

An Evaluation of Investing for Health Funded Caries Prevention Schemes

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Introduction

Northern Ireland children have the worst oral health in the British Isles and this has been the case for many years. The last UK-wide children's dental health survey found that across all age groups a significantly greater proportion of Northern Ireland children have experienced tooth decay than in the rest of the UK (table 1). In addition, compared to the UK average, the number of teeth per child affected by decay is considerably higher in Northern Ireland (table 2).

Table 1. The proportion of children who have experienced dental decay (Source: UK Children's Oral Health Survey 2003).

	AGE GROUP		
	5-year-olds	12-year-olds	15-year-olds
NI	61%	73%	78%
UK	43%	43%	57%

Table 2. The average number of teeth per child affected by dental decay (Source: UK Children's Oral Health Survey 2003).

	AGE GROUP		
	5-year-olds	12-year-olds	15-year-olds
NI	2.5	2.7	4.4
UK	1.6	1.1	2.0

Children who develop dental decay at a young age are very likely to experience continued decay as older children, teenagers and adults. It is therefore of great importance in the prevention of dental decay that strenuous efforts are made to tackle this problem among pre-school children.

Preventing Dental Decay

The causes of tooth decay are well known. However, preventing this disease has proved difficult. Comparing like with like, from 1993 to 2003 the dental health of 5-year-old children in Northern Ireland has not improved and may even have worsened (table 3).

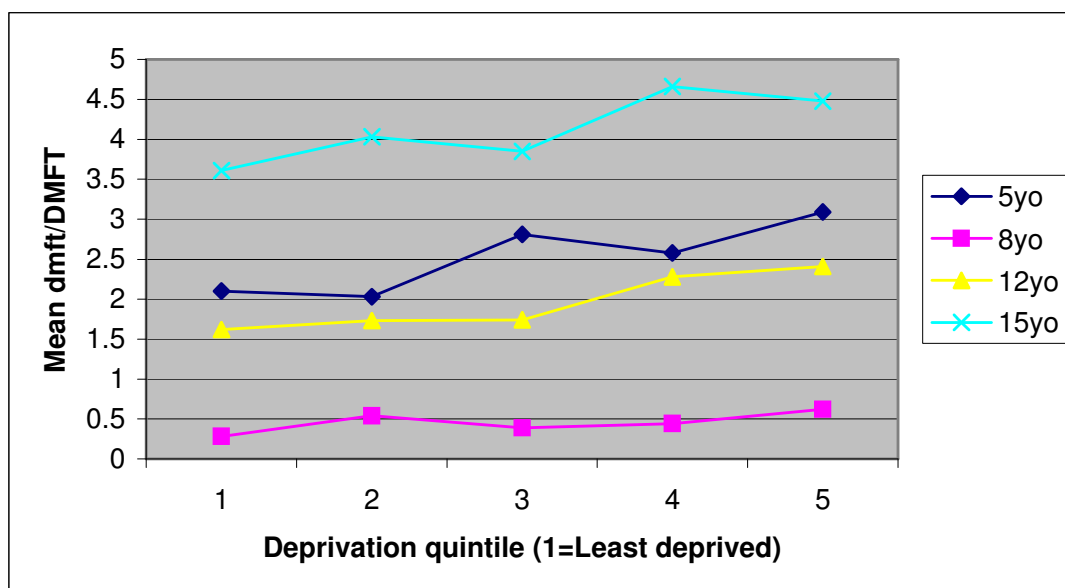
Table 3. The proportion of Northern Ireland 5-year-olds who have experienced dental decay and the average number of teeth per 5-year-old affected by dental decay in Northern Ireland (Source: UK Children’s Oral Health Survey 2003).

	% of children with decay experience	Mean number of teeth affected by decay per child
1983	74	3.7
1993	60	2.3
2003	61	2.6*

*note that for the purposes of comparison the 2003 figures are expressed here using the same diagnostic criteria that were used in 1983 and 1993. The figures presented in table 2 use the updated 2003 criteria and, as a result, the NI figure is slightly lower in that table.

Dental disease is not evenly distributed in the Northern Ireland population. Like many lifestyle related conditions, disease levels are higher among the more deprived sections of society (figure 1).

Figure 1. The average number of teeth per child affected by dental decay shown by deprivation category. (Source: North-South Children’s Dental Survey 2002).



In 2005, against this background, the DHSSPS committed £100,000 recurrently for 3 years to Trust-based programmes designed to prevent dental decay in young children living in Northern Ireland’s 20% most deprived electoral wards.

Policy Context

Fluoride toothpaste schemes aimed at preschool children had been introduced into all Northern Ireland Trusts by 2005 in order to comply with the following 2004/05 dental Priority for Action (PfA):

‘Working together, Boards and Trusts should have implemented an evidence-based caries reduction programme amongst pre-school children by 31 March 2005’.

This was one of a number of dental PfAs at the time all of which aimed to improve the oral health of Northern Ireland children. In the main this was to be done by:

1. Reducing dental decay levels in young children;
2. Reducing dental health inequalities in young children.

In April 2005, Dental Branch (DHSSPS) secured additional funding, from the Investing for Health (IfH) budget, of £300k to help support caries prevention. In May 2005 the Community Dental Service (CDS) were invited to submit bids to support a fluoride toothpaste programme to address dental caries in deprived areas within their Trusts. These new programmes were to complement, rather than replace, existing evidence-based caries reduction programmes introduced to fulfill the PfA detailed above.

Trusts wishing to bid for funds had to complete an application form (figure 2) which required details of their existing scheme as well as proposals for their new programme.

Figure 2. Extract of application form

For current scheme please provide details on:	
• Age of target group	
• SES (and how measured) of target group	
• Where located (urban/rural) of target group	
• Ethnicity of target group	
• Describe the setting(s) of your intervention (e.g. Play/education, Community group, Primary care):	
• Describe the nature of the intervention(s) (e.g. ▪ DHE, Fluoride application, Community development)	

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------|--|
| <ul style="list-style-type: none"> • What other personnel, apart from CDS staff, are involved in delivering the programme ? | |
|--------------------------------------------------------------------------------------------------------------------------------------------|--|

Following evaluation of the submitted proposals, all Trusts received IfH funding for a single scheme (table 4).

Table 4. Summary of Toothpaste Schemes funded through Investing for Health in 2005.

Trust	Age range	Number of children	Type of scheme	Setting
Armagh & Dungannon	½-5 years	2337*	toothbrush & toothpaste delivered on-site	day nursery playgroup nursery school
Causeway	2-4 years	1300	1. toothbrush & toothpaste posted to children 2. supervised brushing on-site	1. at home 2. nursery & playgroup
Craigavon & Banbridge	½-5 years	2337*	on-site toothbrush & toothpaste	day nursery playgroup nursery school
Down Lisburn	3-4 years	1400	1450ppm fluoride toothpaste and toothbrushes delivered by CDS staff	delivered to pre-school sites for use at home
Foyle Community	birth-4 years	9309	dental & nutritional advice to parents toothpaste & toothbrush for children staffed by health visitor	local health centres
Homefirst	2-5 years	750	toothbrush & toothpaste posted to children	at home
Newry & Mourne	½-5 years	2337*	on-site toothbrush & toothpaste	day nursery playgroup nursery school
North & West Belfast	3-5	2042	1450ppm fluoride toothpaste and toothbrushes delivered by CDS staff	delivered to pre-school sites for use at home
South & East Belfast	3-5	1448	toothbrush & toothpaste delivered on-site	delivered to pre-school sites for use at home
Sperrin Lakeland	birth-4 years	3373	school staff relating oral health message learned from CDS with 1450ppm fluoride toothbrushing on site each day	pre-school
Ulster & Community Hospital	3-5	700	1450ppm fluoride toothpaste and toothbrushes delivered by CDS staff	delivered to pre-school sites for on-site toothbrushing scheme

* This is the total figure for the three Trusts in the SHSSB area. The CDS in these three Trusts operate as a single service.

