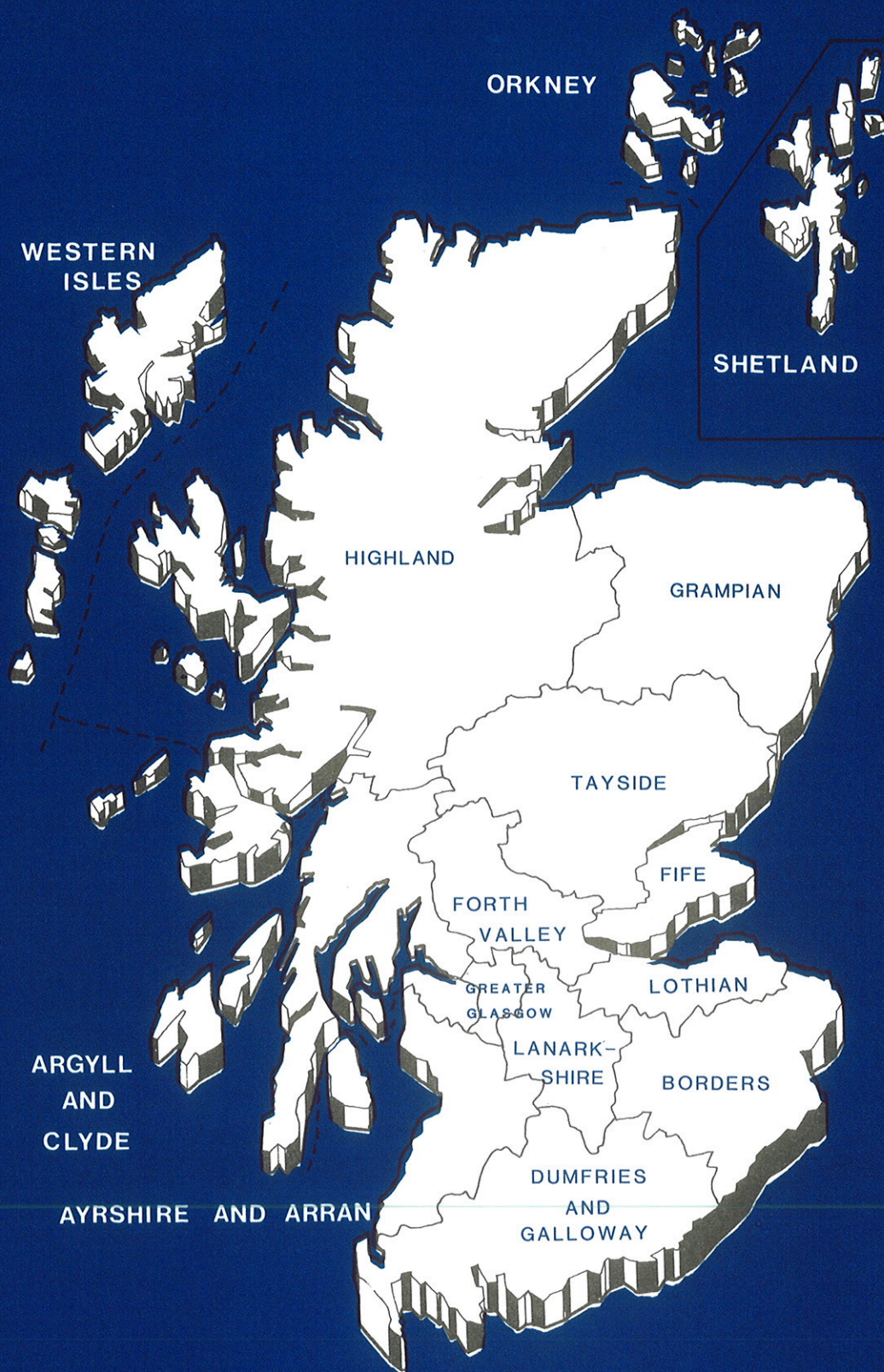


SCOTTISH HEALTH BOARDS' DENTAL EPIDEMIOLOGICAL PROGRAMME



1988 / 89 REPORT

Prepared by
Dental Health Services Research Unit
University of Dundee

SCOTTISH HEALTH BOARDS' DENTAL EPIDEMIOLOGICAL PROGRAMME

REPORT OF THE 1988/89

SURVEY OF 12 YEAR OLD CHILDREN

Prepared by
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Overview

The Scottish Health Boards' Dental Epidemiological Programme, a venture initiated by the Scottish Committee of Chief Administrative Dental Officers in conjunction with the Dental Health Services Research Unit of the University of Dundee, commenced in autumn 1987 with a survey of five year old children. The second stage, a survey of twelve year old children, has now been completed and the results are contained in this report.

Central training and calibration exercises for all examiners and scribes were undertaken in Perth in early November 1988. The survey itself was undertaken in November and December.

The overall caries results for twelve year olds in Scotland show downward trends similar to those observed for five year olds a year previously. The 1988 weighted mean for decayed (cavitated), missing and filled teeth (DMFT) was 2.2 which represents a halving of the 1983 value of 4.5 obtained by the Office of Population Censuses and Surveys. The proportion of children who can be said to have "no caries experience" (DMFT=0) increased more than three-fold since 1983 to reach the value of 32%. There has been a substantial increase in the number of children receiving sealants and/or sealant restorations, with 47% of 12 year olds now coming into this category. In this survey, as in the previous year, a wide range of results were observed for the 15 different Health Boards.

The recorded improvements give cause for some satisfaction, but it must be emphasised that, despite the three-fold increase in numbers with "no caries experience", there are still over two-thirds of Scottish twelve year olds who are suffering, or have suffered from, dental decay. Scotland's children also suffer from higher levels of dental caries than their English counterparts. There is still a long way to go in the fight against this preventable disease.

For this age group, it was considered appropriate to obtain some measure of oral cleanliness and periodontal status. These results provide a baseline for future surveys. In addition an attempt was made, using a recently-developed index, to assess the orthodontic condition of the children.

This programme of annual surveys is now firmly underway. It is hoped that it is fulfilling its intended objective of providing useful information, at national and local level, for the planning of dental health services in Scotland.

Participating Health Boards

Argyll and Clyde	Greater Glasgow
Ayrshire and Arran	Highland
Borders	Lanarkshire
Dumfries and Galloway	Lothian
Fife	Orkney
Forth Valley	Shetland
Grampian	Tayside
	Western Isles

Co-ordinating Committee - Dental Epidemiology, Scotland

Mr. T.R. Watkins*	(Co-ordinator)
Dr. N.B. Pitts*	(Calibration and Results Co-ordinator)
Mr. M.C.W. Merrett	(Calibration Course Organiser)
Mr. R. McKechnie	(Representative of Specialists in Community Dental Health)
Professor K.W. Stephen	(Adviser)

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1. INTRODUCTION

The Scottish Health Boards' Dental Epidemiological Programme (SHBDEP), a planned programme of annual dental surveys, commenced in 1987 with a country-wide survey of 5 year old children. All 15 Health Boards participated, thus providing much needed data at national and local levels (Pitts and Davies, 1988).

