

Adult Dental Health Survey 2009: common oral health conditions and their impact on the population

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IN BRIEF

- Summarises the main findings of the 2009 Adult Dental Health Survey with respect to the state of teeth and periodontal tissues.
- Highlights the decrease from 54% to 31% in the prevalence of visible dental caries in England between 1998 and 2009.
- Suggests the frequency of impact of poor oral health on people's lives has reduced in the last decade.

Data from the Adult Dental Survey conducted in 2009/10 have recorded some major changes in the pattern of oral conditions in British adults. The change in the number of sound and untreated teeth in recent decades has been particularly marked in younger adults. Across all ages there were 17.9 sound and untreated teeth per dentate adult, but among the youngest (16–24-year-olds) it was 26.9 teeth indicating rapidly improving prospects for young adults compared with their predecessors. Between 1998 and 2009 the overall prevalence of caries of all types in England has fallen dramatically from 54% to 31% overall, but the number of teeth affected by caries among those people affected by decay is almost unchanged at around 2.7 affected teeth per person. Caries, and the reduction in caries, affected people of all ages. The rate of new restorations is correspondingly low and young adults in particular had fewer restorations than their predecessors. Much activity is now likely to be around repairing or extending existing restorations. By contrast 37% of dentate adults had crowns, up from 34% in 1998, averaging around three crowns per person among those who have crowns. A minority of British adults had a very healthy periodontal status (17%) and moderate periodontal disease (pockets of 4 mm to less than 6 mm) has also reduced markedly in the last decade, in line with measurably less plaque and more frequent brushing. However, more severe disease has increased slightly (from 6% to 9% of adults). The frequency of impact of poor oral health on people's lives has also reduced in the last decade. However, while clinical conditions are improving, there is a proportion of dentate adults that experience negative effects on their daily life frequently (16%) and/or severely (17%) due to their oral health; who are more likely to be those in a lower socioeconomic position and those with worse clinical status in terms of caries and periodontal disease.

INTRODUCTION

The 2009 Adult Dental Health Survey is the fifth in a series of national decennial dental surveys, carried out since 1968, with the aim of capturing a picture of adult oral health, showing how this has changed over time in the context of changing services and health priorities. The 2009 survey was commissioned by the NHS Information Centre for health and social care and was carried out in England, Wales and

Northern Ireland. In contrast to previous surveys, Scotland did not participate meaning that UK wide comparisons are not possible.

The first paper in this series¹ describes in more detail the sampling and analytic methods. This paper, the second in the series, summarises the main findings of the 2009 Adult Dental Health Survey (ADHS) with respect to the state of teeth and periodontal tissues and how these impact on the quality of life of people. It is based on data from both the questionnaire and the clinical examination. For the dental examination, teeth were examined and data recorded at tooth surface level for caries and restoration status. Periodontal examination was undertaken at two sites on each tooth and data were also recorded for plaque, tooth wear and occlusal contacts. The questionnaire included information on oral-health-related quality of life, by focusing on the impact of oral conditions on the daily life of participants. We employed two indicators (OHIP-14² and

OIDP³) to measure respectively the frequency and the severity of oral impacts.

Some key clinical variables have been chosen to give a feel for the overall state of the oral health of adults in 2009, with reference to earlier data to illustrate trends where appropriate. Due to changes in examination content and criteria, such comparisons were not feasible for all conditions. As ADHS 2009 covers England, Wales and Northern Ireland, a geographical grouping for which combined estimates from previous surveys are not available, the trends presented are for England only, though the general trends are similar for all three countries. Where trends are described, data are presented in ten-year cohorts, and a correction for age has been incorporated in tables and text to account for the 11-year gap from ADHS 1998 to 2009. Complete details of the methods used, including clinical criteria can be found in the technical report of the survey.⁴

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RESULTS

Numbers of sound and untreated teeth in 2009

The absence of any irreversible damage to teeth from tooth decay, tooth wear or trauma and the absence of the permanent restorations required to manage these conditions, gives an indication of the potential for good oral health in the future. We defined 'sound and untreated teeth' as teeth with no visible decay or restoration of any kind, including restorations, such as veneers and crowns, which are not always placed to manage disease. Consequently, this represents not simply the absence of disease history, but also trends in professional dental treatment. As such, differences by age group reflect changes in professional knowledge, technology and practice as well as disease prevalence.

