Invited articles

A series of four articles based on the 1998 Adult Dental Health Survey

by Nigel M. Nuttall, Dental Health Services Research Unit

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Dental status in Scotland 1972-1998

Self-reported impact of dental disease among Scottish dentate adults

Dental health behaviour of Scottish dentate adults

The latest of the decennial surveys was undertaken in 1998 by the Office of National Statistics in collaboration with the dental schools of the Universities of Birmingham, Dundee, Newcastle and Wales. The survey was undertaken by teams consisting of an interviewer and a dental examiner who visited randomly selected households at which all adults over 16 in residence were asked to take part in the survey. In Scotland 1,204 adults were interviewed following which those with some teeth were asked to undergo a dental examination; 668 (70%) of those eligible agreed. A weighting system based on some of the interview responses of those who consented to be dentally examined and those who were interviewed but not examined was used to reduce bias from non-response.

This article looks at what this series of surveys reveals about tooth loss and denture wearing among the population of Scotland.

Surveys of adult oral health have been carried out in Scotland since 1972. The latest of the decennial surveys was undertaken in 1998 by the Office of National Statistics in collaboration with the dental schools of the Universities of Birmingham, Dundee, Newcastle and Wales (Kelly et al., 2000). These surveys have tended to show that Scotland has poorer dental health than the average for the United Kingdom. In 1988, when the previous dental health survey was carried out, Scotland was effectively 10 years behind England both in terms of the proportion of the proportion of its population who had some teeth and the average number of missing teeth in dentate adults. This article looks what the 1998 survey reveals about trends in tooth loss and denture wearing in Scotland by comparing the findings with that of the previous surveys that have been undertaken on an approximately decennial basis since 1972.

Total tooth loss and denture wearing in Scotland 1972-1998

The clearest indicator of the general improvement in the status of the mouths of the Scottish population over the last 26 years is the finding that whereas in 1972 64% of the population were reliant on dentures to some extent by 1998 almost the same proportion was wholly reliant on their own teeth (figure 1). Since the first survey in 1972 the proportion of the population with no natural teeth has fallen by more than a half from 44% to 18% in 1998. However, although this is an improvement, the present level is significantly higher than the level that has been found at the same time in England (12%) and for the UK as a whole (13%). Furthermore, a less encouraging finding is that the proportion of people who require some dentures in addition to their natural teeth has remained unchanged at around 20% for the last 26 years.

![Figure 1 Oral status of adults in Scotland 1972-98](image-url)
Deprivation and total tooth loss

The impact of deprivation on health is increasingly becoming appreciated and dental surveys of children have shown that deprivation is associated with dental health (Pitts et al., 1999). A system for measuring level of deprivation used in Scotland at the present time are DEPCAT scores (Carstairs and Morris, 1991) which can be easily assigned on the basis of a person's postcode. The scores are determined for each area from national census data using the level of overcrowding in households; male unemployment; the proportion of social classes IV or V and the proportion of people in private households with no car. DEPCAT analyses have previously shown deprivation to be associated with a variety of clinical measures of health such as the incidence of cerebrovascular disease, coronary heart disease and mental health problems (McLaren and Bain, 1998). This system is currently used in dentistry for determining who is eligible for the enhanced capitation registration payments scheme. Figure 2 shows that people who live in the areas of high deprivation were much less likely to be wholly reliant on their own natural teeth than the most affluent people. Over half of the least affluent (DEPCAT 6&7) required some dentures (52%) in comparison less than a third of those who lived in a DEPCAT1 area (30%). A quarter of those who were lived in the poorest areas had lost all of their teeth by 1998 compared with 15% or less in the better-off areas.

Figure 2 Adult oral status in Scotland in 1998 by deprivation category (DEPCAT score)
Social class of the head of household is also a type of deprivation measure and this has been assessed at all surveys since 1972 (figure 3). From 1972 through to 1998 total tooth loss has been markedly lower among those from a non-manual working background than those from an unskilled manual working background. However, there has been a steady decline in the proportion of people who have none of their own teeth among people from each social class background. Nevertheless, those from an unskilled manual background in 1998 were still only at the level of those from a skilled manual background 10 years previously and only marginally ahead of non-manual workers 20 years previously.

