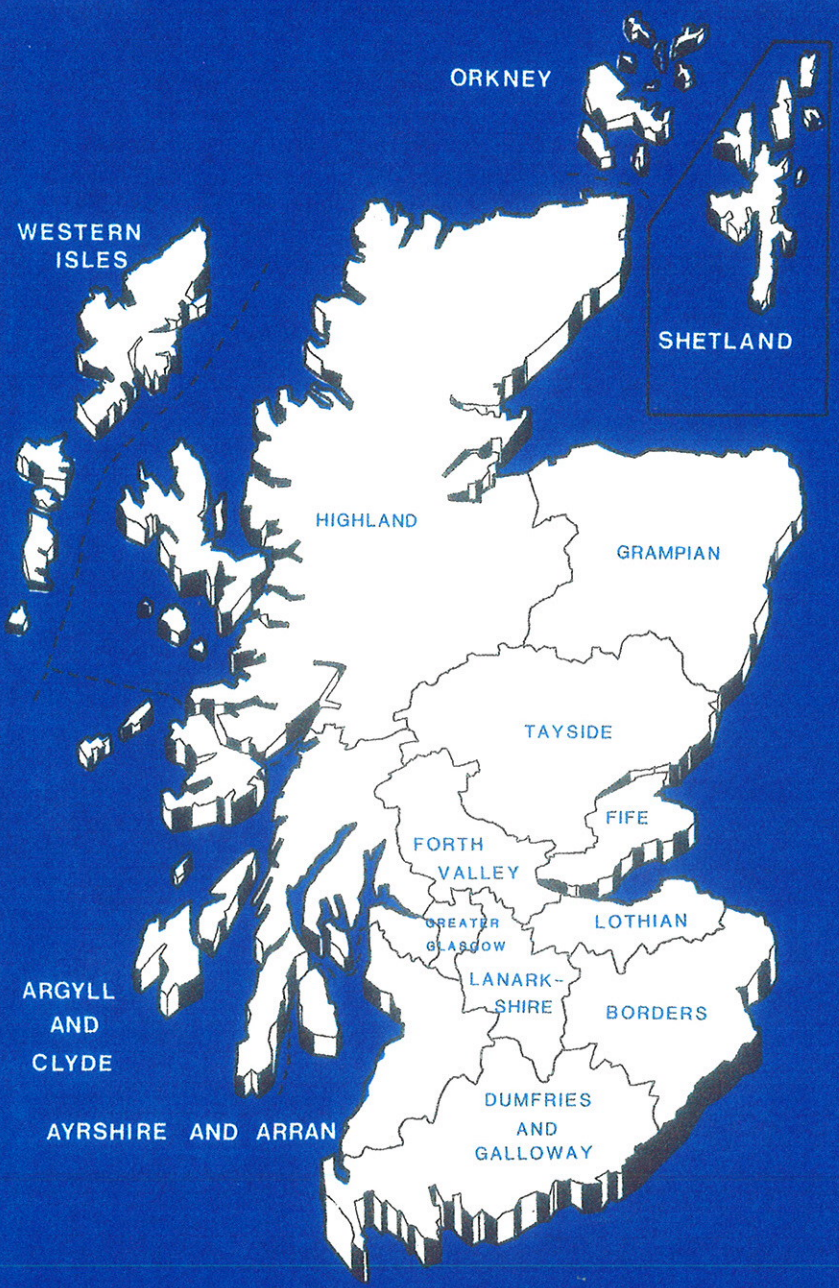
SCOTTISH HEALTH BOARDS' DENTAL EPIDEMIOLOGICAL PROGRAMME

a joint venture between



1992/93 REPORT

Prepared by the
Dental Health Services Research Unit
University of Dundee

SCOTTISH HEALTH BOARDS' DENTAL EPIDEMIOLOGICAL PROGRAMME
REPORT OF THE 1992/93 SURVEY OF TWELVE YEAR OLD CHILDREN

Executive Summary

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Background

The Scottish Health Boards' Dental Epidemiological Programme (SHBDEP) is a joint venture between all fifteen Health Boards (represented through the Scottish Committee of Chief Administrative Dental Officers) and the Chief Scientist Office's Dental Health Services Research Unit based at the University of Dundee. Standardised surveys are undertaken on randomly selected samples of children across Scotland using the criteria and timetable agreed by the British Association for the Study of Community Dentistry (BASCD). This enables Boards to compare their own results with those of Scotland and with other parts of the United Kingdom. The significant changes in contractual arrangements for dental primary care made in 1990, together with current reviews of dental services, make monitoring disease levels and patterns of care particularly important at this time.

Aim

The aim of this year's survey was to determine current levels of tooth decay (dental caries) in 12 year olds in Scotland; these results are summarised below. At the same time information was collected on dental sealants, oral cleanliness, developmental defects of enamel and dental erosion from this large, representative, national sample. Details of these other aspects can be found in the full Report.

Key Results

- *Dental caries experience (DMFT) for Scotland*: The overall result of a mean number of Decayed (D), Missing (M) and Filled (F) Teeth (T) per child of 2.1 is somewhat disappointing as it is very similar to the value recorded for Scotland's 12 year olds four years ago (2.2) and is still higher than the means reported in 1988 for most parts of England. The map opposite (Appendix J of the Report) shows the variation in the distribution of caries experience across Scotland.

- *Dental caries experience (DMFT) for individual Health Boards*: Figure 1, opposite, shows the mean DMFT for each Health Board and the 95% confidence intervals associated with each mean. The size of the error bars indicate the extent to which Figure 1 can be interpreted as a league table; differences falling within the limits of the error bars are not statistically significantly different from one another.

- *The proportion "with caries experience" and the pattern of attack*: 64% of 12 year olds were found to have already experienced dental decay at the "caries into dentine" level of detection (that is decay penetrating beyond the enamel surface of teeth). Most of the dentinal caries was confined to the first permanent molars. Half of the decay and fillings (49%) was found on the occlusal (or biting) surfaces.

- *Trends over time*: The trend seen previously for large reductions in caries levels appears to have come to an end. Current results reinforce similar findings from last year's survey of 5 year olds. The slight reduction in mean DMFT masks changes in the components of the Index. Decay (D) appears to have risen, but this is due to changes in the criteria for measuring decay introduced this year by BASCD. When these are taken into account, there has been no significant change in the percentage of children with decayed teeth over the four years. The mean MT component has stayed around the same level (0.2) but the FT component has fallen from 1.6 to 1.0. Thus the relative amount of restorative care provided (FT / DMFT, the "Care Index") has fallen.

- *Uneven distribution of decay*: It must be appreciated that a minority of children (39%) have all of the decayed teeth and that small groups of children have very high disease levels. Half of the untreated decay can be found in just 7% of the children. This has implications for the targeting of services at these high caries-risk individuals.

More detailed information is available in the full Report. Copies can be obtained from the Dental Health Services Research Unit, Dental School, Park Place, Dundee DD1 4HR. For local information please contact the Chief Administrative Dental Officer of the relevant Health Board.

