the first occasion on which they had used the CPITN. In retrospect it would perhaps have been better if examiners participating in large scale surveys of children had gained some experience initially in using the CPITN on adults.

Evidence that examiners were interpreting the CPITN criteria differently also became apparent. For example, examiner J was one of the two examiners with extensive previous experience in dental epidemiology. Examiner I also seemed to score lower than the other examiners when calibration was carried out. Disagreement between examiners on the allocation of codes as between 0, 1 and 2 are seen to be frequent.

The between-examiner agreement during the course of the field work was monitored by the 'roving team' who carried out duplicate examinations with teams in each of the 8 health boards. In all 136 subjects were examined by the 'roving examiner' and agreement was generally satisfactory but especially in the case of dental caries. However, in the case of codes 1 and 2 of the CPITN wide differences were evident.

The within-examiner agreement during the course of the field work was monitored through each examiner carrying out regular duplicate examinations. In all 268 such examinations were carried out. The level of agreement was again generally high especially in the case of dental caries where over 95% of the dmft/DMFT scores allocated to individual subjects were the same for original and duplicate examinations and the mean original and duplicate dmft/DMFT values were identical (3.35 as against 3.35). In the case of the CPITN the highest score allocated to a subject was the same in original and duplicate examinations in 77% of cases for all examiners combined. For individual examiners this figure was over 60% for 8 out of the 9 teams. For the remaining team agreement on the highest CPITN score was low at 33%.

Table 1 – Appendix B

Calibration of the Dental Examiners: The allocation of maximum codes of the DDE Index by different examiners to 9 different subjects.

X = All surfaces
T = Type of opacity
Y = Labial surfaces of maxillary incisors
N = Number of opacities

Subject		EXAMINER A		B		C		D	
		T	N	T	N	T	N	T	N
1.	X	1	1	1	2	1	1	2	1
	Y	1	1	1	1	1	1	1	1
2.	X	0	0	0	0	0	0	0	0
	Y	0	0	0	0	0	0	0	0
3.	X	1	1	0	0	0	0	0	0
	Y	0	0	0	0	0	0	0	0
4.	X	2	1	0	0	2	1	2	1
	Y	0	0	0	0	0	0	0	0
5.	X	1	4	1	3	1	4	1	3
	Y	1	4	1	3	1	4	1	3
6.	X	0	0	0	0	0	0	0	0
	Y	0	0	0	0	0	0	0	0
7.	X	–	–	3	3	1	3	0	0
	Y	–	–	3	3	1	3	–	–
8.	X	1	4	1	3	–	–	1	4
	Y	1	4	1	3	–	–	1	4
9.	X	0	0	0	0	0	0	0	0
	Y	0	0	0	0	0	0	0	0

Table 2 – Appendix B

Calibration of Dental Examiners:
The Allocation of CPITN codes by Different Examiners to Different Subjects

		Number of sextants given this code									
Subject	*CPITN Code*	*Examiner*									
		A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
1	0	6	–	–	–	6	–	6	–	6	4
	1	0	–	–	–	0	–	0	–	0	2
2	0	5	–	–	–	5	–	6	–	6	6
	1	0	–	–	–	0	–	0	–	0	0
	2	1	–	–	–	1	–	0	–	0	0
3	0	6	–	–	–	6	–	5	–	6	2
	1	0	–	–	–	0	–	1	–	0	4
4	0	6	–	–	–	6	–	5	–	6	3
	1	0	–	–	–	0	–	1	–	0	3
5	0	6	–	–	–	6	–	6	–	6	4
	1	0	–	–	–	0	–	0	–	0	2
6	0	–	6	6	5	–	4	–	3	–	–
	1	–	0	0	1	–	2	–	3	–	–
7	0	–	5	6	6	–	6	–	6	–	–
	1	–	1	0	0	–	0	–	0	–	–
8	0	–	4	5	5	–	3	–	3	–	–
	1	–	2	0	1	–	3	–	3	–	–
	2	–	0	1	0	–	0	–	0	–	–
9	0	–	5	4	5	–	2	–	1	–	–
	1	–	1	0	0	–	1	–	5	–	–
	2	–	0	2	1	–	3	–	0	–	–
10	0	–	5	6	5	–	5	–	5	–	–
	1	–	1	0	1	–	1	–	1	–	–
11	0	–	5	6	6	–	6	–	5	–	–
	1	–	1	0	0	–	0	–	1	–	–

Table 2 – Appendix B (Continued)

Subject	CPITN Code	Number of sextants given this code									
		Examiner									
		A	B	C	D	E	F	G	H	I	J
12	0	6	–	–	–	–	3	6	–	–	–
	1	0	–	–	–	–	1	0	–	–	–
	2	0	–	–	–	–	2	0	–	–	–
13	0	6	–	–	–	–	5	–	–	6	–
	1	0	–	–	–	–	1	–	–	0	–
14	0	6	–	–	–	–	6	–	–	6	–
15	0	–	–	–	–	6	–	6	–	6	–
16	0	–	–	–	–	6	3	5	–	–	–
	1	–	–	–	–	0	2	0	–	–	–
	2	–	–	–	–	0	1	1	–	–	–
17	0	–	4	–	–	–	–	–	4	–	3
	1	–	2	–	–	–	–	–	2	–	3
18	0	–	5	6	–	–	–	–	2	–	–
	1	–	1	0	–	–	–	–	4	–	–
19	0	–	–	6	–	–	–	–	4	–	–
	1	–	–	0	–	–	–	–	2	–	–
20	0	–	–	6	5	–	–	–	–	–	–
	1	–	–	0	1	–	–	–	–	–	–
21	0	–	–	–	5	–	–	–	–	–	1
	1	–	–	–	0	–	–	–	–	–	2
	2	–	–	–	1	–	–	–	–	–	3
22	0	–	5	–	5	–	–	–	–	–	2
	1	–	1	–	1	–	–	–	–	–	3
	2	–	0	–	0	–	–	–	–	–	1

Appendix C

Instructions to Dental Examiners and Recorders

CRITERIA FOR THE ASSESSMENTS

A specimen of the Clinical Record Chart is given in Appendix D.

C.1 **Demographic Variables**

Code from Consent Form

Name and Address

Subject Number:	Must be completed before examination commences:
Box 1 =	Health Board Number
Box 2 =	Age Grouping (1 = infant, 2 = 2nd, 3 = 6th 4 = Inter. Cert.)
Boxes 3, 4 & 5 =	Subject Number. A different 3 digit number must be allocated to each subject in the 4 age groupings. Start at 001 for each age grouping. Substitute examiners must liaise with resident examiners to ensure that each subject is given a discrete number.

It is essential that the subject number also be filled in on top of pages 2 and 3 of the examination chart.

Examiner Number:	Fill in number allocated to you.
School Number:	This number will be communicated to you with the list of schools.
Sex:	Code 1 for Males Code 2 for Females.

Flouride Mouthrinse:	Code 0 if the child *has never* participated in a school fluoride mouthrinse scheme.
	Code 1 if the child *has* participated in a fluoride mouthrinse scheme.
Flouride Tablets:	Code 0 if the child *has never* taken a course of fluoride tablets.
	Code 1 if the child *has* taken a course of flouride tablets
County (Residence):	Each county has been given a code. Enter code of county of *residence.*
Age:	Ask child "How old are you?" Enter reply (e.g. '8 years' = 08, '12 years' = 12)
Date of Birth:	Enter as shown on consent form.
Date of Examination:	Enter date.

C.2 **Dentofacial Anomalies (12- and 15-Year-Olds)**

The conditions listed under space and occlusion anomalies are scored.

0 – absent

1 – present

according to the following criteria:

A. *Occlusion*

Antero-posterior Molar Relationship – when there is either disto-occlusion or mesio-occlusion, at least to a cusp to cusp molar relationship.