Figure 3 Total tooth loss by social class of head of households in Scotland 1972-1998
Rate of Tooth Loss

The trends looked at so far have been patterns of results through the surveys, but once someone has lost all their teeth, they stay that way. So even if no more teeth are lost in the population from now on, there would still be a proportion of the population who would continue to be found to have no teeth. A way of looking at the results of successive surveys to get a feel for the rate at which tooth loss is occurring is to follow the progress of a cohort of people as they get older, for example people aged 25-34 in 1978 would be 35-44 in 1988 then 44-54 in 1998. In figure 4 this has to be done by starting from 1978 (as the previous survey was only 6 years before in 1972). The rate of tooth loss since 1978 looked at in this way is quite low; only 2% of 16-24 year olds had lost all of their teeth by 1978 which remained unchanged within the same group who were aged 25-34 in 1988 and rose to 4% by the time they were aged 35-44 in 1998. Among the next age group those aged 25-34 in 1978 there was actually a drop in total tooth loss from 10% in 1978 to 7% in 1988 in the cohort; this is an impossible event arising from variations between samples and is not actually statistically significant. By 1998 the level of total tooth loss in this group had risen to 13%.

An aspect that is highlighted in figure 4 is the level of tooth loss among groups who have spent all their life within the NHS era (highlighted in yellow) and those containing people who had all lived some time before the introduction of the NHS (highlighted in blue). The contrasts between the groups are not only the overall level of experience of tooth loss but also the subsequent rate at which edentulousness is occurring.

![Figure 4 Total tooth loss by age group in Scotland 1972-1998](image)
The oral health target for Scotland

The oral health target concerned with adult dental health set by the Scottish Executive Department of Health for Scotland is concerned with tooth loss. It intends that by 2010 more than 95% of 45 to 54 year olds should have some natural teeth. Figure 4 shows that among those aged 35 to 44 (who will be 45 to 54 in 2008) 4% have already lost all of their natural teeth. This means that no more than 1% of the cohort can become edentulous over the next 10 years if the target is to be met. Although total tooth loss is obviously much less common now than in the past it may be quite difficult to achieve this target.

References


Dental status in Scotland 1972-1998

(based on the 1998 Adult Dental Health Survey)

by Nigel M. Nuttall, Dental Health Services Research Unit

This article examines how the condition of teeth in the Scottish dentate population has changed since 1978.

The number of natural teeth retained by dentate adults

The variation in the numbers of teeth in the dentate population gives some indication of
the rate at which people are losing teeth and an indirect measure of how many people may be likely to require dentures in addition to their own teeth in ensuing years. Figure 1 shows that the average Scot who had some teeth in 1998 retained just over two-and-a-half more teeth than in 1972. The 1998 average of 23.8 teeth was still, however, almost one tooth less than the average for the UK as a whole.

Figure 1 Average number of teeth among dentate adults in Scotland 1972-1998
In addition to counting the number of teeth the national surveys of adult dental health classify teeth as being in one of four conditions; missing, filled but otherwise sound, sound and untreated, or decayed. The interpretation of these measures is not necessarily straightforward. The number of teeth which are sound and untreated is often as much an indication of an absence of dental treatment as a sign of dental health. Thus, high numbers of sound and untreated teeth have often been associated with those who avoid going to a dentist on a regular basis but can also be a sign of a well looked after mouth. On similar lines is the argument that filled but otherwise sound teeth can indicate past experience of disease or can also reflect having received some dental care. This leads to the now routinely found result that fillings are more common in those who attend for regular dental check-ups than in those who only attend when they have some trouble with their teeth. This would seem to suggest that attending for check-ups is associated with a poor dental outcome or more disease experience, yet these surveys repeatedly show that regular dental check-ups are associated with the positive dental outcome of the retention of natural teeth. Decay is unequivocal as a negative indicator of dental health. However, decay measured as part of traditional epidemiological surveys is not necessarily equivalent to all the caries that would be treated in clinical practice. The rule in previous national dental surveys has been to count only instances where there is definite dentine involvement and a break in surface continuity as cases of decay.