EXECUTIVE SUMMARY

Mean DMFT* results for Scotland by Health Board 1992/93

(* D = caries into dentine)

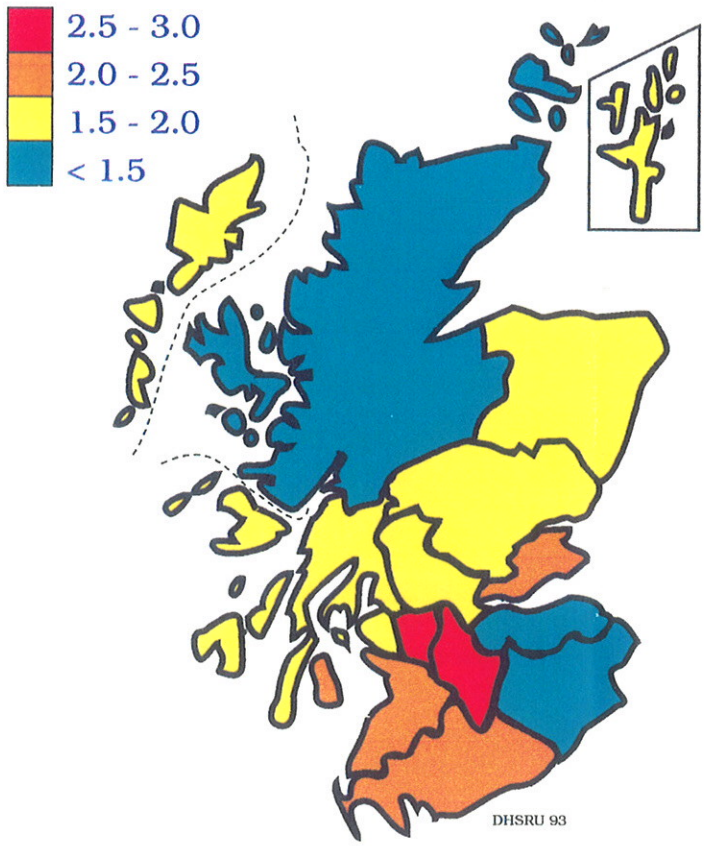
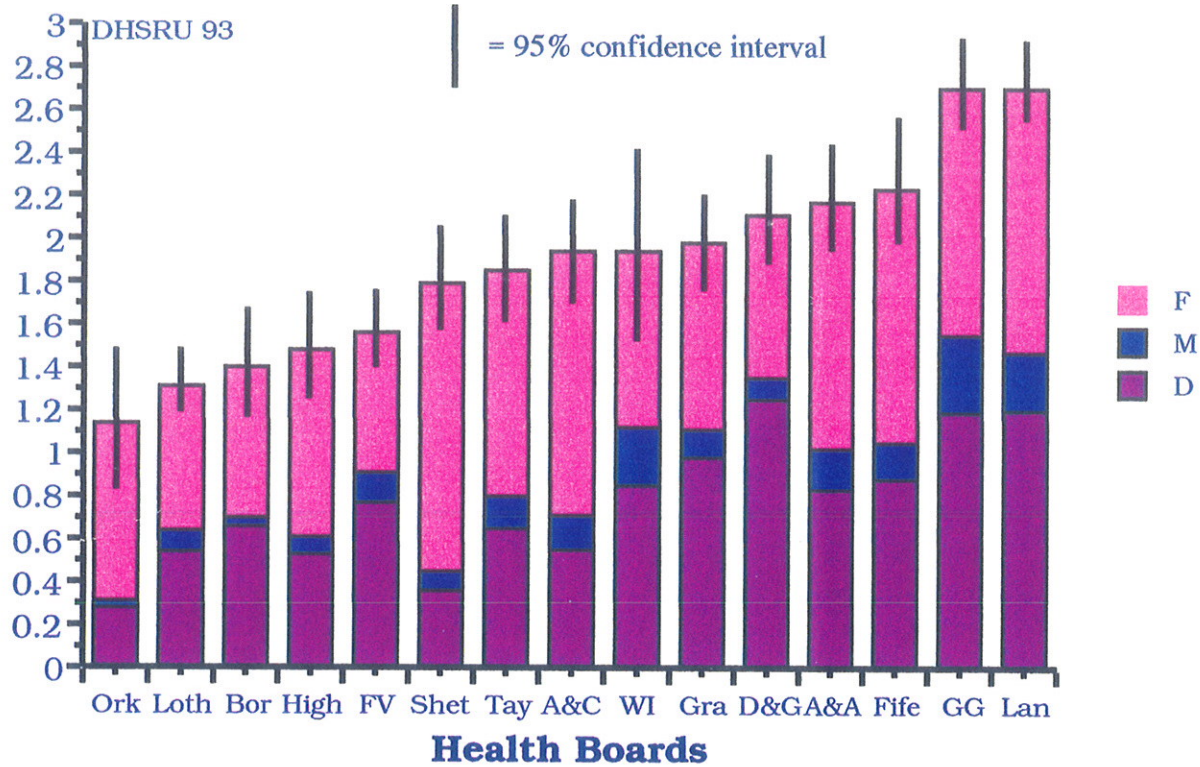


Figure 1. Mean number of Decayed, Missing and Filled teeth (DMFT) per child for each Health Board.



The Programme

This programme of surveys is undertaken under the auspices of the **Scottish Committee of Chief Administrative Dental Officers** (CADOs) and is a joint venture between all fifteen Scottish Health Boards and the Chief Scientist Office's Dental Health Services Research Unit based at the University of Dundee.

The results contained in this report have been obtained as a result of the unstinting efforts of a large team of people from all over Scotland to whom the organisers are very grateful. Appendix A lists the participants.

Participating Health Boards

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

Co-ordinating Committee - Dental Epidemiology, Scotland

Mr. T.R. Watkins*	(Co-ordinator)
Professor N.B. Pitts*~	(Calibration and Results Co-ordinator)
Mr. M.C.W. Merrett	(Calibration Course Organiser)
Professor K.W. Stephen	(Adviser)

** Regional Co-ordinators for British Association for the Study of Community Dentistry (BASCD) caries prevalence studies in Scotland.*

~Scientific Co-ordinator, BASCD UK Dental Epidemiological Programme.

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1. INTRODUCTION

This Report has been prepared for those interested in the detailed dental results of the 1992/93 survey. Readers seeking only a brief overview are referred to the Executive Summary. Key results and discussion are included in the body of the Report whilst further analyses and results can be found in the Appendices.

This is the second survey of the dental health of 12 year old children in Scotland which has been undertaken in the Scottish Health Boards' Dental Epidemiological Programme (SHBDEP) - a programme of annual dental surveys based on the core guidelines provided by the British Association for the Study of Community Dentistry (BASCD) (Palmer et al, 1984; Dowell & Evans, 1988; Pitts, 1993). The programme is organised, via the Scottish Committee of Chief Administrative Dental Officers (CADOs) by the Dental Health Services Research Unit (DHSRU) at the University of Dundee, as a joint venture with the fifteen Health Boards.

Standardised series of surveys are undertaken on randomly selected children across Scotland using the core criteria and timetable for age groups agreed by the British Association for the Study of Community Dentistry. This programme enables individual Boards to compare their results with those of Scotland as a whole and with other parts of the United Kingdom. The significant changes in the contractual arrangements for primary dental care made in 1990, combined with current reviews, make the monitoring of disease levels and patterns of care particularly important at this time.

The purpose of this year's survey was to determine current levels of tooth decay (dental caries) in 12 year olds in Scotland. At the same time information was collected on: dental sealants; oral cleanliness; developmental defects of enamel; and dental erosion from this large, representative, national sample.

2. SAMPLING

Detailed instructions, based on the BASCD guidelines, were sent to all Health Boards in the summer of 1992 to enable each Health Board to identify the number of schools required to obtain the target representative sample of a minimum of 5 - 7.5% of all Secondary I schoolchildren.