Rationale Behind Toothpaste Schemes

Since the 1930's it has been known that fluoride inhibits the development of dental decay. Today fluoride is available in toothpastes, tablets, drops, mouthrinses, varnishes and gels. The challenge is, and has always been, to encourage those at risk of developing decay to use fluoride. Unfortunately, those who are at the greatest risk of developing decay are, for a variety of reasons, least likely to use fluoride formulations. This problem is overcome with the fluoridation of public water supplies where active participation in this effective public health intervention is not required. In the USA and the Republic of Ireland, where around $\frac{3}{4}$ of the population drink fluoridated water, great improvements in population oral health have been observed.

When water fluoridation is not feasible there are a number of alternative fluoride vehicles. Among these fluoride varnishes and fluoride toothpastes appear to be the most effective. In order to maintain their preventive effect, fluoride varnishes must be applied to the teeth by an oral health professional every four months. They are therefore of limited benefit to those patients who do not regularly attend a dental practice. In contrast fluoride toothpastes can be used at home or in school and have been credited with the significant dental health improvements seen across the western world from the mid-1970's onwards.

Types of Toothpaste Scheme Funded by IfH

Evidence of the highest quality is now available which shows that if children brush daily with a fluoride toothpaste (of at least 1000ppm fluoride) then their risk of developing dental decay will be considerably reduced. The DHSSPS Investing for Health (IfH) funding of toothpaste programmes allowed individual Trusts to decide themselves what type of toothpaste supply mechanism they wanted to employ in order to get the greatest number of young children from deprived backgrounds using fluoride toothpaste appropriately. Across the 11 Community Dental Service teams that were in place at the time three different types of scheme were established using the IfH funding:

1. Postal schemes: Fluoride toothpaste was posted out in a pack, along with a toothbrush and instructions on use, to children from deprived families.
2. Supervised tooth brushing schemes: Children in pre-school settings were overseen by staff in a daily brushing routine with fluoride toothpaste.

3. Pre-school distributed schemes: Children attending pre-schools in selected areas received toothbrushes, toothpaste and instructions at school for home use.

Evaluation of Schemes

As the 3 year funding for these schemes was due to end in March 2008, it was important that they were evaluated in order to inform the planning of future preventive initiatives. The evaluation looked at two main areas:

1. How the scheme was operated by the Trust and the views of those who coordinated the scheme;
2. How effective the scheme was at improving dental health.

To undertake the process evaluation (point 1 above), questionnaires were sent to all of the Clinical Directors of the CDS in May 2007 (Appendix 1). All were completed and returned. The information gathered from these questionnaires was analysed and is described below. The outcome evaluation (point 2 above) was carried out using data on dental extractions, provided by the Trusts and by the CSA, and data on dental health gathered as part of the Northern Ireland annual school dental inspection programme.

Analysis of Questionnaires from Postal Schemes

Four Trusts ran a postal toothpaste scheme: Causeway, Homefirst, North and West Belfast and South and East Belfast. Initially Trusts placed orders for the required amount of toothpaste and toothbrushes with Regional Supplies Services (RSS) but the NI-wide size of the order caused RSS to put the contract out to tender which, while obtaining the required goods at a very competitive price, led to a considerable delay. Some Trusts did not receive their first delivery until March-May 2006. All Trusts eventually used 1450ppm fluoride toothpaste and RSS settled on Sanderson toothpaste made by AMS International. Some Trusts initially had concerns about the fluorosis risk of using this concentration of fluoride and started with Sanderson 1000ppm fluoride toothpaste again manufactured by AMS International (Appendix 2).

The cost of the toothpaste varied depending on the tube size and the number of tubes in the Trust's order. Most Trusts tended to order toothbrushes along with toothpaste and then report the combined cost in the questionnaire. However, an approximate average cost for the 75ml

tube of 1450ppm toothpaste is £0.62 with toothbrushes costing around £0.33.

Most Trusts sent at least an information leaflet with the pack of toothpaste and toothbrush and these cost less than £0.01 each.

However, per pack there were significant other costs:

Postage	£0.35
Padded envelope	£0.17
Pack preparation	£0.15

Total pack cost was therefore in the region of £1.63.

Two out of the four Trusts involved the Clinical Director in their programme while in all Trusts the bulk of the work appears to have been undertaken by Oral Health Promotion staff. The first year of the programme required a disproportionate amount of staff time. Over the three years Trust staff devoted approximately 3-4 hours per week to the scheme. Three of the four Trusts involved non-Trust staff in their programme. These included staff in Surestart schemes, some pre-school staff and day centre staff who in two of Trusts put the packs together.

Three Trusts restricted child participation in the scheme to 3-5 year olds and one to 2-4 year olds. Over the three years of these schemes, therefore, cohorts of children joined and cohorts of children left. However, one Trust kept all those who started the scheme in the programme so that today there are children as old as 8 years taking part. Each Trust used different deprivation criteria to determine which children entered their programme although all involved, as a minimum, children living in (or attending playgroups in) the 20% most deprived wards.

The number of children involved per scheme depended on the size of the Trust and on whether the Trust was involved in another type of toothpaste distribution scheme. Across the four Trusts that ran this type of programme almost 5500 children were involved each year. Below are average numbers of children involved for each Trust per year.

Homefirst	1579
Causeway	652
South and East	1239
North and West	1988

The percentage of children who dropped out of the postal programmes appears to be in the order of 1% to 2%. All Trusts sent packs out 4 times per year. Two Trusts had their packs assembled by a local day centre while the other two paid AMS International to send them directly to the children's homes. Two Trusts did not require consent from parents. Of the Trusts that did ask for consent, one used positive consent and one use implied consent.

Overall, all four Trusts considered the postal type of programme to be a success. Year 1 seemed to cause the most problems due to:

- The time taken for the tendering process;
- Lack of regional guidance on how the scheme should run;
- Storage of packs for those using local distribution;
- Lack of replies form parents when positive consent used;
- Difficulties with franked mail.

Suggestion as to how the schemes could be improved were:

- Better targeting of those children at risk of developing caries;
- Regional guidance on running the programme;
- Standardisation of toothpaste used.

The two Trusts that used AMS International for pack delivery felt that this was the key to making the scheme manageable.

Analysis of Questionnaires from Supervised Toothbrushing Schemes

Six Trusts ran a supervised toothbrushing scheme: Homefirst, Causeway, Foyle, Armagh and Dungannon, Newry and Mourne and Craigavon and Banbridge. The latter three Trusts effectively operated as a single CDS Trust and will be considered as a unit from hereon. As with the postal schemes, most of the Trusts that ran supervised toothbrushing programmes did not actually receive their IfH funding until early 2006. In all cases toothbrushes and toothpaste were bought through regional supplies. Initially Trusts were using a variety of toothpastes and toothbrushes but by year 2 of the schemes most had moved to AMS International. One Trust used 1000ppm toothpaste for the first 2 years of their programme and switched to 1450ppm in year 3. The remainder used 1450ppm from the outset. Apart from the purchases outlined above Trusts also used IfH funding to buy toothbrush holders, stickers and leaflets.

All Trusts involved their Clinical Director in the programme. Oral Health Promoters were the staff most intensively used by Trusts but two Trusts also required a considerable time commitment from dental nurses and hygienists/therapists. There was a significant amount of Trust staff time required to run these programmes averaging around 10 hours per week. One Trust CDS was devoting 23 hours per week to the scheme. Those that used the “off-the-shelf” 3-2-1 scheme appeared to require less time per week. Non-Trust staff involved varied considerably by Trust but all made extensive use of pre-school facility staff.

The age range of children involved was quite variable with no two Trusts targeting exactly the same age of children. Most Trusts stopped their scheme at age 5. Half the Trusts recruited children from 0-6 months and half started children at 2-3 years. The most common settings were playgroups and nursery schools and one Trusts involved reception classes.

All the Trusts differed in relation to how they selected the pre-school facilities invited to take part in the programme. Most used Surestart areas as a starting point, possibly adding in other sites from the 20% most deprived wards. One Trust offered the scheme to all pre-school facilities in the Trust's 20% most deprived wards.