The condition of natural teeth among dentate adults in Scotland 1972-98

Figure 2 shows the condition of natural teeth among dentate adults in Scotland. The average number of missing teeth in dentate adults has been steadily declining since it was first measured on a national basis in 1972. Adults with some natural teeth in Scotland had an average of 2.6 fewer missing teeth in 1998 than in 1972. Furthermore, the condition of teeth retained is steadily improving as well. The number of teeth with untreated decay has more than halved in the last 26 years from 2.4 in 1972 to 0.9 in 1998. At the same time the number of filled otherwise sound teeth has risen from 6.5 to 8.8, and so too has the average number of sound and untreated teeth, from 12.3 to 14.1. Nevertheless, the average Scot has almost one more missing tooth and one-and-a-half fewer sound and untreated teeth than the UK average.
The effect of changing the criteria for dental caries.

It was noted earlier that tooth decay in the national surveys has traditionally been defined as lesions where caries penetrates dentine and where there is a visible discontinuity in tooth surface. There has been considerable debate whether this is an appropriate definition from the point of view of defining caries that requires treatment. One of the most significant changes with respect to assessment of dental caries in the 1998 survey has been in the collection of additional caries data. In the previous surveys in this series, with the inclusion for the first time of an assessment of dentine caries without obvious cavitation. These changes do not include lesions confined to enamel which are counted as sound for the purpose of the survey. Radiography was not undertaken.

The effect of the changes can be seen in figure 3 that looks at the findings using the traditional survey criteria and using the new caries criteria. The new caries criteria detected twice as many teeth with dentine caries (1.8) than were found with the more traditional criteria (0.9). As a consequence the average number of teeth classified as sound and untreated dropped from 14.1 to 13.6 and the average number of filled but otherwise sound teeth dropped from 8.8 to 8.4.
The remaining two tables look at dental status using the new caries criteria.

**Tooth Status and Age group**

On the basis of a count of 32 teeth Scottish adults aged 16-24 had an average of 4.3 teeth that were not present (predominantly 3rd molars). There was a higher incidence of caries among younger adults; on average dentate adults aged between 16 and 34 had 2.2 decayed teeth compared with 1.3 among those aged 65 or over, but older adults had many fewer teeth overall. One of the most striking findings of this survey is the experience of filled but otherwise sound teeth among those aged 16-24. The youngest age group had 3.8 filled (otherwise sound) teeth on average compared with 8.9 among those aged 24-34; a difference of 5.1 filled teeth which is considerably larger than the difference between any other two adjacent age groups. This perhaps marks the beginning of a new type of dental patient entering the adult population; one who has markedly fewer existing fillings with a consequently lower need for maintenance treatment for past restorative work.
Deprivation and tooth status

The first article in this series showed that people from areas with higher material deprivation indicated by factors such as lower car ownership and male unemployment are more likely to have lost all their natural teeth in comparison to those who live in more affluent areas. The relationship between deprivation and dental health is also found in the condition of natural teeth. People who lived in poorest areas tended to have more decayed teeth and markedly fewer filled teeth than those from affluent areas indicating that they are suffering both from a higher level of dental disease and an apparently lower exposure to restorative dentistry than the most affluent.
Self-reported impact of dental disease among Scottish dentate adults
(based on the 1998 Adult Dental Health Survey)

by Nigel M. Nuttall, Dental Health Services Research Unit

This article examines the effect that oral health can have on people's lives.
Knowledge of the extent of dental disease gives a clinical indication of the experience of dental problems but not necessarily reflect the problems that people experience as a result of their dentition. There are differences between clinicians' and the public's evaluation of oral health. For example, dentists often appear to be most concerned about the integrity of previous dental work whereas patients often seem most concerned with the appearance of their teeth. It is becoming increasingly appreciated that the way a disease affects people's lives is just as important as epidemiological measures of its prevalence or incidence. This is the first of the UK adult dental health surveys to use and report a measure of the self-perceived impact on people of the dental and periodontal diseases and other oral conditions.