The smaller Health Boards were encouraged to use larger samples to ensure that reasonable numbers would be available for inter-Health Board comparisons.

3. TRAINING AND CALIBRATION

The training and calibration courses for this survey of 12 year olds were held in Perth immediately prior to the survey examinations. The courses were organised by Mr MCW Merrett in conjunction with the Dental Health Services Research Unit who provided the training and calibration elements. Appendix B gives details of these courses along with the results of this year's calibration for dental caries and fillings (Table B1).

4. DENTAL EXAMINATIONS

The examinations took place in November and December 1992. Table 1 shows the number of children examined in each Health Board. 5344 children, representing 8.5% of the Secondary I population, were examined. During the course of the survey examinations 10% of the sample were randomly selected for re-examination to assess intra-dentist agreement (see Appendix B, Table B2).

In order to adhere to BASCD guidelines and international epidemiological criteria, figures for D (decay) only record dental decay (caries) which clinically appears to have reached dentine. Less severe forms of caries, such as decay confined to the enamel, are recorded as "sound".

In previous surveys only dental caries which had progressed sufficiently to produce a cavity into dentine was recorded.

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

Health Board	Sample	Examined	Examined as % of population	Secondary I population
Argyll and Clyde	392	341	6.0	5655
Ayrshire and Arran	365	318	6.4	4969
Borders	249	216	19.1	1132
Dumfries and Galloway	311	287	16.0	1793
Fife	329	266	6.0	4399
Forth Valley	492	431	12.7	3388
Grampian	408	365	5.8	6345
Greater Glasgow	862	732	6.7	10953
Highland	272	232	7.7	3025
Lanarkshire	845	741	9.4	7860
Lothian	612	543	7.1	7678
Orkney	134	126	46.7	270
Shetland	341	322	86.8	371
Tayside	324	288	6.3	4554
Western Isles	153	136	34.3	397
Totals	**6089**	**5344**	**8.5**	**62789**

However, changes in the manifestation of dental decay have necessitated a subtle alteration to the definition of dentinal "decay" for the purposes of BASCD compatible surveys - if, in the opinion of a trained examiner, a surface has decay into dentine (regardless of whether there is a cavity) such a surface will now be coded as decayed. The impact of this change in the criteria, which has been introduced by BASCD across the UK for the year 1992/93, is examined in Appendix C.

5. DATA PROCESSING

The design of the form used for recording the examinations allows rapid computer entry of the data by keyboard operators. Data processing, analysis and reporting was undertaken by the Dental Health Services Research Unit.

6. RESULTS

For ease of reference, key results tables and figures relating to dental caries are included in the main text. More detailed caries results are to be found in Appendix D. All results relate to the permanent dentition only.

Results tables and figures relating to oral cleanliness, developmental defects of enamel and erosion can be found in Appendices E, F and G respectively.

6.1 Dental Caries Results for Scotland

Table 2 shows the overall results for decayed (D), missing (M) and filled (F) permanent teeth along with information relating to the presence of sealants and sealant restorations.

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

	Weighted mean	Range of means for individual Health Boards
age (in years)	12.24	12.20 - 12.31
"sound" teeth (G)	19.37	16.61 - 20.69
"sound" plus sealed teeth (G, $)	21.51	20.86 - 22.27
sealants and sealant restorations ($, N)*	2.16	1.20 - 5.16
decayed teeth (D)	0.87	0.28 - 1.25
missing teeth (M)	0.19	0.03 - 0.36
filled teeth (F)	1.01	0.65 - 1.34
DFT (D+F)	1.88	1.11 - 2.43
DMFT (D+M+F)	2.08	1.14 - 2.70
	%	**Range for Health Boards**
With "zero caries" DFT=0	37.9	26.6 - 51.6
With "caries experience", DMFT>0	63.6	49.2 - 74.8
With "decay", D>0	39.1	16.7 - 54.7
% of children with 1 or more sealants/sealant restorations*	59.2	35.6 - 79.8

** Teeth with N or $, otherwise sound .*
Note: Decay is recorded at the visual evidence of caries into dentine threshold.

Table 2 also gives three different ways of dividing the sample according to their past caries (into dentine) experience. Firstly an overall value for the proportion with "zero caries" (DFT = 0) is given. This is a measure which was defined by the Scottish CADOs in 1986 and is used by many Health Boards in the collection of local data.

Secondly, the revised BASCD measure of the proportion of children "with caries experience" (DMFT > 0) is given. (It should be noted that in the previous SHBDEP report of 12 year olds (1988/89) the figure quoted was the proportion of children "with **no** caries experience", DMFT = 0.) This figure will allow comparison of the results with the 1992/93 surveys of 12 year olds conducted in England and Wales. Finally, the results are expressed as "with current decay" (D > 0) which reflects the proportion of children who had untreated decay into dentine at the time of the survey examinations.

6.2 Dental Caries Experience by Health Board

Table 3 shows the dental caries results for each Health Board. It gives a measure of the total caries experience, DMFT, a breakdown of the figures for its constituent elements and for the percentages with DFT = 0 and DMFT > 0. Figure 1 shows the mean DMFT values for each Board and the 95% confidence intervals associated with each mean. The size of these vertical error bars indicates the extent to which Figure 1 can be interpreted as a league table; differences which do not fall outside the limits of the error bars are not statistically significant.

Although statistically significant differences are evident between the left, middle and right of the figure, care should be exercised to avoid giving too much weight to small differences between Boards which are nearly adjacent in the figure.

TABLE 3. Mean values per child for decayed (D), missing (M) , filled (F) and sealed ($) teeth; percentage with "zero caries" (DFT=0) and "caries experience" (DMFT>0). [D defined as caries into dentine].

Health Board	D	M	F	DFT	DMFT	%DFT=0	%DMFT>0	$
Argyll and Clyde	0.55	0.16	1.23	1.78	1.94	41.1	61.3	1.73
Ayrshire and Arran	0.83	0.19	1.15	1.99	2.18	34.0	67.9	1.45
Borders	0.66	0.04	0.70	1.36	1.40	45.4	55.1	1.51
Dumfries and Galloway	1.25	0.10	0.76	2.01	2.12	30.3	70.7	1.26
Fife	0.88	0.17	1.18	2.06	2.23	36.8	64.3	2.23
Forth Valley	0.77	0.14	0.65	1.42	1.56	44.1	58.5	2.99
Grampian	0.98	0.13	0.87	1.85	1.98	38.9	62.2	1.20
Greater Glasgow	1.19	0.36	1.15	2.34	2.70	31.0	70.5	1.97
Highland	0.53	0.08	0.87	1.40	1.48	49.6	51.3	3.23
Lanarkshire	1.20	0.27	1.23	2.43	2.70	26.6	74.8	2.61
Lothian	0.54	0.10	0.67	1.21	1.31	50.8	50.5	2.44
Orkney	0.28	0.03	0.83	1.11	1.14	51.6	49.2	2.22
Shetland	0.36	0.09	1.34	1.70	1.80	41.3	59.6	5.14
Tayside	0.65	0.15	1.05	1.69	1.84	39.6	62.5	2.44
Western Isles	0.85	0.27	0.82	1.67	1.94	47.8	55.1	2.86

FIGURE 1. Mean number of decayed, missing and filled teeth (DMFT) per child, for each Health Board.

