

2005



National Dental Inspection Programme of Scotland

A Report of the National Dental Inspection Programme on **P7 Children**
throughout Scotland during the school year 2004/2005 prepared for the
Scottish Dental Epidemiological Co-ordinating Committee

National Dental Inspection Programme of Scotland

Report of the 2005 Survey of P7 Children

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National Dental Inspection Programme

The 2005 National Dental Inspection Programme (NDIP) conducted in the school year 2004/2005

It is important that each child's dental wellbeing is assessed so that children and their parents can maintain oral health and take necessary steps to remedy any problems that may have arisen. There is also a need to monitor children's dental health at national and regional levels so that reliable oral health information is available for planning and evaluating initiatives directed towards improvements.

The National Dental Inspection Programme (NDIP) aims to fulfil these functions by providing an essential source of information for keeping track of the changes in the dental health of Scottish children. Combined with the full historical nature of the existing data bank which started to be gathered from 1987 by the Scottish Health Boards' Dental Epidemiological Programme (SHBDEP)¹, NDIP will be able to identify trends and assist in planning future dental services.

Key child age groups are inspected: at entry into school in primary one (P1) and in primary seven (P7) before their move to secondary education. The Inspection Programme has two levels: a *Basic Inspection* (intended for all children) and a *Detailed Inspection* (for a representative sample of a specific age group in alternate years). In the school year 2004/2005, the main focus of the programme was P7.

Dental health of P7 children in Scotland in 2005

All young people should hope to enter adult life with a healthy mouth. However, despite improvements in the last thirty years, many children in Scotland still suffer from tooth decay and have already embarked upon a lifelong journey of deteriorating oral health.

Previous surveys have examined children aged 12 years, with the most recent results for that group being presented for the school year 1996/1997. The 2005 survey is the first time that primary seven (P7) children have been targeted. These P7 results will act as a benchmark figure against which future surveys of the age group can be measured. At the end of their primary school career and just prior to secondary school, just under half of these Scottish children have been found to have some obvious dental decay experience in their permanent teeth.

Scotland does not compare well with other home countries in the United Kingdom. In the 2004/2005 BASCD (British Association for the Study of Community Dentistry) survey of eleven-year old children², Scotland had the highest number of Decayed, Missing and Filled Teeth (D₃MFT) at 1.29, while Wales had 1.09 and England 0.64. Overall, 47.1% of P7 children in Scotland had obvious decay experience compared to 31.3% in England and Wales.

The majority of dental disease continues to be borne by children from more deprived backgrounds, where 11-year olds are more than twice as likely to suffer from obvious decay experience in permanent teeth as children from more affluent homes.

The Scottish Executive consultation document 'Towards Better Oral Health in Children'³ sums up the situation by saying, "*Despite some significant improvements, we still have unacceptably poor levels of oral health. Scotland's children still have too many diseased teeth. Dental disease still results in extreme pain and discomfort, infection, social embarrassment and interrupted work and education for a significant part of the Scottish population.*"

Principal aims of the Programme in 2005

The principal aims are to gather appropriate information in order to inform children (and parents) of their dental/oral health status and, through appropriately anonymised and aggregated data, advise the Scottish Executive, NHS Boards and other organisations concerned with children's health of the prevalence of oral disease.

The 2005 NDIP work took place across all areas of Scotland and involved the collaboration of many people and organisations, including the Consultants in Dental Public Health and Chief Administrative Dental Officers Group, the Scottish Association of Community Dental Directors, Community Dental Officers, Scottish NHS Boards, Local Education Authorities and school and the Chief Scientist Office's Dental Health Services Research Unit (DHSRU) at the University of Dundee.

What did the NDIP Basic Inspection consist of?

The *Basic Inspection* involved a simple assessment of the mouth of each child using a light, mirror and ball-ended probe. Each child was then placed into one of three categories depending on the level of dental health and a letter sent to their parents.

One of three possible letters was sent and each informed the parents about the state of dental health found in the mouth of their child at the time of the school inspection. The letters were as follows:

- Letter A - severe decay and should seek immediate dental care
- Letter B - some decay experience or might require orthodontics and should seek dental care in the near future
- Letter C - no obvious decay experience but should continue to see the family dentist on a regular basis

The results of the *Basic Inspection* are then anonymised and aggregated. They are used to monitor the impact of local and national oral health improvement programmes, and to assist in the development of dental services.

What did the NDIP Detailed Inspection consist of?

The *Detailed Inspection* was a more rigorous and comprehensive assessment that involved recording the status of each surface of each tooth in accordance with international epidemiological conventions.

The specific goals of the *Detailed Inspection* were to determine current levels of established tooth decay, and to determine the impact of deprivation on the dental health of primary seven children in Scotland in 2005.

The remainder of this first section of the report gives the results for the *Detailed Inspection*. The results for the *Basic Inspection* can be found at the end of this document.

How was consistency achieved in the conduct of the inspections across Scotland?

An important part of the NDIP process was that the conduct of the *Detailed Inspections* remained consistent with key elements of the previous SHBDEP system all over Scotland and that the participating community dentists recorded their findings in the same manner. In order to ensure this, the dentists were required to undergo training and calibration exercises before the programme began.

Mandatory two-day training courses took place in Perth in November 2004 consisting of illustrated lectures, IT training and discussion sessions on how to record the inspections, in accordance with criteria set down by the British Association for the Study of Community Dentistry (BASCD)⁴, appropriately modified for NDIP.

These were followed by clinical training sessions using P7 children from two local primary schools. When these were completed, the dentists conducted a series of calibration assessments on another group of schoolchildren. The results were then compared so that only dentists falling inside the range of 'substantial agreement'⁵ would participate in the *Detailed Inspections*.

How many P7 children had a Detailed Inspection?

Each NHS Board was required to identify the number of schools needed to obtain a representative sample of a given size from their primary seven population⁶. The sample sizes used provided adequate numbers to allow meaningful comparisons between NHS Boards.

The sampling procedure for NDIP differs from the previous SHBDEP surveys in so far as whole classes are now selected to simplify the process for schools while ensuring that results reflect the P7 population (or P1 population) in Scotland.

Table 1 shows that nearly 11,000 children across Scotland were inspected in detail. This represents 19% of the P7 population. Across all NHS Boards, the percentage of children inspected varied from 8% to 94%.

NHS Boards can choose to increase the sample size in order to assist with local planning needs, while some less populated Boards need to include large proportions to achieve statistically meaningful numbers.

During the course of the survey, 10% of the children were re-inspected in order to assess the consistency of the examination results of the dentists who were undertaking the inspections.

Table 1: Primary 7 populations, the number of schools involved and the number of children who received a Detailed Inspection by NHS Board across Scotland

NHS Board	Primary 7 populations	Total number of primary schools with P7 children	Total number of primary schools visited	Number of children receiving a Detailed Inspection	% of P7 population receiving a Detailed Inspection
Argyll & Clyde	5059	183	46	890	17.6
Ayrshire & Arran	4641	143	37	781	16.8
Borders	1374	66	19	348	25.3
Dumfries & Galloway	1756	105	27	276	15.7
Fife	3138	144	34	707	22.5
Forth Valley	3318	105	29	561	16.9
Grampian	6136	257	37	723	11.8
Greater Glasgow	10011	286	104	2714	27.1
Highland	2732	183	39	531	19.4
Lanarkshire	7035	229	29	593	8.4
Lothian	8032	228	61	1337	16.6
Orkney	254	20	18	211	83.1
Shetland	310	29	28	291	93.9
Tayside	4505	178	46	831	18.4
Western Isles	282	36	16	132	46.8
Total for Scotland	58583	2192	570	10926	18.7

Unfortunately one NHS Board (Western Isles), due to various difficulties, did not submit data for sufficient children and thus, there was insufficient information for representative sample analysis. This NHS Board is not included in subsequent analysis but this absence does not affect the results for Scotland as a whole.

When did the Dental Inspections occur and what age were the children?

The NDIP inspections took place from November 2004 until June 2005. The staff of the Community Dental Service within each NHS Board undertook all the clinical work associated with both *Basic* and *Detailed Inspections*.

The mean age of the children examined in the *Detailed Inspection* across Scotland (excluding Western Isles) was 11.5. The mean age for both male and female children was 11.5. The range of mean ages across NHS Boards was 11.4 - 11.7 years.

What is meant by 'obvious decay' in this report?

It is important to note that when obvious tooth decay (D₃T) is discussed in this report it means *decay that can be seen to go into the dentine* (i.e. the layer below the outer white enamel of permanent teeth) and includes *pulpal decay*. The *Detailed Inspection* measures obvious decay into dentine when seen under school (rather than dental surgery) conditions.

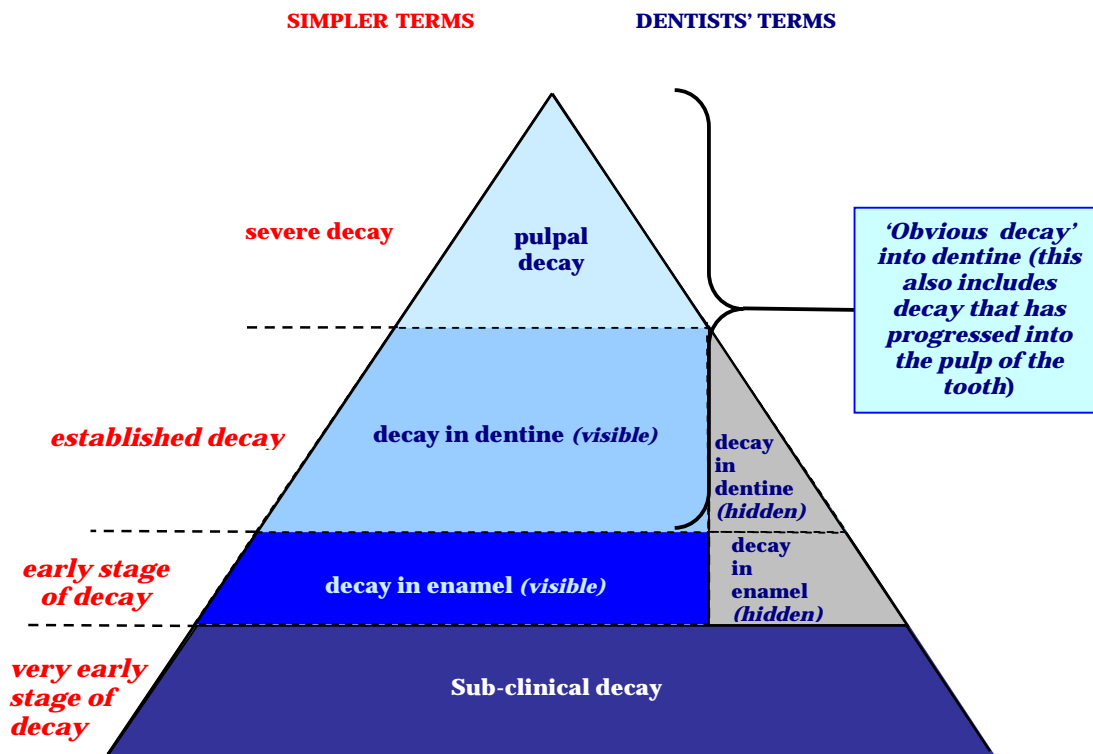
What is meant by 'obvious decay experience' in this report?