The impact of dental disease

There have been a variety of approaches to measuring the impact of dental disease (Slade, 1997a). This considers people's perceptions of how they are affected as a whole by dental disease and conditions using the Health Impact Profile (OHIP) developed by Slade (Slade, 1997b). The aim of this index is to provide a comprehensive measure of self-reported dysfunction, discomfort and disability arising from oral conditions. It is based on Locker's adaptation of the World Health Organisation's classification of impairments, disabilities and handicaps. In the WHO model, impacts are organised linearly to move from a biological to a behavioural to a social level of analysis. Slade and Spencer adapted this by proposing seven dimensions of impact of oral condition. Each of the 7 dimensions in the original scale was assessed from questions on the type of problems experienced (a total of 49 questions). A shortened version (OHIP-14) was later developed based on a subset of 2 questions for each of the 7 dimensions (Slade, 1997b).

The dimensions and questions associated with them are:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Questions concerning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional limitation;</td>
<td>trouble pronouncing words, worsened taste</td>
</tr>
<tr>
<td>Physical pain;</td>
<td>aching in mouth, discomfort eating food</td>
</tr>
<tr>
<td>Psychological discomfort;</td>
<td>feeling self-conscious or tense</td>
</tr>
<tr>
<td>Physical disability;</td>
<td>interrupted meals or poor diet</td>
</tr>
<tr>
<td>Psychological disability;</td>
<td>difficulty relaxing, embarrassment</td>
</tr>
<tr>
<td>Social disability;</td>
<td>irritability, difficulty in doing usual jobs</td>
</tr>
<tr>
<td>Handicap;</td>
<td>life less satisfying, inability to function</td>
</tr>
</tbody>
</table>
In figure 1 the impact of the seven dimensions which make up the OHIP index are arranged in the order according to how many people reported being affected by them. Over a third of the dentate population of Scotland reported being affected by oral pain occasionally or more often in the preceding 12 months. A quarter also reported that their oral condition had made them feel self conscious or tense. Just over a fifth (18%) found their oral condition made it difficult to relax or felt embarrassed by it. Fewer reported being affected functionally by their oral condition; 9% said they had had some trouble pronouncing words or that their sense of taste had changed and 8% felt that their diet had been unsatisfactory or that they had had to interrupt meals because of their oral condition.

Figure 1 Reported impact of health in previous 12 months among dentate adults in Scotland in 1998 assessed by the Oral Health Impact Profile (OHIP14)
Although some impacts were not reported very frequently they were nevertheless important as they concern people whose dental condition is such that it affects their life. Almost 1 in 12 dentate adults in Scotland reported that their oral condition had an occasional impact on their quality of life as a whole over the preceding 12 months. For 8% of people this was reflected in making their life in general less satisfying on occasion but in the case of a small percentage of people it amounted to feeling totally unable to function on occasion as a result of their oral condition.

**Impact of oral disease and deprivation**

Previous articles in this series have shown how material deprivation indicated by factors such as lower car ownership and male unemployment is associated with people who are more likely to have lost all their natural teeth or to have poorer dental health than those who live in more affluent areas. The OHIP analysis has shown that this also translates to a poorer experience of oral health. Over 60% of those in the most deprived areas reported occasional experience of an OHIP-14 problem at some time during the previous year in comparison with under 50% of those from better-off areas (Figure 2).

![Figure 2 Experience of an OHIP14 problem occasionally or more often in the previous 12 months by deprivation category among dentate adults in Scotland in 1998](chart.png)
Another aspect of oral condition which these surveys have shown is important to people is the appearance of teeth. Appearance seems to be a more important factor than tooth function as it has been shown that people are more willing to have back teeth removed than front teeth. Furthermore many people are dissatisfied with the appearance of their teeth. Figure 3 shows that those who live in the most deprived areas have a poorer perception of the appearance of their own teeth than those who live in the most affluent areas; over a third of those living in areas experiencing most deprivation were dissatisfied with the appearance of their teeth in comparison with just over a quarter of those in the most affluent areas.

![Figure 3](image)

**Figure 3** Dissatisfaction of teeth by deprivation category among dentate adults in Scotland 1972-1998

References


Dental health behaviour of Scottish dentate adults

(based on the 1998 Adult Dental Health Survey)

by Nigel M. Nuttall, Dental Health Services Research Unit

This article examines the dental health behaviour of Scottish dentate adults.