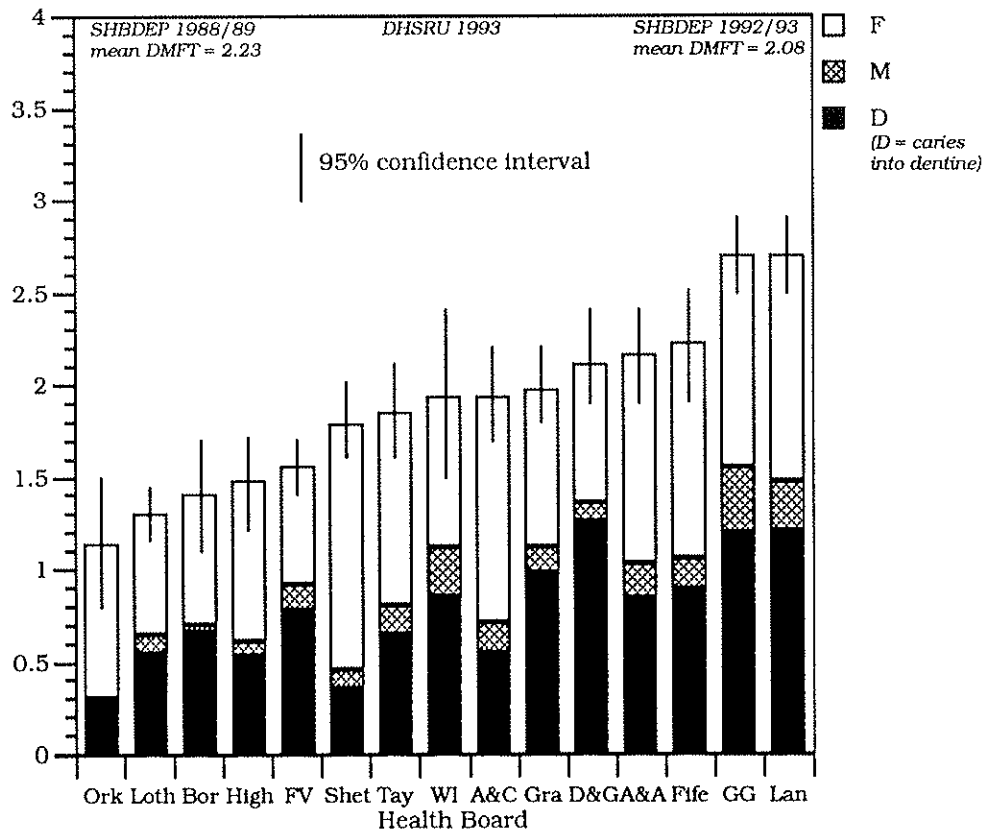
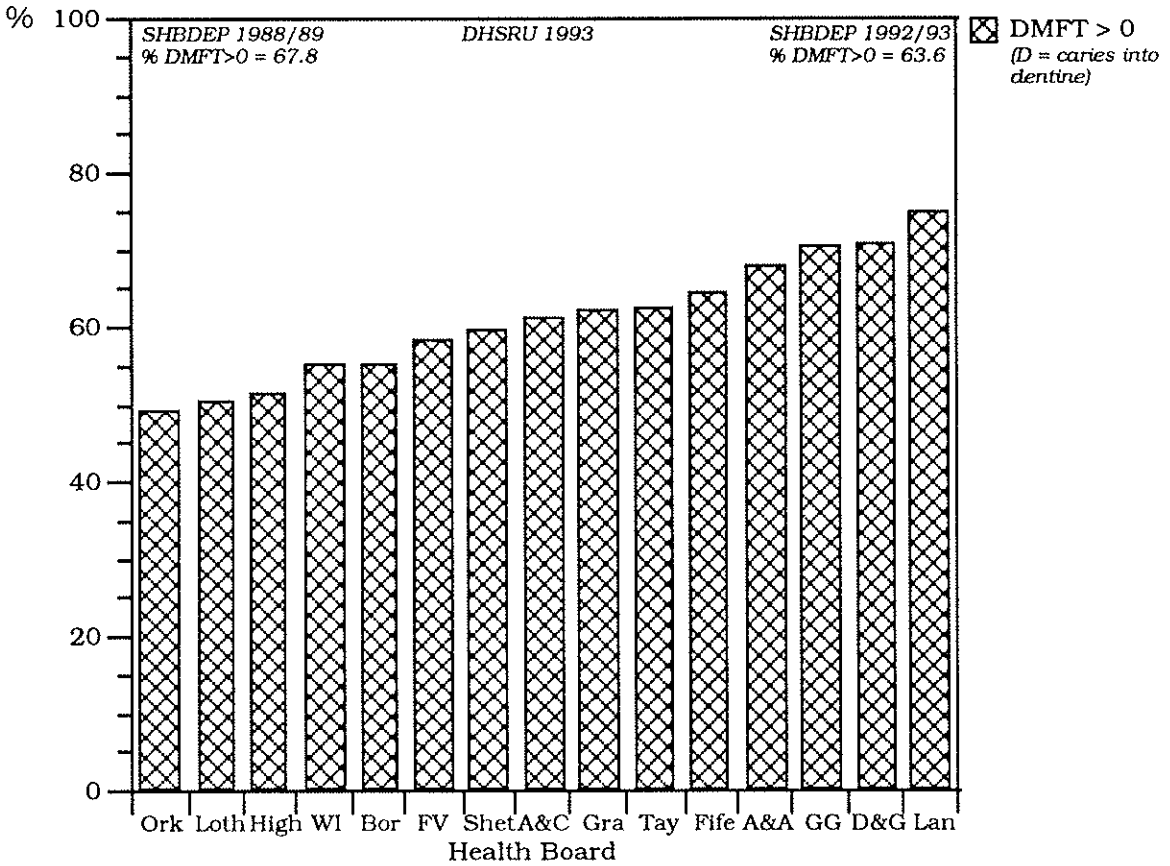


FIGURE 2. Proportion of children "with caries experience", DMFT > 0, in each Health Board.



6.3 The Proportion "With Caries Experience" in each Health Board

Figure 2 shows the proportion of 12 year olds in each Health Board "with caries experience" of the permanent dentition. Overall, 64% of twelve year olds were found to have already experienced dentinal decay, fillings or extractions.

6.4 Teeth and Surfaces

Figure 3 shows the distribution of caries experience by tooth. It can be seen that the first permanent molars (6s) have suffered the majority of the caries experience. The results for each Health Board, broken down to the tooth surface as the unit of measurement, are given in Appendix D, which also includes results relating to trauma.

Table D1 details the mean number of decayed, missing or filled surfaces, along with the number of surfaces with sealants or sealant restorations. Table D2 gives the distribution of decay by tooth surface (mesial, occlusal, distal, buccal and lingual) with Figure D1 giving a graphical representation of the caries experience (D and F) by surface.

6.5 Trends in Caries Prevalence

Figure 4 shows the trends in caries prevalence between 1983 and 1993 for 5, 12 and 14 year old Scottish children. The overall level of decay experience (DMFT) has been decreasing for 12 year olds since 1983, but it is evident that this improvement is slowing down. The additional point on the figure represents an estimate of what the 1992 DMFT would have been if the 1988 criteria had been used (see Appendix C).

FIGURE 3. Distribution of caries experience (DMF) by tooth.