Dentate adults had an average of 17.9 sound and untreated teeth. This varied from 25.9 among 16-24-year-olds to fewer than 8.5 among those who were older than 75 years (and still dentate). If we consider the retention of 21 or more natural teeth in any state as an indicator of a functional dentition,¹ the lifetime prospects for good function should be very good for dentate adults under the age of 45, who on average had more than 20 teeth that were sound and untreated. The average number of sound and untreated teeth among dentate adults varied considerably by country (18 in England, 16.3 in Wales and 15.8 in Northern Ireland).

The change in the number of sound and untreated teeth in recent decades has been quite remarkable. In successive ADHS, each age group has retained more teeth in a sound state than their predecessors and, considering the reduced prevalence of dental decay (see below), we have now reached a stage where we should expect the younger age groups to age well, with many teeth of good quality (Fig. 1). This is a very good starting point but does not take account of periodontal diseases or tooth wear, which will present additional problems with increasing age.

Dental caries in 2009

Dental caries has traditionally been the greatest threat to natural teeth and is still prevalent and a major determinant of the population's oral health. Almost a third of

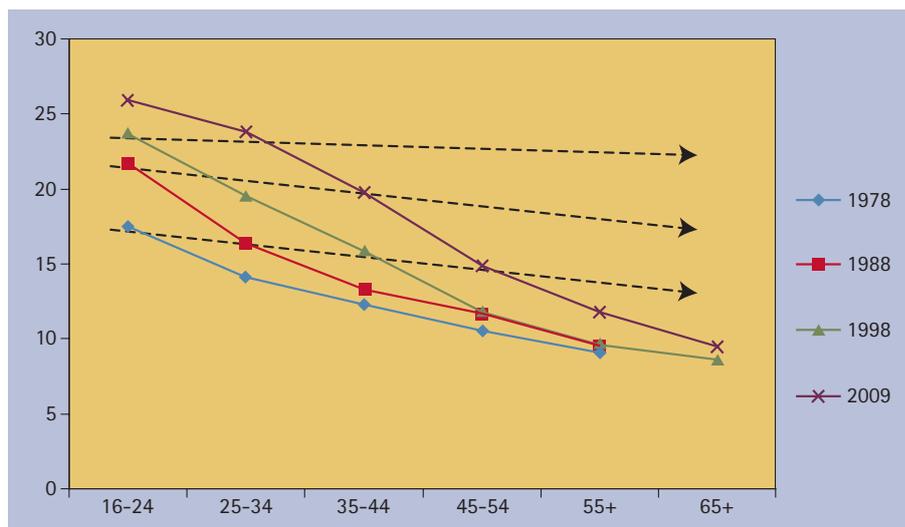


Fig. 1 Number of teeth (y axis) by age group (x axis) 1978–2009. Note that for 1978, data are only available to age category 55+, from 1988 the data refer to 55–64 years. Once again the arrows represent the approximate trajectory for the number of sound and untreated teeth in future for three age groups: those aged 25–34 (top), 35–44 (middle) and 45–54 (lower) with the tip of the arrow representing the projected number at age 65–74