When the term obvious decay experience (D₃MFT) is discussed in this report it means 'obvious decay' (noted above), and in addition includes both missing teeth (extracted due to decay) and filled teeth.

What are the stages of tooth decay?

Dentists use specific professional terms to identify the different stages of tooth decay. However, in order to help understand these, simpler terms have been added to help describe the various stages of tooth decay. These are shown in Diagram 1 below.

Diagram 1:
Stages of tooth decay



What definitions of decay do the dentists conducting the NDIP Detailed Inspection use?

The definitions of decay used are in accordance with the BASCD guidelines and international epidemiological conventions, thus allowing comparisons to be made with other countries in Europe and beyond.

The data presented for decay only relate to dental decay that clinically appears to have penetrated dentine (the inside of the tooth). This is a different diagnostic level from that used by dentists when examining patients in a dental surgery.

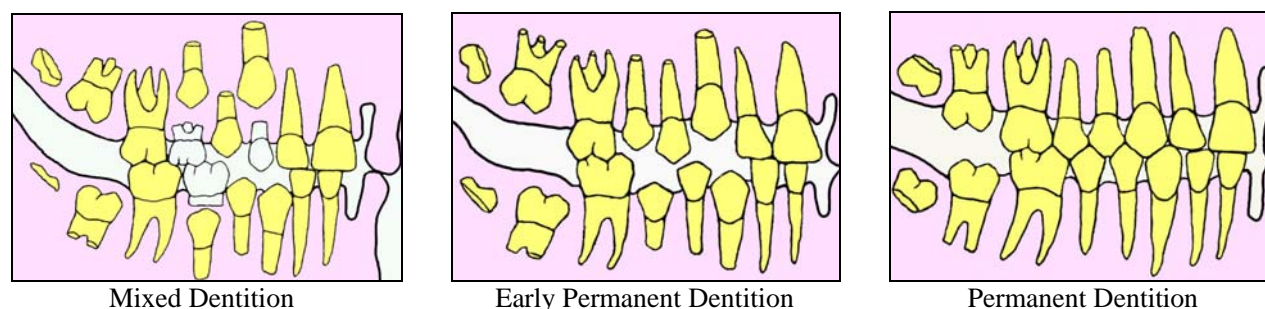
PART 1

DETAILED INSPECTION RESULTS

What is the relevance of age and stage of dental development to this survey?

The dental condition of P7 children in Scotland has not been formally reported in either SHBDEP or NDIP programmes. Previously, the dental health of the permanent teeth of 12-year old children was surveyed, with the last data being recorded for 1996/1997. The P7 children examined during 2004/2005 were approximately one year younger than this and were found to have either a mixed dentition (both deciduous and permanent teeth) or a permanent dentition. The types of dentitions observed are illustrated as a cross section of the mouth in Diagram 2 (with deciduous teeth represented in white and permanent teeth in yellow).

Diagram 2: Range of stages of dental development seen in P7 children



What is the mean number of deciduous and permanent teeth in P7 children in each NHS Board?

Table 2 records the mean number of permanent and deciduous teeth respectively found in P7 children across Scotland.

Table 2:
Mean age and
numbers of permanent
and deciduous teeth
per P7 child
by NHS Board

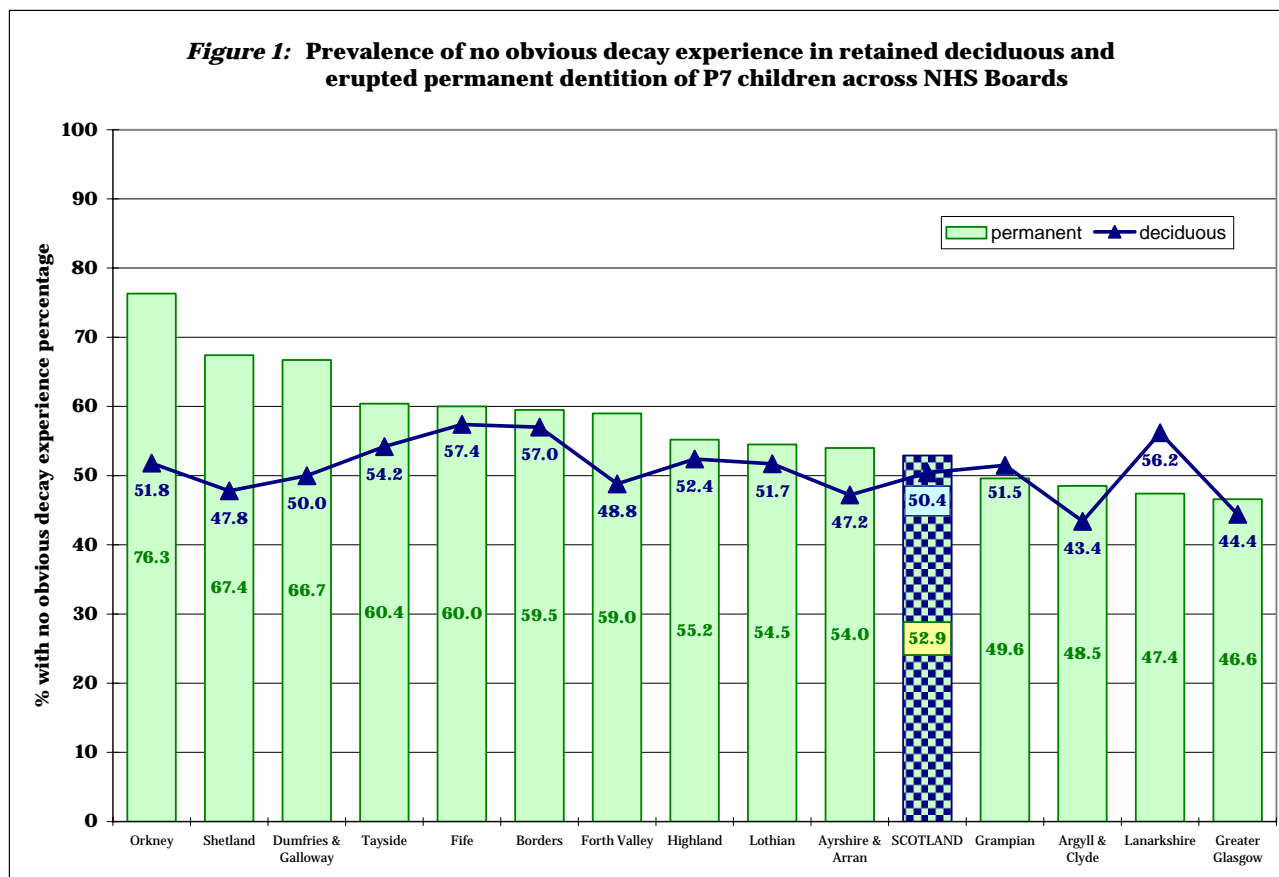
NHS Board	Mean age (yrs.)	Mean no. of permanent teeth	Mean no. of deciduous teeth
Argyll & Clyde	11.51	21.85	4.68
Ayrshire & Arran	11.49	21.14	4.84
Borders	11.39	20.70	5.08
Dumfries & Galloway	11.43	21.38	5.09
Fife	11.45	21.41	4.91
Forth Valley	11.47	21.61	5.17
Grampian	11.66	22.10	4.40
Greater Glasgow	11.50	21.79	4.41
Highland	11.45	20.87	5.02
Lanarkshire	11.49	21.36	4.74
Lothian	11.39	21.70	4.83
Orkney	11.57	21.32	5.47
Shetland	11.65	21.99	5.00
Tayside	11.62	21.79	4.60

What was the prevalence of no obvious decay experience in both deciduous and permanent dentitions?

The level of dental health in P7 children across Scotland is a combination of both their deciduous and permanent dentitions. Those examined in 2005 had a range of mean ages across NHS Boards of 11.4 and 11.7 years.

With the *Detailed Examinations* covering several months of difference in age, the level of natural eruption of the permanent dentition into the mouth, combined with the loss of deciduous teeth from the mouth, meant that it was difficult to fix a constant dentition against which to compare or contrast NHS Board dental health data. However, the average number of deciduous teeth observed in the mouth was quite low and erupted or unerupted permanent teeth occupied the majority of jaw space in both upper and lower arches.

Figure 1 shows the percentage with no obvious decay experience in the retained deciduous and the erupted permanent teeth recorded across Scotland.



There is a wide range of obvious decay experience in both the deciduous and permanent dentitions of P7 children across Scotland. This variation is a reflection of both availability of dental care provision and social deprivation.

However, as the main intention of the survey was to examine the dental status of permanent teeth in P7 children, it was decided to concentrate all the analysis on this dentition alone and not to continue any further analysis on the deciduous dentition.

