Refereed paper

The 1993 national survey of children's dental health

M. C. Downer, DDS, PhD, DDPH

Department of Dental Health Policy, Eastman Dental Institute for Oral Health Care Sciences, 256 Gray's Inn Road, London WC1X 8LD

The 1993 national survey report shows encouraging evidence of general improvements in children's dental health compared with earlier surveys in 1973 and 1983. There have been dramatic declines in dental caries at all ages and this is evident in the different parts of the United Kingdom and in all social classes. However, among 5-year-old children average caries levels have remained unchanged since 1983, although a higher proportion now have no known decay experience. The amount of decay treated by restoration as a proportion of total caries experience has fallen in all age groups and the disease appears to be becoming concentrated at higher levels in a diminishing number of children who are not obtaining dental care. A disturbing finding was the high prevalence of dental erosion, particularly in the primary dentition. Other findings included more than half of children in Scotland and Northern Ireland having fissure sealants, improved parental knowledge about preventing dental disease, reduced numbers of orthodontic extractions and a reduction of one-third in the rate of traumatised permanent incisors. Children must be regarded as the number one priority for dental services in order to safeguard the dental health of rising generations, and renewed efforts must be made to further reduce their disease levels through population based preventive measures.

The third 10-yearly national survey of children's dental health was undertaken in the spring of 1993 by the Social Survey Division of the Office of Population Censuses and Surveys (OPCS) in collaboration with the Unit of Public Dental Health, University of Birmingham, and the Department of Child Dental Health, University of Newcastle upon Tyne. The full report has now been published.[1]

Early in 1994 some of the preliminary findings were made available in an OPCS Monitor.[2] However, these related only to dental caries prevalence among children in the United Kingdom overall and its constituent territorial regions, whereas the main report contains a wealth of additional information for the age groups covered (5–15 years). A commentary on the preliminary results was provided in the *British Dental Journal* in March 1994.[3]

A representative sample of 17 061 children received dental examinations in school representing 90% of those selected. In addition 84% of parents of the 5-, 8-, 12- and 15-year-old children examined responded to a postal questionnaire. The 1993 survey used the same measures of dental health and criteria for the conduct of the examinations as the 1973 and 1983 surveys so that the results would be comparable. However, two further clinical entities were introduced for the first time in 1993 — dental erosion and developmental defects of enamel. A team of 76 specially trained and calibrated community dental officers carried out the examinations under standardised conditions.

This report provides encouraging evidence of improvements in the dental health of children in the UK but reveals a disturbing degree of dental erosion

Br Dent J 1995; 178: 407–412

Received for Publication 14.12.94
Accepted for Publication 06.03.95

Trends in caries experience, territorial differences and levels of restorative care

The 1993 results show encouraging evidence of a further marked decline in caries levels throughout the United Kingdom compared with the earlier surveys of 1973 and 1983. For example,

over the course of 20 years total decay experience (dft, DMFT) among children in England and Wales has fallen by 52% in deciduous teeth at 5 years of age, 82% in permanent teeth at 8 years, 75% at 12 years and 74% at 14 years. Whereas in 1973 only 7% of 12-year-old children had no experience of permanent tooth decay (DMFT = 0), by 1993 50% were free from caries. At the same time, the marked inequalities in dental health between the territorial regions of the country shown in earlier years have been perpetuated with much higher caries levels in Scotland and particularly Northern Ireland than in England currently. It is also apparent that in 5-year-old children in England and Wales, despite an overall decline in caries in deciduous teeth since 1973, average dft has remained steady at 1.6 for the last 10 years. Nevertheless, the proportion of children of this age with no known decay experience (dft = 0) rose from 52% in 1983 to 57% in 1993.

Restorative care

An important contribution to knowledge of trends in children's caries experience is gained from details of the separate components of average dft and DMFT (ie dt, ft; DT, FT). It is the 'filled' component, and the relative proportion of overall caries experience that it occupies, which is directly influenced by the activities of the profession. In England and Wales, on average 31% of total dft of 5-year-old children in 1983 consisted of filled (otherwise sound) teeth. Yet by 1993 this proportion had fallen to 19%. Similarly in 12-year-old children, FT as a proportion of DMFT fell from 72% in 1983 to 58% in 1993. Thus despite rising proportions of children free from evidence of past or present decay in both age groups, and a decline in average total DMFT from 2.9 to 1.2 at 12 years coupled with fewer extractions, restorative index values (ft/dft %; FT/DMFT %) fell markedly in the 10 years preceding the 1993 survey. This suggests that less of the frank decay now seen in children is being treated compared with 1983.