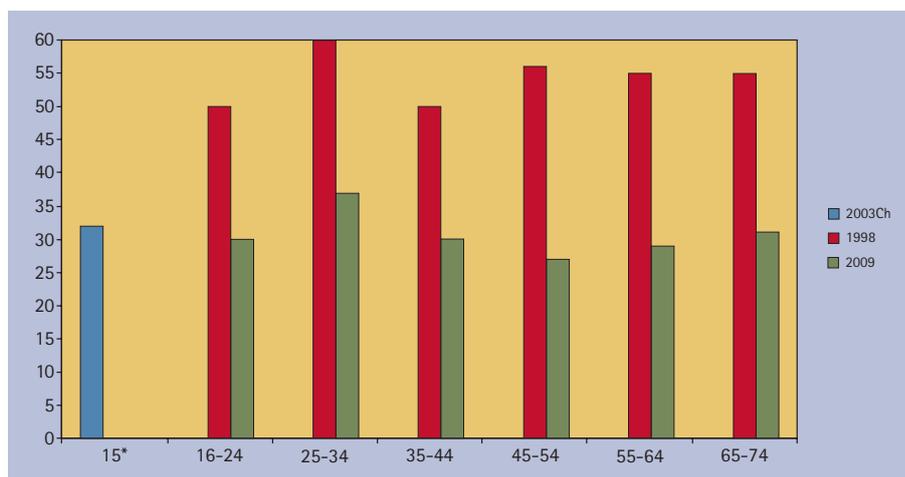


Fig. 2 Percentage of dentate adults with one or more decayed tooth (y axis) in England 1998 and 2009 by age group (x axis). The data refer to all forms of decay. Note that the figure for 15-year-olds in the 2003 children's survey is included for comparison

the dentate adults (31%) had visible caries into the dentine, representing many millions of people with decay. Among the dentate adults with caries at this level, a mean of 2.7 teeth were affected. There were differences between age groups with younger people being more likely to have caries, which is concerning. In particular, 36% of 25-34-year-olds were affected compared with 26% of 45-54-year-olds and 22% of 65-74-year-olds. Social class differences (based on occupational classification) persist, with less than a quarter (24%) of dentate adults from managerial and professional occupations affected, compared with 28% of those from intermediate occupations and 36% of those from routine and manual occupations.

Due to the change in the caries criteria used, trend data are available only for the last two Adult Dental Health Surveys. Between 1998 and 2009, the overall prevalence of coronal caries in England has fallen from 46% to 28%. There were lower values in 2009 in all age groups compared to 1998, but in all cases exceeded 20 percentage points. Interestingly, when the data for 15-year-olds from the Children's National Survey in 2003 is compared with the data for 16-24-year-olds in 2009, the prevalence of decay is very similar (see Fig. 2). The 15-year-olds of 2003 would have been 21 in 2009, so while not a perfect match of age group to age group, the low prevalence of decay that attracted attention in the 2003 children's survey

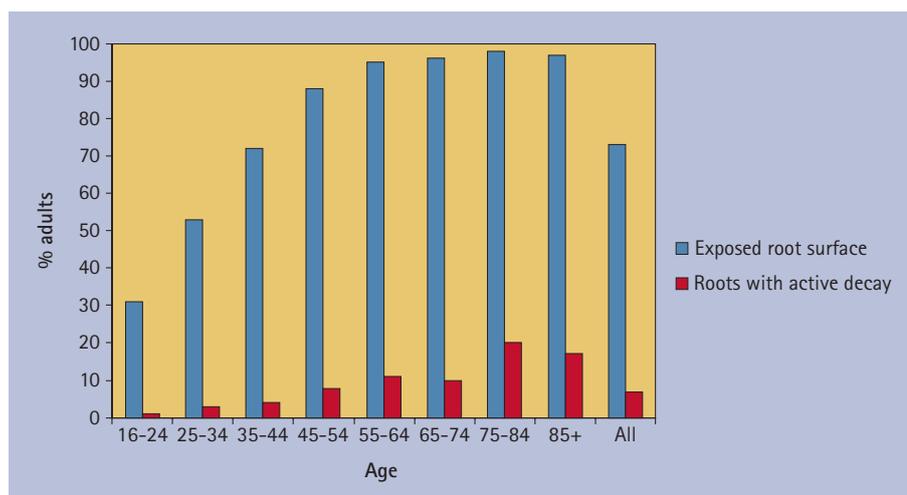


Fig. 3 Percentage of those with one or more exposed root surfaces and roots with active decay (y axis) in England, Wales and Northern Ireland by age group (x axis)