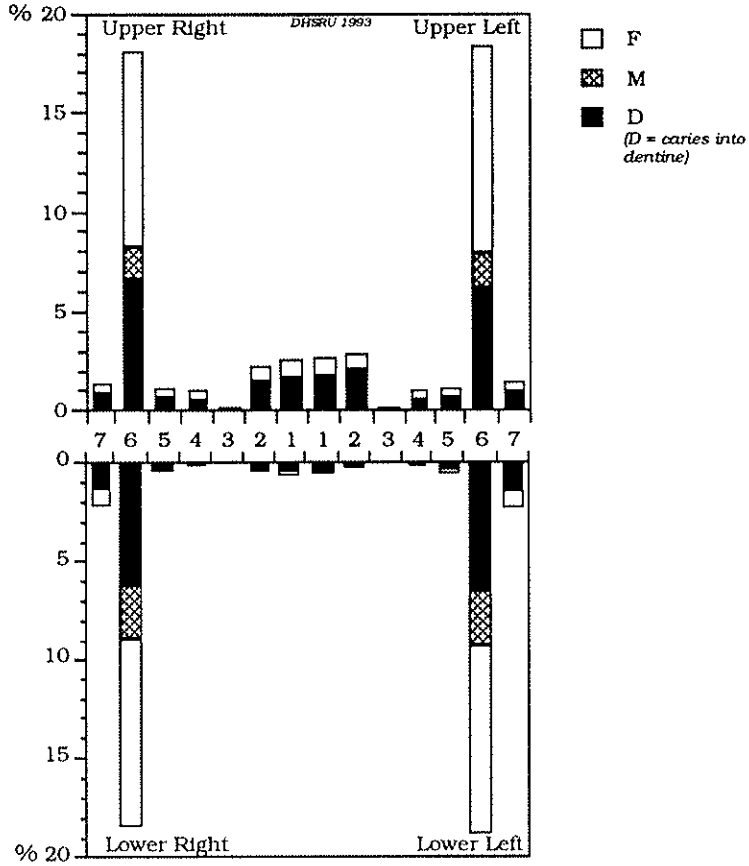


FIGURE 4. Trends in caries prevalence for Scottish children, 1983 - 1993.

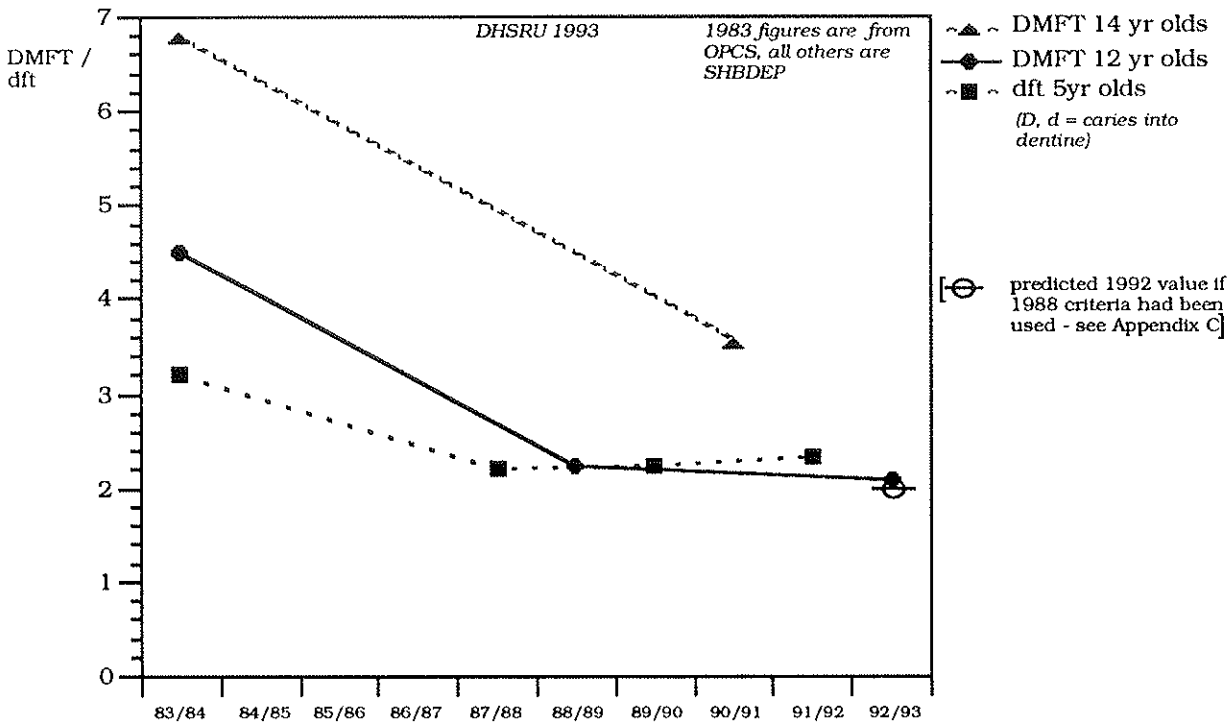
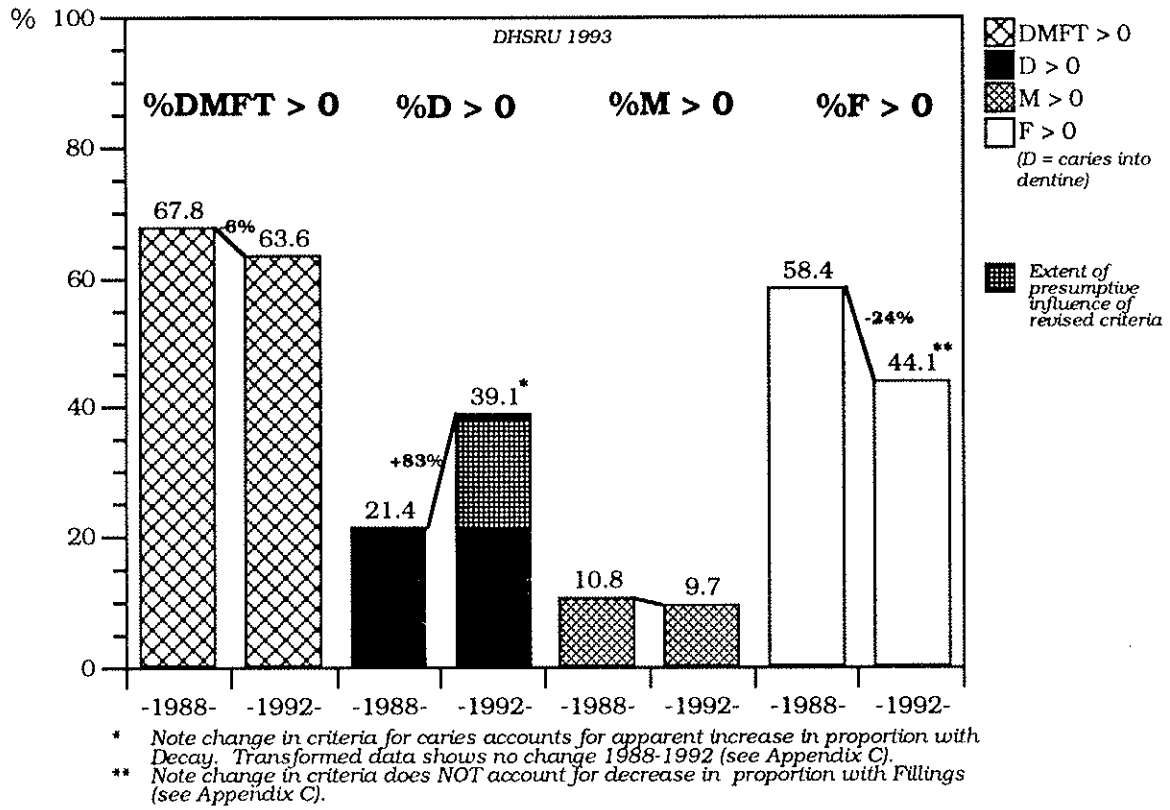


FIGURE 5. Trends in the proportion of 12 year old children "with caries experience" and its components, 1988-1992.



