DENTAL STATISTICS & RESEARCH SERIES

Australia's oral health and dental services

THE UNIVERSITY OF ADELAIDE

Australia's Oral Health and Dental Services

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The Australian Institute of Health and Welfare is an independent health and welfare statistics and information agency in the Commonwealth Health and Family Services portfolio. The Institute's mission is to inform community discussion and decision making through national leadership in the development and provision of authoritative and timely information on the health and welfare of Australians.

The AIHW Dental Statistics and Research Unit (DSRU) is a collaborative unit of the AIHW established in 1988 at The University of Adelaide. The DSRU aims to improve the oral health of Australians through the collection, analysis and reporting of dental statistics and research on the dental workforce, dental health status, dental practices and use of dental services.

DSRU Staff:

Director:	Professor John Spencer
Acting Deputy Director:	Mr Fearnley Szuster
Research Officers:	Mr Jason Armfield
	Mr David Brennan
	Mr Knute Carter
	Dr Jane Chalmers
	Miss Sophie Kriven
	Mrs Judy Stewart
Research Associates:	Dr Rachel Mathew
	Dr Anu Narayanan
Administrative Staff:	Mrs Lorna Lucas
	Mrs Lyn Tucker
Consultants:	Dr Kaye Roberts-Thomson
	Dr Gary Slade *(University of North Carolina)*

Any comments or information relevant to the subject matter of this report would be welcome. Correspondence should be directed to:

The Director
AIHW Dental Statistics and Research Unit
The University of Adelaide
SOUTH AUSTRALIA 5005

Tel: (08) 8303 4051
Fax: (08) 8303 4858
E-mail: aihw.dsru@dentistry.adelaide.edu.au
Website: http://www.adelaide.edu.au/socprev-dent/dsru

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Abbreviations

ABS	Australian Bureau of Statistics
ADA	Australian Dental Association
ADEC	Australian Dental Examinations Committee
AIHW	Australian Institute of Health and Welfare
CDHS	Child Dental Health Survey
CDS	Community Dental Service
CPITN	Community Periodontal Index of Treatments Needs
d	Decayed (deciduous tooth or surface)
D	Decayed (permanent tooth or surface)
DEET	Department of Employment, Education and Training
DFI	Dean's Fluorosis Index
dfs	Decayed or filled surfaces (deciduous dentition)
DFS	Decayed or filled surfaces (permanent dentition)
dmfs	Decayed, missing or filled surfaces (deciduous dentition)
DMFS	Decayed, missing or filled surfaces (permanent dentition)
dmft	Decayed, missing or filled teeth (deciduous dentition)
DMFT	Decayed, missing or filled teeth (permanent dentition)
DSRU	Dental Statistics and Research Unit
dt	Decayed teeth (deciduous dentition)
DT	Decayed teeth (permanent dentition)
F	Filled tooth or surface (permanent dentition)
FT	Filled teeth (permanent dentition)
FTE	Full-time equivalent
IADR	International Association of Dental Research
LFS	Labour Force Survey
LOA	Loss of attachment
M	Missing tooth or surface (permanent dentition)
MT	Missing teeth (permanent dentition)
NDS	National Dental Survey
NDTIS	National Dental Telephone Interview Survey
NHMRC	National Health and Medical Research Council
NOHSA	National Oral Health Survey of Australia
OECD	Organisation for Economic Cooperation and Development
OHIP	Oral Health Impact Profile
OMR	Optical Mark Reader
ppm	parts per million
SADLS	South Australian Dental Longitudinal Study
SDS	School Dental Service
SES	Socioeconomic status
TF	Thylstrup Fejerskov Fluorosis Index
TSIF	Tooth Surface Index of Fluorosis
WHO	World Health Organisation

Glossary

edentulous	having no natural teeth
dentate	having at least one natural tooth
deciduous dentition	primary (baby) teeth
permanent dentition	adult teeth
exfoliate	to naturally lose a deciduous tooth

Symbols used

..	not applicable
n.a.	data not available

List of contributors

Chapter 1 Professor John Spencer

Chapter 2 Mr Michael Davies
Professor John Spencer
Mr David Brennan
Dr Murray Thomson

Chapter 3 Mr Fearnley Szuster
Mr David Brennan
Professor John Spencer

Chapter 4 Professor John Spencer
Mr Knute Carter
Mrs Judy Stewart
Mr David Brennan

Chapter 5 Mr Fearnley Szuster

Editorial team

Several people have contributed to the editing of this publication. Knute Carter and Lorna Lucas of DSRU and Jerry Molar of the AIHW have all worked to improve the consistency, layout and readability of the text. DSRU is indebted to them for the vast improvement of the manuscript from the original presentations by the authors.

1 Introduction

In November 1995 the Australian Institute of Health and Welfare's Dental Statistics and Research Unit sponsored a Workshop on Dental Statistics in Australia. The Dental Statistics and Research Unit was established in 1988 with the purpose of improving the range and quality of statistics on oral health, use of services, provision of services and the dental labour force in Australia.

At the time of the Workshop the main activities of the Unit were in the areas of:

- child oral health – the Child Dental Health Survey
- effectiveness of fluorides – the Child Fluoride Study
- the dentist and dental auxiliary labour force – the National Dental Labour Force Data Collection
- changes in dentist practice activity – the Longitudinal Study of Dentists' Practice Activity
- access to adult dental care, particularly among health card-holders – the Commonwealth Dental Health Program Evaluation Project. [This involves a national dental telephone interview survey, a dental satisfaction survey and surveys of adult public dental service provision.]

The Dental Statistics and Research Unit sought an opportunity to inform the dental community about its activities. Each presentation at the Workshop discussed the purpose, methods, findings and dissemination of dental statistics collected by the Unit. Of particular interest was the identification of additional priorities in the collection of dental statistics and enhancements in the dissemination of available dental statistics. These latter areas were pursued predominantly in a series of plenary sessions covering oral health statistics, dental labour force statistics, and statistics on access to adult dental care.

The present monograph is developed from the papers presented by staff from the Dental Statistics and Research Unit. Its publication aims to provide a record of the substantive material presented at the Workshop. In this sense the monograph is a resource document. However, it is also hoped that its publication will stimulate discussion of the activities of the Unit and how they might be improved.

Dentistry encompasses areas undergoing rapid change. The oral health of the community is changing, with a shift in the burden of disease from children to adults. The distribution of the dental labour force is changing, including the occupational (dentists, dental hygienists and dental therapists) and specialty (general and specialist practice dentists) distributions. The activities of dentists are also changing with movement in the age distribution of patients, their reason for attendance and the services they are provided. While more people in the community enjoy improved oral health and access to dental care of a high standard, other special groups are markedly disadvantaged in terms of untreated disease or disorders and patterns of care which all agree are less than desirable. The pace of change challenges decision-makers to develop sound public health policy in the area of dentistry.

The Dental Statistics and Research Unit, as a national unit, is continuing to pursue activities in line with the views of its stakeholders as to the priorities, the focus and the types of dental statistics required.

The Dental Statistics and Research Unit hopes that this monograph will be found to be informative and stimulating to those like us who wish to improve the oral health and well-being of Australians.

2 Oral Health Statistics

2.1 The Child Dental Health Survey (CDHS)

The Child Dental Health Survey (CDHS) is a national survey of the oral health status of Australian school children enrolled in the School Dental Services in each State and Territory of Australia. The CDHS was implemented in 1977 by the Commonwealth Department of Health, with the objective of recording statistics on the caries experience and oral cleanliness of children presenting for routine courses of care in the School Dental Services (SDS).

With the expansion of the SDS, the number of records forwarded for processing to the Automatic Data Processing Branch of the Commonwealth increased to 932,000 by 1985. The processed data were presented in computer generated reports that were distributed annually to each State and Territory in Australia.

By 1988, the increasing refinement and complexity of the epidemiological issues, together with the dramatic increase in the volume of data collected, created the need to reassess the CDHS. Following a process of review, and a proposal by the Commonwealth to abandon the survey, responsibility for a substantially revised data collection was transferred in 1989 to the Dental Statistics and Research Unit (DSRU) in Adelaide. Following a meeting of all State and Territory directors of dental services, the redesigned CDHS was implemented in March, 1989.

2.1.1 Aims of the redesign of the CDHS

The transfer of the CDHS to the DSRU was associated with the development of a series of short- and long-term aims. The immediate aims of the redesign were to:

- maintain the national time series on disease prevalence;
- improve the quality and utility of the core data items by using more efficient sampling strategies to reduce potential bias, and develop additional data items to capture disease experience and social circumstance of individuals;
- provide relevant reports for planning and policy development in a form that was less intimidating and that could be reproduced easily for broad dissemination; and
- improve the efficiency of data processing and analysis by developing and implementing the use of optical mark reader technology.

2.1.2 Long-term aims for enhancing the CDHS

The long-term aims of the CDHS are designed to maintain the currency of the survey. These changes include considering:

- additional core data items, such as sociodemographic variables to examine the social distribution of dental disease;
- developing a longitudinal database that will permit the calculation of caries incidence;
- improving the representativeness of the CDHS through collecting data items in common with other collections of high standard, and by improving the sampling processes; and
- implementing supplementary studies to improve the usefulness of the core data collection.

A number of the long-term aims have been addressed through two, large supplementary studies concerned with the evaluation of water fluoridation. The nature of these studies, and their relation to the CDHS, are discussed below.

2.1.3 Present uses of the CDHS data

The CDHS is used at several levels and for a number of purposes. States and Territories use the data to assist in management issues, such as resource allocation and as a broad measure of performance. States and Territories also receive as required regional level reporting that assists in examining the regional distribution of dental caries.

The data also have been used to:

- monitor the prevalence of disease nationally, that has provided a basis for formulating goals for children's health at both the national, and State and Territory levels;
- assess progress toward goals at the international level; and
- generate a number of ancillary research projects and scientific papers identifying such issues as the change in the social distribution of disease noting that increasingly few children account for greater and greater proportions of the total burden of disease.

2.1.4 Overview of sampling and data collection methods

This section details the methods used for the Child Dental Health Survey, and includes details on the data items, collection methods, data processing procedures, and the processes of analysis and reporting.

Data items

There is a core data set for the CDHS agreed upon by States and Territories with the DSRU that permits the maintenance of the national time series on the age-specific caries prevalence among Australian school children. The data are collected either at

the tooth level, yielding measures of dmft and DMFT, or at the tooth surface level, yielding the measures of dmfs and DMFS. The measures are a count of the number of teeth (or tooth surfaces) that are decayed, missing due to caries, or filled due to caries.

The following data items are captured on the tooth level optical mark read form currently in use in several States and the Northern Territory. However, birthplace for child and mother, and immediate treatment needs are not collected in all States and Territories.

- Caries experience data – dmft and DMFT
- State and regional identifiers
- Date of examination
- Date of last examination
- Date of first examination
- Date of birth / age of child
- Sex of child
- Birthplace of mother and child
- Immediate treatment needs

The following data items are captured on the surface-specific optical read form implemented for the Child Fluoride Study (described in detail below), and that continue to be used in South Australia and the Australian Capital Territory.

- Caries experience – dmfs and DMFS
- State and regional identifiers
- Preventive programs
- Date of examination
- Date of last examination
- Date of first examination
- Date of birth / age of child
- Sex of child
- Past topical fluoride use by a School Dental Service
- Risk status
- Child identification number

The data items elaborate on the tooth level data form by improving the sensitivity of the measurement of caries experience, introducing a unique identifier that enables the longitudinal tracking of individuals over time, and obtaining data on exposure to types of services and fluoride vehicles within the School Dental Service. The significance of these items is expanded in the section below concerned with the Child Fluoride Study.

Sampling

The collection of data for the CDHS is undertaken by School Dental Service clinics within each State and Territory in Australia. Children are sampled by a number of strategies, including a 1:8 sample of treatment cards; and a systematic sample based on selecting children with certain birth dates. The latter strategy operates by selecting children, for example, with a birth date that falls on either the 1st or the 6th of any month, that produces an approximately 1:19 sampling rate. The sampling rate can be varied by changing the number of dates of the month for inclusion in the sampling scheme. This strategy has the additional benefits of being able to identify under-sampling (since the total number of patients is collected by service providers as part of the productivity figures), and children wrongly sampled (since the birth date is recorded on the data sheet). Weighting the sample by the sampling fraction produces an estimate of any under-sampling. The greatest benefit of this sampling scheme is the reduction of non-representative sampling by removing operator discretion in the selection of cases. It does not, however, avoid the further bias of under-reporting or misreporting of disease experience.

In the majority of States and Territories, examination details are recorded on optical mark read forms, otherwise details are recorded on manual forms which are data entered to produce files which are then forwarded to the DSRU.

Data are obtained from routine dental examinations conducted by non-calibrated dentists and therapists within the School Dental Service of each State and Territory of Australia. The total Australia-wide sample is approximately 100,000 unit records per year, that are weighted prior to analysis to represent State and age-specific estimated resident populations across Australia.

Processing of data

The processing of data occurs either at a State level, for those States with data processing facilities, or within the DSRU for those States without data processing facilities.

Data are forwarded to the DSRU on magnetic media or optical mark read forms and incorporated into the DSRU data collection normally by May of the year following the close of the data collection in December.

The current desired path for data is that:

- there is use of optical mark readers;
- data are checked for validity at the clinic before dispatch to regional offices;
- input editing operated during processing to clean the data; and
- unit record data are forwarded to DSRU on disk or in raw form.

Analysis and reporting

The analysis and reporting cycle contains the following steps to produce a hierarchy of reports from the national to the regional level. Reporting for the CDHS includes age-specific and age standardised caries prevalence estimates at regional, State, and national levels, in addition to estimates of the prevalence of fissure sealants and immediate treatment needs.