All Trusts seemed to use the EHSSB 3-2-1 programme or some variant of it. There are three elements to this type of scheme:

- A dental health education programme;
- A health breaks policy;
- A daily toothbrushing routine.

Each facility was supplied with enough toothpaste and brushes for all the children. All children had their brushes stored in a labeled holder. All Trusts trained the school staff extensively and supplied written information/guidance the school and for parents.

Uptake varied markedly by Trust ranging from 96% to 53%. Most Trusts, but not all, increased the number of pre-schools involved in the scheme each year. Over the 3 years of the programme approximately 4% of the pre-schools recruited dropped out. All Trusts rated the compliance levels of the children in participating schools as excellent. The average number of children involved per Trust per year was:

Homefirst	373
Causeway	not known
Foyle	4115

All Trusts considered their schemes to have been a success with pre-schools generally very enthusiastic. The programme was seen to be promoting healthy lifestyles among young children and their families.

The main problems encountered were:

- Storage of toothbrushes and toothpaste in the pre-school;
- Co-ordination and timing of delivery of supplies;
- Initially encouraging pre-school staff to get involved.
- Not having scheme in place at the start of the school year creates logistical difficulties particularly with consent forms.

Analysis of Questionnaires from Pre-School Distributed Schemes

Six Trusts utilised the pre-school setting to distribute fluoride toothpaste for home use: Ulster Hospitals and Community Trust, North and West Belfast Trust, Homefirst Trust, Foyle Trust, Sperrin-Lakeland Trust and Down and Lisburn Trust. All but one of the Trusts purchased their toothbrushes and toothpaste through RSS, however, the Trust that went directly to the manufacturer paid approximately the same price as those that went through RSS.

In the questionnaire most Trusts provided a combined cost for a tube of toothpaste and a toothbrush of around £0.95, the same figure seen for the postal schemes. The two WHSSB Trusts were, however, able to obtain their toothbrushes and toothpaste at a lower cost than the other Trusts (£0.14 and £0.41 respectively) possibly down to the fact that their order was considerably larger than that of other Trusts.

All Trusts used Sanderson OHP 1450ppm fluoride toothpaste by AMS International in their delivery services except one Trust who used the 1000ppm fluoridation from the same company when the target age group was less than 3 years old. The only addition items supplied with the toothpaste/toothbrush packs were information leaflets, although these were not used by all Trusts.

Trusts used a variety of CDS staff in their programmes, generally dental therapists, dental nurses and oral health promotion officers. On average the pre-school distributed type of scheme required 10 hours of CDS staff time per week. The non-Trust staff most commonly involved were pre-school teachers and class room assistants and to a lesser extent

[◇] Consists of 3 legacy Trusts

SureStart co-ordinators. The core age range targeted by this type of programme was children from 3 to 5 years although some schemes involved children at age 2 while others extended the scheme up to children in Primary 7. The settings used were generally playgroups, nursery schools and reception classes. Two Trusts involved Sure Start groups. As with the other types of scheme there was wide variation in the criteria used to select pre-schools for involvement. Trusts used one or more of the following criteria:-

- All nursery school or playgroups in the Trust area;
- Primary schools or pre-schools in the bottom 20% for dental health;
- Pre-schools in the 20% most deprived wards in the Trust;
- Pre-schools in the Trust's Sure Start or HAZ area;
- Pre-schools which feed the primary schools in the 20% most deprived wards in the Trust;

In each Trust area almost all of the pre-schools approached agreed to participate in the scheme. The number of settings involved per Trust ranged from 20 to 112 and the number of children participating per Trust varied from 652 per year to over 5000. The proportion of pre-schools who dropped out of schemes after years 1 and 2 were very small and most Trusts reported that the compliance of the children in the schemes was excellent.

Half of the Trusts did not seek consent from parents to include their child in the scheme. Among the remaining Trusts a variety of approaches were used including full written, positive comment for each year of the scheme. Half the Trusts provided training to the pre-school staff while all the Trusts provided information leaflets for school staff and parents.

All respondents considered their scheme to be a success. Some Trusts felt that there was a synergistic effect with other school-based initiatives they were involved in. One reply mentioned that the absence of postage costs and relatively small amount of Trust staff time involved, kept costs down. Problems commonly cited by respondents were storage and delivery of toothpaste and staff travel costs for more remote settings. One Trust overcame these problems by having AMS International deliver the packs discreetly to the pre-school/school.

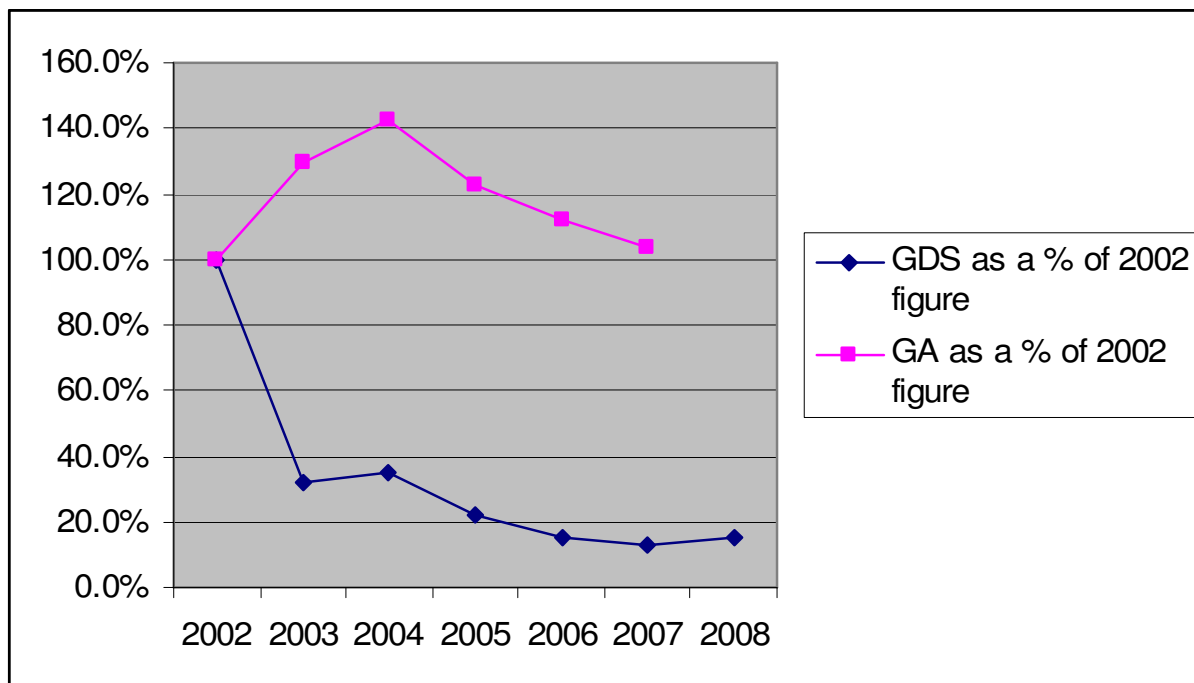
Analysis of Extraction Data

When deciduous teeth are affected by dental decay to a significant extent they often develop dental abscesses or become painful. Eventually these teeth may need to be extracted. Numbers of deciduous teeth extracted is a reasonably valid measure of child dental health because most dentists agree when a decayed deciduous tooth should be taken out. In contrast there is significant variation among dentists on when, or if, a deciduous tooth should be filled.

In the period 2002 to 2008 dental extractions for children could take place either in “high street” dental surgeries or in Trust hospitals. Prior to 2002 “high street” dentists were permitted to carry out extractions on patients under General Anaesthesia (GA) in their own surgery. From 2002 onwards Dental General Anaesthetics (DGAs) could only be undertaken in a hospital setting. This change in legislation had the effect of almost overnight reducing by 70% the number of deciduous teeth extracted in children in “high street” practices. At the same time there was a corresponding rise in the number of deciduous teeth extracted under GA in Trusts.