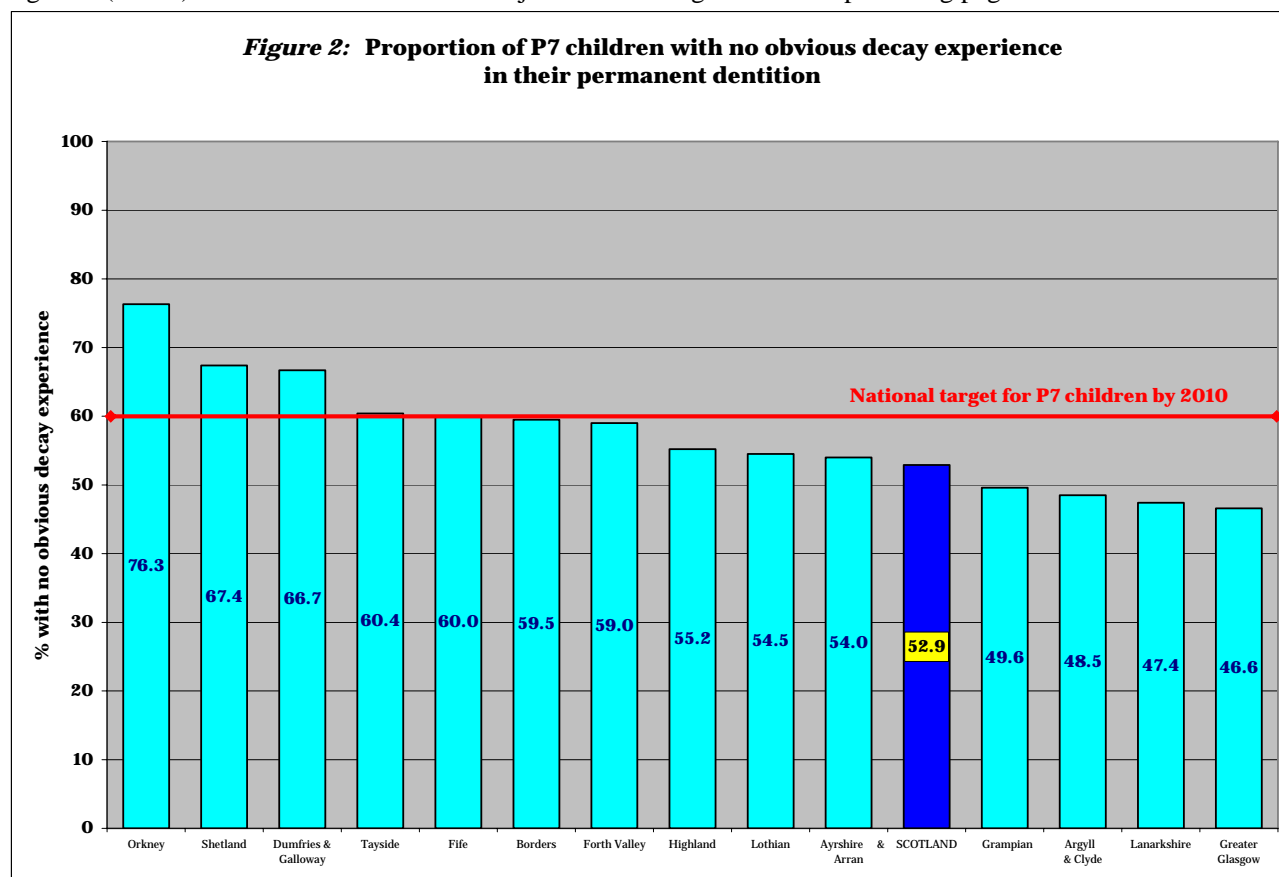
What proportion of P7 children in Scotland had no obvious decay experience in their permanent dentition?

One of the targets set by the Scottish Executive for the year 2010 is that 60% of P7 children should be free of obvious decay experience⁷. Figure 2 shows the percentage of P7 children in NHS Boards who showed no signs of obvious decay experience in their permanent teeth. Across Scotland, 53% of P7 children fall into this category, with a range of 46.6% to 76.3% across fourteen NHS Boards.

These findings illustrate the extent to which some NHS Boards have already achieved the 2010 target and how far other NHS Boards are from achieving that same target.

The value for Scotland of 52.9% with no obvious decay experience is a benchmark figure against which future P7 *Detailed Inspection results* will be measured.

Figure 2 (below) should also be viewed in conjunction with figure 1 on the preceding page.



What levels of decay experience in permanent teeth were seen in P7 children in 2005?

A more detailed description of the decay experience distribution is shown in Table 3.

Table 3: Overall obvious decay experience in permanent teeth of P7 children in Scotland*

	%	NHS Boards
Free of obvious decay experience at the dentinal level ($D_3MFT = 0$)	52.9	46.6 – 76.3
With obvious decay experience, $D_3MFT > 0$ (as per BASCD)	47.1	23.7 – 53.4
With 'current decay', $D_3 > 0$ (as per BASCD)	23.3	13.7 – 30.8
Care index (FT/ D_3MFT)	46.5	37.3 – 63.7
	Mean	NHS Boards
Obvious decay experience (D_3MFT) across Scotland*	1.29	0.59 – 1.58
Decayed teeth (D_3T) across Scotland*	0.52	0.24 – 0.83
Missing teeth (MT) across Scotland*	0.17	0.04 – 0.25
Filled teeth (FT) across Scotland*	0.60	0.25 – 0.75
Decayed, missing and filled teeth for those with obvious decay experience ($D_3MFT > 0$)	2.73	2.14 – 3.07

*excluding Western Isles

It should be noted that although the average number of decayed, missing and filled teeth across all primary seven children examined in Scotland was 1.29, for the 47% of this age group who have experienced dental decay, the average number of affected teeth was more than double this figure at 2.73.

What proportion of obvious decay experience among P7 children was treated with fillings?

The Care Index is used to describe the proportion of obvious decay experience which has been treated restoratively $[(FT \div DMFT) \times 100]$. In Scotland, the Care Index for this age group is 47%. There is concern in Scotland that children will enter adulthood with untreated dental disease. This survey has recorded that 40% of the decay experience is apparently untreated $[(DT \div DMFT) \times 100]$. Every effort should be made to encourage these children to attend for regular routine dental care to ensure that their oral health is restored and maintained, thus establishing a more sound foundation for their adult lives.

Was the level of obvious decay experience in permanent teeth spread evenly throughout the P7 population?

The results shown in Table 4 demonstrate that decay experience was not spread evenly throughout the P7 child population. Some 47% of P7 children had 100% of the obvious decay experience while an unfortunate 13% had 50% of the recorded decay experience. Even more of note, was that 1% of the P7 population had 50% of the observed severe decay into the pulp of their permanent teeth.

Table 4: Skewed prevalence of obvious decay experience in the permanent teeth of P7 children in Scotland

Share of disease		Proportion of P7 population
Established decay experience (D₃MFT)		
100% of teeth with established decay experience	occurred in	47% of population
90% of teeth with established decay experience	occurred in	34% of population
50% of teeth with established decay experience	occurred in	13% of population
25% of teeth with established decay experience	occurred in	5% of population
Established decay (D₃T)		
100% of teeth with established decay	occurred in	23% of population
90% of teeth with established decay	occurred in	18% of population
50% of teeth with established decay	occurred in	6% of population
25% of teeth with established decay	occurred in	2% of population
Severe decay into the pulp		
100% of teeth with severe decay	occurred in	4% of population
90% of teeth with severe decay	occurred in	3% of population
50% of teeth with severe decay	occurred in	1% of population

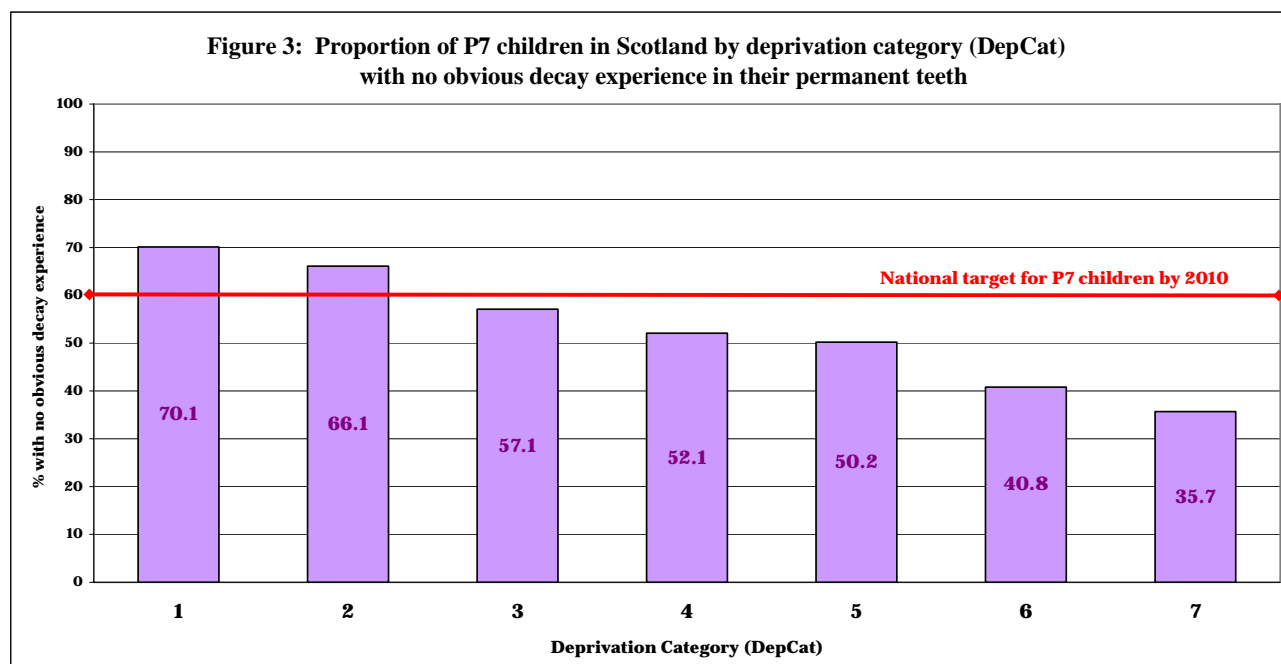
Is there a link between social deprivation and poor dental health among P7 children in Scotland?