The stages in the reporting process conducted by the DSRU include:

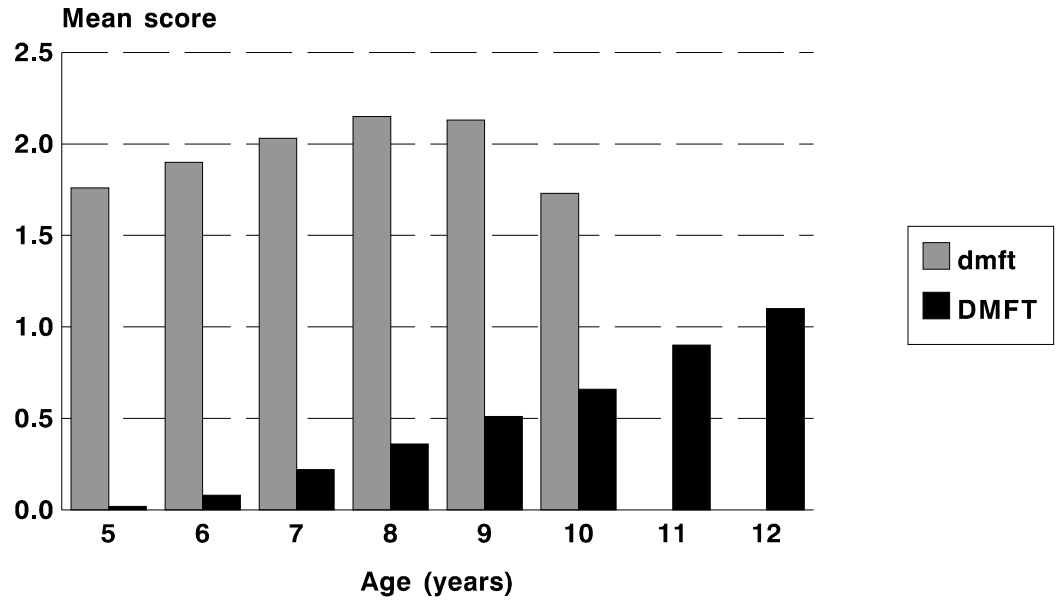
- compiling data files from States and Territories;
- weighting to reflect regional variation in sampling;
- producing preliminary tables at State, Territory and regional level;
- forwarding of preliminary tables to data providers as required;
- compiling national data;
- weighting to reflect sampling variations within States / Territories;
- population estimates between States / Territories;
- interim reporting at State and Territory level for those jurisdictions with the need to include oral health prevalence estimates in annual financial year reports;
- producing final State, Territory, and regional reports in the second half of the calender year for distribution to State and Territory dental directors; and
- producing national reports for distribution to States and Territories, and other interested parties.

There are several other avenues for the dissemination of information from the CDHS in addition to the State and Territory reports, and the national report, including:

- Australia's Health, which is the biennial publication of the AIHW in Canberra;
- scientific publications; and
- ad hoc reports and analyses as requested by data providers, government agencies and researchers.

2.1.5 Trends in dental caries

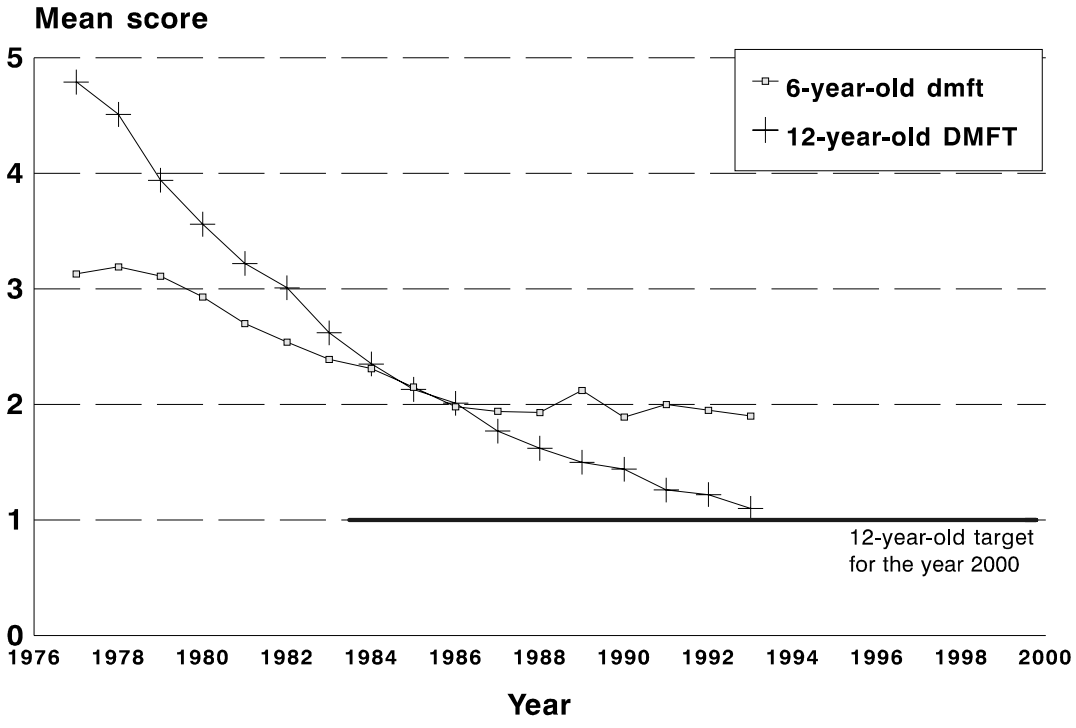
The following section details a range of analyses of the CDHS data with regard to national caries experience estimates among school children, the changing distribution of caries experience, and progress toward a dental health target for the year 2000 for 12-year-old children specified in the Health For All Australians document (Health Targets and Implementation Committee, 1988). The 1988 targets for children sought to reduce for the reference group of 12-year-olds, the DMFT index of decayed, missing, or filled teeth to the level of 1.0 or less by the year 2000.



Source: AIHW Child Dental Health Survey

Figure 2.1: Caries experience (dmft and DMFT) in children aged 5 to 12 years in Australia in 1993

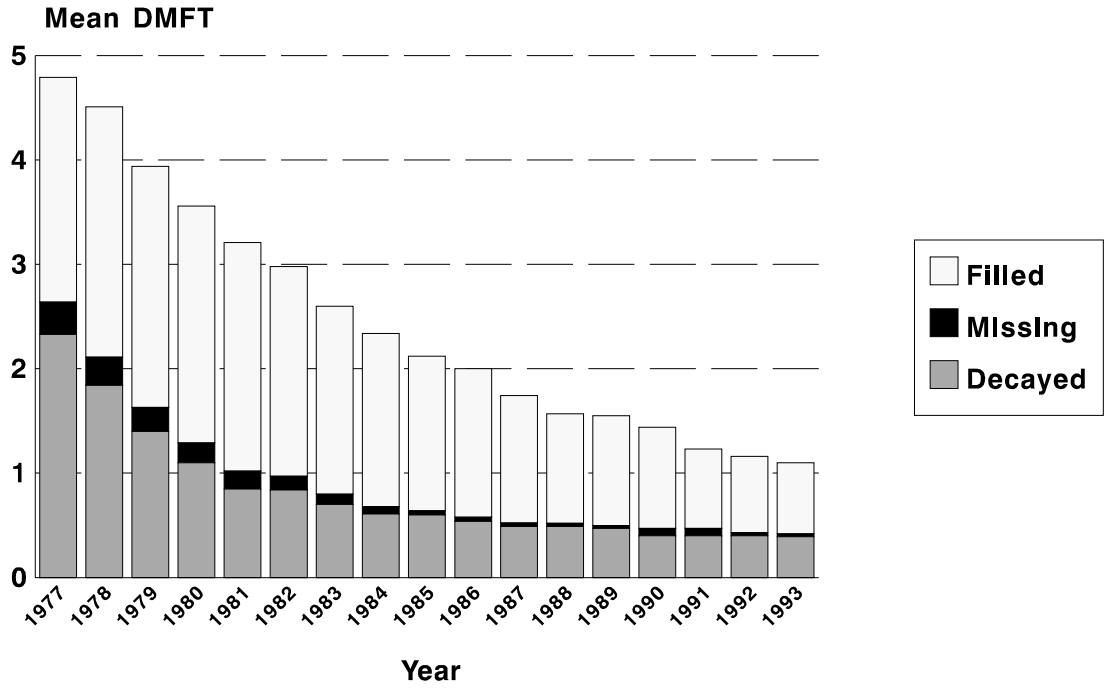
Figure 2.1 presents the caries experience for both deciduous and permanent dentition for the year 1993. The DMFT score for the permanent dentition reflects a gradual accumulation of caries and caries related treatment. Of note is the higher caries experience in the primary dentition than in the permanent, and the greater scores across age groups that reflects both an ageing effect, and to some degree, a cohort effect. That is, some of the increase noted across different age groups is due to the age groups being drawn from different cohorts who have had differing exposures to preventive and treatment regimens. This effect can be very significant where there is a rapid secular change in disease incidence. The figure indicates the peaking of deciduous dmft at age 8, followed by a decline that reflects exfoliation of deciduous teeth. The 6-year-old dmft score for 1993 is 1.90, with 53.2% being caries free, and the 12-year-old DMFT is 1.10, with 43.9% having no caries experience. These compare with the 1977 dmft scores for 6- and 12-year-olds of 3.13, and 4.79 respectively. It should be noted that Victorian 11- and 12-year-olds were excluded from these calculations due to problems in collecting sufficient data for these ages.



Source: AIHW Child Dental Health Survey

Figure 2.2: Time trend in Australia – caries experience for 12-year-olds

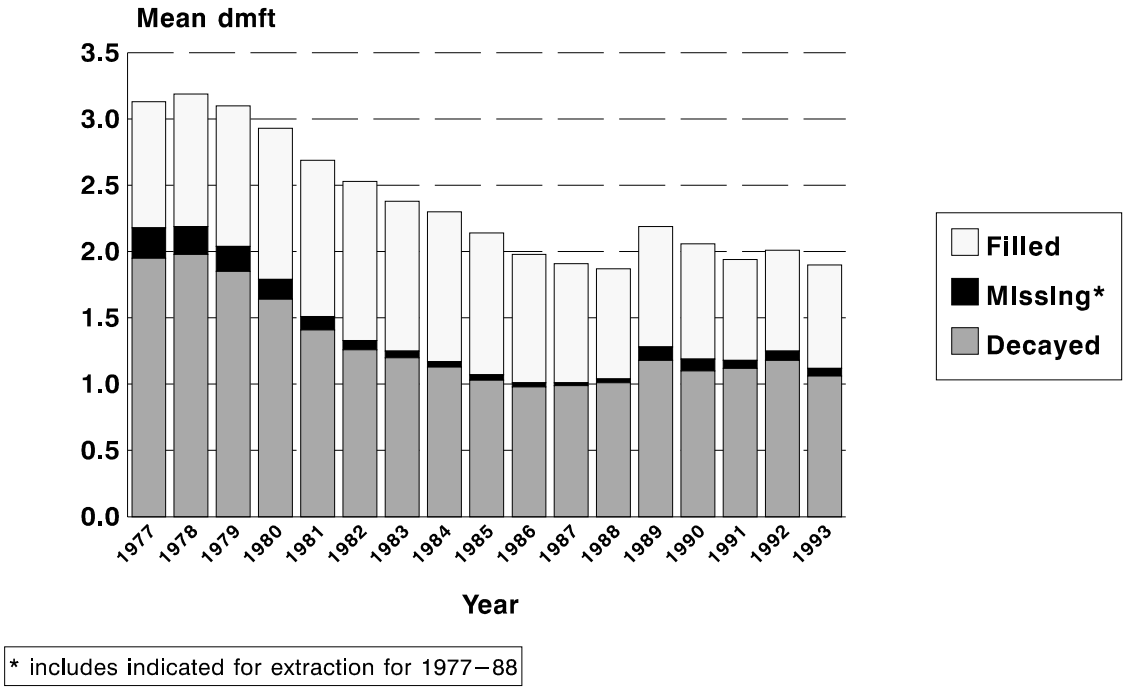
Figure 2.2 presents the caries experience data for both 6- and 12-year-olds as part of a time trend from 1977 to 1993. The decline in 6-year-old dmft across recent years appears to have diminished to virtually zero. When focusing only on the d plus f components, the decline since 1986 has been zero. The continued, but also slowing rate of decline for 12-year-old DMFT is indicated, as is the trend toward the Health for All target for the year 2000 of 1.0. The slight upward turn in the dmft score for deciduous dentition for 1989 is, in small part, due to the inclusion since that time of the missing component, as opposed to the component indicated for extraction used previously, and possibly the introduction of more rigorous sampling procedures within the revised Child Dental Health Survey.



Source: AIHW Child Dental Health Survey

Figure 2.3: Caries experience in 12-year-old children in Australia from 1977 to 1993

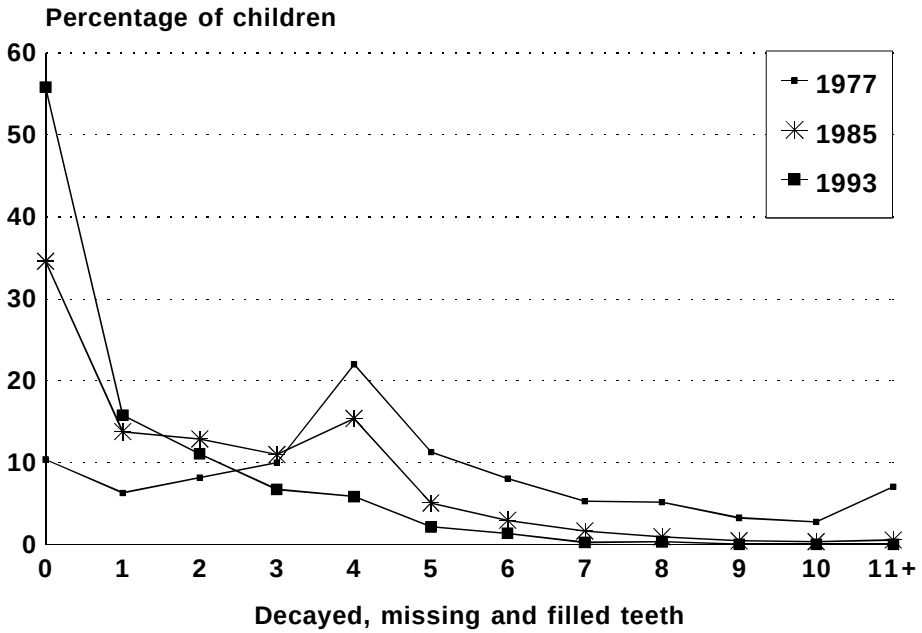
The relative contribution of the DMFT components to the total index score can be analysed in more detail by presenting the 12-year-old DMFT components over time. In addition to the general decline in permanent caries experience noted above, the ratio of decayed to filled teeth has increased from 1:0.92 in 1977 to 1:2.36 in 1990. A plausible account for this pattern is increasing promptness in the treatment of active decay. It is also of interest that the decayed component has remained relatively stable in recent years, with the reduction in the DMFT index being largely attributable to reductions in the filled component. The trend in reducing D/DMFT ratios is consistent with better targeting of care, and the adoption more broadly of a less interventionist treatment philosophy within the public sector of the dental profession in Australia.