Decay experience, dental attendance and home background

As well as geographical variations in caries levels in each age group, the 1993 survey examined caries experience in relation to other background factors which were considered likely to have an influence on children's dental health. Only one of these had a consistent association with mean dft at 5 years. This was the child's reported pattern of dental attendance. At 12 and 15 years, however, both this factor and household social class were shown to have a statistically significant association with mean DMFT.

Table I and figures 1 and 2 present the caries experience of 5-, 12-, and 15-year-old children in the UK in 1993 according to claimed dental attendance pattern (regular, occasional, never or only with trouble) and, for 12- and 15-year-old children, household social class according to the

Table I Dental caries experience in the deciduous dentition of 5-year-old and permanent dentition of 12- and 15-year-old children in the United Kingdom according to child's reported dental attendance and household social class (corresponding 1983 values in parenthesis)

Age, attendance and social category	1993 base	dt, DT mean	MT mean	ft, FT mean	dft, DMFT mean	Caries-free % (1993)
5 years (deciduous)						
Regular attender	658	1.0 (0.9)	—	0.3 (0.7)	1.3 (1.6)	62
Occasional attender	183	1.0 (1.0)	—	0.2 (0.2)	1.2 (1.2)	64
Only with trouble	213	2.5 (2.2)	—	0.4 (0.5)	2.8 (2.7)	35
12 years (permanent)						
Regular attender	633	0.3 (0.4)	0.1 (0.2)	0.8 (2.4)	1.2 (3.0)	52
Occasional attender	197	0.6 (0.8)	0.1 (0.3)	0.6 (1.7)	1.3 (2.8)	49
Only with trouble	194	0.7 (1.1)	0.2 (0.4)	0.9 (1.9)	1.9 (3.4)	37
Class I, II, IIINM	470	0.3 (0.5)	0.1 (0.2)	0.7 (2.0)	1.1 (2.8)	55
Class III M	330	0.5 (0.6)	0.1 (0.3)	0.7 (2.4)	1.4 (3.3)	49
Class IV, V	134	0.6 (0.8)	0.3 (0.4)	1.1 (2.1)	2.0 (3.3)	32
15 years (permanent)						
Regular attender	470	0.5 (0.6)	0.1 (0.5)	1.6 (4.7)	2.2 (5.8)	42
Occasional attender	93	0.7 (1.0)	0.2 (0.5)	1.4 (3.9)	2.3 (5.3)	30
Only with trouble	131	0.9 (1.6)	0.2 (0.8)	2.0 (4.1)	3.1 (6.6)	27
Class I, II, IIINM	381	0.5 (0.8)	0.1 (0.4)	1.4 (4.2)	2.0 (5.4)	42
Class III M	218	0.6 (1.0)	0.1 (0 7)	2.0 (4.7)	2.7 (6.3)	32
Class IV, V	95	0.9 (1.1)	0.3 (0.7)	2.2 (4.5)	3.4 (6.3)	28

dt, DT = teeth with untreated decay
MT = teeth extracted for caries
ft, FT = restored teeth with no caries