Results from the 1987 survey showed that the dental health of five year old children in Scotland had improved considerably since the previous national survey of 1983 (Todd and Dodd, 1985). The value of 2.2 for decayed and filled primary teeth (dft) represented a 31% improvement over the 1983 value of 3.2, and the figures for "zero caries" (dft=0) showed a dramatic improvement from 25% in 1983 to 44% in 1987. It must be appreciated, however, that these findings reveal that there are still very large numbers of 5 year olds suffering from the ravages of decay and that the position in Scotland is worse than that in England and Wales.

At the time of inception of this programme it was agreed that the survey of 5 year old children would be followed in 1988/89 by a survey of 12 year old children, and it is the results of this second survey which are presented in this report. In 1987/88 only caries data was collected, but it was decided that, for 12 year old children, it would be appropriate to also obtain data on their oral cleanliness and periodontal status and to try out a new index which assesses orthodontic treatment need. For logistical reasons the population surveyed was Secondary I pupils of state schools.

The programme adheres to the broad outline for conducting dental health surveys drawn up by BASCD, the British Association for the Study of Community Dentistry (Palmer et al, 1984; Dowell and Evans, 1988). The programme is organised via the Scottish Committee of Chief Administrative Dental Officers in conjunction with the Dental Health Services Research Unit of the University of Dundee.

2. SAMPLING

Detailed instructions, based on the BASCD guidelines, were sent out to all Health Boards in summer 1988 in order to expedite the identification of the numbers of schools required to obtain the target sample of at least 5% of all Secondary I schoolchildren. Small Health Boards used larger samples to ensure that reasonable numbers, permitting valid inter-Health Board comparisons, would be available.

3. TRAINING AND CALIBRATION

The difficulties associated with trying to get a number of different dentists to reproducibly diagnose and measure the extent of dental disease, even when using standardised, clearly stated and written diagnostic criteria, are well known. In order to minimise the impact of such differences and to assess their extent, training and calibration courses were held for the 40 Community Dental Officers and their scribes who were the examining teams for the survey.

Two repeated courses (as the examining teams were split into two groups) were organised by Mr. M.C.W. Merrett in conjunction with the Dental Health Services Research Unit. They were held in Perth on 1st/2nd November and 3rd/4th November, 1988. By the end of the courses a reasonable standard of inter-dentist agreement had been demonstrated on measuring the dental caries status of 12 year old children. The results of the calibration are contained in Appendix A, Table A1. As it is not practicable to make repeated assessments of oral cleanliness/periodontal status on the same subject, it was not possible to calibrate these measurements. The use of well established epidemiological methods (Ainamo et al, 1982; Ainamo et al, 1984; Macauley et al, 1988) was seen as an adequate safeguard. Calibration of the 'experimental' orthodontic assessments is discussed in Appendix D.

The prevalence of dental caries in the chil-

TABLE 1. Number in sample, number and percentage examined, and Secondary I population in each Health Board.

Health Board	Sample	Examined	Examined as % of population	Secondary I population
Argyll and Clyde	247	218	7.0%	3119
Ayrshire and Arran	347	307	6.8%	4486
Borders	139	114	9.9%	1151
Dumfries and Galloway	122	112	6.3%	1769
Fife	237	218	5.1%	4279
Forth Valley	191	166	5.2%	3189
Grampian	326	288	5.0%	5735
Greater Glasgow	575	494	5.3%	9295
Highland	191	159	6.1%	2616
Lanarkshire	527	478	7.0%	6804
Lothian	589	514	6.9%	7396
Orkney	102	95	38.8%	245
Shetland	334	318	90.9%	350
Tayside	243	221	5.2%	4243
Western Isles	126	116	26.5%	437
Totals		3818		55114

TABLE 2. Overall DMFT results for Scotland, incorporating the data from the fifteen Health Boards, appropriately weighted.

	Weighted mean	Range of means for individual Health Boards
age (in years)	12.26	12.19-12.60
decayed teeth (D)	0.39	0.06-0.58
missing teeth (M)	0.24	0.04-0.44
filled teeth (F)	1.60	1.01-2.40
DFT (D+F)	1.99	1.23-2.69
DMFT (D+M+F)	2.23	1.34-3.13
sealants/sealant restorations	2.12	0.72-6.59
		Range for Health Boards
With "zero caries" DFT=0 (as defined by Scottish CADOs, 1986: no caries experience of permanent teeth present)		34.4 22.8-48.7
With "no caries experience", DMFT=0 (as per BASCD)		32.2 20.7-47.2
With no decay, D=0		78.6 69.0-93.7
% of children with 1 or more sealants/ sealant restorations		46.9 23.2-83.6

dren used for calibration, with few decayed surfaces available for assessment, was identified as an issue which may require future consideration.

4. DENTAL EXAMINATIONS

The examinations took place in November and early December 1988. Table 1 shows the number of children examined in each Health Board. A total of 3,818 children (6.9% of the Secondary I intake) were examined although, as expected, a number of the overall sample of children (11%) were unavailable because of absence, parental refusal etc. During the course of the examinations 10% of the sample were randomly selected for re-examination to assess intra-dentist agreement (see Appendix A, Table A2).

5. DATA PROCESSING

The design of the form used for recording the examinations allowed rapid computer entry of the data by keyboard operators. Data processing was undertaken by the Dental Health Services Research Unit who have also carried out the following analyses and produced this report.

6. RESULTS

For ease of reference, the key results tables relating to dental caries are included in the text, whilst more detailed results are contained in Appendix B (all dental caries results relate to the permanent dentition only). Results tables relating to oral cleanliness/periodontal status and to the 'experimental' orthodontic assessments are contained in Appendices C and D respectively.

6.1 Dental Caries Results for Scotland

Table 2 shows the overall results for Scotland in terms of decayed (D), missing (M) and filled (F) permanent teeth together with informa-

tion on the presence of sealants/sealant restorations.

It should be appreciated that, in order to adhere to the BASCD guidelines and international conventions, figures for D only record dental decay (caries) at the 'cavitation' level of diagnosis. This means that only dental caries that has progressed far enough to produce a definite hole (greater than 0.5mm diameter) in the tooth surface is recognised as caries, while teeth with all 'earlier' forms of dental caries (smaller cavities and lesions in which there is no surface breakdown evident) are regarded as 'sound' for the purpose of the survey.

Table 2 also gives the results for those children found to be "caries free" (at the cavitation level) in three different ways. Firstly, an overall value for so-called "zero caries" (no decayed or filled teeth present, or DFT=0) as this is a measure, defined by Scottish CADOs, which is used by many Health Boards in the collection of local data. Secondly, the BASCD measure of "no caries experience" (no decayed, missing or filled teeth or DMFT=0) is given. This gives slightly different results and is useful in order to allow comparisons with results currently being collected in England and Wales. Thirdly, the results are expressed as "no decay" (no decayed teeth or D=0). This measure ignores all evidence of past caries attack (filled or missing teeth) and considers only those teeth present and with no decay at the cavitation level at the time of the examination.

6.2 Dental Caries Experience by Health Board

Table 3 shows the dental caries results for each Health Board by listing the total caries experience (DMFT) as well as its constituent elements.