Source: AIHW Child Dental Health Survey

Figure 2.4: Caries experience in 6-year-old children in Australia from 1977 to 1993

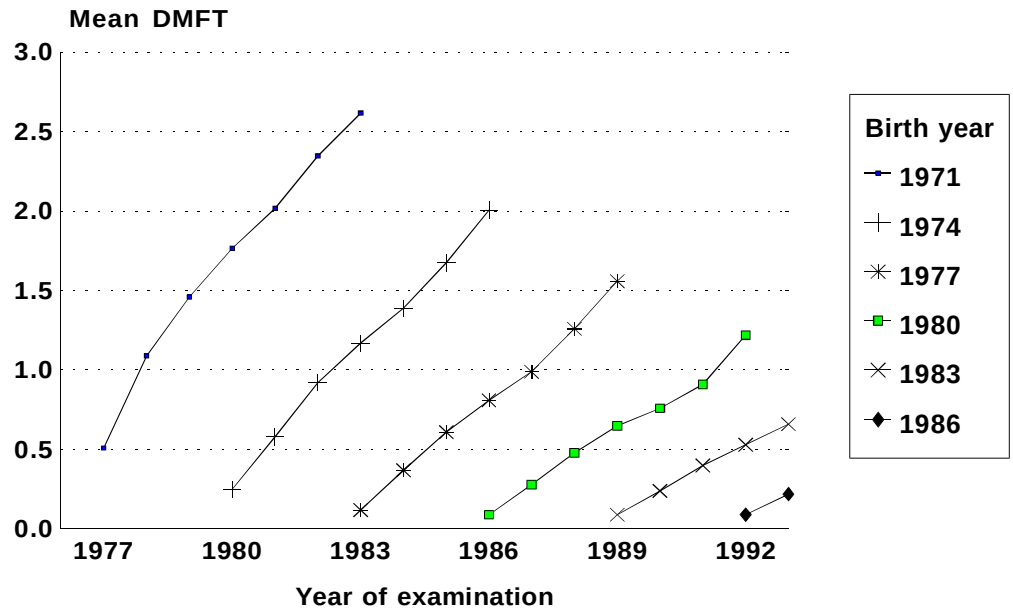
In contrast to the 12-year-old DMFT components presented in Figure 2.2, the dmft components for 6-year-old children the ratio of filled to decayed teeth is substantially smaller than for the 12-year-old children. Of note also is the lack of systematic movement since 1988. These effects reflect a relatively stable situation where there is substantial deciduous caries experience in the majority of children. In addition, the major proportion of the dmft experience is present at age five years, that represents the age that most children commence care with the SDS.



Source: AIHW Child Dental Health Survey

Figure 2.5: Distribution of caries within the population – DMFT for 12-year-olds in 1977, 1985 and 1993

Accompanying the gradual decline in overall DMFT prevalence has been the change in the distribution of caries experience. In 1977, over 20% of children had a DMFT score of four, with smaller percentages both above and below the DMFT score of four. By 1985, however, the most common DMFT score for 12-year-old children was zero, with a second peak at DMFT of four. The continuation of this trend to 1993 has resulted in a very positively skewed distribution with no evidence of bi-modality, and over 50% of children at 12 years of age having no caries experience. For instance, over 75% of all dental disease in 12-year-old children is now contained within 27% of the population, and 14.6% of 12-year-old children in 1993 have a DMFT score of four or more. This change in the distribution of DMFT has implications for targeting of interventions and services to the significant minority of children who still have substantial caries experience.



Source: AIHW Child Dental Health Survey

Figure 2.6: Caries experience (DMFT) for birth cohorts

The change in caries experience over time can also be considered in relation to cohorts of children, rather than in terms of sequential cross-sectional surveys. The benefit of this approach is the better identification of period, ageing and cohort effects.

DMFT for synthetic birth cohorts over time are presented in Figure 2.6. Data are not necessarily for the same individuals, but are based on a sample from the same age population that may include a proportion of the same children. Both the drift downward indicating lower caries experience, and a collapse in the slopes indicating lower incidence of caries are notable. The 1983 birth cohort, who are aged 10 years in 1993 can be used to make a projection for the 12-year-old target for the year 2000. A linear model fits the data well. The regression equation indicates that 12-year-old DMFT will be 0.96 by the end of 1995.

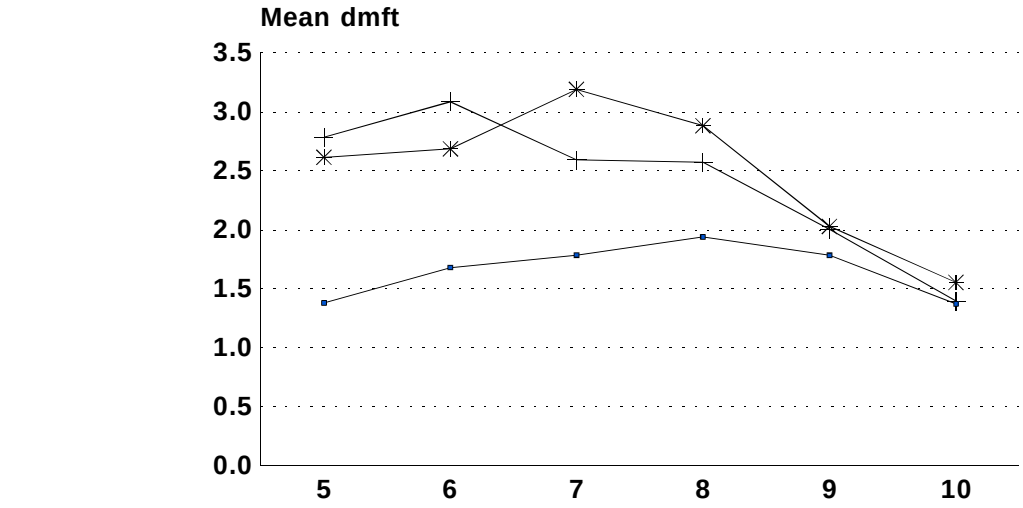
2.1.6 Conclusions

Of the findings presented above, there are three principal conclusions that are of central importance to the present Workshop.

- There has been a dramatic decline in dental caries experience among Australian children since 1977.
- Caries prevalence in permanent dentition continues to decline, in contrast to the stabilising of caries prevalence in deciduous dentition.
- The target of DMFT of 1.0 for 12-year-old children is projected to be achieved in 1995.

2.1.7 Ancillary research from the CDHS

As an example of how the Child Dental Health Survey can be used for ancillary research questions, we can consider a second set of analyses that reflect both the extensiveness of the CDHS collection in the Northern Territory, and the capacity of the survey to study emerging priorities in oral health for target populations. Presented below are four figures documenting the comparative caries experience of Aboriginal, non-Aboriginal children, and overseas-born children in the Northern Territory.

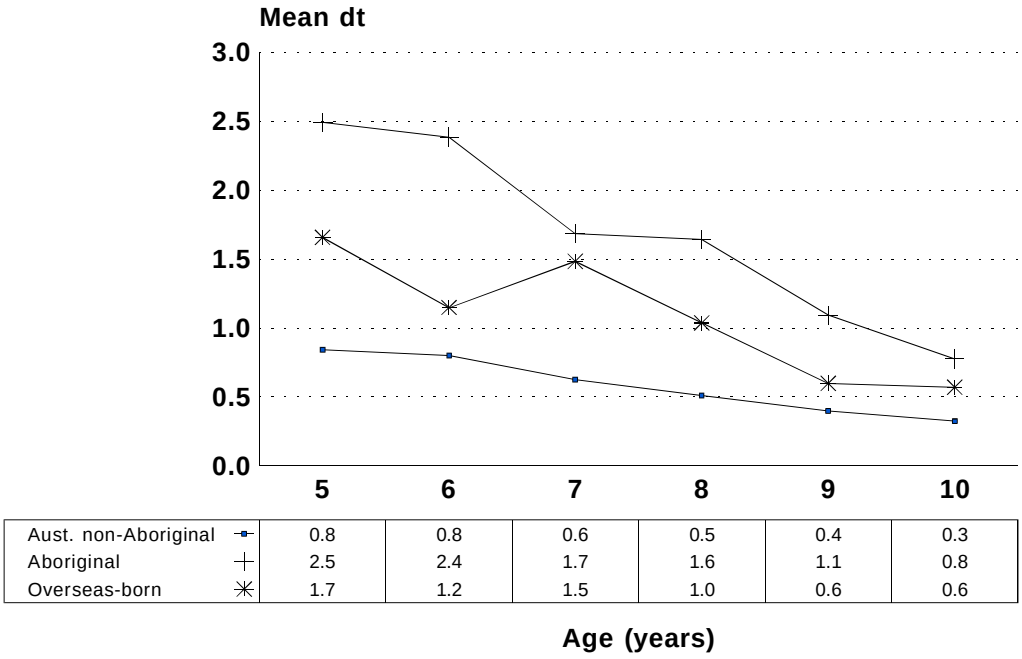


	5	6	7	8	9	10
Aust. non-Aboriginal	1.4	1.7	1.8	1.9	1.8	1.4
Aboriginal	2.8	3.1	2.6	2.6	2.0	1.4
Overseas-born	2.6	2.7	3.2	2.9	2.0	1.6

Source: AIHW Child Dental Health Survey

Figure 2.7: dmft for Aboriginal, non-Aboriginal and overseas-born children for deciduous teeth

A comparison of dmft scores for deciduous teeth for the three groups in Figure 2.7 indicates that both comparison groups had higher dmft scores than the non-Aboriginal Australian-born. There was evidence also from the prevalence of disease at age five years that a substantial proportion of children are entering the Community Dental Service (CDS) with significant caries experience, and that there is variation between groups at entry to the CDS. The dmft continued to increase across age cohorts to age six years for Aboriginal children, age seven years for the overseas-born children, and age eight for the non-Aboriginal Australian-born children. The rates of increase in dmft between the groups following enrolment in the CDS appeared also to vary slightly between groups. This was reflected in the slight divergence between groups of the prevalence scores between children aged four to seven years. The convergence observed across ages six to 10 years was due to the progressive loss of deciduous teeth due to exfoliation, which reduced the number of teeth at risk of caries.



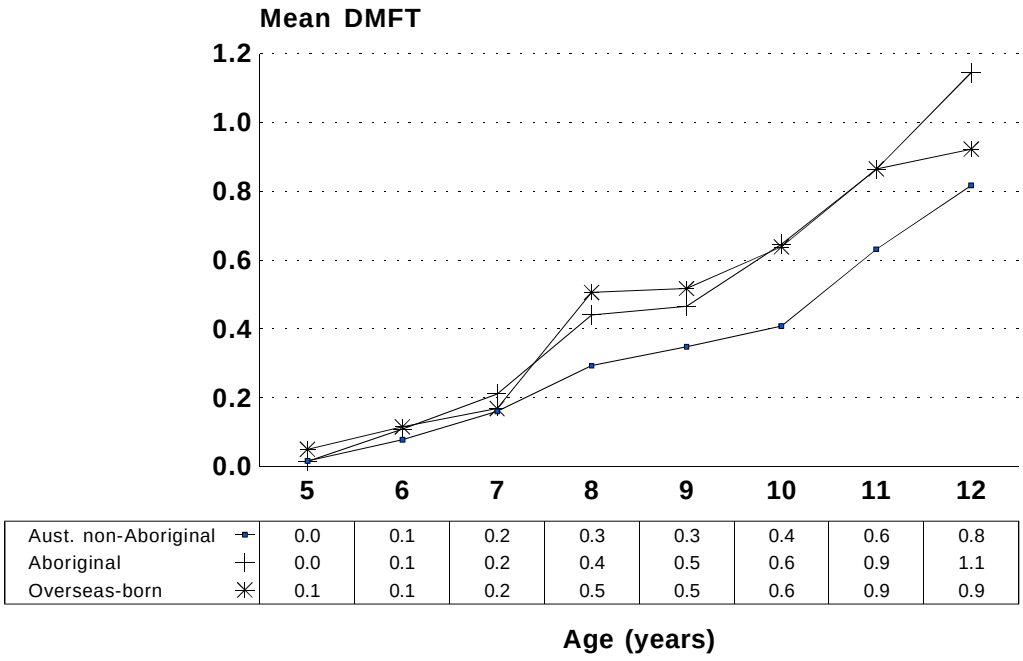
	5	6	7	8	9	10
Aust. non-Aboriginal	0.8	0.8	0.6	0.5	0.4	0.3
Aboriginal	2.5	2.4	1.7	1.6	1.1	0.8
Overseas-born	1.7	1.2	1.5	1.0	0.6	0.6

Source: AIHW Child Dental Health Survey

Figure 2.8: Mean number of decayed deciduous teeth for Aboriginal, non-Aboriginal and overseas-born children

Figure 2.8 presents a comparison of the number of decayed teeth in the deciduous dentition, with both comparison groups having had higher scores than the non-Aboriginal Australian-born group. The number of decayed teeth peaked at age five years for all groups, which was the age at which the majority of children commence school and, subsequently, care with the CDS. The general decline in the number of decayed teeth across ages was due to the greater presence of fillings compared with decay, and the exfoliation of the deciduous dentition, which also influenced the convergence between groups observed at age 10 years.

The summed dmft index, and its constitutive components, can also yield a ratio of decayed teeth to the dmft score in order to gain an appreciation of the proportion of caries experience that is constituted by untreated decay. A high d/dmft proportion provides an indication of greater unmet need for treatment than a low ratio. Although not presented in a figure, both comparison groups had significantly higher ratios of decayed teeth to teeth with caries experience than the Australian-born non-Aboriginal children.