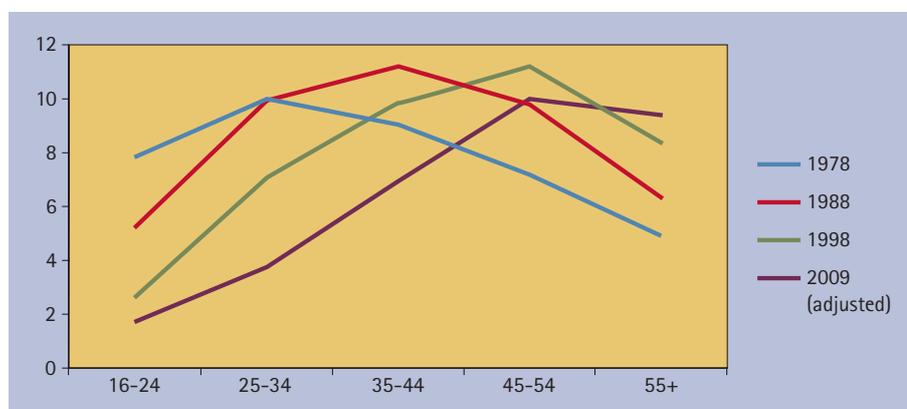


Fig. 4 Mean number of restored, otherwise sound, teeth (y axis) in England 1978-2009 by age group (x axis)

was still very evident in young adults six years later.

In 2009, for the 31% of people with decay, having the disease tended to mean that you had multiple lesions, with a mean of 2.7 decayed teeth per person. While the prevalence of dental caries has fallen considerably, a brief review of the 1998 data suggests that the number of affected teeth among those with decay is virtually unchanged since 1998 (2.7), showing that the extent of the disease in those affected is as it was a decade ago; it is the prevalence of disease that reaches the dentine that has altered, not the intensity among those with the disease. This is quite a remarkable observation and important as we look forward to how we deal with it in the future.

In older adults decay of the roots is a potential concern. Seven percent of the dentate adults were affected by root decay but the average number of teeth with active root caries was quite low (0.2).

However, among those with root decay there were on average 2.3 teeth affected by it. Similar to coronal decay, if you have root caries you tend to have multiple affected teeth. Not surprisingly, older people, with more exposed root surface area have a higher prevalence and number of teeth affected (Fig. 3).

Open dental pulps and oral sepsis in 2009

A recently developed index of clinical consequences of untreated dental caries, PUFA, was used in 2009 and provides a measure of badly diseased and broken down teeth which have been attacked by dental decay and are causing significant problems in need of early attention. Essentially it is a marker of sepsis. The components of the PUFA index are: pulp involvement, ulceration due to trauma, fistula and abscess.

Overall, 7% of dentate adults had one or more PUFA lesions, most commonly an open pulp cavity (4%). Caries-related

ulceration (related to trauma from broken down teeth) was observed in just 1% and fistula or abscess in 2% of dentate adults.

The proportion of dentate adults with PUFA lesions was higher in men than women (8% *vs.* 6%) and varied considerably between socioeconomic household classifications; 4% of those living in managerial or professional households, 7% of those in intermediate occupation and 9% in routine and manual households had a PUFA lesion, mirroring the pattern for caries.

Restorative treatment in 2009

When comparing ADHS data over the last 40 years there is now a generally low rate of accumulation of new dental restorations, reflecting the lower levels of caries and perhaps also an increase in very minimal tooth coloured restorations, which are sufficiently minor to evade detection in the field. Older age groups, who had a higher volume of restorations from their early adulthood, have shown little, if any, increase in the number of restorations. This is probably due to the combination of relatively few newly decayed teeth, good maintenance of existing restorations and tooth loss, which inevitably increases with age as damage to the teeth and supporting structures accumulates (Fig. 4).