Posterior Cross Bite – when either the buccal cusp of a lower tooth lies lingual to the maximum height of a lingual cusp of an opposing upper tooth or buccal to the maximum height of a buccal cusp of an opposing upper tooth.

Posterior Open Bite – when, by direct inspection of lateral segments of both sides of the mouth with the subject in centric occlusion, there is a visible space between the teeth.

Midline Deviation – when there is a midline deviation of more than 2mm.

Overjet – if there is an overjet of 5.5mm. This can be measured with the periodontal probe (from the tip to the end of the black band = 5.5mm).

Overbite – when there is more than 2/3 overlap of the opposing teeth in a vertical sense.

B. *Space*

Crowding – when the examiner estimates that there is a shortage of at least 2mm of space preventing the correct alignment of the teeth.

Spacing – when the examiner estimates that there is an excess of at least 2mm beyond that required for correct alignment of the teeth.

Diastema – when there is no contact point between the central incisors.

C. *Treatment Status*

Not applicable = 0: given where the patient requires no treatment.

Completed = 1: given where the patient has received a full course of treatment and no further treatment is required.

Being given = 2: given where the patient is presently undergoing orthodontic treatment.

Not given = 3: This score will apply to patients requiring treatment but not receiving any.

C.3 **Trauma of Permanent Incisors (8-, 12- and 15-Year-Olds)**

Upper and lower permanent incisor(s) will be examined for traumatic injury.

If there is injury to any incisors then identify the teeth involved and code one of the following categories for each tooth:

0 No evidence of trauma exists;
1 Discolouration;
2 Fracture involving enamel;
3 Fracture involving enamel and dentine;
4 Fracture involving enamel, dentine and pulp;
5 Missing due to trauma;
6 Acid-etch composite restoration;
7 Other permanent or semi-permanent restorations. This refers to items of treatment such as porcelain or acrylic jacket or post crowns, as well as stainless steel crowns, pinch bands, cellulose acetate crowns, directa crowns, pinned inlays;

8 Denture provided due to traumatic loss of this tooth;
9 Assessment cannot be made, there is no permanent incisor present.

In the case where a tooth has more than one condition/treatment give the highest code.

C.4 Community Periodontal Index of Treatment Needs (CPITN) (12- and 15-Year-Olds)

C.4.1 *Sextants*
The sextants are defined by teeth numbers 1.7-1.4, 1.3-2.3, 2.4-2.7, 3.7-3.4, 3.3-4.3, 4.4-4.7. A sextant will be examined only if there are two or more permanent teeth present, not indicated for extraction and in the case of posterior sextants at least one of the teeth present must be an index tooth, i.e. 6 or 7. In the case of anterior teeth at least one of the two permanent teeth present must be an incisor.

C.4.2 *Index Teeth*
The teeth to be examined are

$$\frac{1.7, 1.6, 1.1, 2.6, 2.7}{4.7, 4.6, 3.1, 3.6, 3.7} \quad \text{i.e.} \quad \frac{761/67}{76/167}$$

A tooth must have erupted to the full occlusal plane before scoring it.

Although eight molar index teeth are examined only 4 recordings are made, one relating to each sextant. When both of the designated molar teeth are present, the worst finding from the teeth is recorded for the sextant.

For upper anterior teeth if U.R.1 (i.e. tooth number 1.1) is missing score U.L.1 (i.e. tooth number 2.1). If this is missing score U.L.2 (i.e. tooth number 2.2.).

For lower anterior teeth, if L.L. 1 (tooth number 3.1) is missing score L.R.1 (tooth number 4.1). If this is missing score L.L.2 (tooth number 3.2). If this is missing score L.R.2 (tooth number 4.2).

C.4.3 *The WHO Peridontal Probe*
This instrument was designed for two purposes, namely measurement of pocket depth and detection of subgingival calculus. The pocket depth is measured through colour coding of the WHO probe, with a black mark starting at 3.5mm. The probe has a 'ball tip' of 0.5mm that allows easy detection of subgingival calculus. The ball tip also facilitates the identification of the base of the pocket, thus decreasing the tendency towards false reading by over-measurement.

C.4.4 *Probing*

An index tooth is probed to determine pocket depth and to detect calculus and bleeding response. The probing force can be divided into a working component to determine pocket depth and a sensing component to detect subgingival calculus. Working force should be no more than 25 grams: a practical test for establishing this force is to place the probe point under the thumb nail until blanching occurs without causing pain or discomfort. For sensing subgingival calculus, the lightest possible force which will allow movement of the probe ballpoint along the tooth surface is used.

When inserting the probe into the gingival sulcus the ballpoint should follow the anatomic configuration of the surface of the tooth. Pain to the patient during probing is indicative of the use of too heavy a probing force.

There is no rule specifying the number of separate probings to be made, which will depend on the condition of the tissues surrounding the tooth. However, it would be rare to exceed four probings per sextant.

Assessment should only be made in tissues surrounding fully erupted permanent teeth. Erupting teeth may give false recordings, e.g. bleeding and/or pocket depth.

C.4.5 *Examination and Recording*

In assessing treatment needs the presence of the following indicators is determined for each sextant in the sequence given below:

Pathologic pockets 6mm or deeper	Code 4 = P_2
Pathologic pockets 4-5mm deep	Code 3 = P_1
Supra- or subgingival calculus	Code 2 = C
Gingival bleeding after gentle probing	Code 1 = B
No signs of disease	Code 0 = H

When a 6mm or deeper pocket is found at any index tooth or teeth in the sextant being examined, a code of 4 is given to the sextant. Recording of Code 4 makes further examination of that sextant unnecessary. If the deepest pocket found at the designated tooth or teeth in a sextant is 4-5mm, code 3 is recorded. Again there is no further examination. If no pockets deeper than 3mm are observed, the presence of supra- or subgingival calculus is indicated by the recording of Code 2 for the sextant. If neither deep nor moderate pocketing nor calculus is observed, but bleeding occurs after probing, Code 1 is given to the sextant examined. The gingivae of the designated tooth or teeth should be inspected for the presence or absence of bleeding

before the examinee is allowed to swallow or close his mouth. At times bleeding may be delayed for 10-30 seconds after probing. If there is no pathology Code 0 (zero) is given to the examined sextant.

C.5 **Denture Status (15-Year-Olds)**

Wearing

0 = No denture is recorded when no denture is possible or, where it is possible, the subject states that he/she does not possess and had never possessed a denture.

1 = Upper denture being worn at present.

2 = Lower denture being worn at present.

3 = Both upper and lower denture being worn at present.

4 = Some of upper tooth units replaced by method(s) other than dentures.

5 = Some of lower tooth units replaced by method(s) other than dentures.

6 = Some of back upper and lower tooth units replaced by methods other than dentures.

Need

0 = No denture is required either because of a completely or satisfactorily intact dentition, or because the denture(s) possessed is/are worn and satisfactory at least to the extent that no more than a repair is required.

1 = An upper denture is required either because a dentition is sufficiently incomplete to require a denture which has not been provided or because the denture(s) possessed is/are unsatisfactory in terms of function, design, integrity (tissue-damage, poor fit, unsatisfactory occlusion), aesthetics, or because the subject was not wearing the denture(s) at examination.

2 = A lower denture is required (as for Code 1).

3 = Both an upper and lower denture is required (as for Codes 1 and 2).

4 = Some upper tooth units need to be replaced by method(s) other than dentures.

5 = Some lower tooth units need to be replaced by method(s) other than dentures.

6 = Some of both upper and lower tooth units need to be replaced by methods other than a denture.