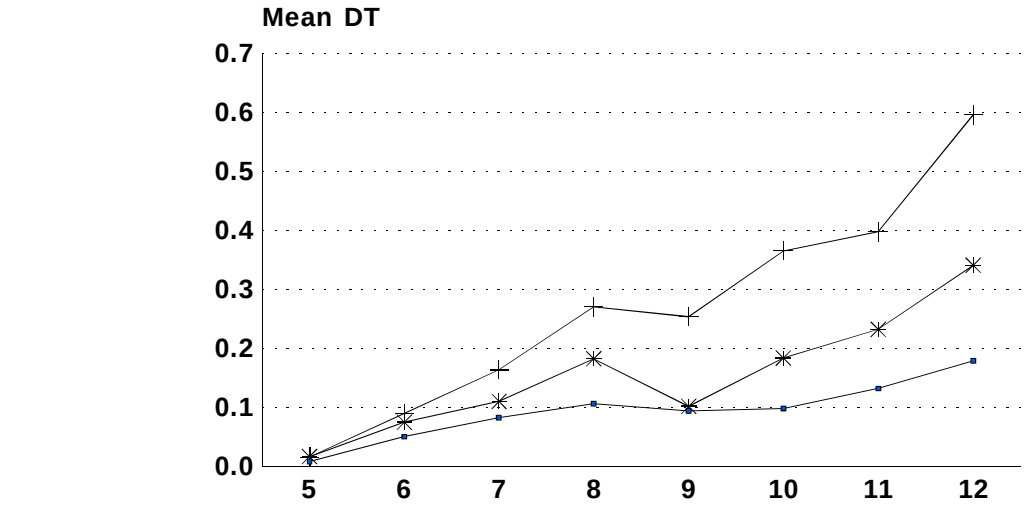


	5	6	7	8	9	10	11	12
Aust. non-Aboriginal	0.0	0.1	0.2	0.3	0.3	0.4	0.6	0.8
Aboriginal	0.0	0.1	0.2	0.4	0.5	0.6	0.9	1.1
Overseas-born	0.1	0.1	0.2	0.5	0.5	0.6	0.9	0.9

Source: AIHW Child Dental Health Survey

Figure 2.9: DMFT for Aboriginal, non-Aboriginal and overseas-born children

Figures 2.9 and 2.10 display the age-specific mean DMFT for the permanent dentition and its decayed component for Aboriginal and non-Aboriginal groups. Figure 2.9 indicates that both comparison groups had higher mean DMFT scores than the Australian-born non-Aboriginal children. There was an apparent divergence in the DMFT scores between the groups from the age of seven years, which reflected both the progressive eruption of the permanent dentition and the corresponding increase in the number of teeth at risk of disease, and the related accumulation of disease and treatment consequences, such as fillings and extractions.



	5	6	7	8	9	10	11	12
Aust. non-Aboriginal	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Aboriginal	0.0	0.1	0.2	0.3	0.3	0.4	0.4	0.6
Overseas-born	0.0	0.1	0.1	0.2	0.1	0.2	0.2	0.3

Source: AIHW Child Dental Health Survey

Figure 2.10: Mean number of decayed permanent teeth for Aboriginal, non-Aboriginal and overseas-born children

There was also a difference between groups for the decayed (D) component of the DMFT index, with both comparison groups having higher mean numbers of decayed teeth than the Australian-born non-Aboriginal. There was substantial evidence of divergence between the groups from the age of five years, with there being no apparent plateauing of the gradients across years. Indeed, there was a three-fold variation in the mean number of decayed teeth by the age of 12 years between the Australian-born non-Aboriginal children and the Aboriginal children.

As with the deciduous dentition, the proportion of the DMFT index that is accounted for by the decayed (D) component provides an indication of the degree of unmet need in each group. Compared to Australian-born non-Aboriginal children, decay represented a higher proportion of DMFT among Aboriginal children whereas it was a lower proportion for overseas-born children. When this is combined with the information that the comparison groups both have higher levels of DMFT, the higher ratio of D / DMFT for the Aboriginal children indicates a double disadvantage: more disease experience and a higher ratio of disease experience being untreated.

There are lower rates of utilisation of the CDS by the Aboriginal community. Aboriginal children show significantly longer periods since the last visit to the CDS compared to the Australian-born non-Aboriginal children (10.9 months for Australian-born non-Aboriginal children, 14.0 months for Aboriginal children). There is no difference in time since last visit between Australian-born non-Aboriginal children, and overseas-born children (10.7 months for overseas-born children).

2.1.8 Future improvements to the CDHS

Since the start of the CDHS there have been dramatic changes in the magnitude and distribution of caries experience in children, which has created a need for changes to the type and detail of data items collected. The CDHS requires constant monitoring and adjustment to ensure that it can respond to the changing contexts of operation in each State and Territory, in addition to providing information of a type, and at a level of aggregation, suitable for each jurisdiction.

There are a number of ways that the Child Dental Health Survey can be further refined to ensure that the data are both more relevant and accessible to the data providers.

Better matching of reporting to State and Territory priorities

The introduction of the revised CDHS, with improvements to the presentation of the report, has been accompanied with increased dialogue with States and Territories concerning the nature of the output. Discussion has focussed on four areas, including the content and format of national, State, regional, and ad hoc reports. The process of consultation has resulted in substantial revision to the regional reports in particular, and variation in the reporting cycles to more closely reflect the need of the data providers.

Increased self-sufficiency in data preparation

Data preparation by data providers is a preliminary step to being able to analyse and report upon data at a level of disaggregation that is both timely and relevant to State and Territory issues. To this end, assistance is provided to data providers on both the methods and technology required for data collection, data processing, and analysis. It is anticipated that improvements in the data collection and preparation process will facilitate a closer matching of reporting cycles with the needs of States and Territories. At present, final State and Territory reports are forwarded to the data providers in the calendar year following the collection of the data.

In those instances where the final reports are in revision, every effort has been made to provide provisional estimates so that the State and Territory mid-year planning and reporting cycles could be fulfilled. The capacity to produce aggregated national estimates are restricted by periodic delays in data returns from providers, cleaning of data, and State and Territory data reporting.

Development of data summary sheets

In an effort to ensure that the data collection, analysis and reporting reaches regional and field staff in a readily digestible form, there would appear to be an opportunity to distribute a data summary sheet linked to most current reports. Such a data summary sheet could be produced in greater numbers and its distribution to the suppliers of data encouraged. The newsletter produced by DSRU would continue to serve as a more detailed examination of issues on a loose rotation between dental health status, the dental labour force, use of services and provision of services as the topic areas.

2.1.9 Additional priorities and objectives

There are a number of changes to the structure of the CDHS that would create qualitative differences to the nature of the data being captured, and correspondingly, the type of research questions that could be addressed through the survey.

Collection of caries experience data at DMFS level

The collection of oral health data at the surface rather than the tooth level would have a number of benefits, including an increase in the sensitivity of the capacity to observe and discriminate levels of caries experience within the population. Surface level measurement would also enhance intra-oral and inter-individual discriminations of disease distribution, which would have implications for developing targeted programs.

Introduction of longitudinal component

The capacity to trace an individual over time as they present for sequential examinations generates the capacity to calculate true caries incidence measures. With regard to examining the relationship between disease and treatment, longitudinal data also permits establishing time precedence of disease and treatment.

Linkage of clinical data to service provision

Future objectives for the CDHS include the maintenance of the higher quality collections associated with the Child Fluoride Study beyond the period of funding provided by NHMRC. The maintenance and expansion of a longitudinal design for the CDHS could also include improved detail on service provision, which could provide the means for evaluating the impact of differential recall periods and the diffusion of new technologies such as fissure sealants.

Observation of variation in services by presenting status

The ability to identify high risk characteristics and groups has assumed a high priority within dental services in Australia for several reasons. A high proportion of children now leave the service with no experience of dental caries and a minority of children account for the majority of disease. This observation, together with an increasing emphasis on minimum intervention, has resulted in the application within several School Dental Services of differential recall periods related to risk status.

The process of allocating patients to categories of risk status would benefit from further refinement of the definitions of risk, the criteria for allocating patients a risk category, and the treatment implications of a risk allocation. Current features of the Child Fluoride Study will permit the estimation of disease incidence for specific sociocultural groups within society for a given service provision regimen and self-care status.

Identify trends in service provision

The maintenance and expansion of a longitudinal design for the CDHS could also link oral health data to information on service provision, which would provide the means for evaluating the diffusion and impact of new technologies such as fissure sealants and resin restorations on disease processes.

Linkage of social factors to clinical data

Collecting information on social characteristics of the sample within the CDHS has a number of potential benefits. The addition of further demographic information provides a means of comparing the sample to known population characteristics drawn from census data. This process can both identify deficiencies in sampling, and provide information for weighting the survey data to more closely reflect the oral health characteristics of identified populations. The extension of the data items would also permit further analysis relevant to the tasks of identifying the magnitude and distribution of social inequalities in oral disease in children, and investigating social determinants of oral disease.

2.1.10 Supplementary studies

There is demonstrable scope for ancillary studies to the CDHS to address matters of more specific scientific interest not addressed best by a 'broad and shallow' prevalence survey. For example, understanding the dental health of Aboriginal children for a particular region would require additional studies

The CDHS has also become the vehicle for a number of supplementary studies. In some cases the CDHS data has simply been disaggregated to a level where it can provide a baseline for an intervention study within a health region, while in others the data collection procedures and technologies have been adopted to create cost-efficient epidemiological studies within special populations.

The versatility of the survey as a platform for additional research has been further demonstrated through the success of two large supplementary studies that have achieved also the long-term aims of the data collection. Specifically, the DSRU has obtained three NHMRC Public Health Research and Development Committee Project Grants to evaluate the effectiveness of water fluoridation. These studies subsume the CDHS data collections in South Australia, the Australian Capital Territory, Brisbane and Townsville, and include a number of significant epidemiological features that are most desirable for maintenance beyond the time scale of the project, including:

- linkage of unit record data over time in a true longitudinal design;
- collection of sociodemographic information of relevance to health related behaviours and outcomes; and
- collection of more specific oral health data at the level of tooth surfaces (DMFS), rather than whole teeth (DMFT).

These studies are designed to complement the existing CDHS collection by permitting the integration of data in the routine reports produced currently, in addition to addressing the specific aims of the study. Due to the scale of the Child Fluoride Study,

section 2.2 describes the aims, design and some of the key findings to date from the study.

2.2 The Child Fluoride Study

This part of the presentation reports cross-sectional data from the baseline collection of the Child Fluoride Study.

2.2.1 Introduction

Fluoride has been the keystone to the prevention of caries in Australia. Since the fluoridation of Beaconsfield in Tasmania in 1953 water fluoridation has increased in coverage to now reach two-thirds of the Australian community (Spencer, 1984). Despite the success of achieving such wide coverage of the community, water fluoridation has almost constantly been the subject of concern. Prominent among this concern in Australia has been the questioning of the extent of reduced caries experience attributable to water fluoridation, and the possible risks to general health, particularly any association with site-specific cancers, and more recently both skeletal and dental fluorosis.

Australia, like many countries, has built a collection of reports that contribute to addressing these concerns. While these reports, such as those of the National Health and Medical Research Council (NHMRC, 1985; 1991), have concluded that water fluoridation is a safe, effective and socially equitable way of preventing dental caries, these conclusions have rested more on the wealth of international data and consistency of the rather more limited Australian data than on the veracity of any individual Australian study.

Most of the Australian studies encountered, whether recognised or not, have one or more research design or analysis problems: misclassification, confounding of fluoride effects, or lack of control for socioeconomic variation. Misclassification of exposure to water fluoridation has occurred principally in the time-series data derived from the Child Dental Health Survey when place of current residence has been used to classify children's exposure to water fluoridation. Misclassification can arise because a substantial percentage of children may have lived in areas with different fluoride levels in public water supplies to that of their current residence (Dooland & Carr, 1985). Confounding, or the mixing of fluoride effects, has occurred when there has been no or only a limited attempt to identify children's exposure to fluoride sources other than water fluoridation. Anecdotal reports from non-fluoridated Brisbane, for example, suggest a much greater exposure to professionally applied fluoride than in comparable fluoridated cities. Finally, as the risk of dental caries and certainly the management of carious lesions have tended to vary by socioeconomic status (Brown et al., 1990), observations of the prevalence of caries in groups with differing histories of exposure to water fluoridation require statistical control for socioeconomic variation. Recent Australian studies attempting to achieve this have used aggregate indices of socioeconomic status of schools, rather than data on individual study subjects (Brown et al., 1990; Stockwell et al., 1990).

2.2.2 Rationale for the Child Fluoride Study

The idea of the Child Fluoride Study grew during the consideration of the Australian studies completed prior to 1991 as part of the most recent National Health and Medical Research Council Report (NHMRC, 1991). There was a need to produce contemporary information from a study with:

- detailed information on residential, and thereby, fluoride history;
- linked, contemporaneous information on fluoride exposure from all sources and the incidence of dental caries;
- statistical control for socioeconomic variation;
- generalisable results to children in Australia, derived from a multi-site study; and
- sufficient power to detect expected small absolute differences in the incidence of dental caries, leading to large sample sizes.

The desired multi-site design and large sample size created the need either for an extraordinary level of funding support or collaborative arrangements with School Dental Services in the conduct of the fieldwork. Not surprisingly the latter was the approach taken.

2.2.3 The aims of the Child Fluoride Study

The aims of the Child Fluoride Study are:

- to compare the prevalence and three-year incidence rates of dental caries among children with differing exposure to fluorides (fluoridated water, controlling for exposure to fluoride from sources other than water supplies and for known confounding variables such as socioeconomic status);
- to examine the relative contribution of fluorides to total fluoride consumption; and
- to examine the relationship between fluorides and dental fluorosis.

The first aim is being achieved in a main longitudinal study. The second and third aims are being addressed through smaller nested studies. The purpose of this presentation is to introduce the main longitudinal study and the nested study on the relationship between fluoride and dental fluorosis.

2.2.4 The main longitudinal study

The main longitudinal study is a multi-site study among children with a range of exposures to water fluoridation and other sources of fluoride. Its design is outlined in the next two figures. Two States were selected, each to have two sites.

Table 2.1: Design of the main longitudinal study

States	Sites	Water fluoridation	Age group at enrolment
South Australia	Adelaide	Yes	5–15 years
	Rest of South Australia	Mixed	5–15 years
Queensland	Townsville	Yes	5–12 years
	Brisbane	No	5–12 years

Four sites were included in the study. Two are in South Australia (Adelaide and rest of South Australia) where the study involves 5–15-year-old children at enrolment and two in Queensland (Townsville and Brisbane) where the study involves 5–12-year-old children at enrolment. Adelaide and Townsville are fluoridated areas, while Brisbane and parts of the rest of South Australia are not fluoridated. More recently the study was expanded to include the Australian Capital Territory as a fifth site.

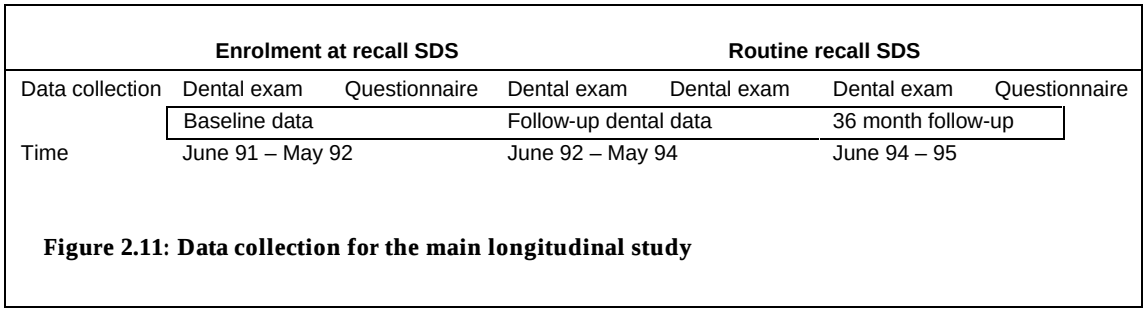


Figure 2.11: Data collection for the main longitudinal study

Figure 2.11 presents details of the data collections and their timing among the study participants. The sampling frame consisted of children aged between 5 and 15 or 5 and 12 years old inclusive at the time of their School Dental Service examination during the enrolment period between June 1991 and May 1992. In each site the sampling ratio varied in relation to the numbers of children under care from the School Dental Service.