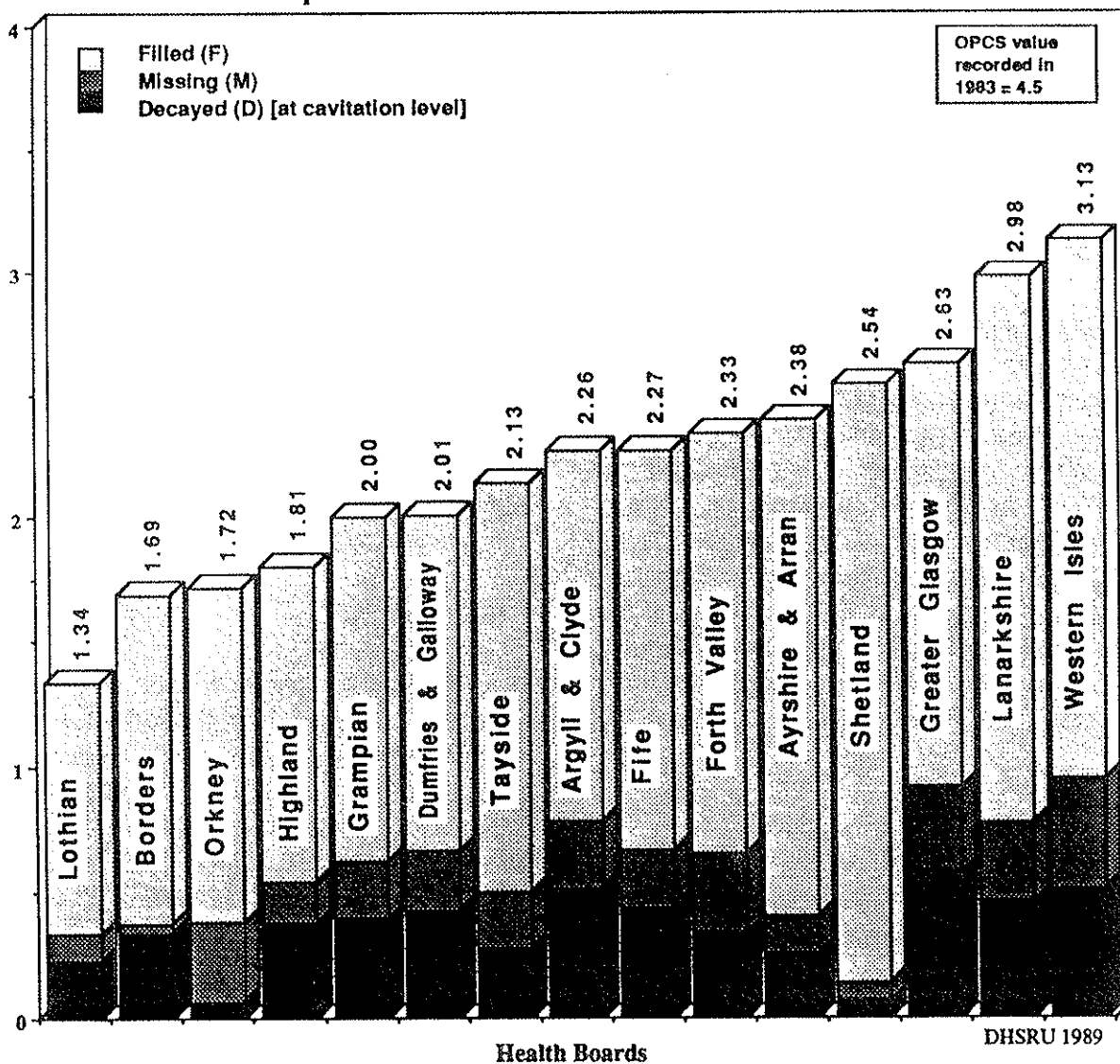
This information on DMFT values is shown in graphical form in Figure 1. The national UK survey conducted by the Office of Population

TABLE 3. Mean values per child for decayed* (D), missing (M) and filled (F) teeth; percentages with "zero caries" (DFT=0) and "no caries experience" (DMFT=0); mean number of sealed teeth per child and percentage with sealed teeth.

Health Board	D	M	F	DFT	DMFT	%DFT=0	%DMFT=0	Sealed	%Sealed>0
Argyll and Clyde	0.51	0.27	1.49	2.00	2.26	32.1	30.3	2.34	46.3
Ayrshire and Arran	0.25	0.15	1.99	2.24	2.38	29.0	27.7	1.96	51.8
Borders	0.33	0.04	1.32	1.65	1.69	35.1	35.1	1.08	32.5
Dumfries and Galloway	0.42	0.24	1.35	1.77	2.01	41.1	39.3	0.72	32.2
Fife	0.43	0.23	1.61	2.04	2.27	37.2	33.9	1.95	46.8
Forth Valley	0.33	0.32	1.69	2.01	2.33	39.8	33.7	1.40	38.6
Grampian	0.39	0.23	1.38	1.77	2.00	34.7	32.3	1.65	40.6
Greater Glasgow	0.58	0.34	1.70	2.28	2.63	26.7	24.7	2.24	47.6
Highland	0.37	0.17	1.26	1.64	1.81	48.4	47.2	3.36	63.5
Lanarkshire	0.46	0.31	2.21	2.67	2.98	22.8	21.5	1.71	39.1
Lothian	0.22	0.11	1.01	1.23	1.34	48.7	47.0	2.65	56.1
Orkney	0.06	0.32	1.34	1.40	1.72	41.1	35.8	1.19	43.2
Shetland	0.07	0.07	2.40	2.47	2.54	24.2	23.6	6.59	83.6
Tayside	0.27	0.23	1.64	1.91	2.13	34.4	32.1	2.83	55.2
Western Isles	0.51	0.44	2.18	2.69	3.13	23.3	20.7	0.78	22.4

* "decay" means caries at the cavitation level of diagnosis

FIGURE 1. Mean number of Decayed, Missing and Filled teeth per child for each Health Board



Censuses and Surveys (OPCS) (Todd and Dodd, 1985) recorded the value of 4.5 for DMFT for Scottish 12 year olds in 1983. It can be seen that all Health Boards were substantially below this value in 1988.

6.3 The Proportion "Caries Free" in Each Health Board

Figure 2 illustrates the "no caries experience" (DMFT=0) results for each Health Board. The overall "no caries experience" value of 32% (Table 2) shows substantial improvement on the Scottish situation in 1983, as assessed by the OPCS Survey, when the recorded figure for 12 year old children was 10% with DMFT=0.

6.4 Site and Surface Results

The results broken down to the 'surface' as a unit of measurement (rather than the 'tooth') are presented in Appendix B. Table B1 shows, for each Health Board, the mean values per child for decayed surfaces (DS), filled surfaces (FS) and decayed and filled surfaces (DFS). Figure B2 demonstrates graphically the distribution of caries experience across the different individual teeth while Figure B3 shows the distribution according to the different types of tooth surface.

6.5 Sealants/Sealant Restorations

The presence of sealants and sealant restorations was investigated for teeth not classified as decayed or filled. Fissures sealants were originally used principally as a preventive measure, but their use as a therapeutic treatment, in some cases in conjunction with a small restoration (the sealant restoration) is now becoming more established. It is not possible, on visual examination, to distinguish between a sealant and a sealant restoration.

Overall figures (Table 1) indicate that 47% of 12 year olds in Scotland have now received this

kind of treatment. There is a marked variation (Table 3 and Figure 3) in regional provision, influenced by a variety of factors which may include Community Dental Service policy in each area, the proportion of children utilising the Community Dental Service in each area and the attitudes of individual Community Dental Officers and General Dental Practitioners in each area. Table B1 indicates the sealant/sealant restoration results by surface (SS) as well as by tooth.