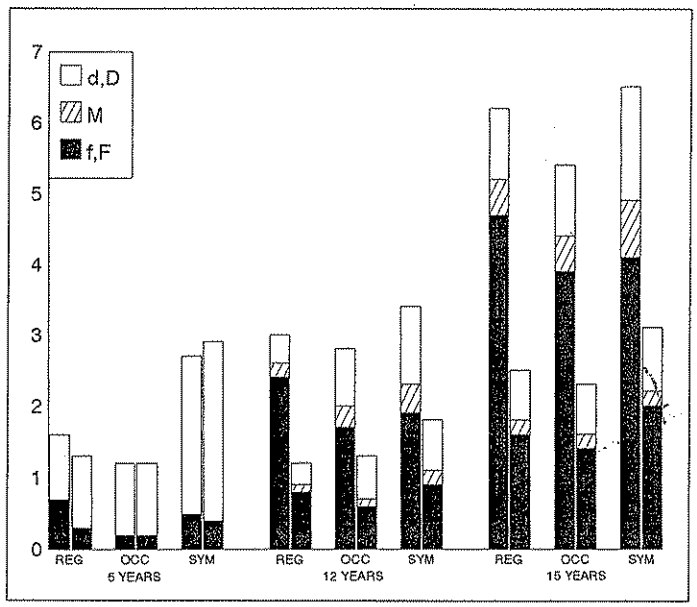

Fig. 1 Dental caries experience (expressed as mean dft per child) in deciduous teeth of 5-year-old and (expressed as mean DMFT per child) permanent teeth of 12- and 15-year-old children according to reported dental attendance in 1983 (first column of each pair) and 1993 (second column).

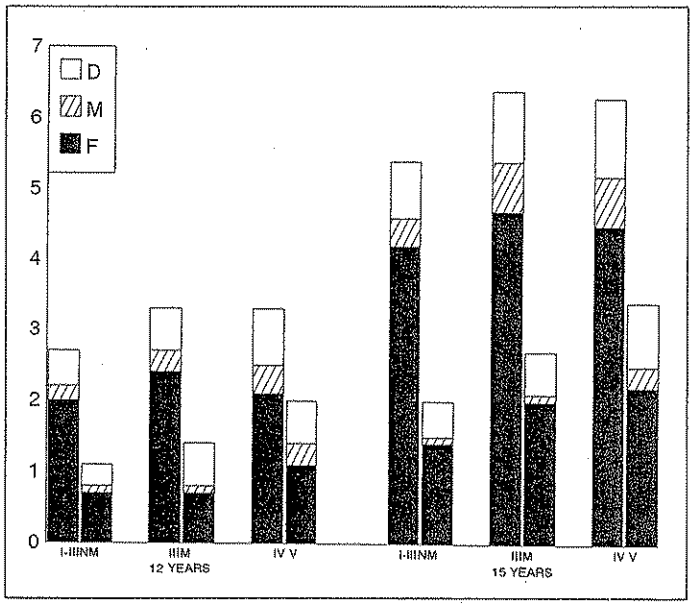

Fig. 2 Dental caries experience (expressed as mean DMFT per child) in permanent teeth of 12- and 15-year-old children according to household social class in 1983 (first column of each pair) and 1993 (second column).

Registrar General's classification. The classes are grouped as I, II and III non-manual, III manual, and IV and V. For comparison, corresponding 1983 values for each indicator are given in the table in parenthesis.

Caries experience and attendance patterns

Table I and figure 1 show that the variation in caries experience (DMFT) at 12 years according to attendance pattern ranged from 1.2 for regular attenders to 1.9 for those who attended only with trouble, and for social class, from 1.1 in the highest status group to 2.0 in the lowest. In both instances the range in values was less than that for geographical variation, shown elsewhere in the survey, which ranged between 1.2 for England, 1.5 for Wales, 2.0 for Scotland and 3.0 for Northern Ireland.

Comparing the 1993 position for 5-year-old children with that of 1983, it is apparent that differences in mean numbers of decayed teeth (dt) for regular and occasional attenders were virtually unchanged. For children who attended the dentist only when they had trouble, however, the mean number of actively decayed teeth rose from 2.2 in 1983 to 2.5 in 1993. For filled primary teeth (ft), the mean number was less than half the 1983 level for regular attenders, 0.3 compared with 0.7. For the occasional and symptomatic (never or only with trouble) attenders there was little change. Overall the level of known decay (dft) fell significantly only for the regular attenders from a mean of 1.6 in 1983 to 1.3 in 1993.