Data from dental examinations at baseline and for each additional examination over the subsequent three years are providing prevalence and incidence rates for dental caries in the permanent dentition. Information concerning exposure to fluoride as well as socioeconomic characteristics of the parents has been obtained using a questionnaire at baseline and is to be updated in a follow-up questionnaire.

2.2.5 The nested study of fluoride and fluorosis

The nested study of fluoride and fluorosis was a cross-sectional study of a sub-sample of subjects 10 years old and over drawn from the main longitudinal study. Participants in the main longitudinal study from the two South Australian sites were stratified by a matrix of their exposure to water fluoridation, use of fluoride tablets, use of infant formula, and age at which tooth brushing commenced. A total of 12 strata were formed and between 560 and 70 subjects drawn from each stratum.

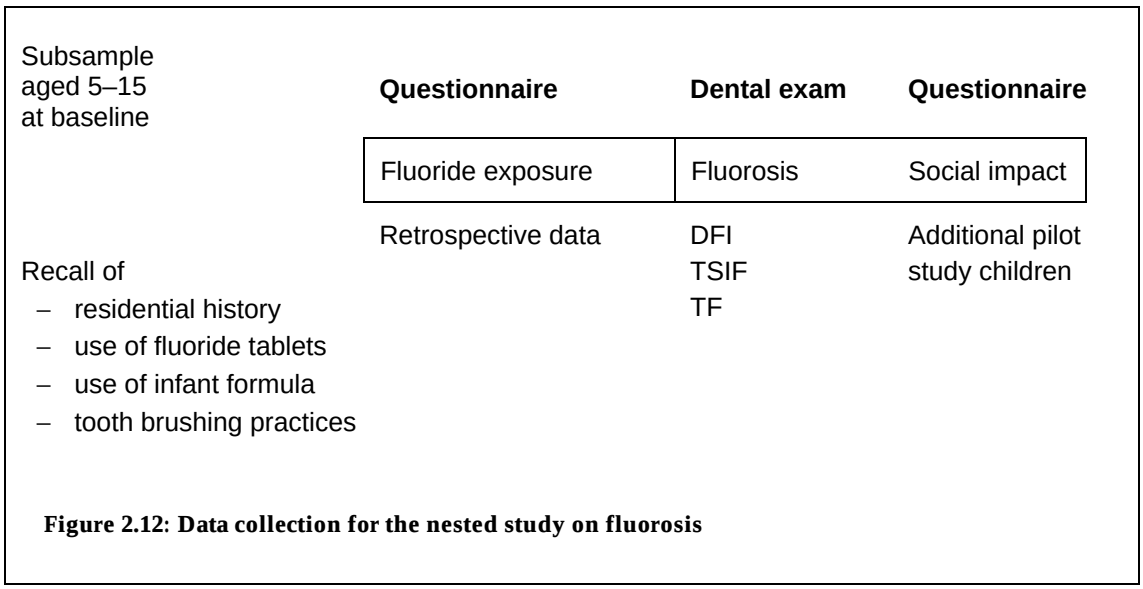


Figure 2.12: Data collection for the nested study on fluorosis

Data on fluoride exposure were available from the baseline questionnaire of the main longitudinal study. Dental examination data on dental fluorosis were collected by two calibrated examiners and a further questionnaire collected data on social impact. The examination included the observation of dental fluorosis across the eight upper anterior permanent teeth from 14 to 24 using three fluorosis indices:

- Dean's Index (Dean, 1942);
- the Tooth Surface Index of Fluorosis (Horowitz et al., 1984); and
- the TF Index of Fluorosis (Fejerskov et al., 1988).

Children were excluded if they wore orthodontic bands. Individual teeth were excluded if teeth were not fully erupted or if already restored on the labial surface.

Data used in two investigations are presented:

- prevalence and risk factors for fluorosis; and
- social impact of fluorosis.

These data also constitute the bulk of data used in the presentation by Greg Hoskin on 'Personal perceptions of fluorosis in South Australian children' (Hoskin, 1994). However, some additional data have been added for Greg Hoskin's analysis. The additional data were derived from a pilot study and involved children identified as having fluorosis by School Dental Service staff during routine dental care. These additional children boosted the numbers with higher severities of fluorosis available for the analysis of the association between fluorosis and social impact.

2.2.6 Methods

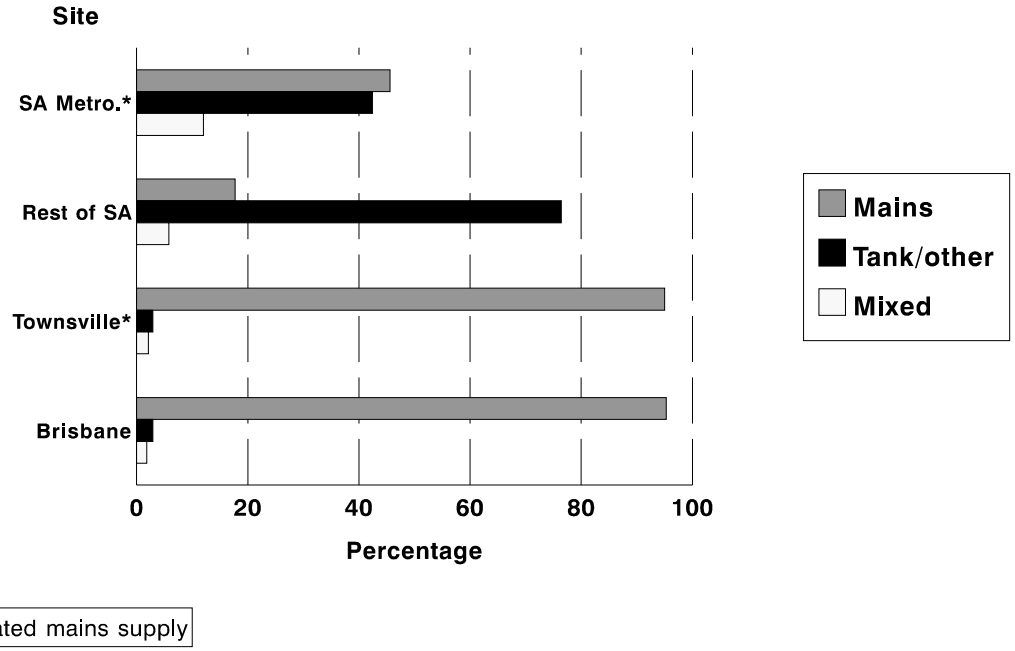
Data describing caries experience at the level of tooth surface were collected between June 1991 and May 1992 by dentists and dental therapists during routine examinations conducted within the School Dental Service. Written instructions detailing World Health Organisation criteria for the recording of decayed, missing and filled tooth surfaces were provided to each clinician. There was no formal calibration of examiners, or testing of examiner reliability through replicate examinations due to the large number of clinics and staff involved.

Parents were contacted by the School Dental Service and invited to participate in the study by providing them with a registration package containing a letter of invitation from the researchers and the director of dental services. Up to two reminders were sent to persons invited to participate. Parents provided a self-completed questionnaire on a range of topics. These included oral hygiene practices, such as the age of commencement of tooth brushing, age first brushed unassisted, current frequency of brushing, and use of toothpaste. Further information was sought on the use of fluoride supplements, including whether they were ever used, and if so, the age of commencement and cessation, and frequency of administration. Information relevant to the assessment of socioeconomic status (SES) was collected at an individual, family and area levels, including parental education, occupation, income, and place of residence. Postcode of residence was also used to calculate exposure to water fluoridation through questions asking the postcode of residence for the lifetime of the target child, including whether the principal source of drinking water during those periods of residence was from the mains supply. Postcodes of residence were matched to a database on postcodes and known fluoride concentrations across Australia. Exposure to water fluoridation was classified as 100% for children who consumed water at 1 ppm for all their life, 0% for those who consumed 0 ppm for all their lives and two further categories of 1–49% and 50–99% for only part-life exposure, or sub-optimal levels of fluoride, e.g. 0.5 ppm.

2.2.7 Results

The results in this section are selected from analyses of the baseline data, and are designed to take us via the short path to some of the more interesting findings and the conclusions that can be drawn with confidence from the data. Figures 2.13 to 2.16 present data on patterns of fluoride exposure which are important as they provide insight to the degree of variability of potential confounding factors, and assist in identifying the size of groups with specific types of risk of caries.

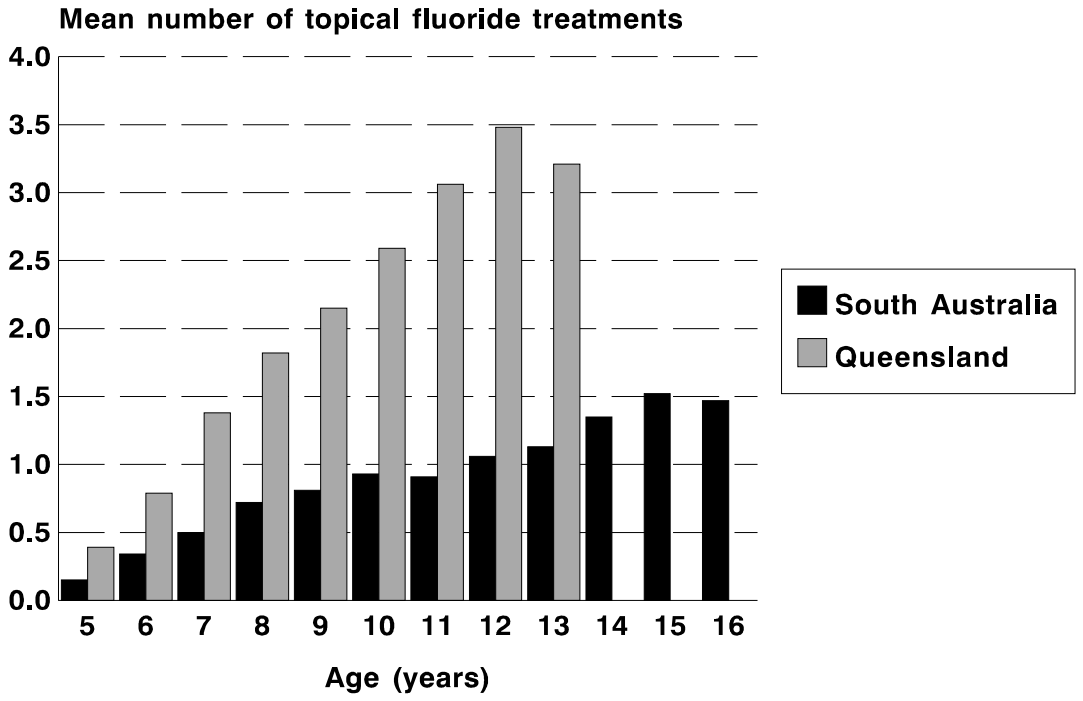
Figures 2.17 to 2.21 present the mean caries level for fluoride exposure groups adjusted for exposures for other factors, and bivariate figures displaying some of the more interesting interactions between factors.



Source: Child Fluoride Study 1991–92

Figure 2.13: Source of drinking water and fluoridation status by site

While over 90% of persons in South Australia are resident in fluoridated areas, residency in an area does not necessarily involve exposure to water fluoridation; as was observed in the South Australian metropolitan area, where only 46% of persons report using the fluoridated reticulated supply as their principal source of drinking water. Approximately 43% use tank or bottled water, with the remainder using some mixture of the two. This contrasts markedly with the Queensland sites, where over 95% of persons draw on the reticulated supply as their principal source of drinking water which is principally non-fluoridated. This finding can be interpreted as a poor commentary on the perceived quality of South Australian drinking water.

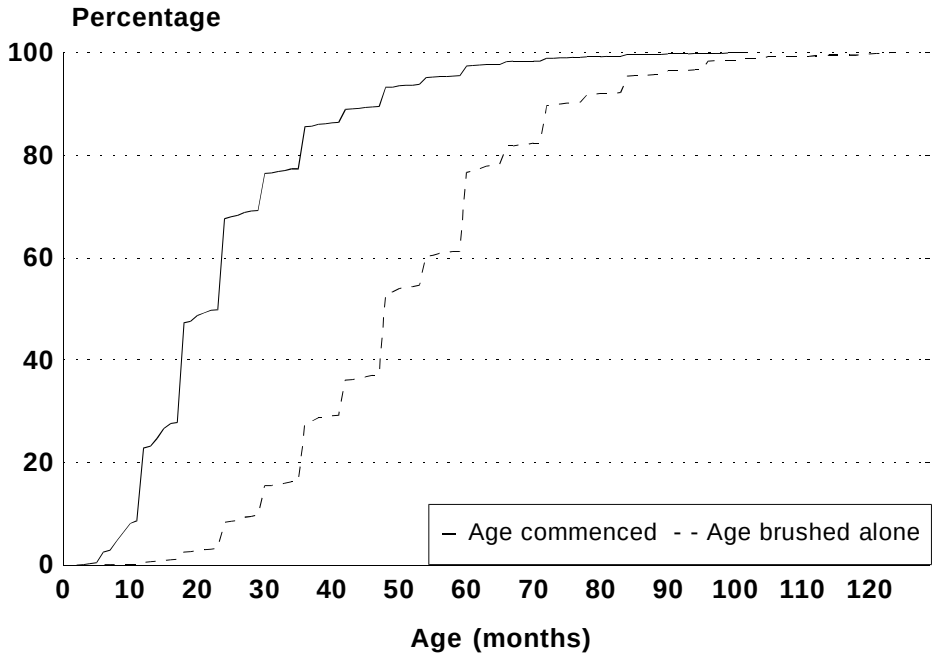


Source: Child Fluoride Study 1991–92

Figure 2.14: Topical fluoride treatments within the SDS by State

The differential dependence on water fluoridation between States was reflected also in the mean number of professionally applied fluoride treatments given to children during the period of their experience with the School Dental Service.

Children in Queensland quickly accumulate more than three times the number of treatments within the School Dental Service than their counterparts in South Australia, with means of 3.5 and 1.1 treatments respectively for 12-year-olds. Although not included in this data, children may also receive fluoride treatments from private dental professionals in addition to those working in the School Dental Service.