Figure 3 shows the percentage changes in number of deciduous teeth extracted in Northern Ireland during this period of legislation change and beyond. From 2002 – 2003 there is a sharp dip in the levels of deciduous teeth extracted in the General Dental Service (GDS) or “high street” practices and a sharp rise in the GA or Trust figure. Following this correction there was a peak in extraction levels in 2004 in both GDS and Trust figures.

Figure 3. Percentage changes in deciduous extractions in the GDS (non-GA) and in the Trusts under GA in Northern Ireland (2002-2008).

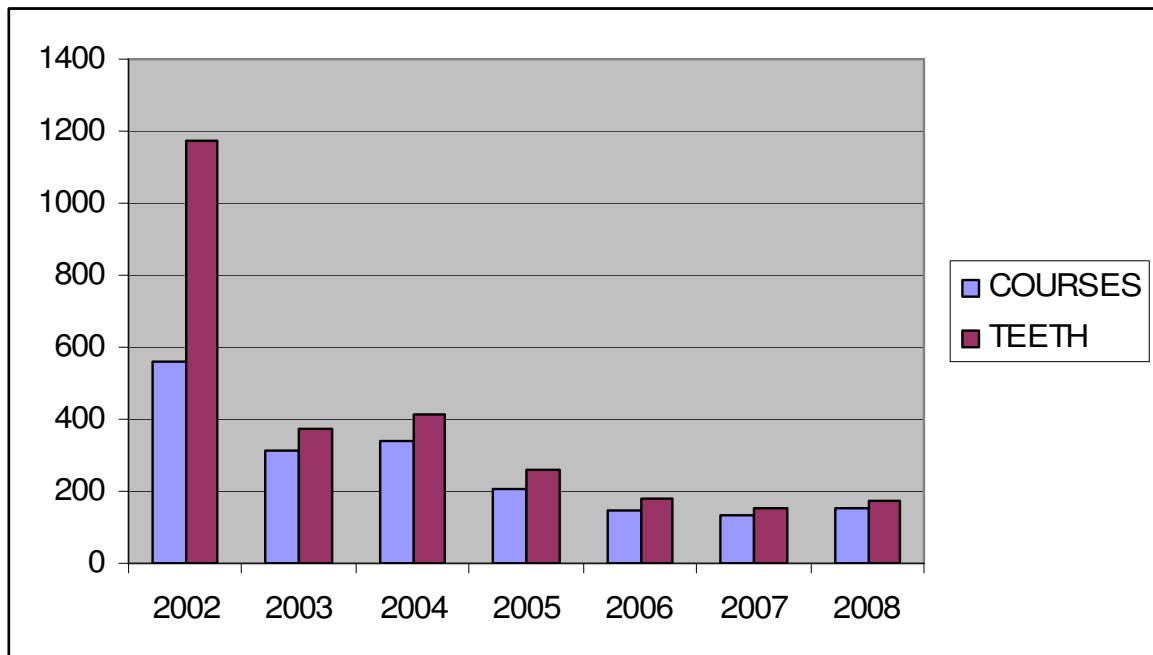


In relation to the Investing for Health (IfH) caries prevention schemes which began in 2005, at the Northern Ireland level there appears to have been a reasonably steady reduction in the total number of deciduous teeth extracted (GDS plus Trust), and this reduction seems to be more marked in the Trust extractions than in the GDS extractions. However, because the decline in the number of extractions began before the inception of the IfH schemes it is difficult to determine the extent of the contribution of these schemes to the observed reduction.

Extractions of Deciduous Teeth in 2-5 Year-Old Children in the GDS

At the Northern Ireland level the GDS extraction figures show a dramatic drop in the number of teeth extracted from 2002 to 2004 followed by steady decline from 2004-2006. Thereafter the numbers level off (figure 4). Broken down by Board the data mirror this pattern for three Boards, the SHSSB being the exception (Appendix 3, figure 3). This appears to be due to a large increase in “high street” extractions in the Armagh and Dungannon area in 2003 followed by another large increase in 2004 in the Newry and Mourne area and a smaller peak in Newry and Mourne in 2007.

Figure 4. Extractions (numbers of teeth and courses) for children aged 2-5 years (inclusive) in the NI GDS 2002-2008 (first quarter data for each year only).



At the Northern Ireland level, approximately 30% fewer deciduous teeth were extracted in the first quarter of 2008 compared to the same period in 2005 (table 5). All Board areas also showed a reduction in deciduous extraction levels in 2 – 5 year old children but the effect is most marked in the NHSSB and WHSSB.

Eight Trusts demonstrated a marked reduction in extraction numbers and three showed an increase. However, caution should be exercised in interpreting these data due to the small numbers involved. Of the three Trusts with an increase in the number of teeth extracted, two were operating a supervised toothbrushing scheme and one employed a pre-school distributed programme. Based on the figures in table 5 it appears that the order of effectiveness for the IfH schemes is:

1. Postal only (most effective)
2. Two or more schemes combined
3. Pre-school distributed only
4. Supervised toothbrushing only (least effective)

Note: It is not possible to apply statistical tests to the data in table 5. To do this we would need to know the number and proportion of children in each scheme who went on to have an extraction. That data is not available.

Table 5. Percentage change per Trust in the numbers of deciduous teeth extracted in the GDS over the 2005-2008 period (figures are for Q1 only).

	Number of teeth extracted in 2005	Number of teeth extracted in 2008	Reduction from 2005 to 2008	% Reduction from 2005 to 2008
Homefirst*	58	37	21	36.2%
Causeway*	26	19	7	26.9%
NHSSB TOTAL	84	56	28	33.3%
Sperrin				
Lakeland#	21	14	7	33.3%
Foyle*	24	14	10	41.7%
WHSSB TOTAL	45	28	17	37.8%
Armagh & Dungannon^	15	17	-2	-13.3%
Craigavon & Banbridge^	9	14	-5	-55.6%
Newry & Mourne^	25	6	19	76.0%
SHSSB TOTAL	49	37	12	24.5%
Ulster#	5	8	-3	-60.0%
North & West Belfast*	31	24	7	22.6%
South & East Belfast~	21	13	8	38.1%
Down Lisburn#	22	12	10	45.5%
EHSSB TOTAL	79	57	22	27.8%
Northern Ireland Total	257	178	79	30.7%

*Used more than one type of scheme

^Supervised toothbrushing only

#Pre-school distributed only

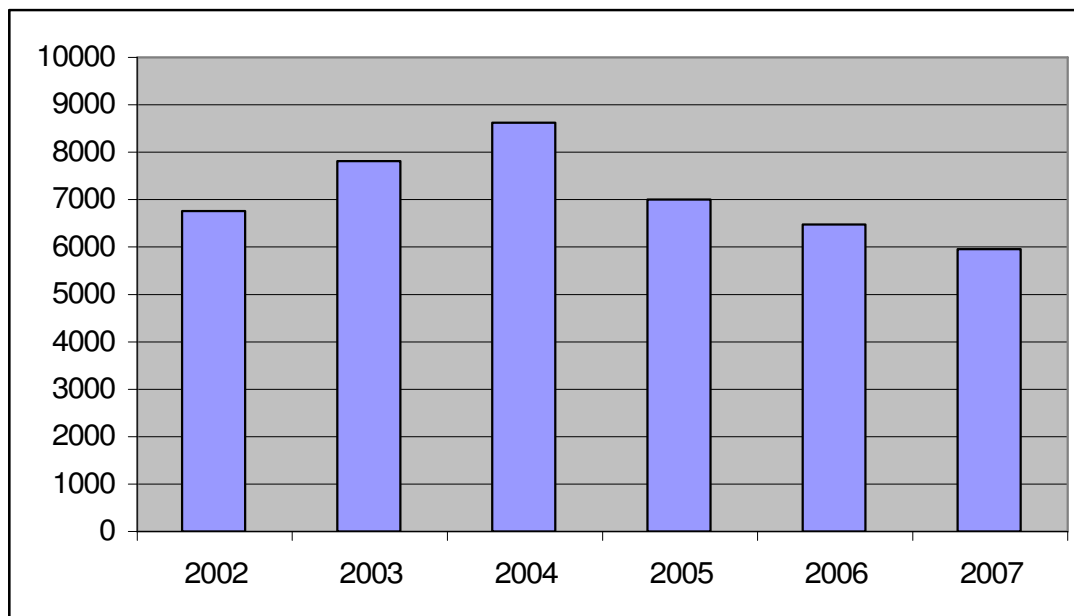
~Postal only

Trust Dental General Anaesthetics

From 2002-2007 there were on average 28,728 *deciduous* teeth extracted under GA each year in Northern Ireland. Over the same period, an average of 4277 *permanent* teeth were extracted per year and *all* extractions came from an average of 7105 cases per year. At a Northern Ireland level, time trends for extractions of both types of teeth and for cases show similar patterns with an activity

rising through 2002-2003 peaking in 2004 and then falling back in 2005-2007 (Figure 5).