A measure of social deprivation often used in Scotland is DepCat (deprivation category)⁸. This is a scale of deprivation based on information gathered in the national census every ten years and describes the socio-economic status of communities in postcode sectors. DepCat scores for each postcode area in Scotland are calculated from the percentage of unemployed males, over-crowded households, households without cars and people from social classes IV and V. The scale ranges from DepCat 1 (least deprived) to DepCat 7 (most deprived).

The index has been shown to be closely linked with measures of death, illness and use of the health service, and a clear association has been established between DepCat measured social deprivation and dental decay in children⁹.

It was possible to attribute DepCat values to the dental data for 98% of the 10,794 children who were examined in this *Detailed Inspection* (excluding those from the Western Isles). Figure 3 graphically illustrates the inequality in dental health status of the permanent dentition between P7 children in the most deprived areas (DepCat 7) compared to that of their more fortunate contemporaries in DepCat 1 and 2.

The children from DepCat 1 and 2 have already reached the 2010 National Target of 60% with no obvious decay experience but those in DepCat 7 are still only at 36%, i.e. 64% of the P7 children in DepCat 7 have already experienced the effects of decay and its consequences in their permanent teeth at this young age.



As with previous child surveys, these results show that more children from the socially deprived areas suffer from established decay, with potential associated pain, discomfort and disfigurement. As this survey of P7 children in Scotland is the first to focus on this particular age group, these results will be used as a baseline against which future results may be compared.

What are the obvious decay experience results in permanent teeth of P7 children across Scotland?

Table 5 shows the results of the prevalence of decay for NHS Boards across Scotland. It details a measure of the total obvious decay experience (decayed, missing and filled teeth [D₃MFT]) and a breakdown of that figure into each of these individual components.

Table 5: Obvious decay experience for each NHS Board in Scotland* (figures rounded to 2 decimal places)

NHS Board	% with no obvious decay experience in permanent teeth	Mean no. of decayed, missing and filled permanent teeth (D ₃ MFT)	Mean no. of decayed permanent teeth (D ₃ T)	Mean no. of missing permanent teeth (MT)	Mean no. of filled permanent teeth (FT)	For those with decay, the mean no. of decayed, missing and filled permanent teeth
Argyll & Clyde	48.5	1.58	0.83	0.16	0.59	3.07
Ayrshire & Arran	54.0	1.19	0.35	0.11	0.73	2.59
Borders	59.5	0.91	0.42	0.09	0.41	2.25
Dumfries & Galloway	66.7	0.71	0.24	0.05	0.42	2.14
Fife	60.0	1.02	0.44	0.14	0.44	2.54
Forth Valley	59.0	1.14	0.47	0.16	0.51	2.78
Grampian	49.6	1.39	0.61	0.15	0.63	2.76
Greater Glasgow	46.6	1.57	0.57	0.24	0.75	2.94
Highland	55.2	1.12	0.43	0.21	0.48	2.50
Lanarkshire	47.4	1.46	0.66	0.19	0.62	2.78
Lothian	54.5	1.16	0.43	0.15	0.58	2.56
Orkney	76.3	0.59	0.30	0.04	0.25	2.50
Shetland	67.4	0.78	0.33	0.10	0.34	2.39
Tayside	60.4	1.06	0.33	0.25	0.47	2.67
Scotland*	52.9	1.29	0.52	0.17	0.60	2.73

*excluding Western Isles

What is the picture of dental health in the permanent teeth of P7 children across Scotland?

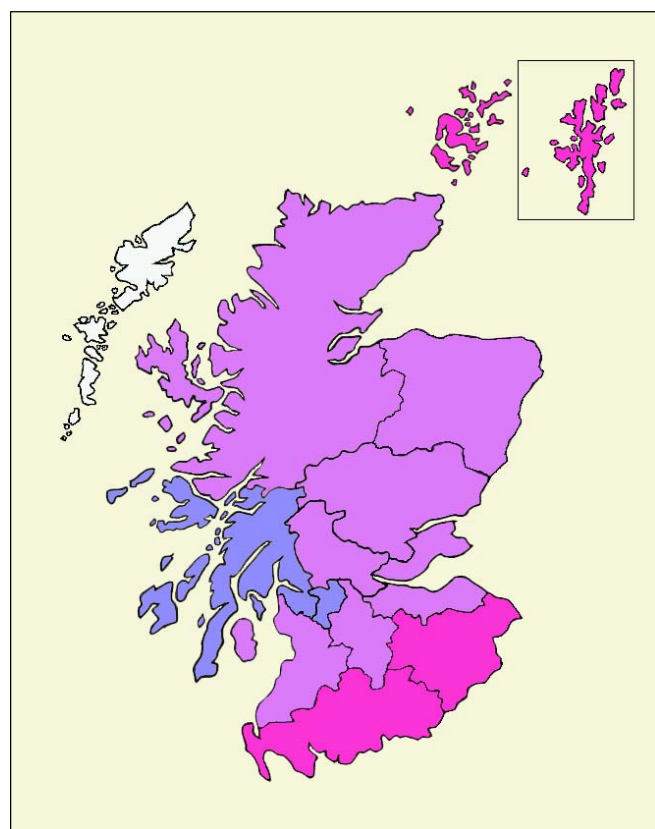


Figure 4:

**Decay experience (D₃MFT)
in permanent teeth
of P7 children in Scotland
by NHS Board**

Mean number of decayed, missing and filled teeth
(D₃MFT)

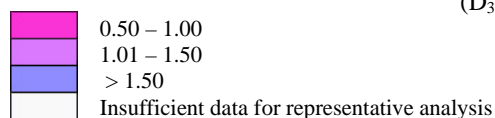
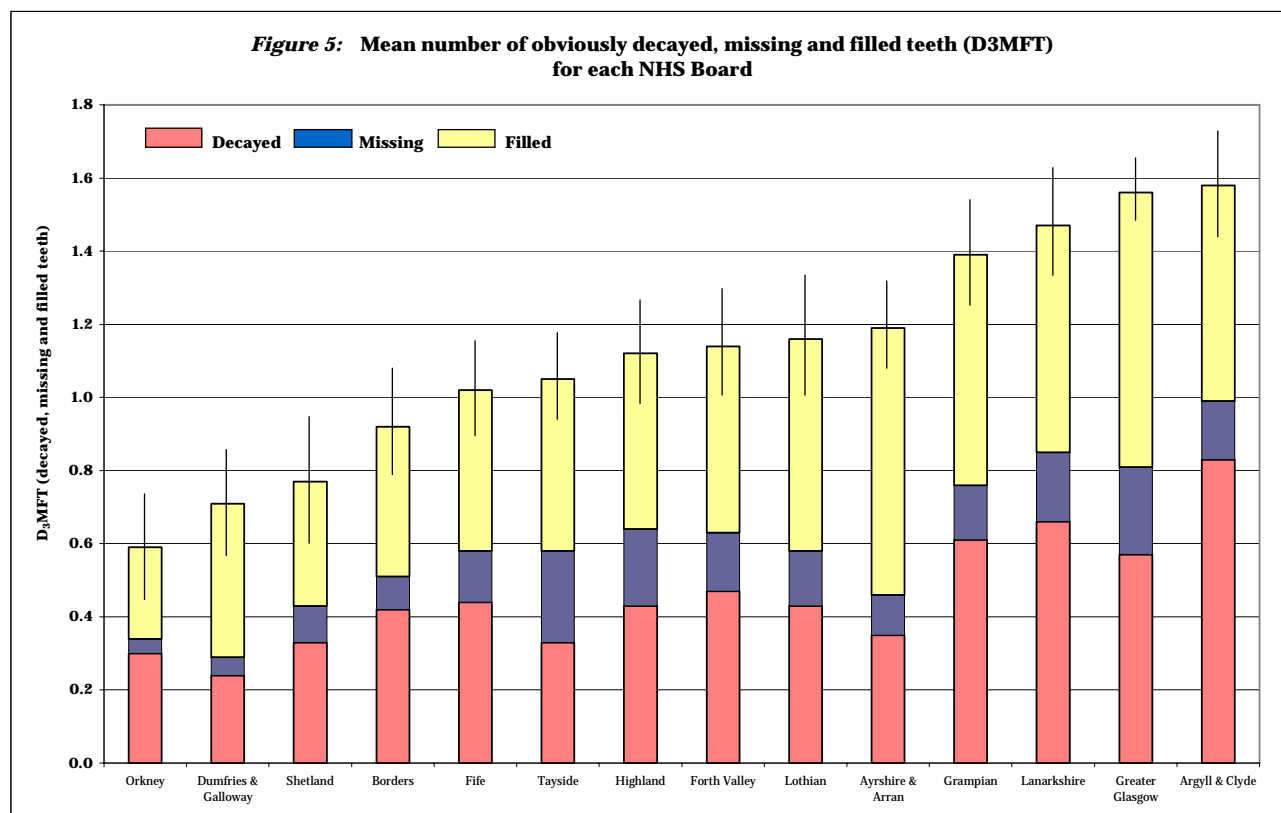


Figure 4 illustrates the mean level of total decay experience in permanent teeth across Scotland. The contrast between Orkney, Shetland, Borders and Dumfries and Galloway in the north and the south compared to Glasgow and Argyll and Clyde, for example, shows the variation in dental health that exists for this P7 age group across the country.