C.6 Enamel Opacities and Fluorosis – Developmental Defects of Enamel Index (DDE) and Dean's Index (8- and 15-Year-Olds)

C.6.1 *Preliminary*
Permanent teeth in 8- and 15-year-old children only in the Eastern, Southern, Mid-Western and North-Western Health Boards are being examined. To demonstrate typical examples of types and number of defects, colour prints are included as an integral part of the index. Each examiner is supplied with a copy of the prints.

C.6.2 *Clinical Examination*
Teeth will not be cleaned prior to the examination except for the removal of food debris with a tissue if necessary. Fibre optic artificial light will be used. The teeth will be examined wet at the time of examination.

The recorder should initiate the examination by calling the first tooth and tooth surface to be examined – i.e. 7 buccal. Examination will commence on maxillary right 7 and continue to maxillary left 7. Following the examination of the upper jaw the child should be allowed to swallow. Examination should then continue starting with mandibular right 7 and proceeding to left 7.

The buccal and lingual surfaces of the permanent teeth of all 8- and 15-year-old children should be inspected visually for defects. If a hypoplastic area appears to be present it should be tactilely explored with a probe to confirm the abnormality of enamel contour. Diagnosis will usually be readily evident where a defect is obvious. However, in other instances the most difficult decision will be deciding whether or not an abnormality is present i.e. the examiner may be unsure whether the enamel is defective or falls within the range of normal. When in doubt the tooth surface should be scored normal. Defects such as palatal pits on the cingulum of incisor teeth should be considered normal. Similarly where defects are obviously not developmental in origin i.e. white spot decay, they should be scored normal. Where an abnormality is obviously present but cannot readily be classified into one of the listed categories of defects, it should be scored 'other' (Code 8). When the examination for the DDE Index is completed then the teeth should be examined for Dean's Index.

The examiner should stand in front of the child, look at the teeth along a horizontal plane, note the distribution pattern of any defects and decide if they are typical of fluorosis i.e. the defects in the questionable to mild scores (the most likely to occur) may consist of fine white lines or patches usually near the incisal edges or cusp tips. They are paper white or frosted in appearance and tend to fade into the surrounding enamel. They are of a generalised nature and there is usually a definite tendency to bilateral distribution. The premolars and second molars are most frequently affected followed by the upper incisors. The mandibular incisors are least affected.

If fluorosis is present then decide on the two most severely affected teeth. Dean's Index is scored on the condition of these two teeth. If the two teeth are not equally affected score on the least affected. When scoring, start at the higher end of the Index i.e. severe, and eliminate each score until you arrive at the condition present. If in any doubt the lowest score should be given.

Criteria for Dean's Classification System for Dental Fluorosis (1942

Classification	*Code*	*Criteria*
Normal	0	The enamel represents the usual translucent semivitriform type of structure. The surface is smooth, glossy, and usually of a pale creamy white colour.
Questionable ((10% of surface)	1	The enamel discloses slight aberrations from the translucency of normal enamel, ranging from a few white flecks to occasional white spots. This classification is utilised in those instances where a definite diagnosis of the mildest form of fluorosis is not warranted and a classification of 'normal' not justified.
Very Mild (10 - 25%)	2	Small, opaque, paper white areas scattered irregularly over the tooth but not involving as much as approximately 25 per cent of the tooth surface. Frequently included in this classification are teeth showing no more than about 1-2mm of white opacity at the tip of the summit of the cusps, of the bicuspids or second molars.

Mild (25-50%)	3	The white opaque areas in the enamel of the teeth are more extensive but do involve as much as 50 per cent of the tooth.
Moderate (100%)	4	All enamel surfaces of the teeth are affected and surfaces subject to attrition show wear. Brown stain is frequently a disfiguring feature.
Severe (100%)	5	All enamel surfaces are affected and hypoplasia is so marked that the general form of the tooth may be affected. The major diagnostic sign of this classification is discrete or confluent pitting. Brown stains are widespread and teeth often present a corroded-like appearance.

C.6.3 *Recording of Data*

Page 2 of the Clinical Record Chart relates to enamel defects and dental fluorosis. The recording chart has been designed to permit the identification of the various types, number and demarcation of defects on the buccal and lingual surfaces of 28 teeth. These two surfaces on posterior teeth commence in the middle of the occlusal surface and extend to the gingival margin.

C.6.4 *Notes on the Recording and Coding of Data*

(i) Deciduous teeth occupying the tooth space, unerupted, missing, heavily restored, badly decayed, fractured teeth and teeth (or tooth surfaces) which for any other reason cannot be classified for defects must be Coded *'X'*. This implies that it will be disregarded from statistical evaluation.

A tooth is present and examined for defects provided any part of the tooth has penetrated the oral mucosa. In the case of a partially erupted tooth score all surfaces present and normal unless there is a defect on the erupted portion. If a child is wearing a fixed orthodontic appliance exclude child from examination.

(ii) *Type of Defect*

Permanent teeth only are being examined, if deciduous tooth is present *Code 'X'*. Tooth surfaces with no defects are coded '0' for permanent teeth. When a defect is observed it is classified with respect to the type of defect it most closely resembles.

The examiner must be familiar with the defects as visually defined in the colour prints. Defects of the same type show considerable variation and it is essential they be classified with respect to the definition of the DDE Index. If the defect does not resemble any of the listed specific defects then it is coded as 'other defect'.

When two types of defect occur on the same surface, each type is coded in the space, the lower code being recorded first. If more than two defects occur then the 2 highest codes only are recorded.

This will produce two codes which will require recoding before it is transferred to punchcards. (The suggested procedure for coding and recoding a combination of types of defects is to specify the code for each type in the same box to give two or more digits which are then transposed to a letter for punchcards.)

(iii) *Number of Defects*
When the type of defect has been classified the number of defects is coded.

Where a combination of defects occurs on a surface a similar procedure to that described under 'type of defect' is followed. Opacities ('type of defect' codes 1 and 2) are charted codes 1 to 4 in 'number of defects'. However, all other 'types of defects' (codes 3 to 8) are only charted for codes 1 to 2 (single and multiple) in number of defects (i.e. 3.1, 3.2, 4.1, 4.2).

In each case where there is a combination recorded for 'type of defect' the appropriate two codes for 'number of defects' are entered in the number row thus.

Type	13	14
Number	41	32

As with other two-code recordings letter substitutes will be used in the computer summary.

(iv) *Extracted or Filled due to Defect*
If a tooth has obviously been extracted or filled (i.e. opacity at edges of filling) due to a defect code 'E' under 'Type' for both surfaces: If filled code 'F' under appropriate surface: Do not record any other defect on that surface: Leave 'number' space blank.

C.6.5 Developmental Defects of Enamel Index (DDE) – Definitions of Terms used in the Classification

C.6.5.1 *Types of Defects*

Developmental defects of enamel may be defined as disturbances in hard tissue matrices and in their mineralisation arising during odontogenesis. Disturbances may be clinically obvious, localised, affecting single teeth or multiple teeth or systemic, affecting groups of teeth developing at the period of disturbance or genetic. Defects may affect all teeth, deciduous only or permanent only and may also involve dentine or cementum or both.

Hypoplasia is defined as a quantitative defect of enamel visually and morphologically identified as involving the surface of the enamel (an external defect) and *associated with a reduced thickness of enamel.* The defective enamel may occur as (a) shallow or deep pits or rows of pits arranged horizontally in a linear fashion across the tooth surface or generally distributed over the whole or part of the enamel surface; (b) the defective enamel may occur as small or large, wide or narrow grooves; (c) in some instances there may be partial or complete absence of enamel over small or considerable areas of dentine.

Opacity is defined as a qualitative defect of enamel identified visually as an abnormality in the translucency of enamel. It is characterised by a white or discoloured (cream, brown, yellow) area but in all cases the enamel surface is smooth and the thickness of enamel is normal, except in some instances when associated with hypoplasia.