6.6. Oral Cleanliness and Periodontal Condition

Oral cleanliness was measured by recording the presence or absence of plaque on specific surfaces of six index teeth (UR6, UR1, UL6, LR6, LL1, LL6). The periodontal condition of the mouth was recorded using the version of CPITN developed for adolescents, the method recommended for use in WHO surveys (Ainamo, et al 1984). The same six index teeth were used as for oral cleanliness. Results are shown in tables C1 and C2 in Appendix C.

7. DISCUSSION

We are very pleased that this second survey in the Scottish Health Boards' Dental Epidemiological Programme has been undertaken successfully, in spite of the extra complications and complexities related to dealing with an older age group and the need to collect more comprehensive data regarding dental health.

7.1 Dental Caries Results for Scotland

The results, as with the 5 year old children in 1987, show a considerable improvement over the years since the last UK national survey carried out in 1983 by OPCS (Todd and Dodd, 1985; note: although OPCS conducted a follow-up survey of Scottish schoolchildren in 1986, the only age groups examined were 8, 11 and 15 year olds, Todd, 1988). For 12 year old children, the

FIGURE 2. Percentage with no cavities or past caries experience in each Health Board

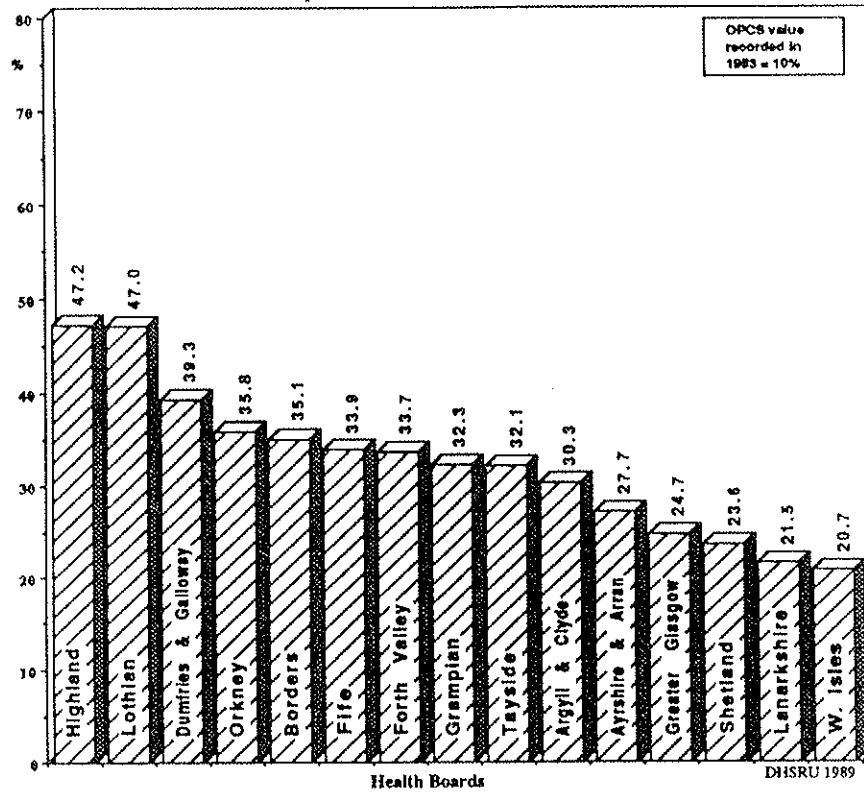


FIGURE 3. Percentage with one or more sealed teeth (sealants or sealant restorations) in each Health Board

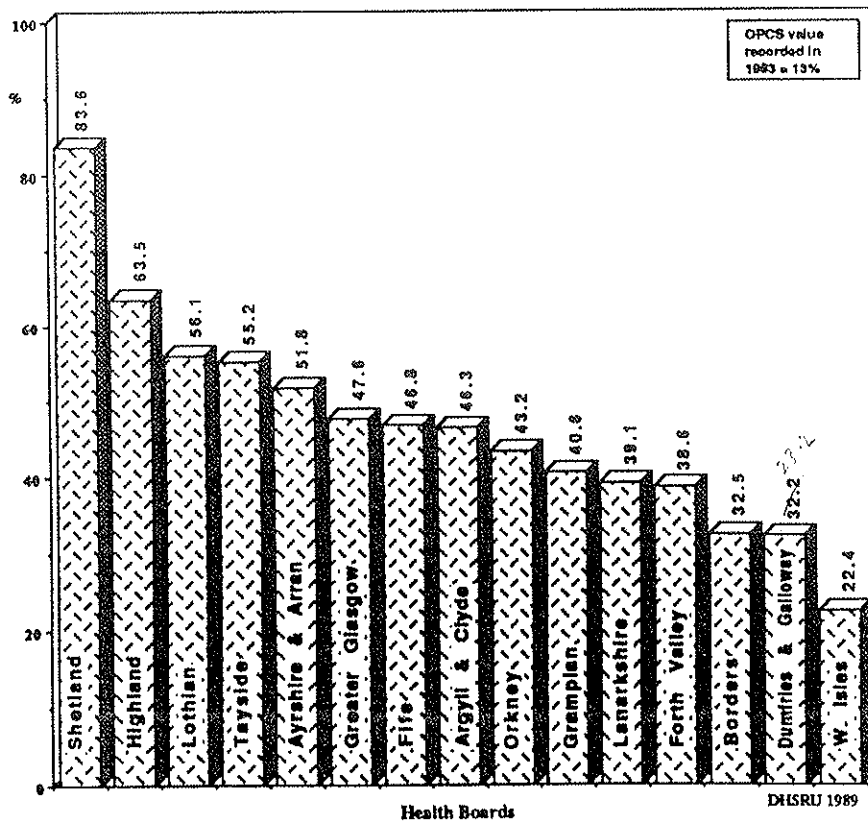
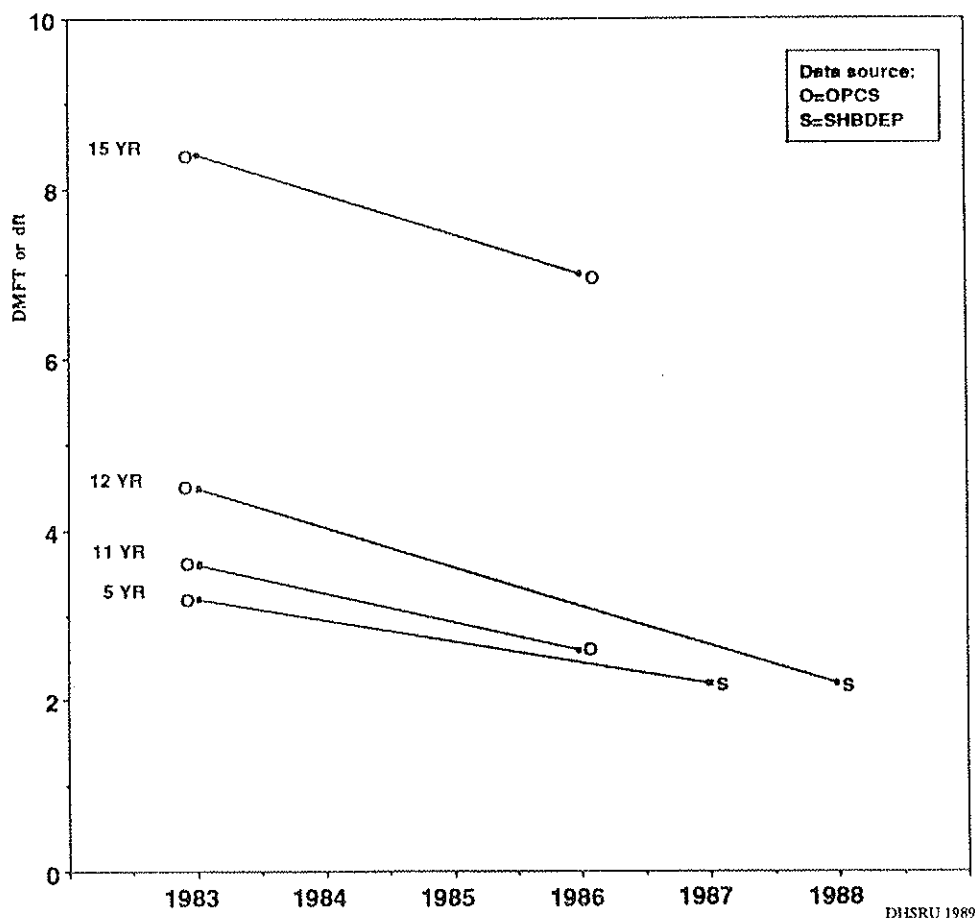