In the older age groups, levels of active decay in the permanent teeth fell most among the symptomatic attenders and least among those who were stated to attend the dentist regularly. At 15 years, for example, the mean number of actively decayed teeth (DT) among the former group fell from 1.6 in 1983 to 0.9 in 1993 while there was little change for regular attenders. The reverse was true of filled teeth (FT) where the greatest fall since 1983 was experienced by those attending regularly. The mean number of filled teeth among 15-year-old regular attenders was 4.7 in 1983 compared with 1.6 in 1993, while for those who attended only with trouble the mean was 4.1 in 1983 compared with 2.0 in 1993. With regard to total decay experience (DMFT), in 12-year-old children the decline was greatest among regular attenders from 3.0 in 1983 to 1.2 in 1993 while at 15 years, there was little difference between regular and symptomatic attenders in the amount of change over the 10 years.

Caries experience and social class

Table I and figure 2 show that levels of active decay in the permanent teeth have not fallen significantly since 1983 among 12-year-old children from any social class. At 15 years children from the non-manual social classes had fewer actively decayed permanent teeth in 1993, a mean of 0.5 compared with 0.8 in 1983. There was also a decline for children from social class III manual from 1.0 to 0.6. For social classes IV and V the position was largely unchanged.

The mean number of filled teeth (FT) fell substantially for 12- and 15-year old children in all social classes. At 12 years the greatest decline was among those of skilled manual workers from a mean of 2.4 in 1983 to 0.7 in 1993. It was

least in social classes IV and V. In both older age groups there were substantial decreases in total caries experience (DMFT) in every social class. However, the declines were again least in children from semi-skilled and unskilled households.

Caries levels in the regions of England and fissure sealants

It is worth noting briefly two other findings related to dental caries in 1993 which have not been reported before. These concern geographical differences within England and the prevalence of fissure sealants in UK children. The familiar gradient in rising caries experience moving from southern to northern England was again demonstrated in 1993. At 12 years of age, for example, mean DMFT rose from 0.6 in the South West through 1.0 in London and the South East, to 1.1 in Midlands and East Anglia, and to 1.7 in the North. For fissure sealants, the proportion of children with sealed permanent teeth at 12 years of age was highest in Scotland and Northern Ireland (60% and 50% respectively) and lowest in England and Wales (35%). For children aged 10 years and upwards, with the exception of those aged 14, the mean number of teeth attacked by caries was reported to be significantly lower for those with fissure sealants than for those without.

Parental views and preferences

Choice of dental service and treatment

Compared with 1983, there was some increase in the use of the General Dental Service and a fall in the use of the Community Dental Service by children. At 5 years, the proportion using the GDS alone or in combination rose from 36% in 1983 to 62% in 1993. However, there was no major change in the proportions using this service among 12- and 15-year-old children. Relatively few used services outside the NHS, though at 12 years, 88% were reported to have had preventive treatment carried out privately.

The overwhelming majority of parents preferred their children's teeth to be filled rather than extracted. For back teeth these included 86% at 5 years, 89% at 12 years and 88% at 15 years. For front teeth the preference for restoration was consistently over 90%. These proportions have changed little since 1983. Among parents of 5-year-old children from non-manual social classes, 95% preferred a decayed back tooth to be filled compared with 84% in the semi- and unskilled classes.

Views on causes and prevention of caries

Parents of 5-year-old children were more likely than parents of 15-year-old children to see sugar as a cause of tooth decay with 84% citing this compared with 77% of parents of the older age group. The corresponding proportions in 1983 were 78% and 66% respectively, indicating some gain in public knowledge during the intervening 10 years. However, parents were more likely to believe that regular cleaning would prevent tooth decay than avoidance of sweet foods. In 1993, 59% of parents of 5-year-old children thought avoiding sweet things would help prevent decay (48% in 1983) while 81% mentioned regular tooth cleaning (74% in 1983). For 15-year-old children the respective proportions were 42% and 83% (37% and 74% in 1983). As in 1983 only 1 or 2% specified fluoridation of water supplies as a preventive measure.

Dental care at home

Eighty four per cent of 5-year-old children whose parents were in non-manual jobs were reported to clean their teeth at least twice a day compared with 74% of children of skilled manual workers and 64% of those of semi-skilled and unskilled manual workers. However, these differences dwindled with increasing age. Among 12-year-old children, though this was not shown in other age groups, there was a significant indirect relationship between the frequency of brushing and the likelihood of active caries. Among those claiming to brush three or more times a day, 22% had active decay. The figure rose to 39% among those who brushed once a day or less frequently. This lends some support to the view that frequent brushing helps maintain the level of fluoride ions (from toothpaste) in the mouth, a critical factor for effective caries prevention. A relationship between frequency of toothbrushing and reduced plaque levels was found in all four age groups covered.