Overall, the mean DMFT has reduced very slightly since 1988 (2.08 vs 2.23), but this marginal fall masks changes in the individual components of the index. The mean value for decayed teeth (D) appears to have risen sharply, but the rise is likely to be due to changes in the criteria for measuring D, introduced this year by BASCD. When these are allowed for, the change has been modest and negative (see Appendix C). The mean missing (M) component has also stayed at approximately the same level (around 0.2), but the filled (F) component has fallen to 1.01 in 1992/93 from 1.60 in 1988/89.

Figure 5 depicts the relative changes in the proportion of children with caries experience. The % DMFT > 0 is slightly reduced, but the key change has been the reduction in the proportion with filled teeth (-24%). The apparent rise in the %D > 0 is accounted for by the change in criteria (see Appendix C).

TABLE 4. Skewed distribution of decay. [D defined as caries into dentine].

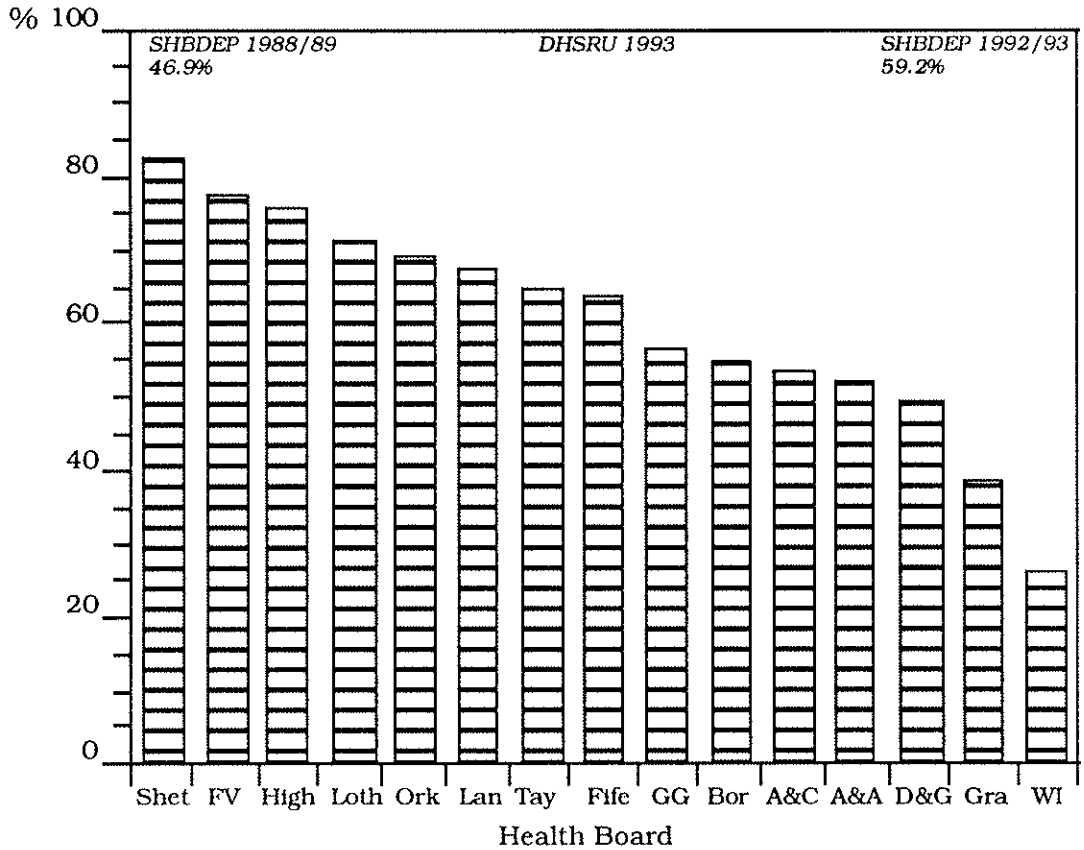
2% of population had 25% of decayed (D) surfaces
7% of population had 50% of decayed (D) surfaces
39% of population had 100% of decayed (D) surfaces

All figures rounded to nearest 1%

6.6 Skewed Distribution of Disease

The distribution of dental caries is now markedly skewed with a minority of the sample experiencing most of the disease. Table 4 shows that all decayed surfaces were to be found in only 39% of the sample and that an unfortunate 2% had one quarter of the untreated decay.

FIGURE 6. Percentage of children with one or more sealant or sealant restoration in each Health Board.



6.7 Sealants / Sealant Restorations

The presence of sealants and sealant restorations was recorded for permanent teeth. Figure 6 shows the proportion of children with one or more sealant or sealant restoration in each Health Board.

In the previous survey of 12 year olds (Pitts & Davies, 1988/89) no distinction was made between sealants placed purely as a primary preventive measure and those placed in conjunction with small, tooth-coloured, restorations (sealant restorations). Sealant restorations became available, as a treatment option, to General Dental Practitioners in 1988 (Statement of Dental Remuneration, 1988). In the present survey the distinction was made between "sealed surface, type unknown" and "obvious sealant restoration" (see Appendix H). Table 2 shows that over half the children (59.2%) had one or more sealant or sealant restoration.

Appendix D, Table D1, gives the number of surfaces with sealants and with sealant restorations respectively, for each Health Board. It can be seen that there are wide variations in the provision of sealants across the Health Boards.

6.8 Oral Cleanliness

Oral cleanliness was assessed (as in 1988/89) by recording the presence of plaque on six index teeth (UR6, UR1, UL6, LR6, LL1, LL6). The results, by Health Board, for the oral cleanliness assessment are given in Appendix E, Table E1.

6.9 Assessment of Developmental Defects of Enamel

An assessment of developmental defects was made using the SCOTS Index, previously tried and tested during the survey of 14 year olds (Davies & Pitts, 1990/91).

Details of the Index are given in Appendix F and the detailed results of the assessment can be found in Tables F1, F2 and F3.

6.10 Assessment of Erosion

An assessment of upper incisor erosion was introduced into the survey examinations for the first time this year. This was done in an attempt to elicit whether tooth surface loss due to erosion (caused, for example, by consumption of acidic drinks) was a dental public health problem in Scotland. Details of the codes used in the erosion assessment are given in Appendix G. Results relating to the distribution and prevalence of erosion are given, by Health Board, in Table G1.

7. DISCUSSION

7.1 Dental Caries Results for Scotland

In comparison with other parts of the United Kingdom (see UK map in Appendix K), Scotland's dental health record for 12 year olds is poor (Evans and Dowell, 1990). "Dental and Oral Health" has been designated a priority area for the NHS in Scotland (Scotland's Health - A challenge to us all, 1992) for which targets have been set (HEBS, 1992). It is therefore important to gain a better understanding of Scotland's present position in order that improvements can be planned and Scotland's relative position with regard to other parts of the UK monitored.