Linked to this accumulation of damage, 37% of all dentate adults had crowns in 2009, up a little from 34% in 1998. In 2009, dentate adults who had crowns had a mean of 3.0 crowns per person. The abundance of crowned teeth is a modern phenomenon, back in 1968 very few crowns were recorded (0.1 crowns/bridges per person). In 2009, crowns were found primarily in the older age groups, presumably reflecting the high levels of accumulated restorative treatment among the generation that grew up in post-war years from the early 1980s onwards. Dental bridges and partial dentures were worn by 7% and 13% respectively of adults with natural teeth. Again, these figures were much higher among older adults. Dental implants were recorded for the first time in the 2009 survey and were present in 1% of the population. There were variations with age, less than 0.5% of the 25-34 age group had at least one dental implant compared with 2% of adults aged 65 and above. There was also an interesting and significant social

class variation with 2% of dentate adults from intermediate occupation households having at least one implant compared with 1% of those from managerial and professional households.

Periodontal conditions in 2009

The periodontal examination consisted of measurement of pocket depth and loss of attachment (the latter for adults over the age of 55) at two sites per tooth and then the worst score per sextant was recorded. In addition, bleeding and presence of calculus were recorded. We also used a composite measure of good periodontal health for dentate adults. This consisted of no bleeding, no calculus, no periodontal pocketing of 4 mm or more and, for adults aged 55 years and over, no loss of periodontal attachment of 4 mm or more.

According to this composite measure, a reasonably sized minority of dentate adults (17%) had healthy periodontal tissues. Perhaps not surprisingly, good periodontal health was more common among adults under 45 years than in older age groups. For example 28% of dentate adults aged 16 to 24 and 20% of those aged 25 to 34 and 35 to 44, had healthy periodontal tissues, compared with 14% of 45-54-year-olds and 10% or less of dentate adults aged above 55. Women were more likely than men to have healthy periodontal tissues (19% and 14% respectively). There were similar levels of good periodontal health in England, Wales and Northern Ireland. Increasing the size of this 'healthy' group is a reasonable and achievable professional and public health aim.

Periodontal pocketing is an indicator of current or historic periodontitis. The nature of periodontal measurement in a field setting means that it is likely that some pockets will have been missed. Estimates of prevalence are therefore likely to be lower (and are very unlikely to be higher) than a true population prevalence. The data are therefore most useful when comparing groups, as any under-recording should be randomly distributed.

Periodontal pocketing was prevalent, with 45% of dentate adults having at least one such periodontal pocket (Fig. 5). However, most affected adults had relatively mild levels of disease, with pocket depths restricted to the range between

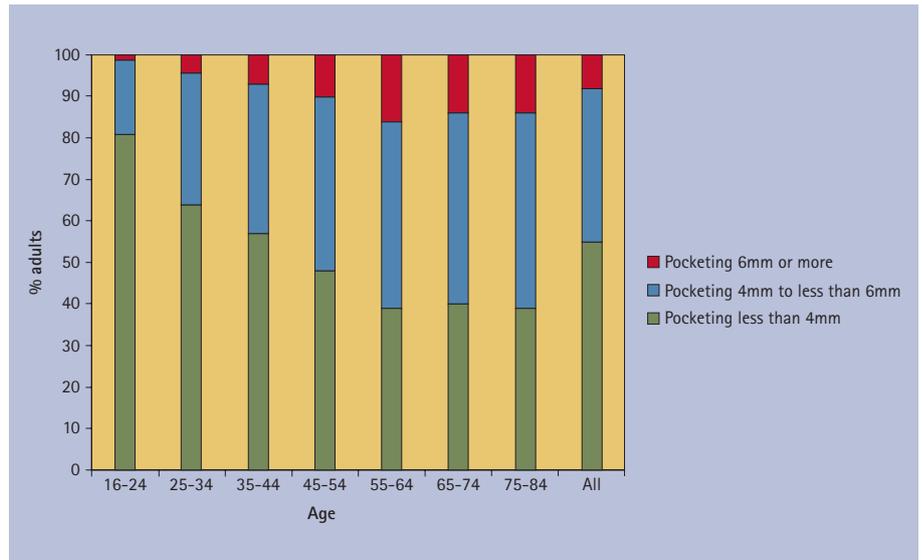


Fig. 5 Percentage of those with any periodontal pocketing at three levels of severity (y axis) in England, Wales and Northern Ireland by age group (x axis)