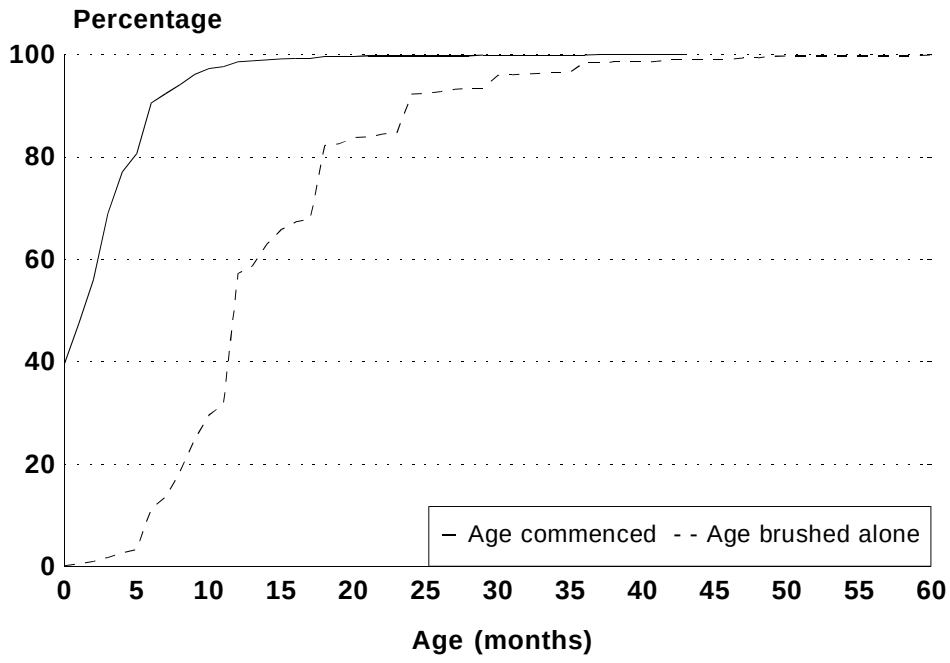


Source: Child Fluoride Study 1991–92

Figure 2.15: Age commenced brushing and age first brushed alone – cumulative percentage by age

Over 20% of the sample commenced brushing by 12 months of age, and over 80% commenced by 36 months. Although not represented in Figure 2.15, it was found that over 95% of children were assisted to brush by their parents at some time. It can be noted also that children commence brushing alone at very early ages, with approximately 30% having brushed alone by 36 months. Approximately 90% have brushed alone by 72 months, which is the age recommended by the National Workshop on Fluorides held in Toronto, Canada (1994) before which children should not brush unsupervised.

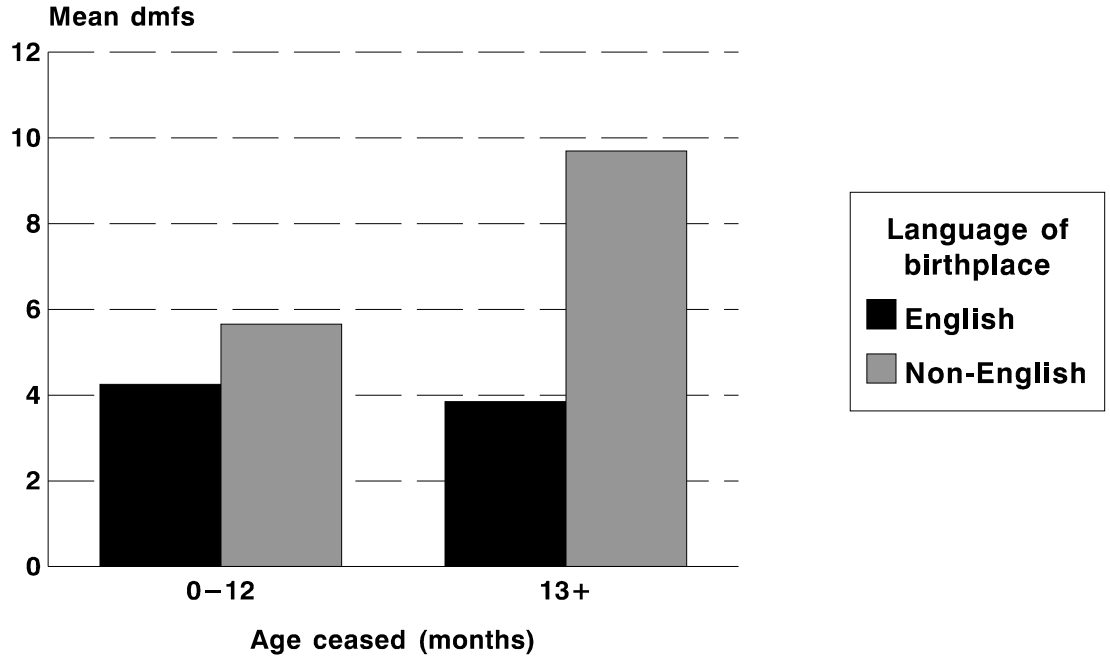
There are in addition to intentionally consumed fluorides, sources of exposure that are unintended. One such source is infant formulas, which are consumed at some time by the majority of children in South Australia and Queensland, and for which there is a marked social gradient in the history of use. These results should be considered in the discussion below of risk factors for dental fluorosis.



Source: Child Fluoride Study 1991–92

Figure 2.16: Cumulative frequency of infant formula consumption

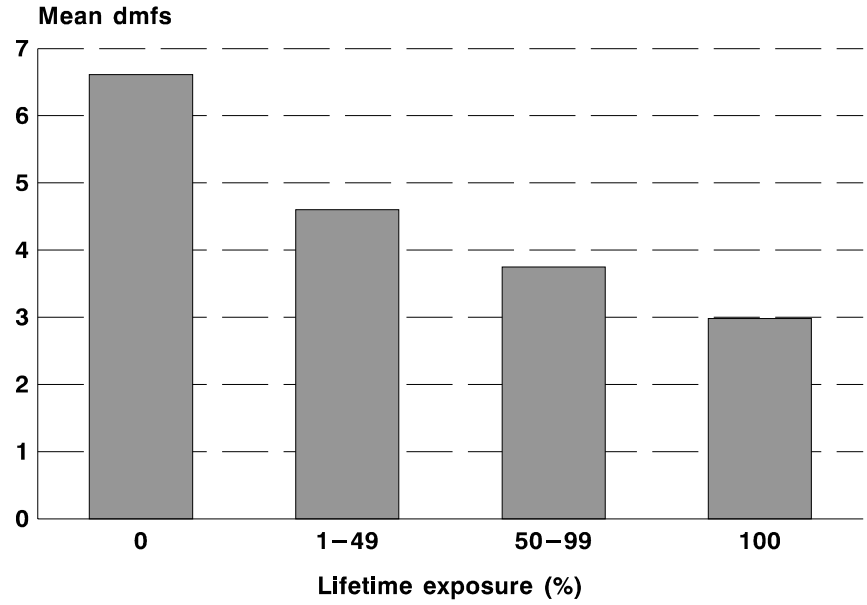
Figure 2.16 presents the cumulative frequency of the age of commencement and the age of cessation of formula use. Infant formulas have been consumed by approximately two-thirds of all children, with 40% of those using formulas commencing at birth. Approximately 40% of children use formula from birth, and 90% of those who ever consume formula have commenced by the age of six months. Some children use formula for a very short time, with approximately 10% ceasing by the age of six months, and one-third by 12 months. Nearly 20% of children continued consuming infant formula beyond the age of 24 months, with a few children continuing up to 5 years of age. It is of note also that two brands account for approximately two-thirds of all history of formula use, and that for each of these brands the fluoride content was very much higher than average. In addition, the most frequently cited brand has the highest fluoride content of 17 brands tested in Adelaide, and the third most common brand has the third highest fluoride content (Thomas & McIntyre, 1993).



Source: Child Fluoride Study 1991–92

Figure 2.17: Adjusted mean dmfs by official language of birthplace of child and age ceased formula

The consumption of infant formula, when considered as a proxy for bottle feeding, has also been associated with caries in deciduous dentition. Presented in Figure 2.17 is a comparison of dmfs experience for late versus early weaned children, by the official language of the birthplace of the child. Of note is the interaction between age of weaning and language, such that there is a greatly elevated mean dmfs score for late weaned children born in a country where English is not the official language.

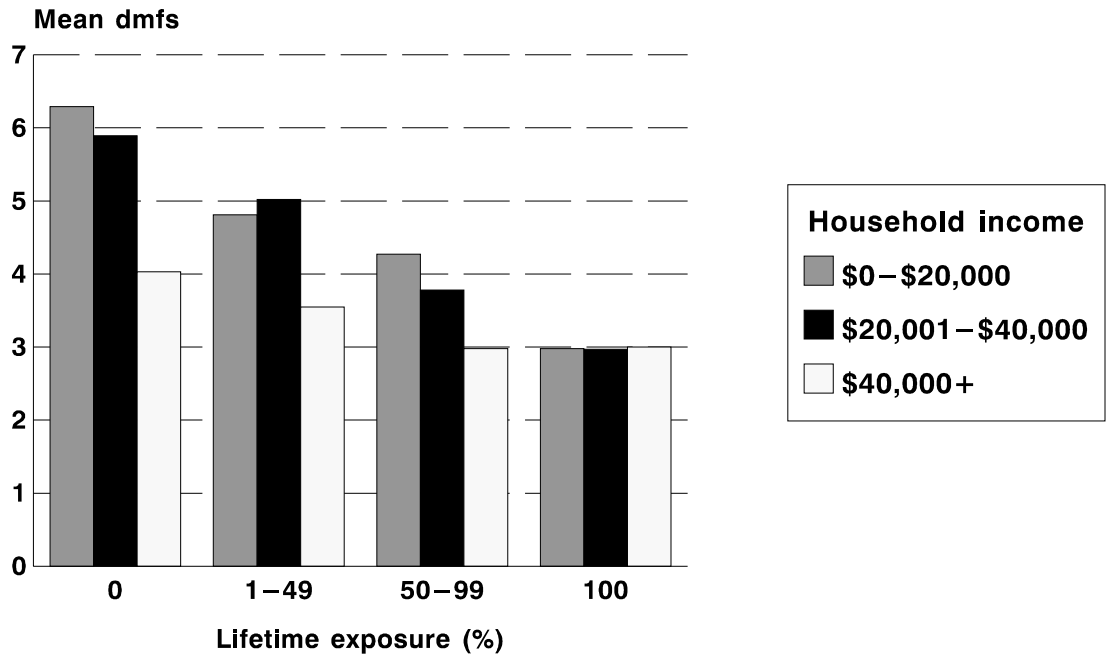


Source: Child Fluoride Study 1991–92

Figure 2.18: Adjusted mean dmfs by exposure to water fluoridation

The relationships between exposure to water fluoridation and caries experience are of central interest.

Age standardised mean caries scores by water fluoridation exposure group show that when considered independently of the influence of other factors in the analysis, including child age, a 47% advantage for those with optimal exposure to water fluoridation remains over those with no exposure. Dmfs scores vary from 6.61 for the zero exposure group to 2.98 for the 100% fluoride exposure group.

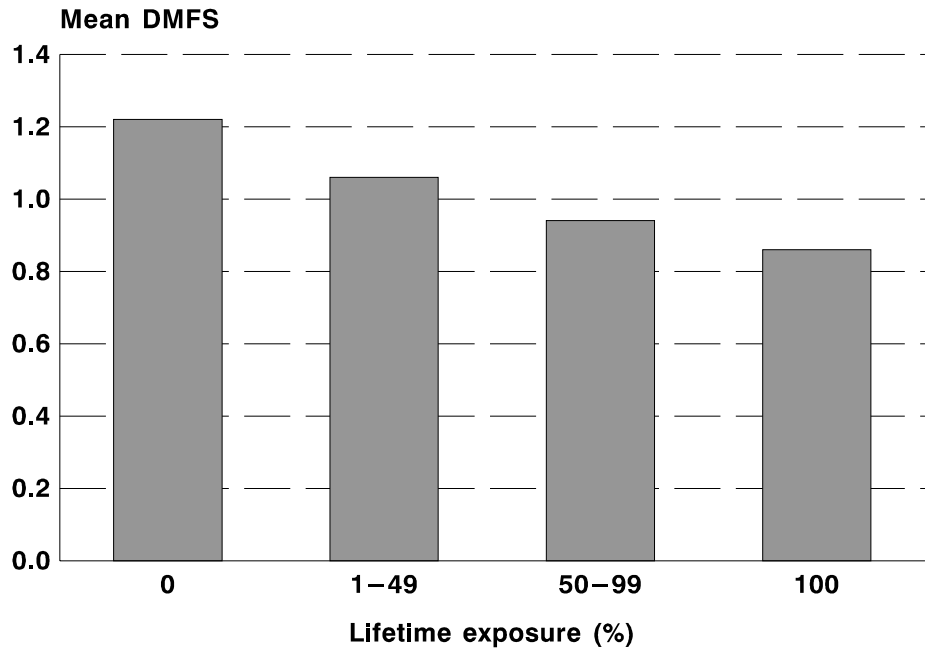


Source: Child Fluoride Study 1991–92

Figure 2.19: Adjusted mean dmfs by household income and exposure to water fluoridation

The interaction of water fluoridation with effect modifiers, such as socioeconomic status (SES) is of further interest. It has been noted in the international literature (Carmichael et al., 1984; Murray et al., 1991) that SES inequalities in caries prevalence increase after the cessation of water fluoridation. It was hypothesised by the National Health and Medical Research Council (NHMRC, 1991) that water fluoridation may compress SES inequalities in caries experience.