Figure 5. Number of patients receiving dental extractions under GA in Northern Ireland (2002-2007).



All Boards except the SHSSB exhibit the pattern seen at the Northern Ireland level (Appendix 4). In the SHSSB area, numbers of GA cases and numbers of deciduous extractions are relatively constant over the 2002-2007 period. Like the GDS figures, more variation in numbers of deciduous teeth extracted is seen at Trust level but this is to be expected due to the smaller numbers of teeth involved.

Most Trusts show a reduction in the numbers of deciduous teeth extracted from the beginning of the IfH dental programmes but in some cases the effect is small or even in the opposite direction to what would be expected (table 6). It is difficult to relate schemes to GA extract centres because patients resident in one Trust area may be seen in another for their DGA. If we assume that patients reside in the Trust where they receive their extraction(s) in, or at least in an adjacent Trust, then the hierarchy of effectiveness of the schemes appears to be:

1. Two or more schemes combined (most effective)
2. Pre-school distributed only
3. Supervised toothbrushing only
4. Postal only (least effective)

Table 6. Percentage reductions per Trust in the number of deciduous teeth extracted under GA over the 2005-2007 period.

	Number of teeth extracted in 2005	Number of teeth extracted in 2007	Reduction from 2005 to 2007	% Reduction from 2005 to 2007
Antrim*	1459	1086	373	25.6%
Mid-Ulster*	1173	1125	48	4.1%
Causeway*	1927	1274	653	33.9%
NHSSB TOTAL	4559	3485	1074	23.6%
Erne Hosp#	819	505	314	38.3%
Tyrone C#	1144	785	359	31.4%
Altnagelvin H*	3559	2432	1127	31.7%
WHSSB TOTAL	5522	3722	1800	32.6%
South Tyrone H^	1201	1044	157	13.1%
Craig. Area H^	1919	2038	-119	-6.2%
Daisy Hill^	3426	3095	331	9.7%
SHSSB TOTAL	6546	6177	369	5.6%
Ulster Hosp#	5785	5217	568	9.8%
RBHSC*	2799	2769	30	1.1%
Mater*	3152	2415	737	23.4%
Lagan Valley~	1343	1414	-71	-5.3%
EHSSB TOTAL	13079	11815	1264	9.7%
Northern Ireland Total	29706	25199	4507	15.2%

*Used more than one type of scheme

^Supervised toothbrushing only

#Pre-school distributed only

~Postal only

Note. See text for limitations on linking extraction centres to different types of IfH scheme.

Data from School Dental Inspections

2008 was the last year of the Northern Ireland school dental inspection programme. Each year the dental health status of all P1, P2 and P7 children whose parents consented to their child being examined, was recorded. The resultant regional database allows the oral health of children living in different Trusts to be compared over time. Table 7 shows how the dental decay levels in children living in the 20% most deprived wards of each Trust (i.e. the target children for the IfH programmes) changed over the lifetime of the IfH schemes. Based on the figures in table 7 it appears that the order of effectiveness for the IfH schemes is:

1. Supervised toothbrushing only (most effective)
2. Two or more schemes combined
3. Pre-school distributed only
4. Postal only (least effective)

There are many reasons why the data collected at school dental inspections may not be directly comparable. Among these are consent processes used, type of light source used and diagnostic criteria employed. However, the inaccuracies inherent in this system of estimating oral health for children involved in the IfH schemes are likely to be less than from the two extraction data sources.

Table 7. Changes in mean number of teeth with decay experience (mean dmft) for children resident in the most deprived 20% of wards in each Trust

	2004-5	2007-8	Actual reduction	% reduction
Causeway*	3.01	2.39	0.62	20.7%
Foyle*	3.90	2.38	1.52	38.9%
Homefirst*	1.78	1.93	-0.15	-8.5%
North West Belfast*	4.15	4.16	-0.02	-0.4%
Mixed total	2.61	2.38	0.23	8.9%
South & East Belfast~	2.45	3.20	-0.75	-30.6%
Postal total	2.45	3.20	-0.75	-30.6%
Down Lisburn#	2.89	2.65	0.24	8.4%
Ulster CHT#	2.10	1.77	0.33	15.9%
Sperrin Lakeland#	1.34	1.40	-0.06	-4.1%
Pre-school distributed total	2.14	1.97	0.18	8.4%
Armagh & Dungannon^	2.38	1.87	0.51	21.5%
Craigavon & Banbridge^	2.30	2.00	0.31	13.3%
Newry & Mourne^	2.20	1.87	0.34	15.3%
Supervised toothbrushing total	2.30	1.91	0.38	16.6%

Conclusions

While Investing for Health funding was provided to Trusts to run one of 3 types of fluoride toothpaste schemes, there were no regional protocols in place specifying exactly how each of the schemes should be run. Partly for this reason, but also because of oral health improvement schemes that were already running locally, and differing Trust cultures, no two Trusts ran the generic elements of the schemes (age groups targeted, deprivation selection criteria, type of toothpaste and type of consent) in precisely the same way. It is therefore not possible to make direct comparisons between the three types of scheme in order to identify the most effective or the most efficient (see Appendix 5 for a list of reasons why schemes can't be directly compared).

However, despite the wide variation in implementation strategies it is still possible to investigate the generic scheme elements in order to assist with the development of regional protocols for each of the scheme types.

There are very significant limitations in using routinely gathered extraction data to determine the effectiveness of caries prevention schemes:

- Trusts used different methodologies to select the children to be included in the schemes and programmes of the same type were not run in exactly the same way by different Trusts.
- While one would hope that there would be reasonable agreement between practitioners on when a deciduous tooth should be extracted, because there has been no standardisation of diagnosis and treatment planning among the dentists involved we cannot assume high levels of agreement.
- Patients from one Trust area may attend a dentist in another Trust area, so a proportion of extractions will not be assigned to the correct Trust.
- We have no way of knowing whether any of the children having extractions are involved in the caries prevention schemes.
- While it was possible to break down the GDS data by age so children in the target age ranges for the schemes could be separated out, the same could not be done for the Trust GA figures.

Notwithstanding these caveats, at the Northern Ireland level the effect of the IfH schemes on caries prevention is difficult to

determine as the number of deciduous extractions carried out was declining before the schemes began. However, it is possible to identify some patterns in the extraction data:

- Most Trust areas showed similar levels of reduction in their extraction numbers over the period when the IfH programmes were running.
- Between 2005 and 2008 the reduction in numbers of deciduous teeth extracted was greater in the WHSSB and NHSSB areas. This pattern is observed in both the GDS and the GA figures.
- In the SHSSB area the reduction in extractions is significantly less than in the other three Boards. In fact, the Craigavon and Banbridge area actually exhibited greater numbers of GDS and GA extractions in 2007/2008 than in 2005. This was the only area to show this trend.

There is no consistent pattern emerging from the three types of outcome data on the most effective type of scheme. In fact, the least effective scheme as judged by extraction data was the most successful according to the screening data.

All Trusts, regardless of which type of scheme they employed, developed and refined their systems as time went by. While this had the effect of making the schemes very difficult to compare it did tend to make the programmes more efficient. There would be considerable value in Trusts sharing their experiences with each other.