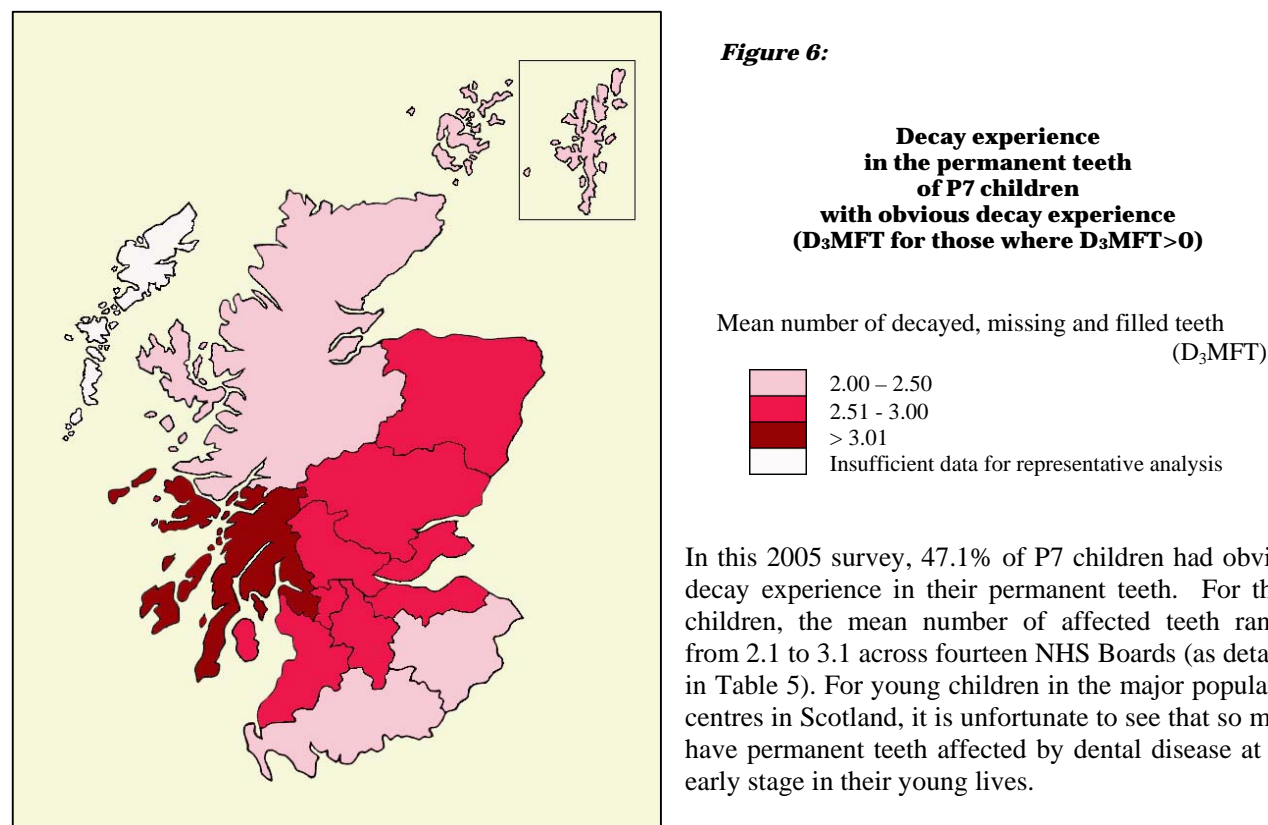
The obvious decay experience for fourteen NHS Boards in Scotland can be seen in Figure 5 (below).



The results in Figure 5 show the average number of decayed, missing and filled teeth per child for fourteen NHS Boards across Scotland. The amount of total decay experience in the permanent dentition of children in this age group varies widely between the different areas of Scotland: for example, Argyll & Clyde, with an average of 1.58 teeth affected by dental disease, has nearly three times more disease than Orkney at 0.59.

The vertical bars indicate the 95% confidence limits associated with each value and again illustrate the limited extent to which the figure can be interpreted as a “league table”. While there is a difference between those NHS Boards at the extreme left of the figure and those on the extreme right, it would be unwise to ascribe too much importance to minor variation in the detailed ranking positions of NHS Boards in close proximity to one another.

What was the average level of decay for those who had experienced obvious decay in their permanent teeth?



What do the findings of the third NDIP Detailed Inspection Survey show?

This was the first survey to examine the specific age group of P7 children since *Detailed Examination* of this type began in Scotland in 1987. This survey may be seen as a benchmark for future surveys of this age group. The Dental Action Plan of the Scottish Executive requires regular data reporting of this P7 age group and has set a target of 60% being free of obvious decay experience by the year 2010.

Results show that the amount of obvious decay experience in permanent teeth of P7 children varies widely between all NHS Boards. High levels of decay continue to be associated with children from socially deprived backgrounds. To improve their dental health, a number of different and complementary approaches need to be made to ensure that dental inequalities are addressed.

Initiatives that are population-based and targeted at children at high risk from dental disease have already been started, by the Scottish Executive and NHS Boards, to prevent dental disease from an early age. Further initiatives to prevent dental disease in primary school-aged children are currently being introduced. It is to be hoped that, with the support of parents, healthcare professionals and others, these good oral health regimes for young children will be carried further through school life into adulthood.

Appendix

Dental Health of the *First Permanent Molar teeth only*

The main report has analysed the data relating to all permanent teeth in the dentition of P7 children. However, as there is considerable variation in the eruption dates, particularly of premolar teeth, some teeth may have been exposed for longer periods of time than others to the risk of dental decay. *First permanent molars* however, as they have no predecessors, are most likely to have erupted within a twelve month window around the age of six years. The analysis of only the *first permanent molars* may therefore be a more reliable measure of the prevalence of decay in this age group. This appendix in the 2005 NDIP report is associated with the results from these four *first permanent molar teeth only*.

What is the level of dental health in P7 children in first permanent molars only?

The average number of obvious decayed, missing and filled teeth across P7 children in Scotland was 1.08. However, when only those children with one or more *first permanent molars* with obvious decay experience (45.5% of eleven year olds) are considered, this figure rises to 2.36.

When the obvious decay experience of all permanent teeth is considered, the mean D₃MFT rises to 1.29 and for the 47% of the P7 population who have D₃MFT>0 this mean rises to 2.73. Comparison of these figures demonstrates that the majority of obvious decay experience in this age group is concentrated in only first permanent molar teeth.

What is the obvious decay experience in P7 children in first permanent molars only?

Table 6 shows the results of the data collected from *first permanent molar teeth* across NHS Boards in Scotland. These are the first results relating to *first permanent molar teeth* across NHS Boards to be detailed in any of the SHBDEP/NDIP surveys.

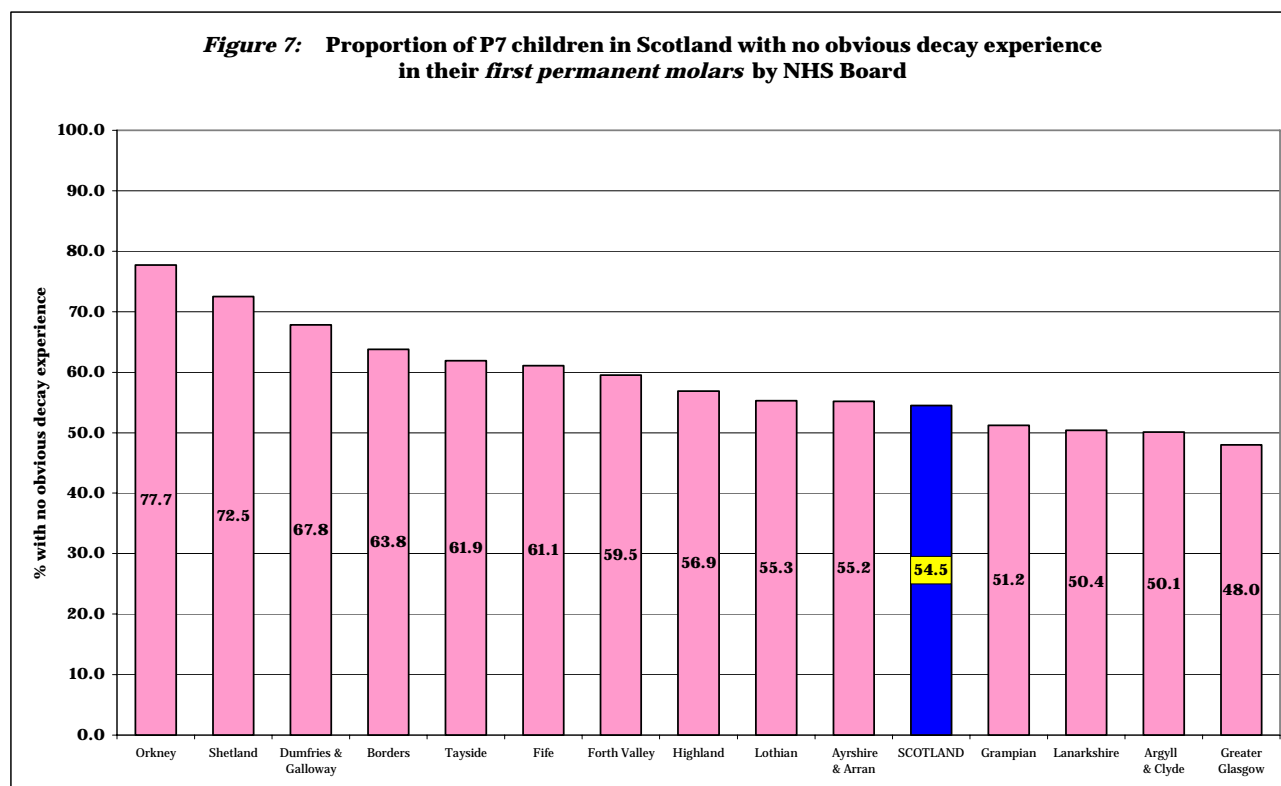
Table 6: Obvious decay experience in *first permanent molars* for each NHS Board in Scotland*

NHS Board	% with no obvious decay experience in <i>first permanent molar teeth</i>	Mean no. of decayed, missing and filled <i>first permanent molar teeth</i> (D ₃ MFT)	Mean no. of decayed <i>first permanent molar teeth</i> (D ₃ T)	Mean no. of missing <i>first permanent molar teeth</i> (MT)	Mean no. of filled <i>first permanent molar teeth</i> (FT)	For those with decay, the mean no. of decayed, missing and filled <i>first permanent molar teeth</i>
Argyll & Clyde	50.1	1.25	0.57	0.16	0.53	2.51
Ayrshire & Arran	55.2	1.03	0.26	0.11	0.66	2.30
Borders	63.8	0.75	0.30	0.09	0.36	2.06
Dumfries & Galloway	67.8	0.66	0.19	0.05	0.41	2.03
Fife	61.1	0.86	0.32	0.13	0.40	2.22
Forth Valley	59.5	0.97	0.35	0.15	0.47	2.39
Grampian	51.2	1.14	0.43	0.15	0.56	2.34
Greater Glasgow	48.0	1.26	0.36	0.24	0.66	2.43
Highland	56.9	0.97	0.32	0.21	0.44	2.24
Lanarkshire	50.4	1.26	0.51	0.18	0.57	2.55
Lothian	55.3	0.99	0.32	0.15	0.52	2.21
Orkney	77.7	0.49	0.23	0.04	0.22	2.21
Shetland	72.5	0.59	0.22	0.07	0.31	2.16
Tayside	61.9	0.91	0.25	0.24	0.43	2.40
Scotland*	54.5	1.08	0.37	0.17	0.54	2.36

*excluding Western Isles

The average number of decayed, missing and filled *first permanent molars* in Scotland is 1.08, with a broad range across NHS Boards of 0.49 - 1.26.