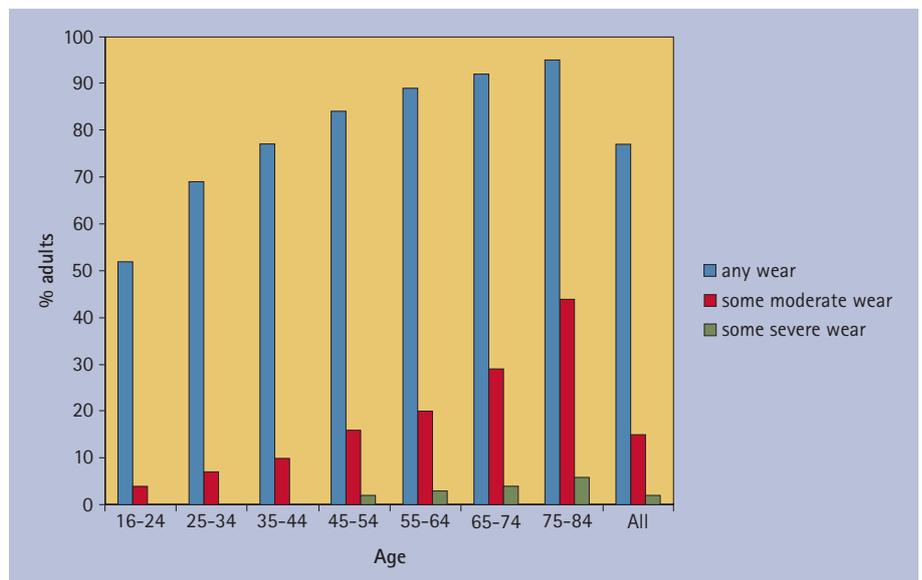


Fig. 6 The proportion with evidence of tooth wear (y axis) in England, Wales and Northern Ireland by age group (x axis)

4 mm and less than 6 mm (37% of dentate adults). A small but important proportion had deeper pocketing, 8% with at least one pocket over 6 mm and only 1% had any pockets over 9 mm detected. As expected, given the cumulative nature of periodontal diseases, the prevalence of pocketing increased with age, despite older age groups having fewer teeth overall. The prevalence of pocketing was higher in men and there was also a trend of higher prevalence of pocketing of 6 mm or more in some socioeconomic groups (7% of dentate adults from professional and managerial households, 9% from intermediate occupation and 11% from routine and manual occupation households).

Loss of attachment (LoA) is an indication of damage over a lifetime and takes into account gingival recession. It is therefore often a better indicator of the life course effects of disease than pocketing. Overall, 66% of adults aged 55 and above had LoA of 4 mm or more, 21% had LoA above 6 mm and 4% above 9 mm. At all three levels of LoA the proportion increased with age.

Compared to ADHS 1998, there has been a considerable drop in the prevalence of pocketing of 4 mm or more in England, from 55% down to 45% in 2009, signifying an overall reduction in disease. In contrast, an overall increase in pocketing over 6 mm occurred between 1998 and 2009