RECOMMENDATIONS

Three user groups, one for each type of scheme, should be set up so that Trusts can learn from each other and make their schemes more efficient. Consideration should be given to developing protocols for each type of scheme. Once these were operational, good quality baseline oral health measures should be undertaken so that, over time, an accurate assessment of scheme effectiveness can be made. This may usefully be linked in with a rolling dental survey programme.

APPENDICES

APPENDIX 1

CORE QUESTIONNAIRE TO BE COMPLETED FOR IFH FUNDED CARIES PREVENTION SCHEMES

	SECTION 1	
	Purchase of toothpaste/toothbrush	
1	At what stage during the first year of the scheme did the IfH money become available to you?	Please enter month:
2	How did you purchase the toothpaste/toothbrush?	Please describe the process (e.g. directly with manufacturer, regional supplies):
3	How much IfH funding did you receive each year for this scheme?	
4	How many tubes of toothpaste and toothbrushes did you purchase in each year of the scheme?	_____ tubes of toothpaste _____ toothbrushes
5	What was the unit price of the toothpaste and toothbrushes?	
6	What brand of toothpaste and toothbrushes did you purchase?	
7	How many ppm of fluoride were in the	

	toothpaste that you purchased?	
8	Apart from toothpaste and toothbrushes what else did you spend the money on?	
9	Please supply costs for other articles of expenditure.	
	SECTION 2	
	Staff	
1	Please list the CDS staff that were involved in your scheme. Mention all staff involved in the design, implementation and monitoring of your scheme.	Please list the staff by post title, you do not need to provide staff names:
2	Please fill in the lines opposite to show how many hours per week of CDS staff time was consumed by this project when it was up and running.	_____hours of Clinical Director's time per week _____hours of SDO's time per week _____hours of CDO's time per week _____hours of Health Promotion Officer's time per week _____hours of Dental Therapist's time per week _____hours of Dental Hygienist's time per week

		____ hours of Dental Nurse's time per week ____ hours of Administrative Staff's time per week
3	Please list any other personnel involved in your programme (e.g. non-CDS Trust staff, voluntary workers, other non-Trust staff).	Please specify job title of other personnel involved and their role in the programme:
	SECTION 3	
	Children	
1	What age group of children were involved in the scheme?	
2	What type(s) of pre-school setting was used (e.g. playgroup, nursery school, reception class)?	

3	How were the pre-schools selected (e.g. deprivation score, sure start involvement etc)?	
	SECTION 4	
	Numbers	
1	How many pre-schools/schools were approached, how many agreed to take part?	_____ were approached

		_____ agreed to participate
2	How many pre-schools/schools were involved in each year of the scheme?	_____ pre-schools/schools in year 1 _____ pre-schools/schools in year 2 _____ pre-schools/schools in year 3
3	How many children were involved in each year of the scheme?	_____ children in year 1 _____ children in year 2 _____ children in year 3
4	How many of the pre-schools/schools recruited continued through to end of the programme (i.e. did not drop out)?	
5	Approximately how many children attending the pre-schools/schools involved in the scheme did not participate?	
6	Overall, how was the compliance level of the children who took part in the scheme?	Excellent Good Fair Poor

	SECTION 5	
	The future	
1	Will the scheme continue after funding ceases?	
2	In your opinion was the scheme a success overall? Please explain your answer	
3	What were the main problems encountered by the CDS in delivering the scheme?	
4	How could the scheme have been improved?	

5	Have you undertaken your own evaluation of the programme? If so, please provide us with your report.	

APPENDIX 2



APPENDIX 3

Figure 1. Number of deciduous teeth extracted in Q1 in the GDS in children aged 2-5 years in the EHSSB by Trust area (2002-2008).

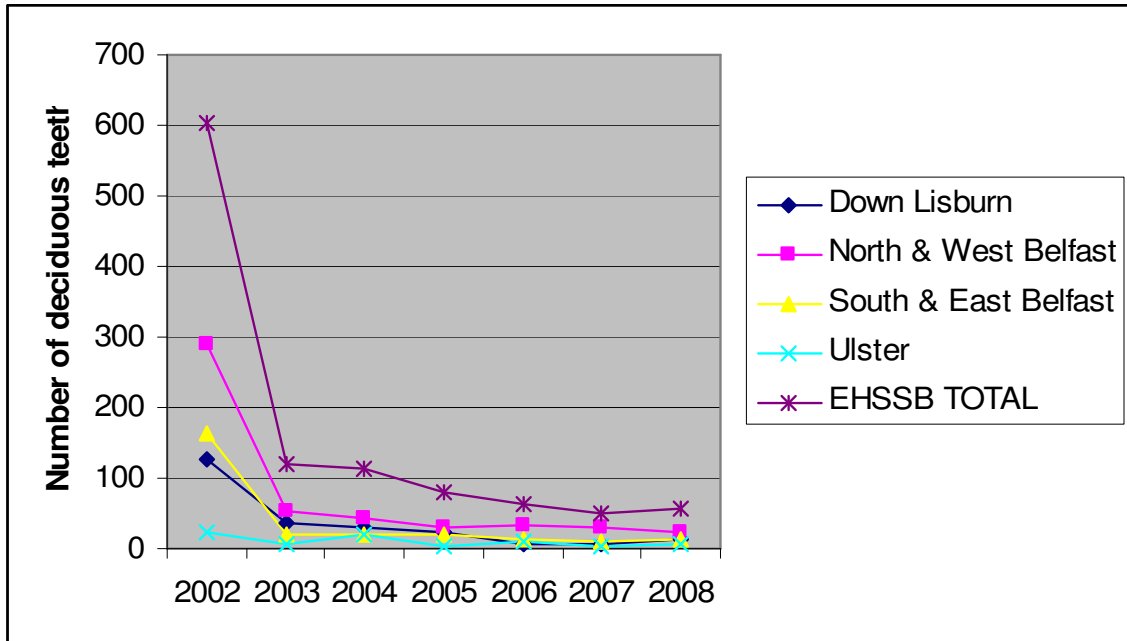


Figure 2. Number of deciduous teeth extracted in Q1 in the GDS in children aged 2-5 years in the NHSSB by Trust area (2002-2008).

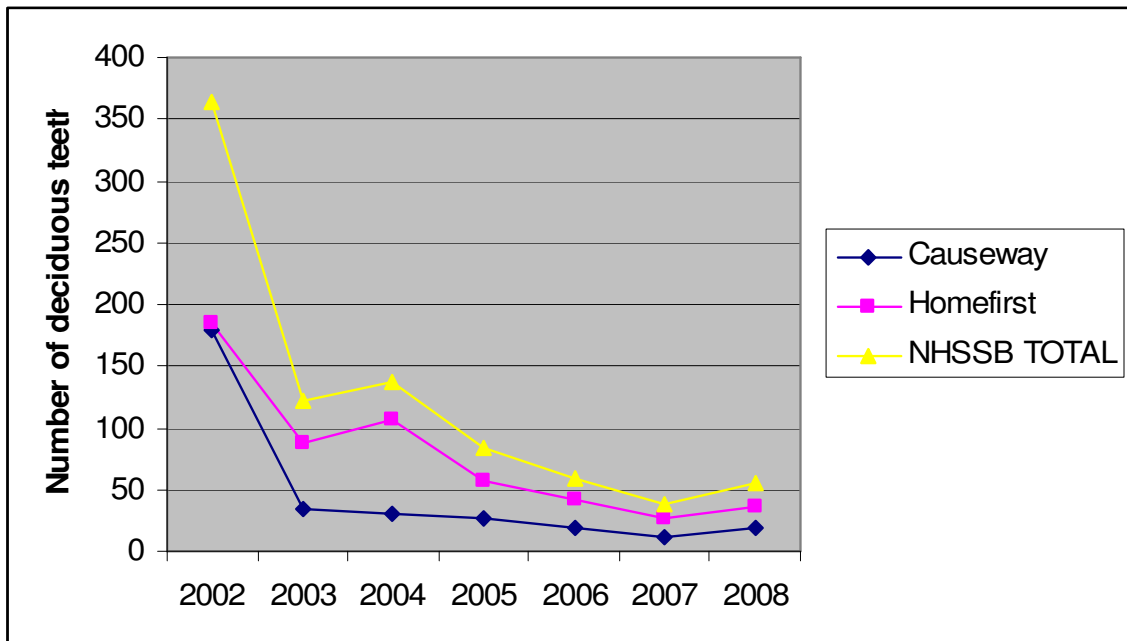


Figure 3. Number of deciduous teeth extracted in Q1 in the GDS in children aged 2-5 years in the SHSSB by Trust area (2002-2008).