Across Scotland, the percentage of *first permanent molars* with no obvious decay experience was 55%, with a similar broad range across NHS Boards of 48.0% - 77.7%. This is illustrated in Figure 7.



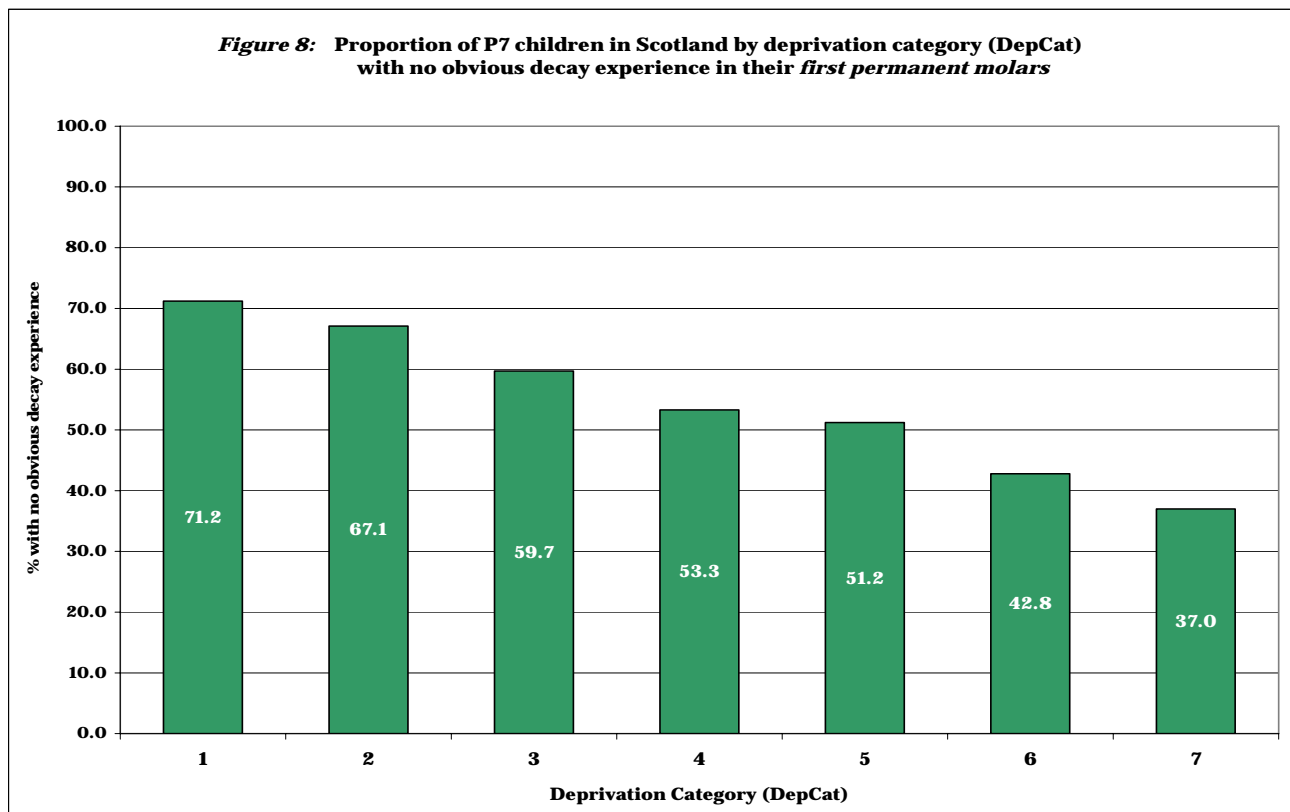
Was the level of obvious decay in the first permanent molars evenly distributed throughout the population of P7 children in Scotland?

The results in Table 7 below, clearly demonstrate how decay in the *first permanent molars* is spread unevenly among P7 children in Scotland. Some 14% of P7 children had 50% of the decay experience, while an unfortunate 4% had 100% of the teeth with severe decay into the pulp.

Table 7: Skewed prevalence of obvious decay in *first permanent molars* of P7 children in Scotland

Share of disease		Proportion of P7 population
Established decay experience (D₃MFT)		
100% of teeth with established decay experience	occurred in	46% of population
90% of teeth with established decay experience	occurred in	35% of population
50% of teeth with established decay experience	occurred in	14% of population
25% of teeth with established decay experience	occurred in	7% of population
Established decay (D₃T)		
100% of teeth with established decay	occurred in	22% of population
90% of teeth with established decay	occurred in	17% of population
50% of teeth with established decay	occurred in	6% of population
25% of teeth with established decay	occurred in	2% of population
Severe decay into the pulp		
100% of teeth with severe decay	occurred in	4% of population
90% of teeth with severe decay	occurred in	3% of population
50% of teeth with severe decay	occurred in	1% of population

Figure 8 shows the proportion of P7 children with no obvious decay experience in their *first permanent molars* by DepCat. As the majority of decay experience in this age group is found in these four *first permanent molar* teeth, the results closely mirror those for **all** permanent teeth at this age level. Similar results were also found in the 1996/1997 SHBDEP survey of 12-year old children¹⁰. Those living in the more socially deprived areas DepCat 6 and 7 are more likely to have decay in their *first permanent molars* than those who are living in the least deprived areas of DepCats 1 and 2.



What is the picture of dental health in the first permanent molars of P7 children across Scotland?

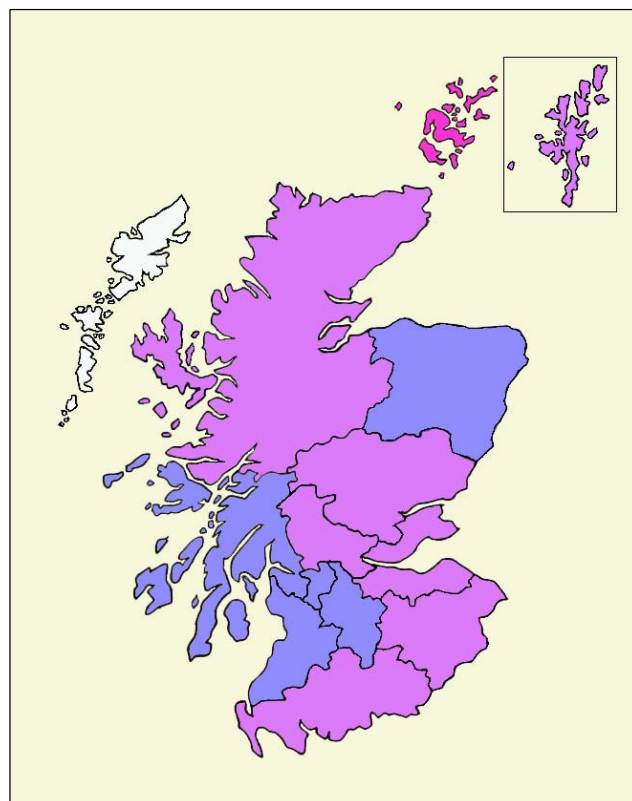


Figure 9:

Decay experience (D₃MFT) in the *first permanent molars* of P7 children in Scotland by NHS Board

Mean number of decayed, missing and filled teeth (D₃MFT) in *first permanent molars*

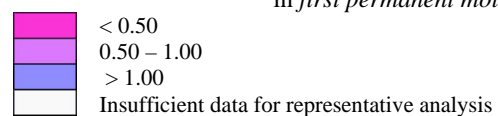


Figure 9 illustrates the mean levels of total decay experience in *first permanent molars* across Scotland. The contrast between Orkney in the north, and Glasgow and Lanarkshire in the south, for example, shows the variation in dental health that exists for this P7 age group across the country.

The amount of obvious decay experience to be found in the *first permanent molars* in each NHS Board can be viewed in Figure 10.