Three other points of interest with regard to home care are worthy of note. The most common time for brushing the teeth was before bed with after breakfast coming a close second. Approximately half of 5-year-old children brushed their own teeth while half were helped by their parents. Nine per cent at 5 years of age were given fluoride drops or tablets.

Other aspects of children's dental health

Periodontal disease

The high level of variation found between individual examiners during training for the survey led to the view that the reliability of observational measures of plaque and gingivitis might be questionable. However, the examination for presence of calculus and periodontal pocketing, confined to 15-year-old subjects, was consid-

ered to provide harder data. Overall 10% of these children were found on probing to have one or more pockets of between 3.5 mm and 5.5 mm in depth though more severe pocketing was not found. The corresponding proportion in 1983 was 9%. The proportion of 15-year-old children with sub- or supragingival calculus was 32% compared with 33% in 1983.

Malocclusion

The examination for malocclusion included application of the Index of Orthodontic Treatment Need (IOTN) and its aesthetic component. At the age of 9 years, 54% of UK children were assessed as having a treatment need for malocclusion ranging from moderate to very great. Among 15-year-old children 34% still had at least a moderate treatment need but just 4% had a very great need. At this age, 8% had received treatment by appliance and a further 11% were undergoing treatment at the time of the survey. Among parents of those 12-year-old children assessed by the dentist as having no treatment need, 8% thought their children should have their teeth straightened. This rose to 27% for children assessed as having great treatment need and 22% for those with very great need. On the other hand parents of almost half of 12-year-old children assessed as being in very great need (47%), and almost two-thirds at 15 years (63%), thought that the arrangement of their children's teeth was satisfactory. One notable finding of the survey was that among children aged 11 years or over in the UK, the proportion who had orthodontic extractions was less than half the level recorded in 1983. At 12 years, for example, 4% had orthodontic extractions compared with 8% in 1983. The proportion at this age in 1993 having extractions for caries was 7%.

Dental erosion, developmental defects of enamel and accidental damage

Nearly a quarter (24%) of UK 5-year-old children had erosion of the lingual surfaces of the primary incisors affecting dentine or pulp. The permanent dentition was less likely to be so severely affected. Among children of 13 years or over, in only 2% had erosion progressed through and beyond the enamel. Nevertheless, around 30% had evidence of erosion of enamel. The widespread prevalence of erosion in primary teeth in particular, with over half of children affected to some degree, is a worrying indication of the high consumption of acidic drinks in the young.

Twenty-three per cent of UK 12-year-old children exhibited demarcated opacities of tooth enamel while 20% had diffuse opacities, possibly associated with fluoride ingestion. The majority of diffuse opacities (63%) were confined to less than a third of the affected tooth surfaces. Very few children (2%) showed evidence of enamel hypoplasia.

There has been some decline since 1983 in the proportion of children who sustained some accidental damage to the permanent incisors, particularly in the older age groups. At 12 years of age, for example, the rate per 1000 incisors of fractures involving enamel and dentine in 1993 was 5.9. The corresponding rate in 1983 was 8.9. Boys were more likely to sustain damage to their incisors than girls. The prevalence among children aged 12–13 years for those with an overjet of 9 mm or greater was 33% compared with 16% for those with a less than 5 mm overjet.

Concluding observations

The present review has necessarily had to be selective and only some of the more salient findings of the survey have been presented. The full report contains an enormous amount of other important new health related data but does not comment extensively on their implications. It may be that a brief discussion of some of these would be a useful conclusion to this commentary.