This year minor changes have been introduced into the SHBDEP criteria (see Appendix C) in order to make the Scottish results more directly comparable with those derived from the rest of the UK. Some ambiguity in interpreting the earlier written criteria led to many English Regions using what has now been agreed nationally for 1992/93 in 1988/89. This means that a more valid comparison will be possible between Scottish data for 1992/93 and that derived from England and Wales. Scotland's results in the 1988/89 comparison map (Appendix K) may actually flatter Scotland's true position.

It is encouraging to note that the results from this year's training and calibration course, undertaken with the revised criteria and the new "BASCD training pack", were considerably better than those seen in previous years (see Appendix B).

The 8.5% of Secondary I children successfully examined allows inter-Health Board comparisons to be made and satisfies the BASCD guidelines. The number of children in the sample who were unavailable for examination this year was 745 or 12.2%; this was felt to be acceptable and compares with 11.1% of the sample who could not be examined in 1988/89.

Table 2 suggests that the average 12 year old in Scotland has approximately two teeth which have been affected by caries (one which has been filled and one which is decayed but unfilled), while one child in every five will have lost a tooth because of decay. Almost 40% of children had untreated dentine decay at the time of the survey.

Table 5 provides a weighted mean for Scotland of the "Care Index" (% [FT/DMFT]). This confirms that only one half (49.7%) of the caries experience was made up of restorative care. These results indicate a rather unsatisfactory record of preventing and managing this disease.

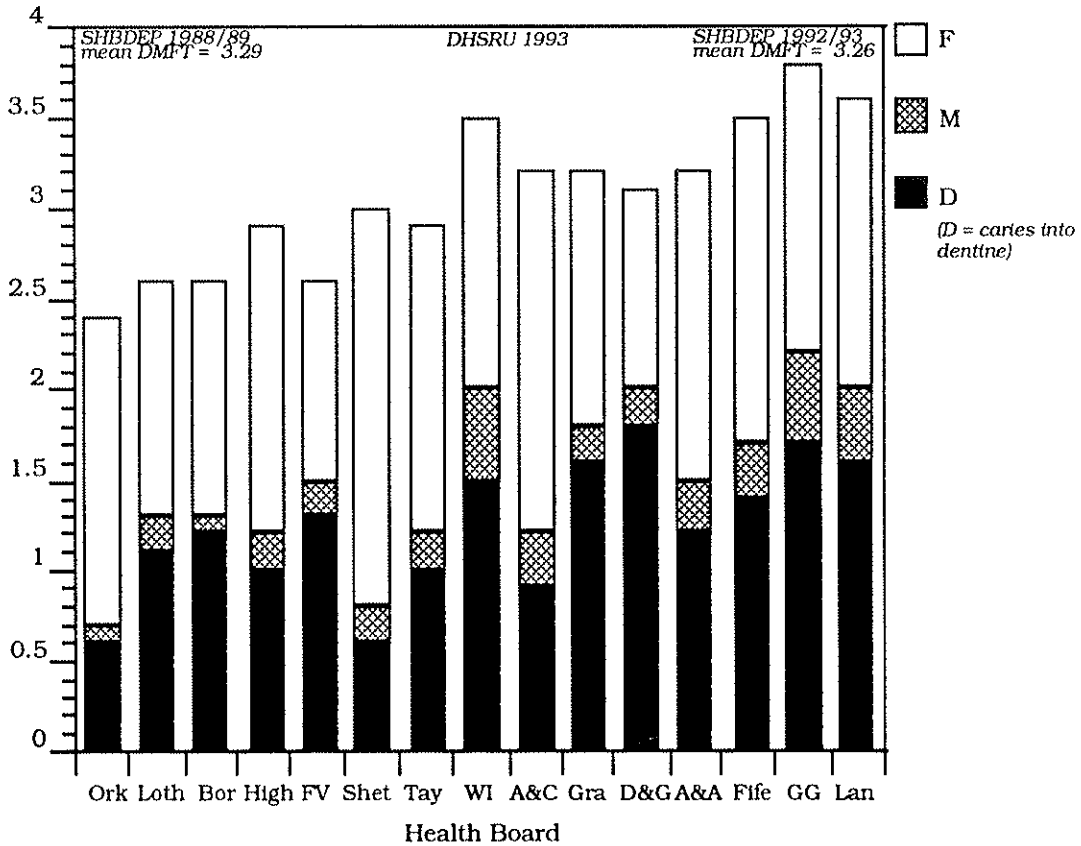
It should be appreciated, by all those involved in planning and evaluating dental services, that the results of epidemiological surveys conducted at the "caries into dentine" level (undertaken in a school setting without access to the further diagnostic aids and X-ray facilities available to the dental practitioner), will inevitably result in an underscoring of caries levels when compared to the findings of clinicians planning care for individual patients in a dental surgery setting (Pitts, Deery & Fyffe, 1993). Thus, direct estimations of treatment need, or the amount of restorative care that would be planned by clinicians for these same children, cannot be made from epidemiological survey data (Nuttall & Davies, 1988).

TABLE 5. Mean DMFT, Care Index (CI) and DMFT for those "with caries experience", by Health Board

Health Board	DMFT	RANK	*CI	RANK	DMFT for those with DMFT>0	RANK
Orkney	1.14	1	72.9	2	2.32	1
Lothian	1.31	2	51.3	8	2.59	3
Borders	1.40	3	49.8	9	2.55	2
Highland	1.48	4	58.9	4	2.88	5
Forth Valley	1.56	5	41.9	14	2.67	4
Shetland	1.80	6	74.7	1	3.01	8
Tayside	1.84	7	56.9	5	2.95	6
Western Isles	1.94	8	42.4	13	3.52	13
Argyll and Clyde	1.94	9	63.5	3	3.16	9
Grampian	1.98	10	43.9	11	3.19	10
Dumfries and Galloway	2.12	11	36.1	15	2.99	7
Ayrshire and Arran	2.18	12	53.0	7	3.21	11
Fife	2.23	13	53.0	6	3.46	12
Greater Glasgow	2.70	14	42.6	12	3.83	15
Lanarkshire	2.70	15	45.7	10	3.61	14
Scotland	**2.08**		**49.7**		**3.26**	

** CI = FT / DMFT*

FIGURE 7. Mean number of decayed, missing and filled teeth (DMFT) per child for those with DMFT > 0, for each Health Board.



Nevertheless, the survey results are of considerable value in allowing valid comparisons of different geographical locations, in estimating trends in caries prevalence over time and making comparisons with other national surveys (which all employ analogous criteria).

7.2 Dental Caries Experience by Health Board

The all-Scotland mean values must be interpreted with some caution locally, as a wide range of mean values for DMFT and its constituents are seen across the 15 Health Boards (Table 3). For example, the mean number of decayed teeth in Dumfries and Galloway (DT=1.25) is four and a half times higher than that seen in Orkney (DT=0.28), while Shetland (FT=1.34) has almost twice as many fillings per child as Borders (FT=0.70). Figure 1 allows inter-Board comparisons to be made but, once again, it must be stressed that care should be taken not to ascribe too much importance to differences which are within the 95% confidence intervals.

Figure 1, together with the map of Scotland reproduced in the Executive Summary and as Appendix J, indicates that for 12 year olds in Scotland: relatively low levels of DMFT were seen in Orkney, Lothian, Borders and Highland; intermediate levels were seen in Forth Valley, Shetland, Tayside, Western Isles, Argyll & Clyde and Grampian; while higher levels were found in Dumfries and Galloway, Ayrshire & Arran, Fife, Greater Glasgow and Lanarkshire.