Combinations of hypoplasia and opacities can occur on the same tooth surface. They may be quite distinct from each other, that is, separated by normal enamel, or as a composite lesion composed of an adjacent opacity and hypoplasia.

Discoloured enamel is defined as an obvious abnormal appearance of the enamel, which because of its colour and distribution cannot be considered within the normal range of variation in colour and shade of tooth enamel. This category excludes coloured opacities.

C.6.5.2 *Number and Demarcation of Defects*

Single: A defect *well demarcated* from the adjacent normal enamel. Only one lesion is visible on the tooth surface.

Multiple: More than one defect with margins *well* demarcated from the adjacent normal enamel.

Diffuse: Fine white lines. Distinct lines of opacity which follow the pattern of the perikymata. Confluence of adjacent lines may be observed.

Diffuse: Patchy. Irregular, cloudy areas of opacity *lacking* well-*defined margins.*

CODES FOR DDE

1.	*Status*	*Code*
	Unerupted, missing	
	Heavily restored, badly decayed, badly fractured teeth, deciduous tooth	X – Occupying both type and number boxes
2.	*Types of Defect*	
	Normal	0
	Opacity (White/cream)	1
	Opacity (Yellow/brown)	2
	Hypoplasia (pits)	3
	Hypoplasia (grooves: horizontal)	4
	Hypoplasia (grooves: vertical)	5
	Hypoplasia (missing enamel)	6
	Discoloured enamel (not associated with opacity)	7
	Other defects	8

3. *Number of Defects*

Single	demarcated	1	
Multiple	demarcated	2	
Diffuse, fine white lines		3	for opacities only
Diffuse, patchy		4	for opacities only

4. *Treated Defects*

Extracted due to defect	E
Filled due to defect	F

C.6.6 *Treatment Needs*

This is intended to provide information on the significance of defects as a clinical problem. It is not expected that all defects have a treatment need. For example defects not having a restorative need or appearance problem need not be identified as requiring treatment. A defect on the buccal surface of an upper anterior tooth may require cosmetic treatment, whereas the same defect on a posterior tooth would best remain untreated.

The information was entered in two boxes at the base of the chart used to collect the enamel defects information. The dental examiner was asked for a subjective assessment on two aspects of defects: one to identify defects with a restorative need (1st box) and secondly those with an aesthetic need (2nd box). The coding procedure was to specify the actual number of teeth requiring treatment. If number was greater than 8 then it was coded 9.

C.7 **Caries**

Section 6 of the Clinical Record Chart records caries.

NOTE: It will be the recorder's responsibility to indicate always to the examiner what piece of information is being collected. The recorder should be trained to look for inconsistencies and to question any information that may appear erroneous or even unlikely.

A tooth is present and examined for caries provided any part of the tooth has penetrated the oral mucosa. The clinical examination will be conducted with a plain mouth mirror and a sharp explorer or probe (maillefer 20) using a fibre optic light source. Radiographic measurement will not be included.

C.7.1 *Status*

Record status for each tooth space for all four age groups. The examiner should commence the examination on the upper right, upon the call of upper right 8 by the recorder. He should call the status for each tooth following the recorders call from the upper right 8 (tooth number 1.8) continuing to the upper left 8 (tooth number 2.8) proceeding to the lower right 8 (tooth number 4.8) and ending at the lower left 8 (tooth number 3.8).

It should be noted that although the FDI international system of numbering teeth has been used the recorder may call 8, 7, 6, etc. to retain simplicity without causing confusion. There are five possible codes for each box in the Status Column:

Blank	=	Permanent tooth present
P	=	Deciduous tooth being scored
U	=	Permanent tooth unerupted
E	=	Permanent tooth extracted due to caries
M	=	Permanent tooth lost due to other reasons

Rules

(i) If there is a blank then the remaining five boxes in the row (four in the case of incisors or canines) must be filled in with one of the permanent 'condition' codes. A tooth is present and examined for caries provided any part of the tooth has penetrated the oral mucosa.

(ii) If there is a U and E or an M in the status box, then the remaining five boxes in the row (four in the case of incisors or canines) *must* be left blank.

(iii) In the case of P, this is placed in the status box when a deciduous tooth is being scored. For 5-year-olds this is all deciduous spaces, i.e. 1.5 to 2.5 in the upper and 3.5 to 4.5 in the lower and may be denoted P-P along status columns.

For other age groups, P is placed in the status box of deciduous spaces when the deciduous tooth is present and the permanent successor is not visible. When a P is placed in the status box of a tooth then the remaining five boxes (four in the case of incisors and canines) must be filled in by one of the deciduous 'condition' codes.

Where both deciduous and permanent teeth are present in the same space, permanent tooth only is recorded.

For 5-year olds where any of $\frac{baab}{baab}$ are missing use clinical judgement to decide status. If there is evidence that the tooth or teeth have been extracted due to caries score status P and score 7 on first three boxes under condition (see 4 below). If the tooth has been normally exfoliated record U under status and leave condition blank.

For 8-year-olds where spaces exist in $\frac{baab}{baab}$ area, record U under status unless the permanent tooth has erupted and has been lost. Use clinical judgement to determine reason for any missing $\frac{edccde}{edccde}$ in eight year olds.

For 12-year-olds where there is a space and the deciduous tooth is absent record U under Status.

(iv) For both deciduous and permanent teeth when a tooth is deemed missing due to caries it will be assumed that 3 surfaces were affected by caries prior to extraction. To indicate this fact the following procedure will be adopted.

(a) *Deciduous teeth:* Having placed P in the status box the first three boxes following (i.e., O, M and B in the case of molars and M, B and D in the case of incisors and canines) will be coded 7 and the remaining boxes will be scored 0.

(b) *Permanent:* Having placed E under status the boxes will be left blank and the computer will be instructed to score 3 surfaces as decayed and the remaining surfaces (2 in the case of molars and premolars and 1 in the case of incisors and canines) as sound. (Score S.)

C.7.2 *Condition and Treatment Need*

The examiner should commence the examination on the upper right upon the call of upper right 8 by the recorder, the surface sequence for each tooth being occlusal, mesial, buccal, distal and lingual. He/she should then

proceed to call condition for each surface first and treatment for the whole tooth second. The same sequence of examination is used as for status i.e. upper right 8 (tooth number 1.8) to upper left 8 (tooth number 2.8) to lower right 8 (tooth number 4.8) to lower left 8 (tooth number 3.8).

For the 20 spaces in which deciduous teeth are followed by permanent successors, need to provide extra boxes had been avoided by the technique of using a numerical score for the primary teeth and a letter score for the permanent teeth in the condition rows. There is no such distinction in the treatment rows as a simple data analysis programme instruction will relate entries to permanent or deciduous teeth on the basis of the entries in the condition rows.

It is important for each examiner to set up a system with his recorder which will avoid any misunderstanding. While different examiner/recorder teams may feel comfortable with slightly different calling systems, the following two general rules are proposed.

– Letters which sound alike, for example S and F should be transformed into a word which might be either the actual word it represents, for example, 'sound' for S or some other word which is simple and effective.

– In response to the call of a tooth space by the recorder, the examiner should always respond with a letter or number or appropriate word for condition followed by a number for treatment.

C.7.2.1 *Condition*
In the case of a partially erupted tooth, score all surfaces present and sound unless there is caries on the erupted portion.

Surface Scores
If the score is the same for each surface, put the condition letter or number in the first box and draw a line through the rest.

Code O or S – No Caries
A surface should be considered sound if it shows no evidence of treated or untreated caries, or if it is at the doubtful stage. These scores will also apply in the case of defects not to be counted as caries:

(a) white and/or chalky spots;
(b) discoloured or rough spots;

(c) hard stained pits or fissures in the enamel that catch on the explorer point but do not have a detectably softened cavity, undermined enamel or softening in the walls of the cavity, undermined enamel of softening in the walls of the pit or fissure.