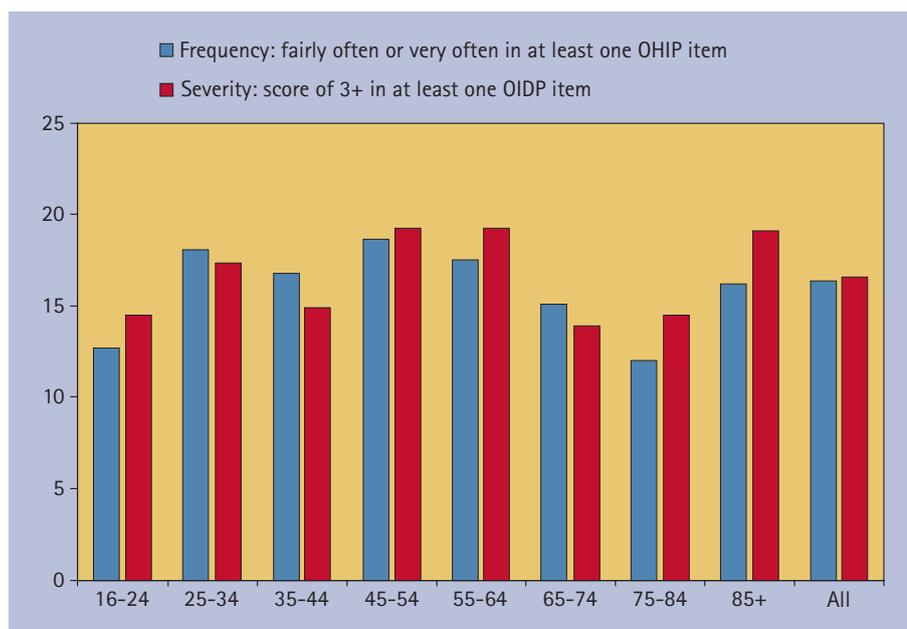


Fig. 7 Proportion of those with oral impacts (y axis) in England, Wales and Northern Ireland by age group (x axis)

(6% and 9% respectively). Any explanation for this mixed pattern of change would be speculative, but the general improvement is absolutely in line with the reductions in the prevalence of plaque between 1998 and 2009. The increase in prevalence of deeper pockets is more difficult to explain, but may simply reflect retention of a greater proportion of teeth with periodontal disease; such teeth may have been more commonly removed in previous generations. Whatever the reason, these divergent trends are of interest and significance to all dentists.

Prevalence of tooth wear in 2009

Tooth wear was recorded for the buccal, incisal and palatal surfaces of the six upper anterior teeth and for the worst affected surface of each of the six lower anterior teeth.

Overall, the prevalence of tooth wear extending into dentine was high, with over three-quarters (77%) of dentate adults showing some tooth wear in their anterior teeth. This is mostly the sort of wear that is consistent with normal ageing and exposure of dentine on the incisal tips. However, 15% showed moderate wear (more extensive dentine exposure), and 2% severe wear that extended as far as secondary dentine. The damage from wear is cumulative, so its prevalence increased with age (Fig. 6). Given the fact that tooth wear is a natural process, the high prevalence of moderate wear in the older age groups is probably of little concern, but people in younger age

groups affected by moderate and severe wear may warrant some attention.

Compared to ADHS 1998, there have been small increases in the proportion of dentate adults with moderate wear (11% in 1998 *vs.* 15% in 2009) and with severe wear, though the latter remains less common.

Impact of oral health on people's quality of life in 2009

This section focuses on the impacts of oral health on the quality of life of British dentate adults. Up to now, we have provided an overall clinical picture of the state of the dentition among British dentate adults, which shows some striking changes even in the last decade. However, clinical measures alone do not directly assess the problems experienced by people due to their oral health. To establish how people are impacted they have to be asked directly and this formed part of the interview.

To do this, we used two well-validated, questionnaire-based composite measures:

1. The Oral Health Impact Profile (OHIP-14) to assess the frequency of a range of indicators of dysfunction, discomfort and disability arising from oral conditions
2. The Oral Impacts on Daily Performances (OIDP) to assess how severely oral conditions affect a person's daily life, in terms of carrying out basic daily life activities or behaviours.

The frequency of oral impacts (OHIP) was determined through a five-point scale (never/hardly ever/occasionally/fairly often/very often) and referred to 14 oral impacts grouped into the following seven domains:

- Functional limitation
- Physical pain
- Psychological discomfort
- Physical disability
- Psychological disability
- Social disability
- Handicap.

The participants also rated the severity of oral impacts on some basic functions of daily life (OIDP):

- Eating
- Speaking
- Cleaning teeth or dentures
- Going out
- Relaxing, including sleeping
- Smiling, laughing and showing teeth without embarrassment
- Carrying out their major work or role
- Emotional stability (for example, becoming more easily upset than usual)
- Enjoying contact with other people.