Attention has already been drawn to the disturbingly high prevalence of dental erosion in children. It is the first time that this factor has been looked at on a national basis and the findings must be a matter of considerable professional concern. This apart, dental caries must remain the prime focus of interest since this disease and its sequelae are the major cause of dental morbidity, tooth loss and expenditure in the dental primary care services. While overall, caries levels have fallen dramatically since the national surveys of children's dental health began in 1973, the 1993 survey shows that in 5-year-old children there has been no further fall in disease levels since 1983. This cohort of young children is the bellwether for the pattern of dental health likely to be seen in the years ahead in older children, adolescents and eventually young adults. Our failure to make further inroads into reducing their caries levels is not a good omen for the future. In older children, the successive national surveys give the impression that caries has gone on declining steadily. However, evidence from other countrywide, regionally based surveys, carried out at shorter time intervals than the national surveys, indicates that in recent years caries levels in 12- and 14-year old children are also no longer falling at the previous high rate, and may be starting to level out.[4]

A further matter of concern regarding 5-year-old children is the finding that numbers of primary teeth with active decay were higher in 1993 than in 1983, average numbers of filled

teeth lower, and in those children who only attended the dentist when in pain, known caries experience had risen slightly during the 10 year period. This, taken in conjunction with an increase in the proportion overall at this age who are nonetheless free from known decay experience, suggests a complex process whereby the disease is becoming concentrated in a diminishing number of children, with higher than average disease levels, who are not obtaining dental care. In older children, among almost all groups surveyed, irrespective of their dental attendance pattern or social class, the amount of caries treated restoratively has declined markedly since 1983.

It seems clear that any restructuring of the dental services must ensure that young children in particular are afforded the highest priority for care. At the same time the necessity for serious progress to be made in fluoridating public water supplies and controlling sugar consumption by every practicable means must again be stressed. It is likely that without such population based preventive measures, targets recently promulgated by government for the dental health of young children by the year 2003,[5] the scheduled date for the next national children's survey, will not be achieved. Trying to further reduce children's caries experience to any significant extent by means other than such whole population strategies is likely to be inordinately and unrealistically expensive. Even these measures should possibly be concentrated on communities with above average levels of disease in order to make the best use of resources.

References

1 O'Brien M. *Children's dental health in the United Kingdom 1993*. London: Office of Population Censuses and Surveys, 1994.
2 Office of Population Censuses and Surveys. *Dental caries among children in the United Kingdom in 1993*. OPCS Monitor. London: OPCS, 1994.
3 Downer M C. The 1993 national survey of children's dental health: a commentary on the preliminary report. *Br Dent J* 1994; **176:** 209–214.
4 Downer M C. Caries prevalence in the United Kingdom. *Int Dent J* 1994; **44:** 365–370.
5 Department of Health. *An oral health strategy for England*. London: DH, 1994.

BDA Information Centre now offers CD-ROM Medline on a multi-drive tower

The BDA Information Centre has recently acquired a new CD-ROM Medline multi-drive tower which means that members who access this system from their home or surgery computer can now search Medline files through to 1966. Similarly, members wishing to use the Medline facility in the Information Centre can search back through these files themselves without the considerable inconvenience of having to ask a member of staff to change CD discs (as was previously the case). Members with neither a computer nor the time to visit the BDA personally can simply telephone, write or fax the Information Centre to request a free CD-ROM Medline search. The Centre also offers a photocopying service to members (a photocopy request form is available on request). The fax number is 0171 935 6492. The Information Centre has also joined the huge number of other institutions and individuals currently using their computers and modems to access the Internet. Members who are subscribers to an Internet service can send electronic mail to the BDA via the Information Centre's Internet E-Mail address which is: bdainfo@clus1.ulcc.ac.uk

Members without a computer but who are thinking about buying one can try one out without being pressurised by salesmen in the Centre's Multimedia Room which offers three personal computers available for members to use. These are equipped with Computer Assisted Learning packages and Wordprocessing, as well as Medline on CD-ROM. They also have laser printers attached to them. Also, for £2.50 per half hour session, the Information Centre now offers members the chance to 'surf' the Internet themselves where it will be possible to browse the many World Wide Web pages available. The BDA now has 'Web' pages at the following Internet address: http://www.shef.ac.uk/uni/projects/der/bda/bda1.html

For further details of these or all our Information Services please telephone Roger Farbey, Information Centre Manager on 0171 935 0875 Extension 207.