If in doubt, assign the lower score and use probe only to confirm diagnosis in the case of a fissure sealant. If caries is visible under a fissure sealant but cannot be confirmed by probing, score O or S.

Code O or T – Trauma
A permanent surface should be recorded 'trauma' if part of its substance is missing for reasons other than treated or untreated caries and the latter condition is not present. As traumatised deciduous teeth at age 8-9 are accepted to be an extremely rare occurrence, O rather than any trauma code is used.

Code 1 or D – Decayed
Caries will be considered to be present in a surface when any lesion has a detectably softened floor, undermined enamel, or softened wall. On an interproximal surface, the lesion must be visible and the probe point must enter a lesion with certainty. Where any doubt exists, caries should not be diagnosed as being present. It must be emphasised that clinical caries is a stage in the process of dental caries. Dental caries proceeds from a microscopic lesion, which cannot be diagnosed positively by present clinical methods, to a cavity (or clinical caries) which can be diagnosed by clinical examination. The upper limit for this category is complete destruction of a crown. Where only roots remain for deciduous teeth, decayed is recorded only when no permanent successor has erupted.

The stages of dental caries that precede cavitation and other conditions similar to the early stages of caries should be deliberately excluded because they cannot be diagnosed positively and reliably.

Decayed is recorded where a surface contains a temporary filling requiring further treatment, or where a complete filling is lost. (See Filled for defective filling). For a primary surface, decayed is recorded even though it is about to be exfoliated.

Code 2 or K – Filled and Primary Decay
A surface should be classified filled and primary decay when a surface has been filled and another area is carious.

Code 3 or Y – Filled and Secondary Decay
A surface should be classified filled and secondary decay when there is recurrent caries in contact with a filling.

Code 4 or F – Filled
Surfaces should be considered filled whenever a filling or any permanent material is present and there is no discrete or recurrent caries. A defective filling where there is no discrete or recurrent caries, e.g. cracked or partly missing, is scored 4 or F with the appropriate treatment code indicating the replacement restoration required. A tooth with a three-quarter crown should also be recorded as filled even if it is a bridge abutment. (See code 5 or C – *Crowned* for a tooth, deciduous or permanent, which has a full crown, i.e. total coverage, including bridge abutment).

Code 5 or C – Crowned
All surfaces should be placed in this category if a tooth has a full crown (intended total crown coverage) in a permanent material and including bridge abutments. C is still the score even where the reason for the crown is trauma.

Code 6 or Q – Crowned and Decayed
A surface should be scored crowned and decayed where there is either a discrete (presumably root) or recurrent caries lesion.

Code 7 – Missing Due To Caries – Deciduous Teeth Only
This category should be used when Primary teeth have been extracted due to caries. Eruption patterns and the status of the corresponding tooth space in the opposite segment of the same arch provide useful clues where the cause of loss is in doubt. In the absence of positive history of tooth loss because of caries or convincing circumstantial evidence, a deciduous tooth space should be scored 8 or 9, and permanent tooth space X as appropriate. Clinical judgement will be used as mentioned under status.

Code 8 – Other Absent – Deciduous Teeth Only
This category should be used for primary tooth spaces vacant for reasons other than caries or normal exfoliation. Specific purposes included will be trauma or removal as part of orthodontic treatment.

Code 9 or X – Excluded Teeth
This category should be used for teeth which have been banded for orthodontic reasons, for congenitally absent teeth, for impacted teeth and teeth which cannot be properly examined.

Erupted supernumerary teeth are not scored in these columns.

C.7.2.2 *Treatment*
This will be recorded for each tooth after the condition of the tooth has been established.

Code 0 – None
This code is used when it is considered that a tooth requires no treatment. A carious deciduous tooth near exfoliation – caries should be recorded but record treatment required as '0'.

Codes 1 to 4 – Fillings and Crowns
Depending on the surface coverage of fillings or the need for a crown, these codes should be used to designate treatment required to remove caries lesions (primary or secondary), to repair trauma, or replace unsatisfactory fillings, in consideration of both function and appearance. Discolouration of a tooth due to trauma or a pulp condition or an incomplete pulp extirpation may be a reason for a restoration. Replacement of a filling or crown is adjudged necessary, in the absence of untreated caries or after a condition score of 0, when there is one or more of:

(i) A deficient margin which, in the examiner's judgement on the evidence of insertion of an explorer, or of deep staining, allows leakage at least to dentine.

(ii) An overhanging margin of a dimension at least equal to the thickness of a standard precast crown.

(iii) A deficient contact point between normally spaced teeth or a deficient marginal ridge allowing, or facilitating food impact.

(iv) A fracture or defect in a filling allowing leakage at least to dentine.

(v) A discolouration or disharmony of shape or colour of an existing filling or crown.

(iv) A clinical decision to fill in case of doubt. e.g. 'sticky fissure' or to restore tooth defects.

Codes 5 or 6 – Pulp Treatment or Extraction Due to Caries
These scores are used when there is obvious pulp involvement or when more than 2/3 of tooth structure has been lost. The examiner's clinical judgement must be relied upon to select which of these scores apply in individual cases and it is noted that there may be a consistent difference between local examiners and rovers in allotment of those scores.

N.B. Score 4 infers restoration also, but does not discriminate as to type.

Code 7 – Extraction Due to Periodontal Disease
A tooth should be placed in this category when periodontal disease has advanced so far that the tooth is loose or functionless and, in the clinical judgement of the examiner cannot be restored to a firm and functional state. Such teeth would normally score 8 in the periodontal disease condition measurement.

Code 8 – Extraction Due to Other Reasons
This score is used for teeth requiring extraction for any other reasons not covered in scores 6 and 7.

Code 9 – Other
This score is used for any other treatment of teeth not covered by scores 1 to 8 and specifically for recontouring and repairing restorations.

C.8 **Fissure Sealants**
The occlusal surfaces of the permanent molars and premolars will be examined with the probe and the presence of fissure sealants recorded as follows:

0 No Sealants present in any teeth;

1 Sealant present on part or all of any surface;

2 Assessment cannot be made, there are no permanent molars or premolars present.

If Code 1, fill in remaining two boxes as indicated on chart.
If Code 0 or 2, leave remaining two boxes blank.

N.B. Do not fill in Fluoridation Status Box

C.9 **dmft/DMFT**
At end of examination or when back at base, fill in dmft/DMFT box. Count number of deciduous/permanent teeth affected by caries and record number in boxes 57, 58 on page 1 of clinical record card.

Appendices D, E, and F show sample pages of a Clinical Record Chart and Questionnaires

Appendix D

UNIVERSITY COLLEGE CORK
National Survey of Childrens Dental Health 1984

NAME _____ ADDRESS _____

School _____

Subject No. [1][2][3][4][5] Card No. 1 [6] Examiner No. [7][8]

School No. [9][10][11] Sex [12] Fluoride Mouthrinse [13] Fluoride Tablets [14]

County (residence) [15][16] Age (ask child) [17][18]

Date of Birth Day [19][20] Month [21][22] Year [23][24]

Date of Examination Day [25][26] Month [27][28] Year [29][30]

1 Dentofacial Anomalies (12 and 15 year-olds)

A. Occlusion (0 or 1)

Anteroposterior molar relation [31] Posterior Crossbite [32] Posterior Openbite [33]

Midline Deviation [34] Overjet [35] Overbite [36]

B. Space (0 or 1)

Crowding [37] Spacing [38] Diastema [39]