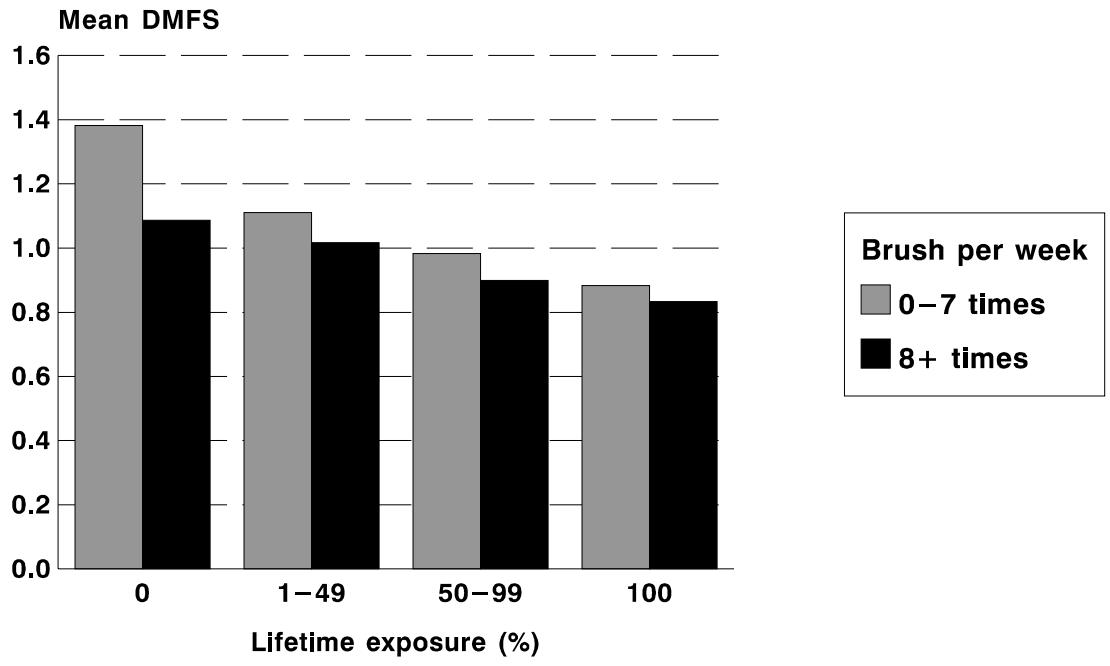
The dmfs scores by household income groups and water fluoridation exposure groups that have been age standardised and adjusted for other factors show that there is greater than a 50% advantage across water fluoridation levels for the poorest income group, which diminished as household income increases. In effect, water fluoridation eliminates the SES inequality in deciduous caries experience that is attributable to household income. Based on this finding, there is a clear social justice argument for both the continuation and expansion of water fluoridation, and a message warning of who will suffer disproportionately should water fluoridation be discontinued in an Australian community.



Source: Child Fluoride Study 1991–92

Figure 2.20: Adjusted mean DMFS by exposure to water fluoridation

The effects of water fluoridation on caries experience in the permanent dentition can be seen in Figure 2.20 which shows mean DMFS scores by fluoride exposures adjusted for child age and other effects. There was a 29% advantage in DMFS scores for lifetime exposure to water fluoridation compared to zero exposure, with scores ranging from 1.22 for the zero exposure group to 0.86 for the 100% exposure group.



Source: Child Fluoride Study 1991–92

Figure 2.21: Adjusted mean DMFS by frequency of brushing and exposure to water fluoridation

There was also an interaction of brushing frequency with water fluoridation. Of particular note is the finding that even among those children brushing regularly, there remains a 24% advantage for lifetime exposure to water fluoridation over those with no exposure. This advantage increases to 36% across levels of water fluoride exposure among those brushing up to once per day. This finding supports the argument that exposures to fluoride from different sources are additive in their effect, and that in this case, tooth brushing alone with a fluoridated toothpaste does not make redundant the fluoridation of the water supply.

2.2.8 Conclusions

There are three key findings that can be drawn from these analyses of the baseline data:

- exposure to water fluoridation has a significant effect on caries experience independent of social and other confounders;
- water fluoridation acts to reduce the significant social inequality in caries experience in children; and
- water fluoridation has an additive effect with fluorides from other sources in the prevention of dental caries in children.

2.2.9 Further issues associated with water fluoridation

Despite the continuing accumulation of evidence supporting the importance of water fluoridation in the prevention of caries, there are further issues, including the risk of fluorosis, that have become critical to public health policy on the use of fluorides.

Hoskin and Spencer in 1992–93 found that South Australian children 10 to 17 years old were able to recognise very mild and mild fluorosis and register changes in satisfaction with the colour and appearance of teeth. Even mild fluorotic changes were associated with psycho-behavioural impacts like embarrassment and self-consciousness. The community recognised dental fluorosis and judged its impact as an adverse health effect.

It also appears that the prevalence of fluorosis may have increased above levels expected from water fluoridation alone. Widespread fluorosis among 7- and 12-year-old children in Western Australia using the TF index of fluorosis has been documented (Riordan, 1993; Riordan & Banks, 1991). Nearly half of the 7-year-old children in a fluoridated city had a TF index score of 1 or more, while among 12-year-olds 40% had a TF index score of 1 or more in fluoridated Perth and 33% had a TF index score of 1 or more in the non-fluoridated Bunbury region.

Puzio and Spencer in 1992–93 used both the TF and Dean's indices in a study of fluorosis in South Australian children aged 10 to 17 years old (Puzio & Spencer, 1993). The prevalence of fluorosis using the TF index was 29.3% among children not exposed to water fluoridation and 56.7% among those exposed to water fluoridation. The prevalence of fluorosis using Dean's index and a case definition of a score of 1 or more, was 19.0% and 34.3% for children not exposed and exposed to water fluoridation respectively.

The magnitude of the possible increase in the prevalence of fluorosis across fluoridated and non-fluoridated areas is suggestive of a role for discretionary fluorides in the aetiology of these levels of fluorosis. Riordan (1991) has documented use of fluoride supplements, residence in a fluoridated area, greater use of infant formula and toothpaste with fluoride as significant risk indicators for the presence of fluorosis.

When targeting reductions in exposure to fluoride four issues need to be taken into consideration:

- the ages at which there is an indication of increased fluoride exposure;
- the potential to reduce exposure;
- the effect of any reduction in exposure on benefits to all ages; and
- the effect of any reduction in exposure on risks to all ages.

Recommendations have been made to control exposure to discretionary fluorides by: reducing fluoride levels in infant formula powder and additionally altering practices of preparing formula to avoid the addition of fluoridated water; limiting the use and delaying the starting age, and the age-specific dosage of fluoride supplements; and providing children's toothpastes with low fluoride concentrations as well as increasing awareness and compliance with recommended tooth brushing practices including:

- parental supervision and involvement;
- use small headed toothbrush;

- smear of toothpaste only; and
- spitting, not swallowing.

These measures could have a substantial impact on the risk of fluorosis without more than marginal reduction in the benefit of caries prevention.

Exposure to water fluoridation should remain unchanged, at least until evidence accumulates that further action on fluoride exposure is required. Water fluoridation remains a safe, effective and socially equitable vehicle for caries prevention among all age groups of the Australian community.

Future work

A great deal of work remains to be done on the Child Fluoride Study. Tasks include consolidating and cleaning the three-year caries incidence data. It also will involve returning to the 20,000 plus participants from the study baseline for further information on fluoride exposures during the last three years that may have changed, and repeating the analyses conducted at baseline on the caries incidence data, which will permit us to unravel some of the time precedence problems found between fluoride exposures and caries experience in the cross-sectional study, where for instance, some fluoride exposures (such as professional topical applications) are associated with higher caries scores because the fluorides are being used as a targeted treatment.

Finally, there is a need to disseminate the findings of the research. We plan to continue to provide information to our colleagues in the research project in Queensland, South Australia and the Australian Capital Territory by presenting directly to the staff. This process has commenced in Queensland where there were two talks on the research finding given during September in Townsville and Brisbane. We would like to continue this process in South Australia and the Australian Capital Territory as the opportunities become available. We shall continue to publish in the scientific literature the results of the baseline analyses, and in due course, the analyses of the prospective data. The work on the Child Fluoride Study over the next two years will be supported by a new grant from the NHMRC, who also funded the establishment of the cohort.

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2.3 Adult Oral Health – Adult Dental Programs Survey

2.3.1 Introduction

Adult oral health data has been less comprehensive than that for children, both in terms of the frequency of data collection, and the scope of geographic regions covered. There has also been little attention directed towards particular groups within the adult population who may have oral health needs that differ, either in type or magnitude, from the general population.

In 1992 the National Health Strategy identified the presence of inequalities in oral health and access to dental services as a major public health issue. Oral health goals and targets for Australia have included persons from low socioeconomic backgrounds as a priority group within the population.

2.3.2 Purpose

The purpose of the Adult Dental Programs Survey is to monitor the oral health of card-holders as they attend for public-funded dental treatment. Card-holders are the target population of persons eligible for public-funded dental care. These card-holders represent a financially disadvantaged group of adults among the Australian population. The survey will evaluate oral health status of patients attending for care, their demographic and utilisation characteristics, and profiles of services provided throughout courses of care.

2.3.3 Methods

Data items

The data items collected through the Adult Dental Programs Survey can be grouped into four categories:

1. oral health: including data on caries experience, periodontal status, and dental prosthetics;
2. patient characteristics: including age, sex, Aboriginality, card status, country of birth, language spoken, and residential postcode;
3. visit details: including type of care (such as emergency or scheduled visits), time since last course of care, number of visits in the last year, and waiting time; and
4. services provided: including treatment items received by patients.

Looking at oral health data in more detail, these items consist of:

- Caries experience: collected for both coronal and root status of each tooth. (Coded according to the protocol described by the National Institute of Dental Research, 1987.)

- Periodontal status is collected using the Community Periodontal Index of Treatment Needs (CPITN) for each sextant. (Coded following World Health Organisation guidelines (Ainamo et al., 1982).)
- Dental prosthetics are also recorded, indicating the presence of full or partial dentures, and fixed bridges.

Data collection

These data are collected on a sample of patients undergoing public-funded dental care primarily by staff of State or Territory dental services. Patients attending for care are sampled at the beginning of a course of care on the basis of day of birth within any month. Oral health data of sampled patients are then recorded by the examining dentist. Patient and visit details are also recorded, and services received are collected throughout the course of care.

Sampling

Sampling fractions are calculated to provide sufficient numbers of patients to provide estimates with a precision of a relative standard error of 40% or less for parameters as low as 5% (such as emergency patients receiving preventive services) by six age groups and allowing for disaggregation by five levels of another factor, such as region. Consequently, 119 x 6 age groups x 5 disaggregations gives 3,570 courses of care per State / Territory.

To avoid unreasonable workloads in States or Territories which have smaller patient flows, a sample of only 119 by six age groups is sought in these locations, providing target yields of 714 courses of care. With slight variations in sampling rates between States, a national sample yield of approximately 30,000 cases is planned.

Table 2.2: Sample size by State/Territory

State/Territory	Sampling ratio	Target yield	Patient's day of birth
New South Wales	1:30	6000	1st
Victoria	1:19	6000	1st & 31st
Queensland	1:31	6000	30th
South Australia	1:15	4500	1st & 2nd
Western Australia	1:10	4500	1st to 3rd
Tasmania	1:12	1400	29th to 31st
Australian Capital Territory	1:10	700	1st to 3rd
Northern Territory	1:19	700	1st & 31st
Australia		**29800**	

Preparation

Oral health data items are recorded on optical mark read (OMR) scan forms. These forms are forwarded to the DSRU where they are scanned to produce ASCII data files for subsequent computer processing and analysis. Edit profiles used in conjunction with the scanning software can detect errors such as incomplete fields, allowing for possible correction and re-scanning. Other data items such as patient characteristics, visit details, and service data may be recorded on the same form or derived from computer management information systems and linked to the oral health data files.

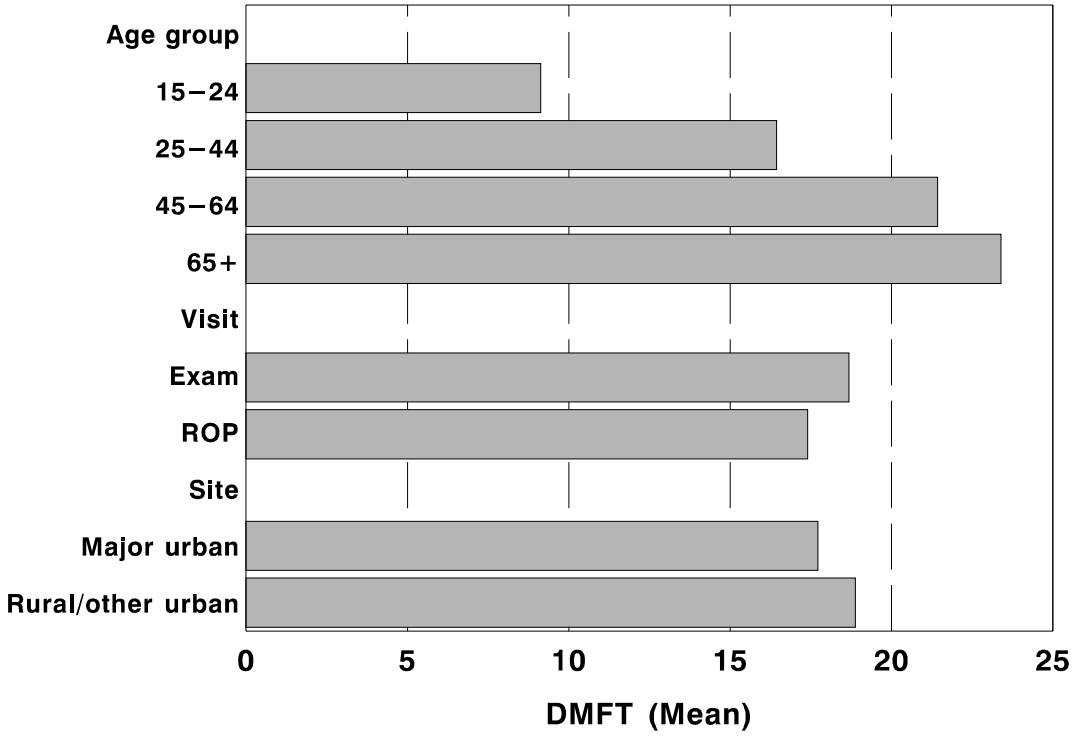
Analysis

Statistical analysis of these data files has three primary aims:

- to monitor oral health status over time;
- to examine oral health status by a range of explanatory variables (such as type of course of care and geographic location), controlling for potential confounding factors (such as age); and
- to investigate the influence of oral health status on services provided.

2.3.4 Key results

The following results use data from the Adult Dental Programs Survey collected in New South Wales, Victoria, and South Australia as part of the 1992–93 Research Database on Dental Care for Adults in Australia. They illustrate the range of analyses described above.