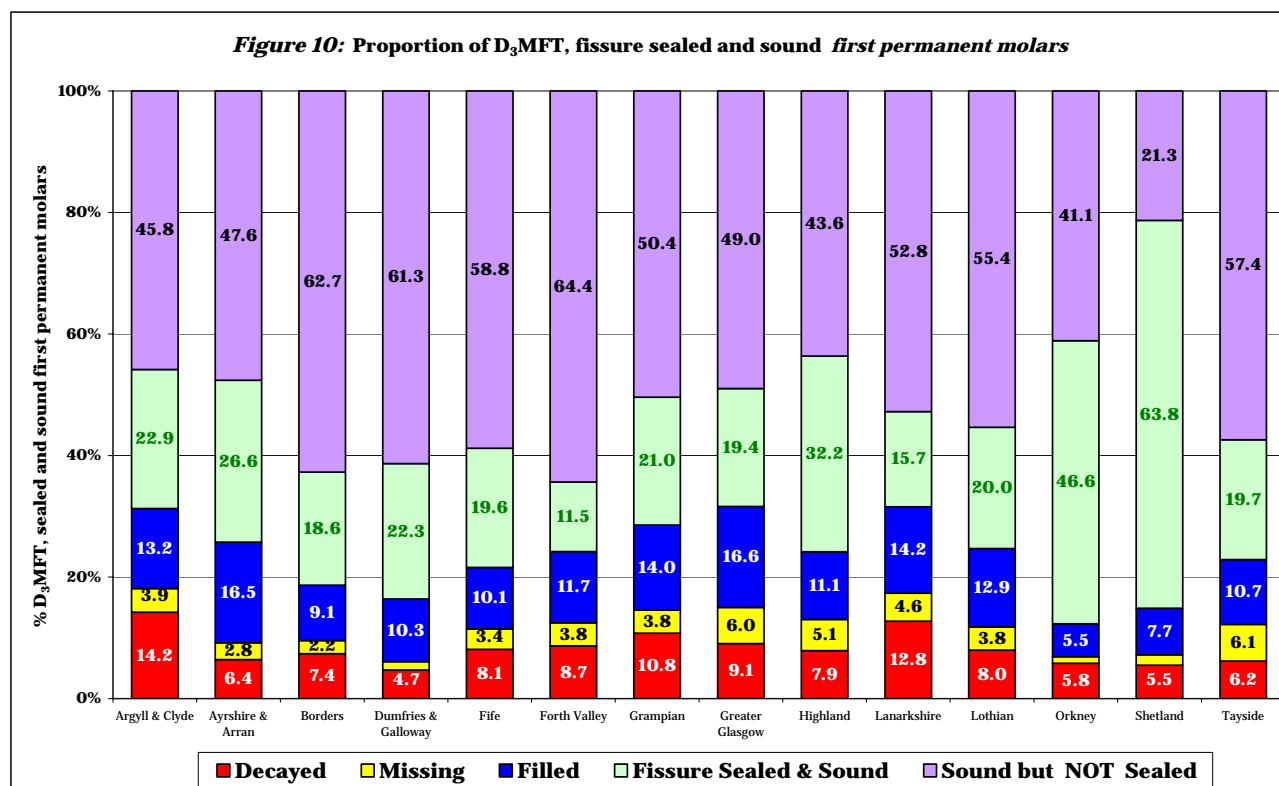


Figure 10 shows in detail not only the proportion of obvious decay experience in the *first permanent molars* but also for the first time, the level of sound teeth that have received fissure sealant treatment. The proportion of fissure sealant treatment carried out across NHS Boards ranged widely from 11.5% in Forth Valley to highs of 46.6% and 63.8% in Orkney and Shetland respectively. As a preventive measure, the placement of fissure sealants has been recommended in children of high caries risk to help reduce the level of dental decay¹¹.

What was the average level of decay for those who experienced obvious decay in their first permanent molars?

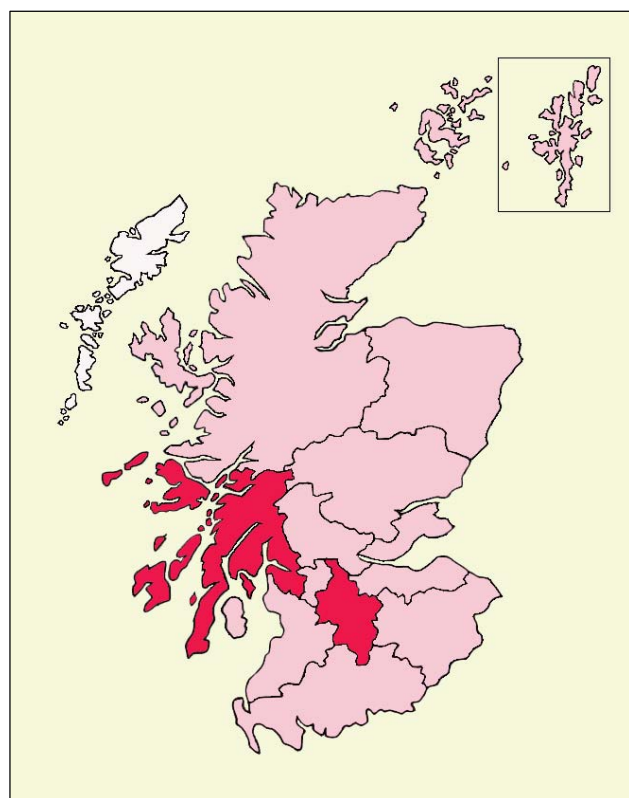
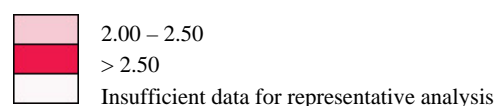


Figure 11:

**Decay experience
in the first permanent molars
of P7 children
with obvious decay experience
(D₃MFT for those where D₃MFT > 0)**

Mean number of decayed, missing and filled teeth (D₃MFT)
in first permanent molars



In the 2005 survey, 45.5% of P7 children had obvious decay experience in their *first permanent molars*. For those children, the mean number of affected teeth ranged from 2.0 to 2.6 across fourteen NHS Boards (as detailed in Table 6). Disappointingly, in two NHS Boards an average of just over 2.5 *first permanent molars* out of a total of 4 were affected by obvious decay experience. For young children, this is a poor level from which to maintain a good permanent dentition into adult life.

References

- 1 Pitts NB, Davies JA. Scottish Health Boards' Dental Epidemiological Programme, 1987/88 Report. University of Dundee, 1994.
- 2 Pitts NB, Boyles J, Nugent ZT, Thomas N & Pine CM. BASCD Survey Report. The dental caries experience of 11-year-old children in Great Britain. Surveys co-ordinated by the British Association for the Study of Community Dentistry, 2004/2005.
- 3 Towards Better Oral Health in Children: A consultation document on children's oral health in Scotland. Scottish Office, 2002.
- 4 Mitropoulos C, Pitts NB & Deery C. BASCD Trainers' Pack for Caries Prevalence Studies, 1992/93. University of Dundee, 1992.
- 5 Landis JR & Koch GG. The measurement of observer agreement for categorical data. *Biometrics*, 1977; 33: 159-174.
- 6 Watkins TR & Pitts NB. Scottish Health Boards' Dental Epidemiological Programme. Protocol; 1994 version. Stirling, 1994.
- 7 An Action Plan for Improving Oral Health and Modernising NHS Dental Services: Scottish Office, 2005.
- 8 Carstairs V, Morris R. Deprivation and Health in Scotland. Aberdeen University Press, 1991.
- 9 Pitts NB & Nugent Z. Capitation registration in Scottish 5 year olds related to caries prevalence and deprivation scores. *Journal of Dental Research*, 1995; 74(3): 857.
- 10 Pitts NB, Davies JA & Fyffe HE. Scottish Health Boards' Dental Epidemiological Programme, 1996/97 Report. University of Dundee, 1997.
- 11 Preventing Dental Caries in Children at High Caries Risk: SIGN Guideline Number 47, 2000.



National Dental Inspection Programme (NDIP) 2005

PART 2

Basic Inspection Results

The *Basic Inspection* of the NDIP programme aims to inform the parents/carers of individual P1 or P7 children by letter of the oral health of their child. These letters record the principal clinical findings of the dental inspection of the child and convey the degree of urgency with which an appointment for attendance at a dentist is suggested.

One of three possible letters was sent but all informed the parents about the state of dental health seen in their child at the time of the school inspection. The letters were as follows:

- Letter A - severe decay and they should seek immediate dental care
- Letter B - some decay experience or might require orthodontics and should seek dental care in the near future
- Letter C - no obvious decay experience but they should continue to see the family dentist on a regular basis

The results of the *Basic Inspection* are then anonymised and aggregated. They are used to monitor the impact of both local and national oral health improvement programmes, and to assist in the development of dental services.

In the school year 2004/2005, the main aim of the *Basic Inspection* of NDIP was to invite children in all P1 and P7 classes of Scottish Local Authority (LA) schools to participate in the inspection programme.

Primary 1 Data

During 2004/2005, all P1 classes of Scottish Local Authority schools were invited to participate in the *Basic Inspection* of the NDIP programme.

These *Basic Inspections* were conducted in primary schools across all NHS Boards and overall, 43,244 P1 children were inspected (Table 8). This represents 81% of P1 children who attended mainstream Local Authority schools across Scotland in the 2004/2005 school year and whose parents/guardians were advised by letter of the oral health of their child.

Table 8: Number of P1 children inspected by NHS Boards during the school year 2004/2005

NHS Board	Total number of P1 children in Local Authority schools 2004/2005	Total number of Local Authority P1 children inspected 2004/2005	Proportion of Local Authority P1 children inspected 2004/2005
Argyll & Clyde	4,417	2,298	52.0%
Ayrshire & Arran	3,866	3,450	89.2%
Borders	1,173	1,038	88.5%
Dumfries & Galloway	1,256	1,095	87.2%
Fife	3,896	3,249	83.4%
Forth Valley	3,348	2,592	77.4%
Grampian	5,605	4,818	86.0%
Greater Glasgow	8,918	7,547	84.6%
Highland	2,239	2,028	90.6%
Lanarkshire	6,509	5,429	83.4%
Lothian	7,520	5,643	75.0%
Orkney	243	228	93.8%
Shetland	263	75	28.5%
Tayside	4,001	3,548	88.7%
Western Isles	266	206	77.4%
Scotland	53,520	43,244	80.8%

Primary 7 Data

All NHS Boards were required to undertake *Basic Inspections* on not only P1 but also P7 children during the school year 2004/2005. In total, 42,111 P7 children received a *Basic Inspection*. This represented 72% of P7 children attending mainstream Local Authority schools across Scotland (Table 9). As with the P1 children, all the parents of the P7 children who received a *Basic Inspection* were advised by letter of the oral health of their child.