Table 5 demonstrates that the ranking of Boards by mean DMFT agrees very poorly with the ranking by Care Index. There are also great variations in the Care Index, from three quarters (74.7%) of the caries experience being restored in Shetland to just over a third (36.1%) being restored in Dumfries and Galloway.

Figure 7 (which has Boards ordered as in Figure 1) shows that the ranking of Boards on the basis of the amount of decay experience for those who have decay is a little different from that for mean DMFT and that there are considerable variations in the amount of unrestored decay in need of treatment. Care must therefore be exercised in assessing the service needs of different Health Boards, particularly on the basis of a single measure.

7.3 The Proportion "With Caries Experience"

Figure 2 shows that there is a considerable range, around the weighted mean of 64%, of percentages of children who have evidence of D, M or F according to the survey criteria. Generally, the ranking of Health Boards is fairly similar to that seen in Figure 1, as Boards with low mean caries scores have lower percentages of children with "caries experience" (see Table 5).

Table 5 also lists, in its fifth column, the mean DMFT values for those with "caries experience." As would be expected, the average levels of disease for those affected (3.3) is considerably higher than that for the examined sample as a whole (2.1). Thus the treatment needs of this group of the population are higher than would be anticipated from looking at the overall Health Board means alone.

7.4 Teeth and Surfaces

The pattern of caries attack and previous treatment disclosed in Figure 3 reveals the importance of the first permanent molars. These four teeth had 74% of the caries experience. Overall 49% of decay and fillings were found on the occlusal surfaces. This finding has both clinical and public health implications: the use of preventive sealants and sealant restorations has the potential to achieve significant reductions in caries experience, particularly when the repeated restoration of the first molars is considered.

As almost 60% of 12 year olds had at least one first permanent molar either absent or with an occlusal surface which had dentine decay or some form of restoration, *targeting*

the use of sealants is less of an issue than in lower caries populations. It must also be remembered that unrestored surfaces coded as "sealed surface, type unknown" ($) may have been carious prior to sealant placement.

Trauma to teeth and surfaces causes considerable problems for those affected (see Appendix D). However, these children are a minority (7%) of 12 year olds and thus trauma to teeth cannot be regarded as a major public health problem for this age group in Scotland.

7.5 Trends in Caries Prevalence

The results of this year's survey reinforce the suggestion from last year's study of 5 year olds (Pitts, Nugent, Fyffe & Smith, 1992), that the previous trend for large and continuing reductions in caries levels appears to have come to an end. If the previous improvement in mean DMFT had continued linearly, then a mean of considerably less than 1.0 would have been expected (Figure 4). It can be shown from the data collected before and after the change in criteria (Appendix C) that, if the prevalence had remained truly unchanged since 1988, then a modest increase in the mean DMFT observed would have been expected.

In fact a very mild decrease in DMFT was observed with most of the effect being attributable to the reduction, by over one third, of the number of filled teeth (from FT=1.60 in 1988/89 to FT=1.01 in 1992/93). The mean number of filled teeth was minimally affected by the revised criteria (see Appendix C). This trend in the filled component **is** a cause for concern.

A similar pattern is evident with changes since 1988/89 in the proportion of 12 year olds "with caries experience". Similarly, Figure 5 shows: a marginal fall in the % DMFT>0; that (allowing for the criteria change) there was little change in the %D>0 or %M>0 components; but that there was a 24% fall in the %F>0.

These changes are reflected in a deterioration of the Care Index (FT/DMFT). This has fallen from almost three quarters (72%) in 1988 to around one half (49%=1992 observed value, 57%= predicted, transformed value using Appendix C data).

Although the overall DMFT dropped slightly, when data for the "worst 25%" of the children was examined, the mean DMFT increased from 5.1 to 5.2. For the worst 10% the increase was from 6.6 to 6.9; for the worst 5% it was from 7.3 to 9.9. It is evident that those with most of the disease have got worse over the four year period.

The reasons for such changes in four years are not clear cut. However, the introduction of the "capitation" system of paying General Dental Practitioners with the "New Contract" of October 1990, the impact of the changes in General Anaesthesia in Dentistry following the Poswillo report (Department of Health, 1990) and the changed role of the Community Dental Service (which has been re-deployed away from the "routine" treatment of children) may all have had some effect.

As discussions on further changes for the NHS care of children are underway, following the Bloomfield Review of Dental Remuneration (Bloomfield, 1992), the dental health of this age group should continue to be monitored.

Looking at the relative positions of Health Boards in 1988/89 and comparing them with 1992/93: Lothian, Borders, Orkney and Highland are still in the lower caries part of Figure 1, whilst Greater Glasgow and Lanarkshire are at the other extreme. Western Isles have improved from the previous highest value, but generally the other Boards have seen little overall change (with 3 Boards improving, 3 staying the same and 3 slipping back).

7.6 Skewed Distribution of Disease

Table 4 clearly demonstrates the skewedness of the caries distribution.

The realisation that a minority of the children suffer disproportionately from decayed teeth has implications for the targeting of preventive and therapeutic services at the high caries-risk individuals in the population. Reliable methods of identifying the high-risk individuals are problematic, but should be developed.

7.7 Sealants / Sealant Restorations

The level of sealant use is encouraging and represents an increase from the 1988/89 survey. The proportion of children with 1 or more sealants /sealant restorations was 46.9% in 1988/89 and was 59.2% in 1992/93. The number of sealed surfaces per child varied markedly between Boards. Table 3 shows a range of means from 1.2 for Grampian, to 3.2 for Highland and an exceptional 5.1 for Shetland. The majority of sealants / sealant restorations (mean = 2.3) were classified by the examiners as code $ (sealed surface, type unknown) while very few (mean = 0.03) code N "obvious sealant restoration" were seen.

The encouraging increase in the emphasis on these preventive types of care is welcomed. The Distance Learning Pack "TRENDS in the Management of Fissure Caries" (Paterson et al, 1989) distributed by the Scottish Office to all General Dental Practitioners in 1989/90 may have had some impact on these results.

7.8 Oral Cleanliness

Generally, there was surprisingly little change (for Scotland as a whole and for individual Boards) between mean estimates of plaque made in 1988/89 and those made in the latest survey (see Appendix E). On average, one third of the index teeth were recorded as having plaque present, although just over one third of children were free from plaque according to the examination method employed. There were considerable variations between Health Boards in the levels of oral cleanliness seen.

7.9 Assessment of Developmental Defects of Enamel

The detailed results and some comments relating to developmental defects are set out in Appendix F.

In summary, the findings demonstrate that there are more demarcated opacities than diffuse opacities and that, whilst there are some variations between Boards, only 11.4% of the children examined had "SCOTS" code 2 diffuse opacities (of which half were distributed symmetrically).

It is interesting that of the 1,623 subjects who had some type of SCOTS lesion, and answered the question relating to marks on their teeth, only 24% were aware of the presence of any defect.

7.10 Assessment of Erosion

The first large scale attempt to assess dental erosion, from an epidemiological point of view, across Scotland follows the inclusion of this type of examination in the UK 1993 Survey of Child Dental Health recently conducted by the Office of Population Censuses and Surveys. Anecdotal evidence suggested that there might be an increase in the prevalence of this condition and that it might constitute a public health problem.

The findings in Appendix G indicate that the examiners found it hard to agree on "erosion confined to enamel" and thus inter-Board comparisons on this basis are suspect. However, it is erosion into the dentine (which is more obvious) in 12 year olds which was the concern . As only 2% of the population exhibited this condition, the anxieties that erosion might be a generalised problem in Scotland seem to be unfounded.

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