Attending for Regular Dental Check-ups

A key behavioural indicator that has been used since the first survey of adult dental health of England and Wales in 1968 is whether people say they go to a dentist for a regular dental check-up, an occasional dental check-up or only when they have trouble with their teeth.

The proportion of dentate adults who claim to attend for regular dental check-ups has risen from a third in 1972 to over a half (55%) in 1998 (Figure 1). However, the Scottish average in 1998 was 5% behind that reported in England. It is notable that attending for check-ups is lowest among the youngest age group. In some respects this gives a misleading impression as seeking check-ups has been shown by these surveys to be strongly related to retaining teeth and those who have poorer dental health in each age group gradually drop out through becoming edentate, leaving a progressively higher proportion of those who are more dentally motivated. It may be of concern, however, that there is a slight fall in the percentage of 16-24 year olds claiming to go for regular dental check-ups from the level in 1988. The main reason for the overall improved level of attendance seems to be a marked increase in the proportion of people over 45 who now claim to attend for dental check-ups; in 1988 44-47% of adults over 45 claimed to go for a regular check-up whereas in 1998 60-62% claimed to do so.
People from the most deprived areas were much less likely to claim to go for regular check-ups than those from well-off areas; 70% of those from DEPCAT1 areas said they went for regular check-ups in comparison with only 28% of those from DEPCAT6 and DEPCAT7 areas. Over half of the least well off said they only went to a dentist when they had some trouble with their teeth.
The participants in the survey were also given a list of statements about factors that are related to dental attendance. In figure 3 the 'odds ratio' of each answer having been given by a person from the most deprived areas compared with a person from the most affluent areas is given. A high odds ratio indicates a bigger difference between the responses from different groups. Cost of dental treatment appeared to be the main concern of people from the most deprived areas. People in the most deprived areas were over 4 times more likely to be concerned about aspects of dental treatment costs than those from the most affluent areas. The poorest were also more than twice as likely as those from the most affluent areas to agree that they would rather not have 'fancy treatment' or visit a dentist unless they could see a definite need to.
Tooth Cleaning

There has been no significant change in reported frequency of cleaning teeth among Scots since 1988 (figure 4); 70% of the dentate population report cleaning their teeth at least twice a day in 1998 compared with 69% in 1988. Findings reported elsewhere in the 1998 survey report showed that there was no relationship between reported frequency of brushing and effective plaque removal; those who said they brushed twice a day or more often were as likely to have some plaque in their mouths when they were dentally examined as those who said they brushed less often.

Figure 4 Total cleaning behaviour of dentate adults by country and year of survey
People were also asked if they used any additional methods for cleaning their teeth. The use of dental floss has slightly increased, but nothing like the increase in reported use of mouthwash which has more than doubled (from 13% to 29%) since the last survey. Indeed, Scots in 1998 were more likely to report using mouthwash than the UK average.

It has been shown that people living in areas where there is a high level of material deprivation are less likely to attend for regular dental care than those in the most affluent areas and that cost is perceived as a major factor. However, looking at tooth cleaning behaviour shows that not all dental behaviours of those who live in the most deprived areas are a simple function of costs. Figure 5 shows that people who live in DEPCAT areas 6 and 7 were less likely to say they brushed their teeth twice a day or more than those living in DEPCAT area 1. They were also much less likely to say they used dental floss; only 9% of those in DEPCAT areas 6 and 7 said they used floss in comparison with around 40% of those living in DEPCAT areas 1 and 2. However, the opposite is the case with the use of mouthwash, almost a third of those living in the poorest areas said they used mouthwash compared with around 20% of those in the two most affluent areas.

![Figure 5 Tooth cleaning behaviour by deprivation category (DEPCAT) in Scotland 1998](image)
The national surveys of adult oral health traditionally only make limited comments about findings such as the above. There are a variety of reasons why those in poorer areas may use mouthwash to a greater than average extent. Nevertheless, the findings show that those living in the most deprived areas do feel the need for some agent to affect their oral condition and perhaps more importantly are prepared to spend money on such an agent. As with issues in diet there may be arguments that better and cheaper alternatives exist to the products that are being bought. But these rest on making judgements about what the product is providing for the purchaser. Mouthwash seems to be taking on a significant value to many people living in the most deprived areas.

Thanks and Disclaimers

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