Table 9: Number of P7 children inspected by NHS Boards during school year 2004/2005

NHS Board	Total number of P7 children in Local Authority schools 2004/2005	Total number of Local Authority P7 children inspected 2004/2005	Proportion of Local Authority P7 children inspected 2004/2005
Argyll & Clyde	5,059	2,936	58.0%
Ayrshire & Arran	4,687	4,208	89.8%
Borders	1,479	1,309	88.5%
Dumfries & Galloway	1,362	1,156	84.9%
Fife	3,138	2,656	84.6%
Forth Valley	3,307	2,358	71.3%
Grampian	5,957	723	12.1%
Greater Glasgow	10,011	8,386	83.8%
Highland	2,732	2,362	86.5%
Lanarkshire	7,035	5,554	78.9%
Lothian	8,032	6,137	76.4%
Orkney	254	241	94.9%
Shetland	306	286	93.5%
Tayside	4,505	3,637	80.7%
Western Isles	292	162	55.5%
Scotland	58,156	42,111	72.4%

A range of logistical issues impacted upon the ability of several NHS Boards to deliver comprehensive inspection coverage of all schools. These included limitations in professional manpower in some Community Dental Services to meet conflicting service demands and difficulties with some of the computer software. However, NHS Boards, CHP's and Local Authorities across Scotland continue to work in partnership to improve the NDIP programme. It is expected that a greater coverage of both P1 and P7 classes will be possible in future with the introduction of a new, more stable NDIP software specifically designed to assist in the collection and analysis of the dental inspection data. For individual interpretation of the local results contained in tables 8 and 9, readers are advised to contact the NHS Board concerned.

As stated in the 2004 NDIP Report, while the required target is that all P1 and P7 children should receive a *Basic Inspection*, it is improbable that this will be conducted on every child within a target population in participating schools for the following reasons: parental permission not given, child unable/unwilling to co-operate or child not at school on the day of the dental inspection. The variation in the size of the P7 population between the *Basic* and *Detailed Inspections* in some areas is a reflection of the different times that the fluctuating numbers of children attending school were assessed during the school year.

Readers are advised that if more precise details of dental health are required at either regional or national level, they should refer to the Detailed Inspection results recorded in Part 1 of this Report.

How can the NDIP Programme results be applied to local NHS services, CHPs and Local Authorities?

Information from the NDIP programme can be utilised at both NHS Board and at Community Health Partnership (CHP) level. These data can be useful in highlighting areas that require health promotion or dental services input and will be a useful monitoring tool over time. Local Authorities can also receive the anonymised and aggregated data at both individual primary school or 'cluster' levels.

With the recent Scottish Executive Dental Action Plan and other appropriate local oral health strategies of NHS Boards either in place or being initiated, an improvement in the level of dental health is expected in both nursery and primary schools, with sustained progress being seen in the succeeding years at each of the monitoring levels.

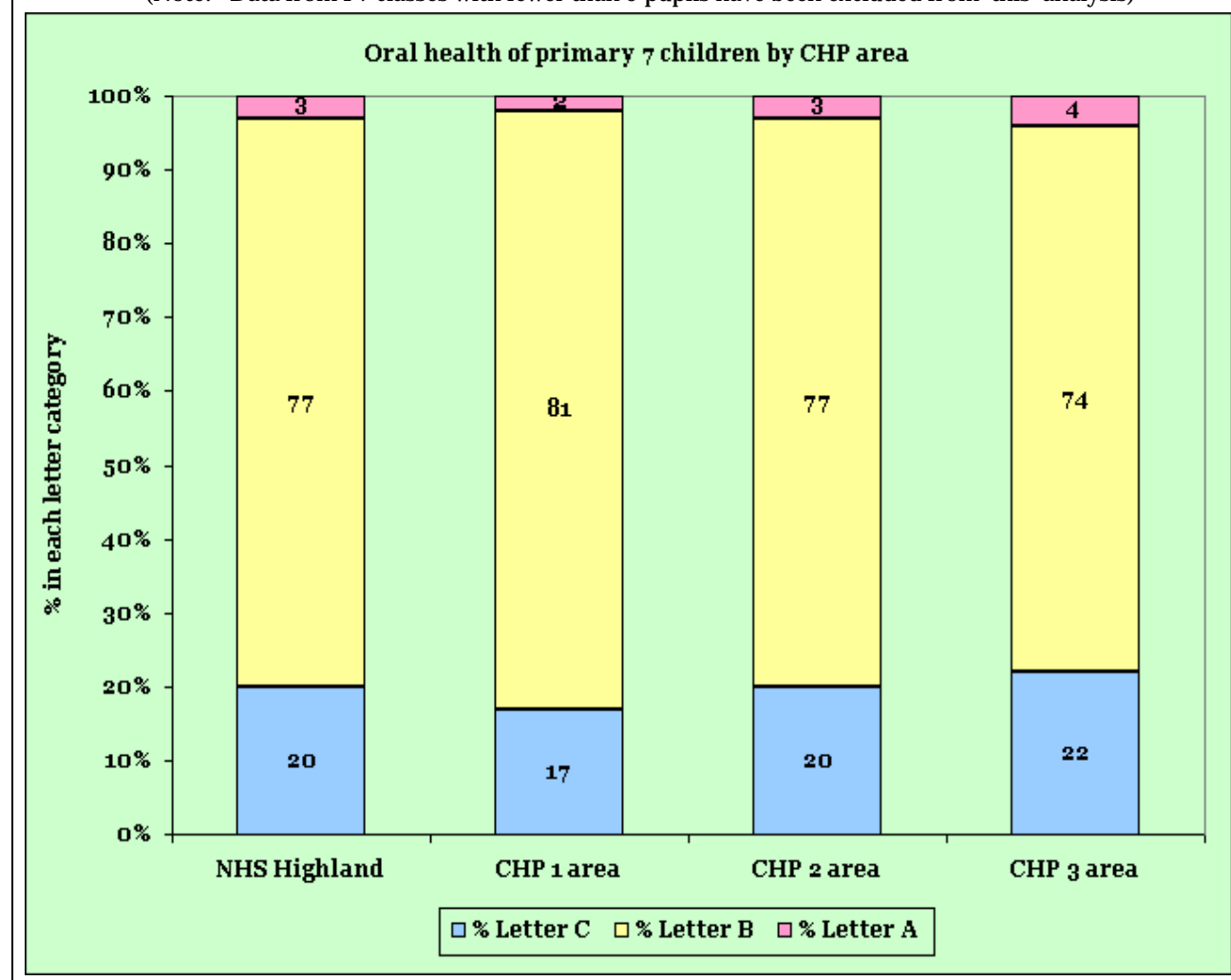
How can results from the NDIP Basic Inspections be presented at a local level?

The data returned from the *Basic Inspections* in the NHS Highland area are illustrated in Tables 10 and 11 and show the capacity of the NDIP methodology to reflect the oral health of primary 7 children in the three CHP areas.

Table 10: Analysis of the letters issued by NHS Highland for each CHP area

Number in each location	Letter A	Letter B	Letter C
NHS Highland	71	1731	458
CHP 1 area	8	360	74
CHP 2 area	29	646	168
CHP 3 area	34	725	216
Percentage (%) in each location	% Letter A	% Letter B	% Letter C
NHS Highland	3	77	20
CHP 1 area	2	81	17
CHP 2 area	3	77	20
CHP 3 area	4	74	22

(Note: Data from P7 classes with fewer than 5 pupils have been excluded from this analysis)



Variation within an individual CHP area may be even more marked and inspection results from locally defined areas are useful when targeting specific resources to where they might have the greatest effect.

In order to illustrate this variation, the aggregated results from the *Basic Inspections* of the P7 children in primary schools of Highland CHP 3 are set out in Table 11.

Table 11: Variance in oral health of P7 children within Highland CHP 3 area

Primary School	Letter A (n)	Letter B (n)	Letter C (n)	Oral health of P7 children in Highland CHP 3 area
School 88	2	13	1	Highland CHP 3
School 120	1	4	2	
School 87	1	10	-	School 88
School 110	4	35	7	
School 126	1	8	2	School 120
School 108	2	22	2	
School 121	1	11	1	School 87
School 102	1	10	2	
School 103	2	27	2	School 110
School 122	3	38	10	
School 123	2	22	7	School 126
School 116	2	25	9	
School 112	1	8	8	School 121
School 98	1	7	7	
School 117	1	18	1	School 102
School 114	1	19	4	
School 118	2	41	11	School 108
School 90	1	20	7	
School 106	2	29	14	School 103
School 91	1	27	5	
School 100	1	30	9	School 122
School 119	1	28	8	
School 127	-	10	1	School 123
School 93	-	16	2	
School 96	-	6	1	School 116
School 109	-	23	4	
School 107	-	26	5	School 112
School 105	-	5	1	
School 89	-	26	6	School 98
School 115	-	17	5	
School 99	-	43	13	School 117
School 124	-	13	4	
School 94	-	6	2	School 114
School 125	-	5	2	
School 111	-	18	9	School 118
School 95	-	6	3	
School 113	-	17	9	School 90
School 97	-	16	9	
School 104	-	7	5	School 106
School 92	-	4	4	
School 101	-	9	12	School 91
CHP 3	34	725	216	
Highland	71	1731	458	

primary school

Oral health of P7 children
in Highland CHP 3 area

0% 20% 40% 60% 80% 100%

% in each letter category

Letter A Letter B Letter C

(Note: Data from P7 classes with fewer than 5 pupils have been excluded from this analysis)

The variation in the distribution of the oral health categories between the individual schools in NHS Highland demonstrates that no single strategy would be equally appropriate to all schools.

It is intended that these data will be gathered by NHS Boards in future years to facilitate the monitoring of changes in the oral health of both P1 and P7 children at this *Basic Inspection* level.

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The National Dental Inspection Programme would not have been possible without the efforts of many people throughout Scotland who worked together to ensure its success.

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Dental Health Services Research Unit

Local Education Authorities of Scotland

NHS Boards of Scotland

Scottish Association of Community Dental Directors

National Dental Inspection Programme
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2005

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