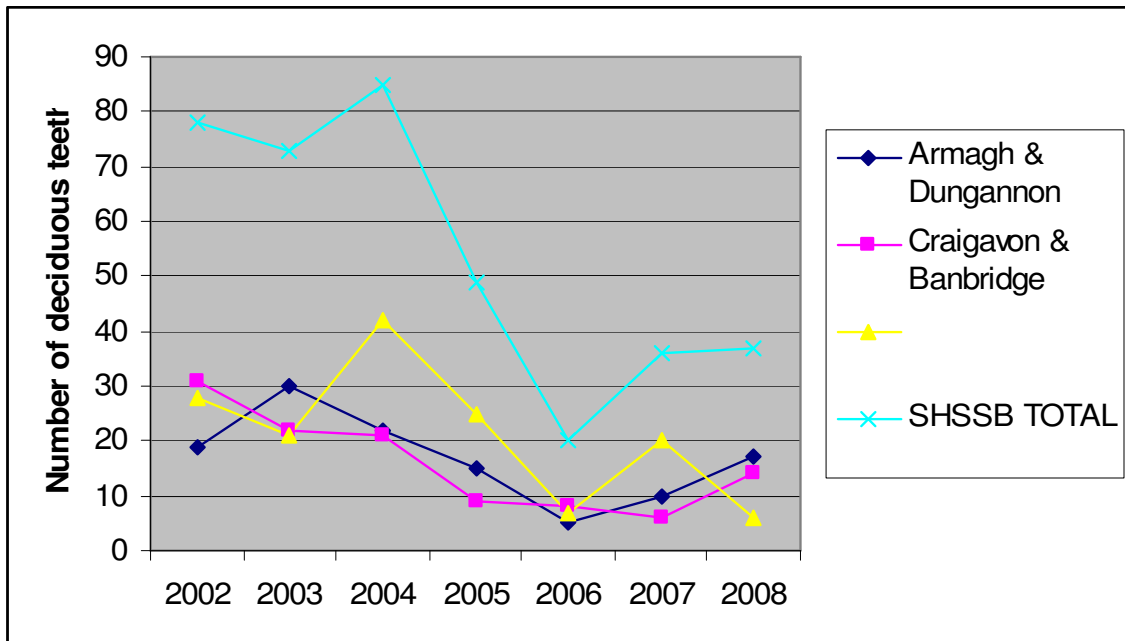
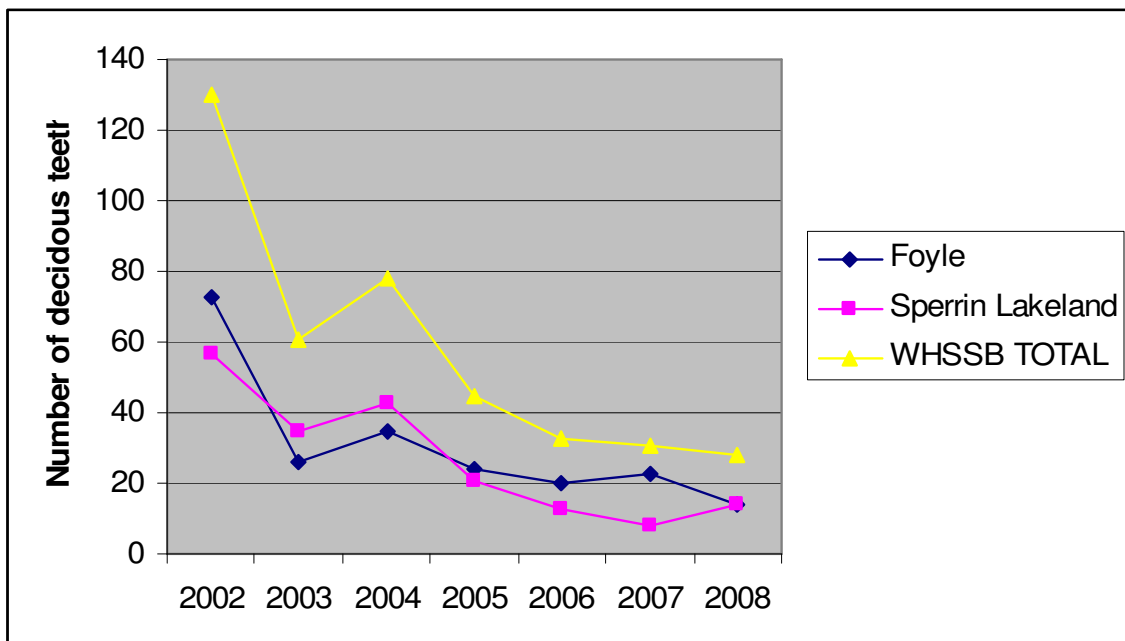


Figure 4. Number of deciduous teeth extracted in Q1 in the GDS in children aged 2-5 years in the WHSSB by Trust area (2002-2008).



APPENDIX 4

Figure 1. Number of patients receiving dental extractions under GA in NHSSB area shown by hospital (2002-2007).

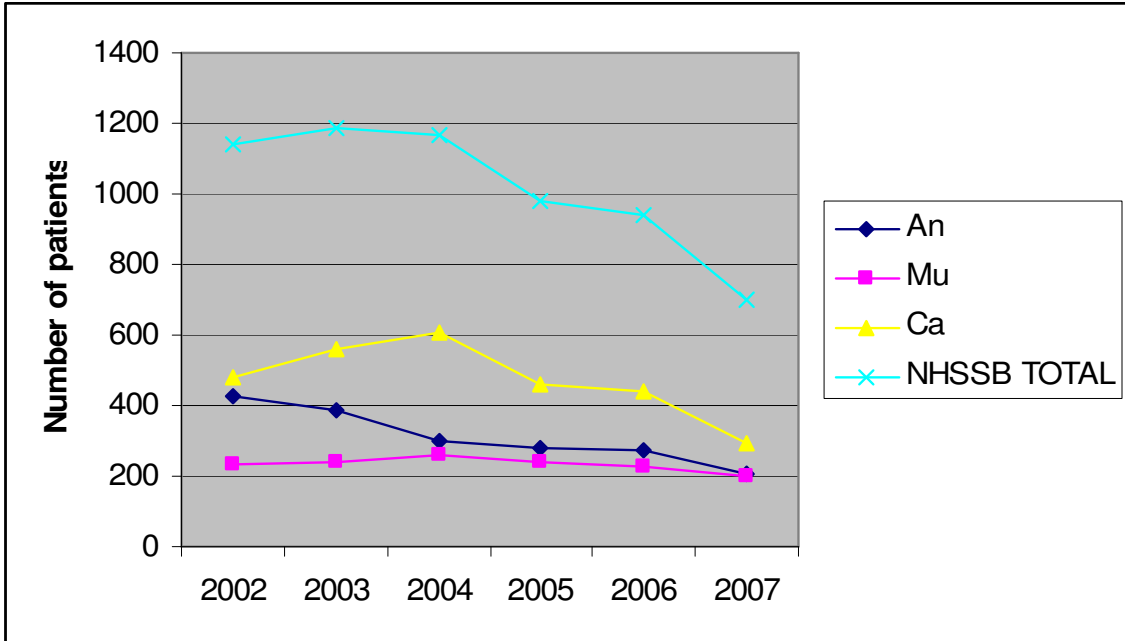


Figure 2. Number of patients receiving dental extractions under GA in WHSSB area shown by hospital (2002-2007).