C. Treatment Status (0,1,2 or 3) [40]

2 Trauma of Permanent Incisors (8, 12 and 15 year-olds)

Codes 0 to 9

Right		Left		
41	42	43	44	Upper
2	1	1	2	
45	46	47	48	Lower

3 Community Periodontal Index of Treatment Needs (12 and 15 year-olds)

17 or 18	11	26 or 27	
49	50	51	Codes 0 to 4
52	53	54	
47 or 48	31	36 or 37	

4 Denture Status (15 year-olds)

Wearing [55] Need [56] Codes 0 to 6

dmft (5 year-olds) [57][58]

DMFT (8,12 and 15 year-olds) (Complete at end of examination)

[59][60][61][62][63][64]

Fluoridation Status (Office Use Only) [65]

Subject No. (1–5) Card No. 2 (6)

5 Developmental Defects of Enamel (8 and 15 year-olds)

	Upper Right														Upper Left													
TOOTH	7		6		5		4		3		2		1		1		2		3		4		5		6		7	
SURFACE	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L
TYPE	7													20	21													34
NUMBER	35													48	49													62

Subject No. (A S A B O V E) (1–5) Card No. 3 (6)

	Lower Right														Lower Left													
TOOTH	7		6		5		4		3		2		1		1		2		3		4		5		6		7	
SURFACE	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L	B	L
TYPE	7													20	21													34
NUMBER	35													48	49													62

Deans Index of Fluorosis Codes 0 to 5 (63)

Treatment Need

Restorative (64)

Aesthetic (65)

Code No. of teeth 0 - 8, More than 8 teeth : 9

Subject No. | | | | | | Card No. 4 (6)

6 Caries (All Ages)

TOOTH	STATUS	CARIES CONDITION - O	M	B	D	L	TREATMENT NEED
1·8							13
1·7							20
1·6							27
1·5							34
1·4							41
1·3							47
1·2							53
1·1							59
2·1							65
2·2							71
2·3							77

Subject No. A S A B O V E | | Card No. 5 (6)

TOOTH	STATUS	CARIES CONDITION - O	M	B	D	L	TREATMENT NEED
2·4							13
2·5							20
2·6							27
2·7							34
2·8							41

TOOTH	STATUS	CARIES CONDITION - O	M	B	D	L	TREATMENT NEED
4·8							48
4·7							55
4·6							62
4·5							69
4·4							76

Subject No. A S A B O V E | | Card No. 6 (6)

TOOTH	STATUS	CARIES CONDITION - O	M	B	D	L	TREATMENT NEED
4·3							12
4·2							18
4·1							24
3·1							30
3·2							36
3·3							42
3·4							49
3·5							56
3·6							63
3·7							70
3·8							77

7 Fissure Sealants

NONE = 0
SOME = 1
NOT APPLICABLE = 2
(78)

IF SOME
UPPER = 1
LOWER = 2
BOTH = 3
(79)

PREMOLAR = 1
MOLAR = 2
BOTH = 3
DECIDUOUS MOLAR = 4
(80)

Fill in dmft / DMFT on page 1

Appendix E

UNIVERSITY COLLEGE CORK
National Survey of Childrens Dental Health 1984

NATIONAL SURVEY OF CHILDRENS' DENTAL HEALTH

Dear Parent/Guardian,

University College Cork is co-operating with the Department of Health and the Health Boards in a Survey of Childrens Dental Health. The main purpose of the Survey is to obtain information on the dental health of children in order to help plan future dental services. Children in some classes will be examined by a dentist in the school.

Your child's class has been selected for inclusion in the Survey. The dental examination will be carried out by a dentist and will not involve any dental treatment. The Department of Education approves of the Survey taking place during school hours.

There are other details which we need to know and which only parents such as you can give us; details about cleaning teeth, visiting the dentist, attitudes to false teeth and so on.

I am writing to ask you for your help by:-

1. Completing the attached consent form.
2. Answering this Questionnaire.
3. Returning both tomorrow to the child's teacher in the envelope provided.

The information you give will be treated in strict confidence and used for statistical purposes only. Nothing that would identify you or your child will be included in the results.

I hope you will feel able to help us and in which case I thank you in advance for your co-operation.

Yours sincerely,
Denis M. O'Mullane

Denis M. O'Mullane,
Director,
National Survey of Childrens' Dental Health.

TO: PARENTS

HOW TO FILL IN THE FORM

A. Most questions can be answered simply by putting a tick (✓) in the box next to the answer that applies to you.

Example

Yes ☑

No ☐

B. Usually after answering each question you go on to the next one unless a box you have ticked has an arrow next to it with an instruction to go to another question.

Example

In this case if the Yes Box is ticked go to question 4. If the No Box is ticked continue to next question.

Yes ☐ → GO TO Q4

No ☐

C. If you cannot remember, do not know, or are unable to answer a particular question please write that in.

D. If you have more than one child please answer the questions in relation to the child to whom the form was given.

E. When you have finished, please have your child return the form to the teacher, tomorrow.

We are most grateful for your help and co-operation.

QUESTIONNAIRE

Do not write in this Space

Subject No. ☐☐☐☐☐

School No. ☐☐☐

1. Who usually brushes your child's teeth? TICK A BOX

My child's teeth are not usually brushed	☐ 1 → Go to Q4
Your child	☐ 2
A Parent	☐ 3
Child and Parent together	☐ 4
Other (please tick and write in below)	☐ 5

Other: _____

2. How often does your child brush his/her teeth (or have them brushed for him/her) ? TICK A BOX

More than 3 times a day	☐ 1
3 times a day	☐ 2
Twice a day	☐ 3
Once a day	☐ 4
Once a week or more	☐ 5
Less than once a week	☐ 6

3. At what times of the day does your child usually brush his/her teeth or have them brushed for him/her?

PLEASE TICK ALL THAT APPLY

Before breakfast	1
After breakfast	2
Midday	3
Before the evening meal	4
After the evening meal	5
Before bed	6
Other times	7

4. Who told you about the care of your child's teeth and gums?

PLEASE TICK ALL THAT APPLY

Don't know	1
Nobody told me about this	2
I heard about it on television or radio or at the pictures	3
The dentist told me about it	4
The doctor told me about it	5
A dentist's helper (assistant) told me about it	6
I learned about this from newspapers and/or magazines	7
Other (please tick and write in below)	8

Other: _____

5. How often does your child eat sweet foods, or sweet drinks (such as biscuits, cakes, sweets, coca-cola, pepsi-cola, 7up, etc.) between normal meals?

	TICK A BOX
Never	1
Once a day	2
Twice a day	3
Three times a day	4
Four times a day	5
Five times a day	6
Six times a day	7
Seven or more times a day	8
Don't know	9

---

6. The next series of statements relate to how you think about your child's dental health.

Please tick one box for each statement whether you agree, disagree or don't know.