FIGURE 4. Mean caries scores for Scottish children



mean value for decayed, missing and filled teeth has halved during the 5 year period 1983-1988 (4.5 down to 2.2) whilst the average number of children remaining "free" of cavities and evidence of past caries experience has more than trebled (10% to 32%).

These improvements over time are illustrated for four different age groups of Scottish children in Figure 4, using data from the OPCS UK national survey of 1983 (Todd and Dodd 1985), from the OPCS survey of Scottish children's dental health in 1986 (Todd 1988) and from the two surveys so far conducted in this programme. This reduction in caries prevalence is consistent with that seen in many of the developed countries of the world over the last decade (Renson et al, 1985).

7.2 Dental Caries Experience by Health Board

The variation in caries experience between Health Boards is very marked (Figure 1). It is interesting to look at last year's results for 5 year olds alongside this year's results, as some Health Boards maintain a similar position vis a vis the rest of the country, whilst others show an improvement in their relative position, which raises the question of what happens to children between the ages of 5 and 12 in these areas to influence their dental health. Although there are significant differences between Health Boards at the extreme ends of the figure, it should be appreciated that the degree of precision associated with the mean values is such that this should not be interpreted as a definitive "league table".

7.3 The Proportion Caries Free in each Health Board

It must be underlined that, although we are witnessing substantial improvements in child dental health, this survey shows that, on average, more than two-thirds of our 12 year old children (68%) have suffered and are still suffering from a largely preventable dental disease. The "caries free" individuals tend to mask the amount of disease experienced by those with some dental caries. For these children with caries (DMFT>0) the mean value of DMFT is 3.29 which is surely unsatisfactory.

Vigilance must be maintained in the battle against dental caries and every effort made to increase the proportion of children who are free of dental caries. The dental health of Scottish children has historically been inferior to that achieved in England and Wales (Todd and Dodd, 1983) and there is recent evidence to show that this unfortunate state of affairs is continuing (Mellor et al, 1988).

7.4 Sites and Surfaces

The DFS (surface) values for each Health Board (Table B1) are (by definition) higher than the corresponding DFT (tooth) values (Table 3). These surface data provide a more detailed understanding of the actual amount of caries experienced by each child and the pattern of carious attack. Figure B3 reveals that most of the caries and fillings (51%) were found on the occlusal surfaces in contrast to the lower proportions affecting the other surfaces (of the order of 10-15%). If the pattern of attack on individual teeth is also examined (Figure B2), it becomes apparent that over three-quarters of present and past caries experience (77%) has affected the "6s" (or first permanent molars). Thus, strategies specifically aimed at preventing caries of occlusal surfaces in general and first permanent molars in particular (whilst at the same time seeking to keep operative intervention to a minimum) would seem to be strongly justified.

7.5 Sealants/Sealant Restorations

The provision of sealants to Scottish children showed a marked increase between 1983 and 1986 (Todd, 1988). Thirteen percent of 12 year olds had some sealants in 1983, whereas by 1986 37% of 11 year olds had some sealants (no figures are available for 12 year olds in 1986) and this survey now records a figure of 47% in 1988. The incorporation of item 6e, the sealant restoration (in four different guises), into the fee scale and the wider use of sealants by many dentists is leading to a very high proportion of occlusal surfaces presenting to the examiners as sealed. While the increased utilisation of this preventive item is welcomed, it complicates the interpretation of caries survey data. It is not possible, for example, for an examiner to differentiate between a sealed surface which was and remains sound and one which had suffered from a moderately sized carious cavity prior to the placement of a sealant restoration. The growing use of sealant restorations will tend to artificially depress conventional measures of caries experience. Comparison of the sealed 'surface' data with the sealed 'teeth' results (Table B1) indicates that, although in some cases more than one surface per tooth has been sealed, in the majority of cases sealants are restricted to single surfaces.

7.6 Oral Cleanliness and Periodontal Condition

The results obtained in this section of the examination will serve as a useful benchmark in providing local norms by which the status of children in smaller localities can be judged. They will also hopefully be of use in assessing the effectiveness of any future Health Promotion programmes which aim to improve oral hygiene practices at the community level.

Once again considerable variations between Health Boards are evident with mean plaque score values (0=minimum, 1=maximum) ranging from 0.15 to 0.5 (Table C1) whilst the mean number of the 6 index teeth with a CPITN score of 0 ranged from 3.73 to 5.60 (Table C2) although

some of this variation may be attributable to inter-examiner variability. The CPITN results for 12 year olds in Scotland as a whole compare quite favourably with the results for children from 38 countries which have been assessed using the same system (Pilot et al, 1987), although unfortunately data published at present refers only to slightly older age groupings.

7.7 Assessment of Orthodontic Condition

As increasing attention focuses upon the need to assess children's orthodontic status and their resultant treatment needs, the opportunity was taken to include in this year's programme the first large scale trial of a promising new Orthodontic Index (IOTN). This exercise was the first time that Community Dental Officers (rather than specialist orthodontists) had been used as examiners.

The details of this trial exercise are set out in Appendix D. The reproducibility achieved was disappointing when compared with that achieved previously by orthodontists. This may well be due to the Community Dental Officers' lack of familiarity with the definitions of some of the terms and assessments used in the Orthodontic Index. If these dentists are to become more proficient with this Index they may require more extended training sessions in smaller groups. Until further work has been completed to validate the widespread use of this Index, the overall results must be treated with some caution.

8. SUMMARY

The second stage of this programme has been successfully completed, thanks to the willing cooperation of a large number of people the length and breadth of Scotland. A total of 3,818 children from the 15 Health Boards have been examined by trained and calibrated examiners employing a standardised system of diagnosis.