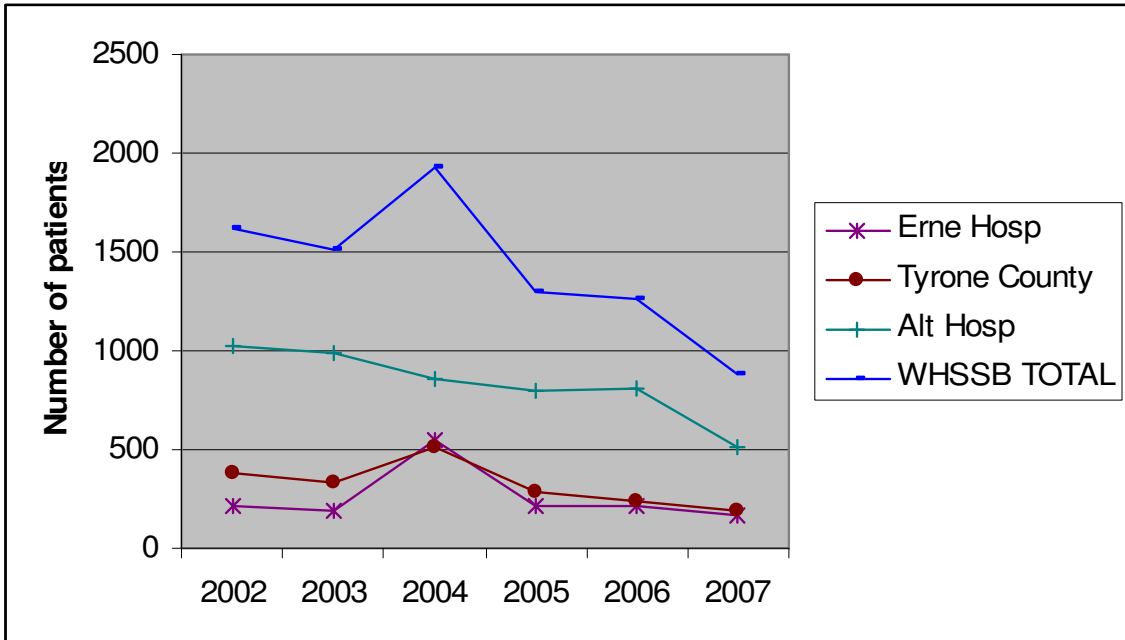


Figure 3. Number of patients receiving dental extractions under GA in SHSSB area shown by hospital (2002-2007).

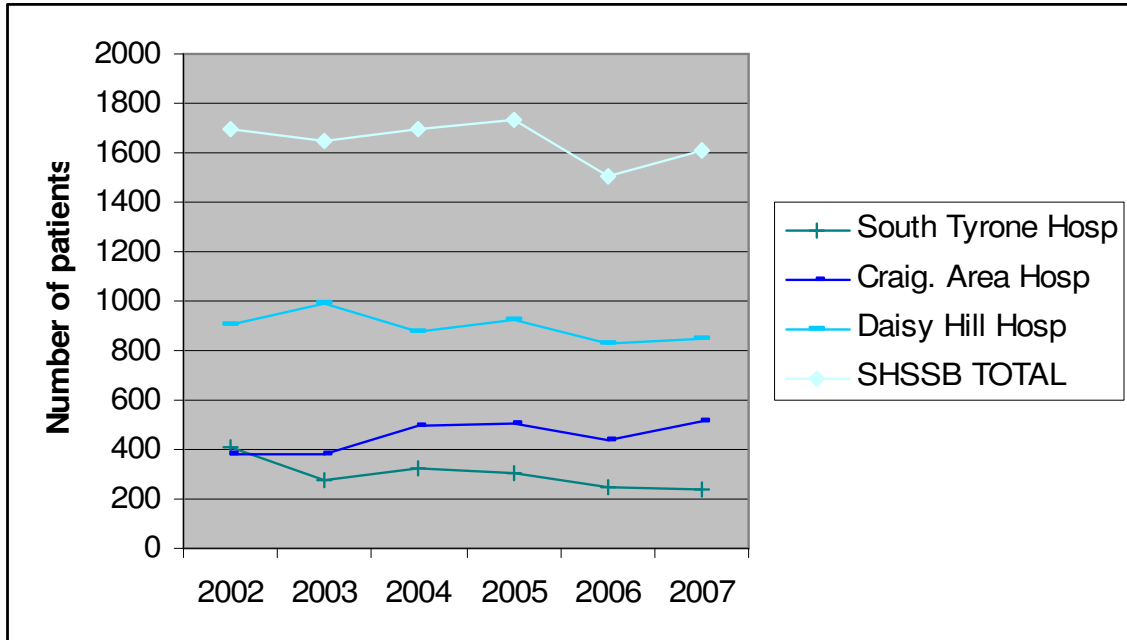
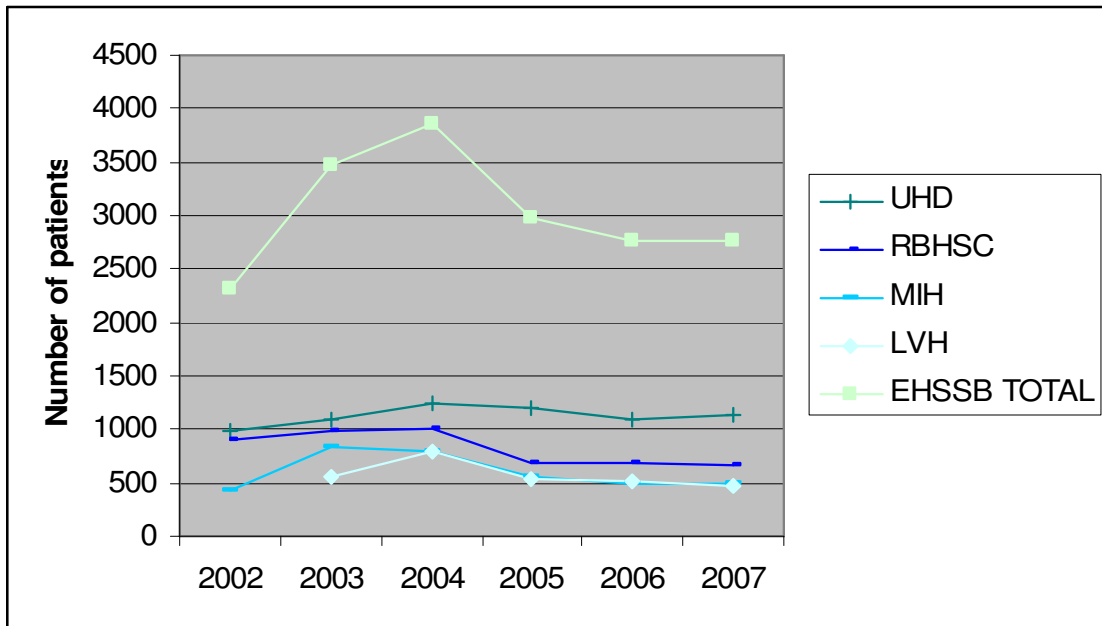


Figure 4. Number of patients receiving dental extractions under GA in EHSSB area shown by hospital (2002-2007).



APPENDIX 5

Why schemes of the same type can't be combined for analysis and why schemes of different types can't be compared:

- All Trusts were running caries prevention programmes targeting young children prior to the commencement of the IfH funded schemes. In many cases Trusts continued to run these programmes in tandem with their IfH schemes. This makes it difficult to isolate the effect of the IfH scheme.
- Some Trusts ran more than one type of IfH scheme simultaneously again making it difficult to determine the effect of any single scheme.
- Not all Trusts used the same strength of fluoride toothpaste initially, although by the final year of the schemes only Sanderson 1450ppm toothpaste was being used.
- There was significant variation between Trusts in the age that children entered into the schemes and also in the age that they left the schemes.
- Trusts used different deprivation criteria to determine if children would be included in their scheme.
- Some Trusts only admitted children to their scheme when parental consent had been obtained. Among these Trusts the methods used to obtain consent varied.