	Agree	Disagree	Don't Know
1. A child should go to the dentist regularly even when there seems to be no problems with the teeth or gums.	1	2	3
2 Drinking water which contains fluoride has no effect on a child's teeth.	1	2	3
3 Eating sweet foods or sweet drinks regularly can be harmful to a child's teeth.	1	2	3
4 Thorough toothbrushing with toothpaste can reduce the chances of getting cavities in children's teeth.	1	2	3
5 Caring for the gums in childhood has little effect on gum disease later on.	1	2	3

---

7. For proper dental care a child should go to the dentist: TICK A BOX

Once every 6 months	1
Once every 12 months	2
Once every 18 months	3
Once every 2 years or less often	4
Only when teeth cause pain	5
Don't know - no opinion	6

8. If your child had a bad back tooth and it was not a baby (milk) tooth but a second (permanent) tooth, would you rather it was filled or would you rather it was taken out? TICK A BOX

Filled	1
Taken out	2
Don't know	3

9. If your child had a bad front tooth and it was not a baby (milk) tooth but a second (permanent) tooth, would you rather it was filled or would you rather it was taken out? TICK A BOX

Filled	1
Taken out	2
Don't know	3

10. How do you think your child's teeth are at the moment?

PLEASE TICK ALL THAT APPLY

- Healthy, no visit to the dentist needed [1]
- Healthy, but his/her teeth need to be checked [2]
- Has decayed teeth/tooth but has no pain [3]
- Has broken teeth/tooth but has no pain [4]
- My child has toothache sometimes [5]
- My child has toothache often [6]
- Don't know [7]
- Other (please tick and write in below) [8]

Other: _____

11. How do you think your child's gums are at the moment?

PLEASE TICK ALL THAT APPLY

- Gums rarely bleed [1]
- Gums bleed sometimes [2]
- Gums bleed often [3]
- Gums are swollen [4]
- Don't know [5]
- Other (please tick and write in below) [6]

Other: _____

12. Have you noticed any brown or white marks or areas on your child's front teeth

- Yes [1]
- No [2]

THIS SECTION IS TO DO WITH YOUR CHILD'S USE OF AVAILABLE DENTAL SERVICES

13. When was the last time your child visited the dentist? TICK A BOX

Within the past 6 months	1	
Between 6 and 12 months ago	2	
Between 1 and 2 years ago	3	
Between 2 and 3 years ago	4	
Never	5	→ Go to Q19
Don't know	6	

14. Was your child's last visit to the dentist: TICK A BOX

To a private dentist	1
To the school clinic	2
Other	3

15. Why did your child go to the dentist last time? (If he/she went for more than one visit last time, why did he/she go for the first visit?). Was it because: TICK A BOX

He/She was having trouble with his/her teeth?	1
I was sent a card by the dentist	2
He/She went for a check-up	3
For some other reason (please tick and say why below)	4

Other reason: _____

16. Last time your child went to the dentist was it for just one visit or was more than one visit needed?

TICK A BOX

One visit	1
More than one visit	2

17. What kind of treatment did he/she have during his/her last visit to the dentist.

PLEASE TICK ALL THAT APPLY

Teeth filled	1
Teeth taken out	2
Treatment to stop teeth decaying or going bad, e.g. by painting and/or sealing the teeth	3
Teeth cleaned and polished	4
No treatment	5
Other treatment (please tick and say what below)	6

Other treatment: _____

18. How many times over the past 3 years has your child been to the dentist?

TICK A BOX

9 times or more	1
6 times or more	2
3 times or more	3
Once or twice	4
None	5
Don't know	6

19. Does your child have an appointment at the moment to see a dentist? TICK A BOX

Yes	1
No	2

20. If your child has not been to the dentist in the past 12 months which of the following are the best reasons?

PLEASE TICK ALL THAT APPLY

My child had no problems or need for treatment	1
We didn't know any really good dentist	2
I was afraid the treatment might be painful for my child	3
I didn't have the time to bring my child to the dentist or I was too busy	4
It would cost too much money	5
We didn't think the dental trouble our child had was serious enough to go to the dentist	6
I don't like to bother the dentist unless it is really important	7
The dentist's surgery was too far away so we didn't want to go	8
My child would have had to miss some classes so I didn't want him/her to go	9
Other reason (please tick and write in below)	10

Other reason: _____

21. Would you prefer your child to have visited the dentist in the past? TICK A BOX

More frequently	1
The same	2
Less frequently	3

---

22. For each of the following tick whether you agree, disagree or don't know.

	Agree	Disagree	Don't Know
If my child has a toothache there is a dentist available to treat him/her locally	1	2	3
If my child needs treatment but is not in pain there is a dentist available to treat him/her locally	1	2	3
There are enough dentists working locally (including school dentists, private practice dentists, hospital-based dentists, etc.)	1	2	3

---

23. If you want to bring your child to the dentist how long do you think you'll have to wait for an appointment? TICK A BOX

Less than one week	1
Less than one month	2
Less than six months	3
More than six months	4
Don't know	5

---

24. For each of the following tick whether you agree, disagree or don't know.

My child would attend the dentist more often:

	Agree	Disagree	Don't Know
If good dental care cost less	1	2	3
If travelling to and waiting at the dentist's took less time	1	2	3
If we could get an appointment at a time that was suitable for us	1	2	3

25. From your own experience how friendly have you found dentists? TICK A BOX

Very friendly	1
Reasonably friendly	2
A little unfriendly	3
Quite unfriendly	4
Don't know - no opinion	5

26. Do dentists tell you what they are doing to your child's teeth? TICK A BOX

Usually	1
Sometimes	2
Rarely	3
Never	4
Don't know	5

27. Do you think that dentists are good at their job and know what they are doing?

TICK A BOX

Yes	1
No	2
Don't know	3

28. Do dentists show you and your child how to look after your child's teeth?

TICK A BOX

Usually	1
Sometimes	2
Rarely	3
Never	4
Don't know	5

29. Do you think that dentists do not like to cause your child pain, and try to avoid it if they can?

TICK A BOX

Yes	1
No	2
Don't know	3

30. Do you have a family dentist who treats a number of members of your family?

TICK A BOX

Yes	1
No	2

31. Have you got some of your natural teeth or have you lost them all. (to be filled in by both parents please)

	MOTHER	FATHER
Got some or all	1	1
Lost them all	2	2

32. Many people have or will have false teeth. Which of the following describes how you think wearing false teeth compares with your own natural teeth?

	TICK A BOX
Natural teeth are better	1
False teeth are better	2
Both are about the same	3
Don't know - no opinion	4

33. Please fill in the approximate ages for both parents if possible.

Father's age _____

Mother's age _____

34. Please give the ages of all the children in the family (except the child for whom this form is being completed).

_____

_____

35. Please give the occupations of both parents. (Give as much detail as you can).

Mother's Occupation: _____

_____

If unemployed, what was her last job: _____

_____

Father's Occupation: _____

_____

If unemployed, what was his last job: _____

_____

THANK YOU VERY MUCH FOR YOUR HELP

Please do not forget to return the consent form for the dental examination with the questionnaire to the child's teacher in the envelope provided.

Appendix F

UNIVERSITY COLLEGE CORK
National Survey of Childrens Dental Health 1984

Do not write in this Space

Subject No. ☐☐☐☐☐

School No. ☐☐☐

STUDENTS QUESTIONNAIRE

Name: .....

Date of Birth: _____ Date _____ Month 19 _____ Year

HOW TO FILL IN THE FORM

A Most questions can be answered simply by putting a tick (✓) in the box next to the answer that applies to you.

Example

Yes ☑

No ☐

B Usually after answering each question you go on to the next one unless a box you have ticked has an arrow next to it with an instruction to go to another question.

Example
In this case if the Yes Box is ticked go to Question 4.
If the No Box is ticked go on to the next question.

Yes ☐ → GO TO Q4

No ☐

C. If you cannot remember, do not know, or are unable to answer a particular question please write that in.

We are most grateful for your help and co-operation.

1. How often do you brush your teeth?

TICK A BOX

Never	1 → Go to Q3
More than 3 times a day	2
3 times a day	3
Twice a day	4
Once a day	5
Once a week or more	6
Less than once a week	7

2. At what times of the day do you usually brush your teeth?

PLEASE TICK ALL THAT APPLY

Before breakfast	1
After breakfast	2
Midday	3
Before the evening meal	4
After the evening meal	5
Before bed	6
Other times	7

3. How often do you use dental floss to clean between your teeth? TICK A BOX

I don't know what dental floss is	1
At least once a day	2
Once a week or more	3
Less than once a week	4
Never	5

4. Who told you about the care of your teeth and gums?

You can tick MORE than one

Don't know	1
Nobody has told me about this	2
Parents told me about this	3
Teachers told me about this	4
I heard about it on television or radio or at the pictures	5
The dentist told me about it	6
A dentist's helper (assistant) told me about it	7
The doctor told me about this	8
I learned about this from newspapers and/or magazines	9
Other (please tick and say what below)	10

Other: _____

5. How many times a day do you eat sweet foods or sweet drinks (such as biscuits, cakes, sweets, coca-cola, pepsi-cola, 7up etc) between normal meals?