The results for dental caries reveal substantial improvements in the dental health of 12 year olds since 1983. The average Scottish 12 year old

now has 2.23 decayed (cavitated), missing and filled teeth, although it must be appreciated that the range of means across the Health Board Areas is considerable (from 1.34 - 3.13). Similarly, while the weighted mean value for Scotland of the percentage of children with "no caries experience" (DMFT=0) is 32.2%, the range across the Health Boards is wide, from 20.7% - 47.2%.

The increase in the provision of sealants reflects increased efforts to provide preventive dental care and should be welcomed.

This year, when surveying an older age group, the programme has been expanded to include a wider assessment of dental health. It is hoped that the results of the oral cleanliness/periodontal condition assessments and the orthodontic assessments, taken together with the caries results, may prove to be of use in the planning and evaluation of dental health services in Scotland.

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Appendix A

TABLE A1. Calibration Results for caries data.

	Group			
	A	B	C	D
Number of dentists	11	10	10	9
Number of subjects	11	10	10	9
Decayed teeth				
Mean per dentist	0.273	1.900	5.900	1.444
Standard deviation	0.467	2.234	2.025	0.726
Coefficient of variation	1.711	1.176	0.343	0.503
Filled otherwise sound teeth				
Mean per dentist	14.182	18.800	12.600	21.111
Standard deviation	1.168	1.874	1.776	0.782
Coefficient of variation	0.082	0.010	0.141	0.037
Decayed, missing and filled teeth				
Mean per dentist	17.182	23.300	24.200	30.111
Standard deviation	2.272	2.669	1.549	1.900
Coefficient of variation	0.132	0.115	0.064	0.063

$$\text{Coefficient of variation} = \frac{\text{Standard deviation}}{\text{mean per dentist}}$$

TABLE A2. Intra-dentist agreement as assessed by the Dice Similarity Measure (value of 1 denotes perfect agreement and value of zero denotes no agreement).

Dentist	for decayed teeth	for filled teeth	no. of cases
1	0.67	1.00	4
2	1.00	1.00	6
3	no decay	1.00	4
4	1.00	1.00	7
5	1.00	1.00	17
6	1.00	1.00	16
7	1.00	1.00	4
8	1.00	1.00	6
9	0.75	1.00	6
10	1.00	1.00	6
11	no decay	1.00	9
12	1.00	1.00	9
13	1.00	0.97	10
14	1.00	1.00	7
15	0.92	0.97	12
16	0.80	1.00	10
17	1.00	1.00	9
18	no decay	0.99	32
19	1.00	1.00	4
20	0.86	0.98	11
21	1.00	1.00	5
22	no decay	1.00	7
23	1.00	1.00	11
24	1.00	1.00	7
25	no decay	1.00	11
26	0.00*	0.97	9
27	1.00	1.00	10
28	no decay	1.00	9
29	0.67	0.92	8
30	0.75	1.00	15
31	1.00	0.97	10
32	1.00	0.97	10
33	0.67	0.95	9
34	1.00	1.00	16
35	1.00	1.00	16
36	1.00	1.00	20
37	1.00	1.00	4
38	1.00	1.00	7
39	no decay	1.00	8

* only one decayed surface, recorded at only one of the two examinations

Appendix B

TABLE B1. Mean number of surfaces decayed (DS), filled (FS) and sealed (SS) per child for each Health Board.

(see Table 3 in main text for DMFT results)

Health Board	DS	FS	DFS	SS (ST*)
Argyll and Clyde	0.85	2.26	3.11	3.06 (2.34)
Ayrshire and Arran	0.40	3.20	3.60	2.04 (1.96)
Borders	0.40	1.92	2.32	1.09 (1.08)
Dumfries and Galloway	0.60	2.05	2.65	0.81 (0.72)
Fife	0.66	2.49	3.15	2.03 (1.95)
Forth Valley	0.58	2.66	3.24	1.51 (1.40)
Grampian	0.59	1.94	2.53	1.73 (1.65)
Greater Glasgow	0.85	2.59	3.44	2.36 (2.24)
Highland	0.58	2.21	2.79	3.47 (3.36)
Lanarkshire	0.71	3.41	4.12	1.78 (1.71)
Lothian	0.29	1.41	1.70	2.73 (2.65)
Orkney	0.08	1.79	1.87	1.36 (1.19)
Shetland	0.08	3.90	3.98	7.08 (6.59)
Tayside	0.35	2.33	2.68	3.00 (2.83)
Western Isles	0.72	3.35	4.08	0.89 (0.78)

* Value for sealed teeth (ST) given to enable comparison with number of surfaces sealed.