For these severity ratings, they reported on a scale from zero to five, where zero was no effect and five was a very severe effect.

Overall, 16% of dentate adults reported at least one oral impact occurring either frequently or very frequently in the last 12 months. If oral impacts that occurred occasionally were also included, then the prevalence was 41%. The respective prevalence in the ADHS 1998, where OHIP-14 was also used, was 51%, indicating a considerably better quality of life in 2009. This is in line with the respective trends in clinical measures across the ADHS surveys. While causality cannot automatically be assumed, the fact that both changes are going in the same direction should be reassuring.

Looking at the severity of oral impacts, 17% of dentate adults reported that their oral health had a severe negative effect (OIDP severity rating of three or higher) on their ability to carry out at least one of the basic functions of their daily life in the last 12 months. This prevalence was 36% when oral impacts of lower severity (OIDP ratings of one or two) were also included. Difficulty eating, avoiding smiling and

difficulty cleaning teeth were the daily life functions most commonly affected by oral conditions.

Both the frequency and severity of oral impacts were higher among women (18% for frequency and for severity) than men (14% for frequency and 15% for severity). Oral impacts also varied significantly by age groups and socioeconomic household classifications, but not between the three countries. The age pattern of variation showed higher frequency and severity of impacts among those aged 25-64 years and the very old (85+ years), but lower estimates, indicating better quality of life, in the very young and those aged 65-84 years (Fig. 7). In terms of socioeconomic position, there were clear gradients with lower groups reporting higher prevalence of impacts: 13% of those living in managerial or professional occupation households, 17% of those in intermediate occupation and 21% in routine and manual occupation households reported a frequent or very frequent OHIP-14 item, while the respective estimates for experiencing a severe oral impact using the OIDP were 13%, 15% and 22%.

There were clear associations among dentate adults between oral impacts and some clinical measures. Dentate participants with 21 or more teeth had considerably better quality of life compared to those with fewer natural teeth. Similarly, participants with active decay, those with severe periodontitis (pocket depth of 6 mm or higher or loss of attachment of 9 mm or higher) and those with dental sepsis all reported much higher frequency and severity of oral impacts, compared to their counterparts without the respective conditions. As might be expected, the differences were very large for PUFA lesions (Table 1).

CONCLUSION

The oral health of British adults, as measured clinically, is generally fairly good and improving, particularly among younger age groups. The prevalence of dental caries and the need for restorative treatment may have peaked for young adults in the 1980s and is now in sharp decline, but many older adults require

Table 1 Associations between oral impacts and clinical indicators among British dentate adults (n = 6,469)

	Proportion (%) with frequent or very frequent oral impacts (OHIP-14)	p	Proportion (%) with severe oral impacts (OIDP rating ≥3)	p
Retention of 21 teeth				
Yes	15		15	
No	27	<0.0001	26	<0.0001
Any decayed tooth				
Yes	24		24	
No	13	<0.0001	14	<0.0001
Any PUFA lesion				
Yes	38		38	
No	15	<0.0001	15	<0.0001
Moderate wear				
Yes	18		19	
No	16	0.224	16	0.107
Pocket depth 6 mm+ or loss of attachment 9 mm+				
Yes	25		27	
No	16	<0.0001	16	<0.0001

complex treatment just to maintain their dentate state after the effects of higher decay rates in their past. The reasons for the continued reduction in dental caries are not clear, welcome though they are, and understanding the reasons may be important if we hope to maintain the trajectory. Low level periodontal disease is also in decline, but the increase in tooth wear in young adults and the increase in the proportion of deeper periodontal pockets are causes for some concern. Overall, oral impacts were neither very frequent, nor very severe. Since the ADHS 1998, their prevalence has declined, in line with the corresponding improvement in oral health. However, there is a proportion of dentate adults that experience severe negative effects on their daily life due to their oral health; and it is more likely to be those in a lower socioeconomic position and those with worse clinical status in terms of caries and periodontal disease.

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