TICK A BOX

None	1
Once a day	2
Twice a day	3
Three times a day	4
Four times a day	5
Five times a day	6
Six times a day	7
Seven or more times a day	8
Don't know	9

6. Many people have or will have false teeth. Which of the following describes how you think wearing false teeth compares with your own natural teeth?

TICK A BOX

Natural teeth are better	1
False teeth are better	2
Both are about the same	3
Don't know - no opinion	4

7. The next series of statements relate to how you think about your oral and dental health.

Please tick one box for each statement whether you agree, disagree or don't know.

	Agree	Disagree	Don't Know
1. A person should go to the dentist even when there seems to be no problems with the teeth or gums	1	2	3
2. Drinking water which contains fluoride has no effect on the teeth	1	2	3
3. Eating sweet foods or sweet drinks regularly can be harmful to a child's teeth	1	2	3
4. Thorough toothbrushing with toothpaste can reduce the chances of getting cavities in teeth	1	2	3
5. Caring for the gums in childhood has little effect on gum disease later on	1	2	3

8. For proper dental care a person should go to the dentist:

	TICK A BOX
Once every 6 months	1
Once every 12 months	2
Once every 18 months	3
Once every 2 years or less often	4
Only when teeth cause pain	5
Don't know - no opinion	6

9. If you had a bad back tooth would you rather it was filled or would you rather it was taken out?

TICK A BOX

Filled	1
Taken out	2

10. If you had a bad front tooth would you rather it was filled or taken out?

TICK A BOX

Filled	1
Taken out	2

11. How do you think your teeth are at the moment?

PLEASE TICK ALL THAT APPLY

Healthy, no visit to the dentist needed	1
Healthy, but I would like to have them checked	2
I have decayed tooth/teeth but no pain	3
I have broken tooth/teeth but no pain	4
I have toothache sometimes	5
I have toothache often	6
Don't know	7
Other (Please write in below)	8

Other: _____

12. How do you think your gums are at the moment?

PLEASE TICK ALL THAT APPLY

Gums rarely bleed	1
Gums bleed sometimes	2
Gums bleed often	3
Gums are swollen	4
Don't know	5
Other (please write in below)	6

Other: _____

---

13. At the moment, do you think your teeth look alright as they are or would you prefer to have them straightened?

TICK A BOX

Alright as they are	1
Prefer to have them straightened	2
Don't know	3

---

14. Have you noticed any brown or white marks or areas on your front teeth?

Yes	1
No	2

THIS SECTION IS TO DO WITH YOUR USE OF AVAILABLE DENTAL SERVICES

15. When was the last time you visited the dentist? TICK A BOX

Within the past 6 months	1
Between 6 and 12 months ago	2
Between 1 and 2 years ago	3
Between 2 and 3 years ago	4
When I was in primary school	5
Never	6 → Go to Q21
Don't know	7

16. Was your last visit to the dentist: TICK A BOX

To a private dentist	1
To the school (Health Board) dental clinic	2
Other (please tick and write in below)	3

Other: _____

17. Why did you go to the dentist last time? TICK A BOX

I was having trouble with my teeth	1
I had a note from the school dentist	2
I went for a check-up	3
For some other reason (please tick and say why below)	4

Other reason: _____

18. Last time you went to the dentist was it for just one visit or did you need more than one visit?

TICK A BOX

One visit	1
More than one visit	2

19. What kind of treatment did you have during your last visit to the dentist?

PLEASE TICK ALL THAT APPLY

Teeth filled	1
Teeth taken out	2
Treatment to stop teeth decaying or going bad by painting and/or sealing the teeth	3
Teeth cleaned and polished	4
No treatment	5
Treatment to have teeth straightened	6
Other (please tick and write in below)	7

Other: _____

20. How many times in the past 3 years have you been to the dentist?

TICK A BOX

9 times or more	1
6 times or more	2
3 times or more	3
Once or twice	4
None	5
Don't know	6

21. Do you have an appointment at the moment to see a dentist? TICK A BOX

Yes	1
No	2

22. If you have not been to the dentist in the past 12 months which of the following are the best reasons for not going?

PLEASE TICK ALL THAT APPLY

I had no problem or need for treatment	1
My parents didn't know any really good dentist	2
I was afraid the treatment might be painful	3
I was too busy to see a dentist; or I didn't have the time	4
My parents didn't think the dental trouble I had was serious enough to go to the dentist	5
It would cost too much money	6
I didn't think the dental trouble I had was serious enough for me to go to the dentist	7
I thought the dental trouble I had would go away soon	8
I don't like to bother the dentist unless it is really important	9
The dentist's surgery was too far away	10
I would have had to miss some classes so I didn't want to go	11
Other reason (please tick and say why below)	12

Other reason: _____

23. Would you prefer to have visited the dentist in the past?

TICK A BOX

More frequently	1
The same	2
Less frequently	3

24. For each of the following statements please place a tick under agree, disagree or don't know.

	Agree	Disagree	Don't Know
If I have a toothache there is a dentist available to treat me locally	1	2	3
If I need treatment but am not in pain there is a dentist available to treat me locally	1	2	3
There are enough dentists working locally (including school dentists, private practice dentists, hospital-based dentists etc.)	1	2	3

25. If you want to go to the dentist and you are not in pain how long do you think you will have to wait for an appointment?

TICK A BOX

Less than 1 week	1
Less than 1 month	2
Less than 6 months	3
More than 6 months	4
Don't know	5

26. For each of the following tick whether you agree, disagree or don't know.

You would attend the dentist more often:

	Agree	Disagree	Don't Know
If good dental care cost less	1	2	3
If travelling and waiting at the dentist took less time	1	2	3
If you could get an appointment at a time that was suitable for you	1	2	3

---

27. If you have not been to the dentist or have only been there once or twice since you left primary school is it because:

PLEASE TICK ALL THAT APPLY

You are no longer entitled to free dental treatment	1
You are entitled to free dental treatment but you could not get an appointment	2
You could not afford to pay a private dentist	3
You did not want to spend money on your teeth	4
Other reason (please tick and write in below)	5

Other reason: _____

---

28. From your own experience how friendly have you found dentists? TICK A BOX

Very friendly	1
Reasonably friendly	2
A little unfriendly	3
Quite unfriendly	4
Don't know - no opinion	5

---

29. Do dentists tell you what they are doing to your teeth?

TICK A BOX

Usually	1
Sometimes	2
Rarely	3
Never	4
Don't know - no opinion	5

---

30. Do you think that dentists are good at their job and know what they are doing?

TICK A BOX

Yes	1
No	2
Don't know - no opinion	3

---

31. Do dentists show you how to look after your teeth?

TICK A BOX

Usually	1
Sometimes	2
Rarely	3
Never	4
Don't know	5

---

32. Do you think that dentists do not like to cause you pain and try to avoid it if they can?

TICK A BOX

Yes	1
No	2
Don't know	3

---

33. Do you have a family dentist who treats a number of members of your family?

TICK A BOX

Yes	1
No	2
Don't know	3

34. Please fill in the approximate ages for both parents if possible.

Father's age	1
Mother's age	2
Don't know father's age	3
Don't know mother's age	4

35. Please give the ages of all your brothers and sisters.

_____

_____

36. Please give the occupations of both parents. Give as much detail as you can.

Mother's Occupation: _____

_____

If unemployed, what was her last job? _____

_____

Father's Occupation: _____

_____

If unemployed, what was his last job? _____

_____

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