FIGURE B2. Distribution of caries experience by tooth

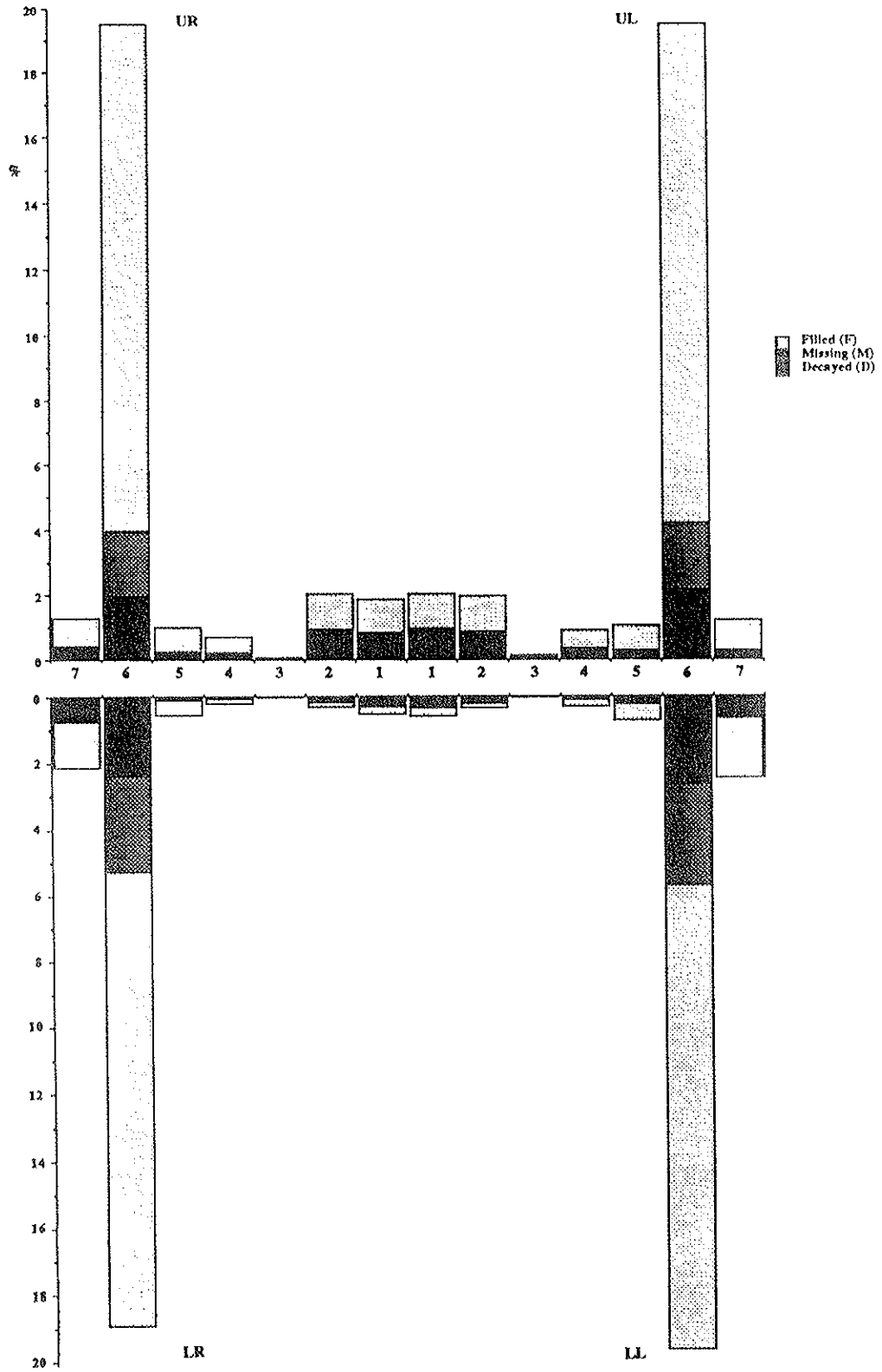
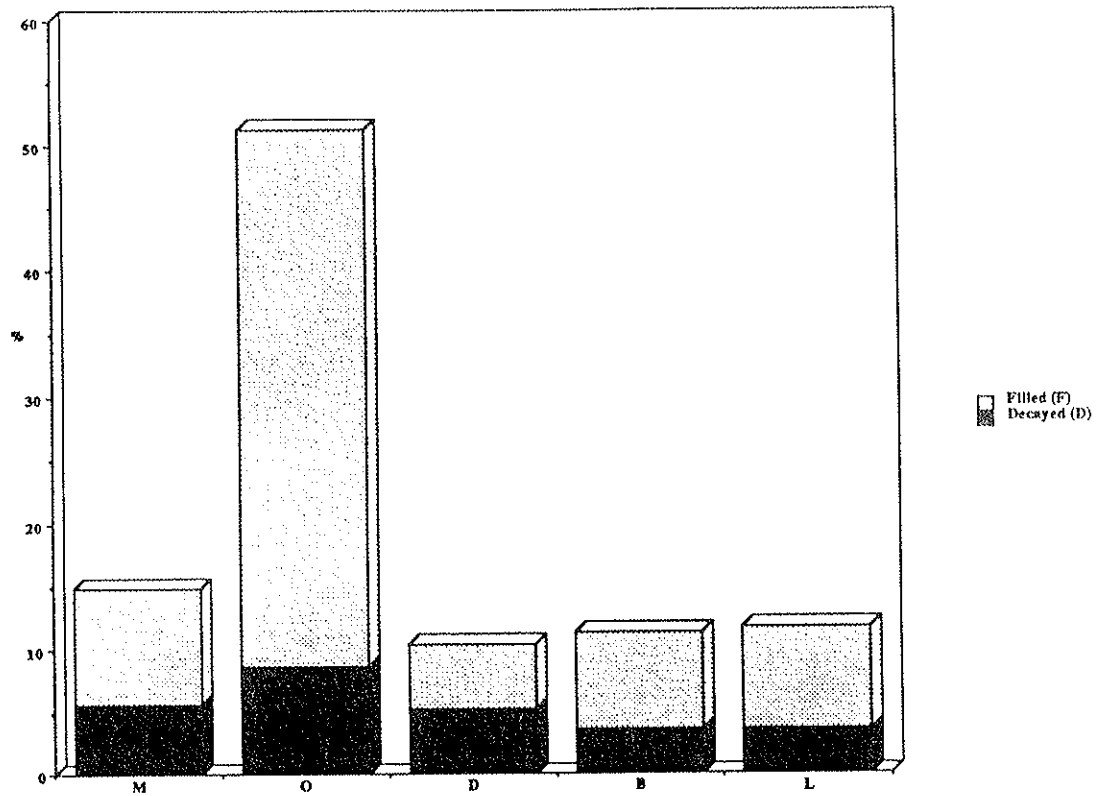


FIGURE B3. Distribution of caries experience by tooth surface



Appendix C

TABLE C1. Mean plaque scores and distribution of total plaque scores.

Health Board	Mean	s.d.	% of persons with each total plaque score							Valid cases
			0	1	2	3	4	5	6	
Argyll and Clyde	0.26	0.31	45	17	13	8	8	6	4	218
Ayrshire and Arran	0.50	0.36	20	11	12	13	13	16	14	307
Borders	0.24	0.28	45	20	11	9	10	4	3	114
Dumfries and Galloway	0.34	0.33	31	19	18	11	6	12	4	112
Fife	0.28	0.33	43	16	14	9	9	2	7	217
Forth Valley	0.29	0.33	42	18	13	9	7	7	4	166
Grampian	0.23	0.26	42	23	13	13	5	3	2	288
Greater Glasgow	0.41	0.35	28	15	13	13	12	11	8	493
Highland	0.37	0.35	31	15	14	13	15	6	6	159
Lanarkshire	0.39	0.33	25	18	18	13	10	8	8	478
Lothian	0.29	0.31	37	16	17	11	9	5	4	514
Orkney	0.15	0.19	52	24	13	8	3	0	0	95
Shetland	0.29	0.28	32	21	19	12	10	4	3	318
Tayside	0.38	0.32	23	20	21	12	9	10	5	221
Western Isles	0.37	0.30	26	14	21	22	10	4	3	116
SCOTLAND (weighted values)	0.34		33	17	15	12	9	8	6	

Each index tooth recorded as 0 no plaque, or 1 plaque.

$$\text{Mean score} = \frac{\text{total for recorded index teeth}}{\text{number of index teeth}}$$

Index teeth UR6, UR1, UL6, LR6, LL1, LL6 - no substitution if index tooth not present.

Percentages may not add to 100 due to rounding errors.

TABLE C2. CPITN - distribution of highest score and mean number of index teeth with each score.

Health Board	% of persons who have as highest score					Mean number of index teeth with			Valid cases
	0	1	2	3	4	0	1	2	
Argyll and Clyde	55	37	8	1	1	4.71	0.95	0.12	218
Ayrshire and Arran	51	21	28	0	0	4.96	0.61	0.33	307
Borders	33	28	32	7	0	4.51	0.85	0.50	114
Dumfries and Galloway	48	30	21	2	0	4.86	0.47	0.39	112
Fife	55	29	15	1	0	4.46	1.09	0.19	218
Forth Valley	27	46	22	5	0	3.89	1.40	0.36	166
Grampian	46	32	12	10	1	4.44	1.00	0.34	288
Greater Glasgow	35	49	15	1	0	3.87	1.55	0.21	494
Highland	27	55	18	0	0	3.73	1.87	0.21	159
Lanarkshire	40	31	27	2	0	4.40	0.76	0.52	478
Lothian	34	43	22	1	0	4.36	1.17	0.31	514
Orkney	94	6	0	0	0	5.60	0.08	0.00	95
Shetland	57	3	40	0	0	5.03	0.07	0.69	318
Tayside	33	47	17	3	0	4.24	1.28	0.24	221
Western Isles	89	10	2	0	0	5.43	0.11	0.02	116
SCOTLAND (weighted values)	41	38	19	2	0	4.34	1.11	0.30	

Percentages may not add to 100 due to rounding errors.

Appendix D

Assessment of Orthodontic Treatment Need

Two recently introduced measures were used in assessing the orthodontic condition of the children. The first, IOTN - the dental health component, was a measure of the need for treatment, which was recorded on a scale from 1 to 5 with 1 indicating little or no need and 5 indicating a severe malocclusion requiring attention. The second measure, SCAN - the aesthetic component, used an illustrated 10 point scale to assess the aesthetic impairment of the individual, with 1 indicating no impairment and 10 indicating severe impairment.

Table D1 outlines the methodology in greater detail. (It was found that Clinical Community Dental Officers new to the system took considerably longer than the 1-2 minutes recorded for the orthodontists who developed the system).

Table D2 presents the orthodontic results from the calibration exercises. The results for the IOTN assessments were disappointing, with a minority of the results achieving what could be termed "moderate agreement" (Landis and Koch, 1977). The reproducibility of the SCAN assessments was more encouraging for 3 out of the 4 groups of children. These calibration results, representing the best efforts of a group of dental officers new to the system, mean that interpretation of the results obtained for the orthodontic assessments must be made with some considerable caution.

Table D3 sets out the IOTN results for each Health Board and appears to show that the most common categories were '2' and '3'.

Table D4 presents the SCAN results for each Health Board. It is apparent that, generally, the children gave themselves a less severe score for aesthetic impairment than did the dental examiners and that the majority of children were assessed as being in the SCAN 2, 3 and 4 categories.

TABLE D1.

THE ASSESSMENT OF ORTHODONTIC TREATMENT NEED IN 12 YEAR OLD SCOTTISH SCHOOL CHILDREN

The Index of Treatment Need has been developed to measure the need for orthodontic treatment.

It aims to rank malocclusion in terms of dental health need and socio-psychological well being.

The Index identifies those individuals who would benefit most from orthodontic treatment.

The Index of Treatment Need (IOTN) has two components:-

- 1) Dental Health
- 2) Aesthetic

1) Dental Health Component

This component records the various occlusal traits of a malocclusion which would increase the morbidity of the dentition and surrounding structures.

There are five grades, grade 1 represents a negligible need for treatment, while grade 5 indicates a high priority for treatment. A ruler which measures overjet, overbite displacement and other features is used to determine the grade. The highest scoring trait is recorded, and this describes the priority for treatment for a particular case.

2) Aesthetic Component

The aesthetic component is recorded using the Standardised Continuum for Aesthetic Need (SCAN). This is a scale of ten photographs showing different levels of dental attractiveness. The dental attractiveness of an individual can be rated with reference to this scale.

Grade 1 represents the most attractive arrangement of teeth.

Grade 10 represents the least attractive arrangement.

The dental attractiveness is recorded by both the dentist and patient.

It takes in the order of 1-2 minutes to record the Dental Health and Aesthetic component.

REFERENCES

- Brook P.H. & Shaw W.C.
The development of an index of orthodontic treatment priority.
European Journal of Orthodontics. In Press.
- Evans R.M. & Shaw W.C.
Preliminary evaluation of an illustrated scale for rating dental attractiveness.
European Journal of Orthodontics. 9: 314-318, 1987.

TABLE D2. Inter-examiner variability in orthodontic assessments.

	Group			
IOTN	A	B	C	D
range of Kappa values	-0.14 to 0.76	-0.25 to 0.84	-0.15 to 0.66	-0.16 to 0.69
% of Kappa values above 0.41 (i.e. moderate agreement and above)*	11/55 = 20%	4/45 = 9%	13/45 = 29%	9/36 = 25%
SCAN				
range of values of Pearson's correlation coefficient	0.18 to 0.97	0.12 to 0.91	-0.19 to 0.88	0.28 to 0.98
% of values statistically significant ($p < 0.05$) i.e. Pearson's $r > 0.55$	40/55 = 72.7%	30/45 = 66.7%	19/45 = 42.2%	32/36 = 88.9%

* Landis and Koch, 1977

TABLE D3. Index of orthodontic treatment need - percentage of children in each category.

Health Board	% in category					Valid cases
	1	2	3	4	5	
Argyll and Clyde	10	33	29	13	15	218
Ayrshire and Arran	4	40	21	10	25	307
Borders	8	23	26	16	27	113
Dumfries and Galloway	3	37	26	13	21	112
Fife	4	31	21	15	29	218
Forth Valley	4	25	34	11	26	165
Grampian	6	20	33	29	11	288
Greater Glasgow	9	32	25	14	19	494
Highland	2	18	35	15	31	159
Lanarkshire	4	33	30	18	15	474
Lothian	11	32	30	21	7	514
Orkney	13	33	27	5	22	95
Shetland	14	28	15	10	33	318
Tayside	1	29	29	22	20	221
Western Isles	8	49	22	22	0	116

Percentages may not add to 100 due to rounding errors.

TABLE D4. Percentage of children in each SCAN category, as assessed by the dentists (D) and by the child (C).

Health Board		% in each category										Valid cases
		1	2	3	4	5	6	7	8	9	10	
Argyll and Clyde	D	6	19	22	26	10	8	2	5	1	0	218
	C	11	23	29	17	8	5	4	2	1	0	"
Ayrshire and Arran	D	1	9	12	16	17	8	17	10	8	3	307
	C	13	27	27	16	5	4	2	4	2	0	"
Borders	D	11	25	12	14	10	7	11	6	3	1	113
	C	6	33	33	15	6	1	1	3	3	0	114
Dumfries and Galloway	D	3	17	22	21	6	10	9	7	5	0	112
	C	8	28	28	21	9	3	3	1	1	0	"
Fife	D	4	18	17	22	13	10	6	6	3	1	218
	C	19	30	24	11	4	3	2	3	2	1	"
Forth Valley	D	2	19	15	19	19	12	6	5	2	1	165
	C	5	19	33	24	8	5	1	4	1	1	166
Grampian	D	4	14	14	17	16	12	12	8	4	1	288
	C	8	23	31	19	9	4	2	2	1	1	"
Greater Glasgow	D	8	23	23	17	6	9	6	6	1	0	493
	C	18	22	25	13	7	6	2	3	3	1	494
Highland	D	2	13	17	29	11	11	11	6	1	0	159
	C	4	21	31	20	10	4	3	5	1	1	"
Lanarkshire	D	5	25	24	22	8	8	3	4	1	0	478
	C	8	21	32	18	9	5	2	3	2	0	477
Lothian	D	5	21	16	20	9	14	8	5	2	0	514
	C	18	26	28	9	6	5	2	4	2	0	"
Orkney	D	1	17	21	44	6	2	1	7	0	0	95
	C	13	23	31	21	5	2	2	2	1	0	"
Shetland	D	20	28	14	15	7	5	3	4	3	1	318
	C	13	25	34	12	5	4	2	3	2	0	"
Tayside	D	2	20	23	24	10	10	5	5	1	1	221
	C	19	24	28	8	5	6	1	5	3	1	"
Western Isles	D	3	19	29	21	9	5	3	7	5	0	116
	C	11	22	35	14	7	3	4	3	3	0	"

Percentages may not add to 100 due to rounding errors.

SCOTTISH HEALTH BOARDS' DENTAL EPIDEMIOLOGICAL PROGRAMME

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ERRATUM. Figure B3 on page 16 shows distribution of caries experience by tooth surface for all dentition present. The key to figure B3 should read

- Filled (F+f)
- Decayed (D+d)

The figure for permanent dentition only is given below.