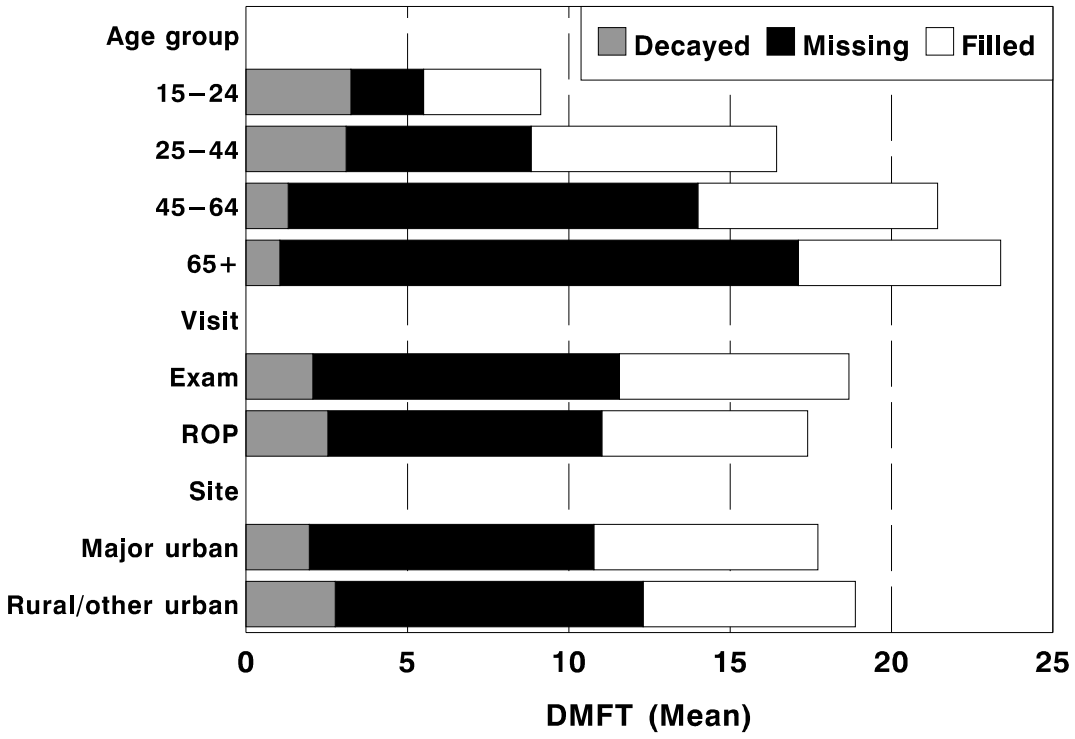


Source: Adult Dental Programs Survey 1992–93

Figure 2.22: Mean DMFT by age, visit type and site

Caries experience has been examined by age, visit type and geographic location to assess whether there are differences in DMFT such as between major urban and rural / other urban sites. Figure 2.22 shows that DMFT increased across age groups, from below 10 decayed, missing or filled teeth in the 15–24 years age group to over 20 for patients aged 45–64 and 65+ years. DMFT was higher for patients visiting for an

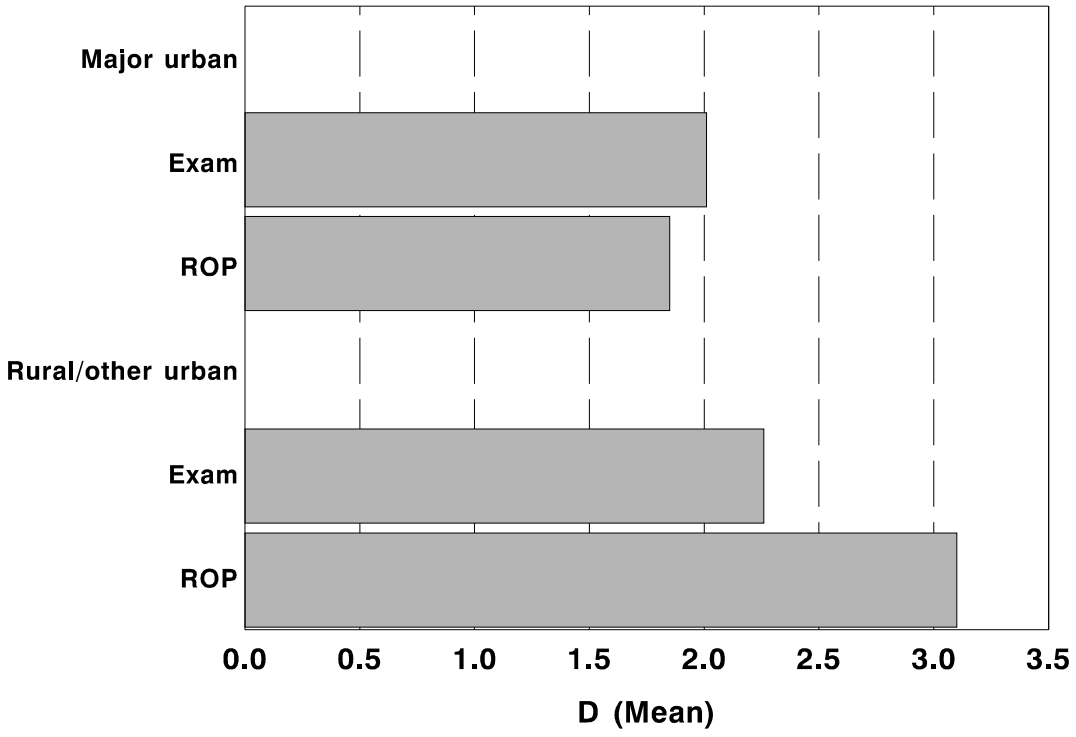
examination compared to relief of pain (ROP), and was higher for patients from rural/other urban compared to major urban sites.



Source: Adult Dental Programs Survey 1992–93

Figure 2.23: Mean DMFT components by age, visit type and site

Figure 2.23 presents the components of DMFT by age, visit type and site. By age, the decayed component is lower across older age groups, the missing component is higher in older age groups, while the filled component remained stable for patients aged 25–44 years and over. Comparison by visit type shows slightly higher numbers of decayed teeth for patients making ROP visits, but these patients had lower numbers of missing and filled teeth resulting in a lower total DMFT score. Comparison of DMFT components by site suggests that the main difference in caries experience is due to higher levels of decayed teeth among patients from rural/other urban sites, that contributes to a higher DMFT score for patients at these sites.



Source: Adult Dental Programs Survey 1992–93

Figure 2.24: Mean decayed teeth: site by visit type

More detailed analysis which included age, visit type and site in an analysis of variance model indicated a significant interaction between site by visit type for decayed teeth, which is shown in Figure 2.24. At major urban sites patients had similar numbers of decayed teeth regardless of visit type. For exam visits, similar numbers of decayed teeth were observed at rural / other urban sites and major urban sites. In contrast, patients visiting for relief of pain at rural / other urban sites had the highest level of decayed teeth.

2.3.5 Reporting procedures

Proposed reporting procedures of data from the Adult Dental Programs Survey include publication in three main styles. These are:

- technical reports, incorporating standard tables;
- briefer reports (e.g. research reports or newsletters); and
- publication of scientific articles.

Another reporting procedure involves presentation of papers at conferences, such as the International Association for Dental Research. Results are also made available through requests for information.

2.3.6 Additional priorities

Currently these data have been collected in 1995 for Victoria, Western Australia, South Australia, Tasmania, and the Northern Territory.

Priorities in this survey include the following.

- In the short-term:
  - to achieve complete implementation of data collection across all States or Territories; and
  - to link the oral health data already collected with the patient, visit, and service data from computer management information systems.
- In the medium-term:
  - provision of error reports to participating State or Territories may be beneficial in order to enhance the quality of the data being collected; and
  - inclusion of private practitioners involved in providing public-funded care would ensure a more representative set of cases for analysis.
- In the longer-term:
  - the longitudinal linkage of individual patient oral health data and courses of care data over time.

For the survey to realise it's potential, not only is it necessary to maintain the collection over a long time-frame, but effort is also required currently in bringing the survey on-line in terms of being collected completely across all States or Territories, and in terms of meeting target sample yields.

2.3.7 References

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2.4 Adult Oral Health – The South Australian Dental Longitudinal Study

The South Australian Dental Longitudinal Study (SADLS) is a longitudinal study of the oral health of elderly people which commenced data collection in 1991. Subjects were selected from persons aged 60 years or more who were listed on the South Australian Electoral Database living in either Mount Gambier or Adelaide, creating a random sample stratified by age, sex and dentate status. Interviewed people were invited to take part in an oral examination which followed the US National Institute of Dental Research protocol, and those who did were examined by one of four calibrated dentists. Some 2,751 people were sampled, and 1,650 (60%) took part in a face-to-face interview. Among that group, 1,205 were dentate, of whom 913 (75.8%) were examined. Of the 445 edentulous people interviewed, 313 (70.3%) were examined.

The second-year data collection took place in 1993. The examination procedures were identical to those used at baseline. The social survey was conducted by telephone, and Oral Health Impact Profile (OHIP) questionnaires were completed by all participants.

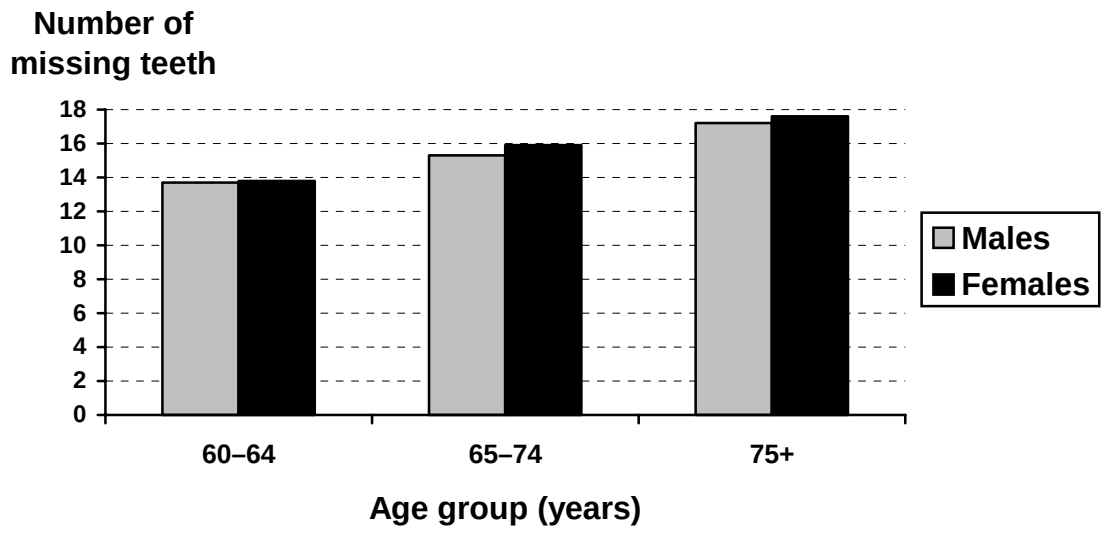
The 5-year data collection is planned for late 1996, and will use identical examination and social survey procedures to those used at baseline and two years, as well as some supplementary data collection. Funding for this stage has been awarded by the National Health and Medical Research Council of Australia.

2.4.1 Baseline findings

Edentulism and tooth loss

Some 41% of the Adelaide subjects were edentulous, and nearly one-half of the dentition was missing among the dentate subjects. Multivariate analyses revealed higher rates of edentulism among people who were older, female, Australian-born, were holders of pensioner health benefit cards, or who had left school at an early age. Among dentate people, there were more missing teeth among people who were older, Australian-born, were holders of pensioner health benefit cards, or who had left school at an early age.

Figure 2.25 presents the number of missing teeth by age group and gender, and shows that, while there were no differences between males and females, the mean number of missing teeth increased across the age groups.



Source: South Australian Dental Longitudinal Study (1991)

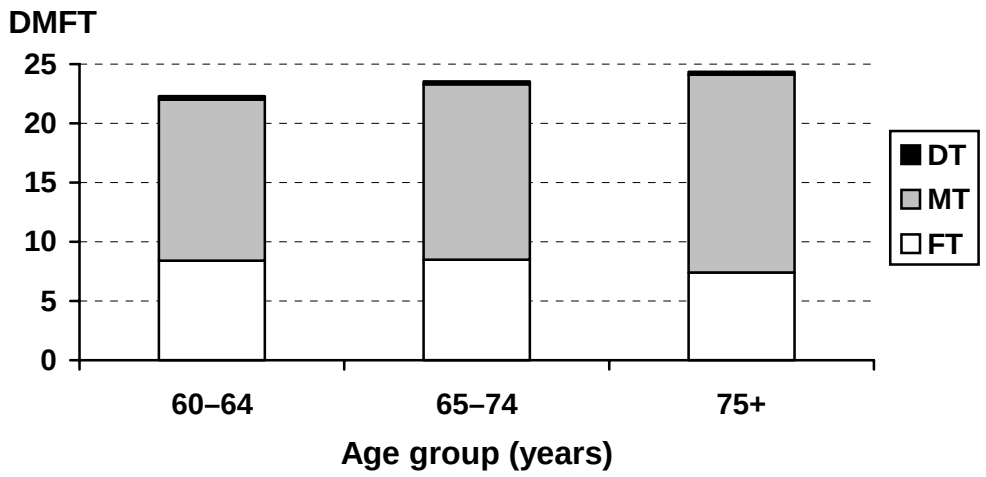
Figure 2.25: Mean number of missing teeth by age group and gender – dentate only

Virtually all edentulous people, and 57% of dentate people, wore dentures, and an inability to chew at least one food type was reported by 38%. Chewing incapacity was strongly associated with tooth loss. These findings indicate that there is a substantial burden of oral disease and dysfunction among older adults, particularly the oldest-old and those who are socioeconomically disadvantaged (Slade et al., 1996b).

Dental caries

Among the dentate subjects, there was an average of 14.7 missing teeth (almost half the entire dentition of 32 teeth), 8.3 filled teeth and 0.3 decayed teeth. A further 0.2 teeth were present as retained roots. The observed mean DMFT of 23.3 differed little from data published in the 1980s on other groups of non-institutionalised elderly Australians. Older age groups had more missing teeth, and Mount Gambier subjects had more missing teeth than those in Adelaide.

Figure 2.26 presents the mean DMFT among dentate subjects by age group.



Source: South Australian Dental Longitudinal Study (1991)

Figure 2.26: Mean DMFT by age group – dentate only

The mean DFS (22.1) was higher among younger subjects, females, and in Adelaide. Root surface caries affected a mean 3.1 surfaces, and was greater among those aged 70–79, males, and Adelaide residents. Expressed as an attack rate (in order to control for the number of surfaces at risk), the differences were only statistically significant among age groups. Tooth-specific survival data indicated that no more than 40% of molars were retained, and that lower incisors and canines were the teeth most frequently retained (Slade & Spencer, 1997).

Social impact of oral conditions

The Oral Health Impact Profile (OHIP) is a 49-item instrument which was developed and evaluated using the SADLS baseline data. Its purpose is to enable reliable and valid measurement of the social impact (discomfort, dysfunction and disability) of oral disorders. The OHIP is recognised as being the most useful and thorough instrument of its kind, and has been used for some years now in longitudinal studies of elderly people's oral health in Canada (Toronto's 7-year data collection was in 1996) and the United States (the Piedmont study 7-year data collection was in 1995). The OHIP offers a reliable and valid instrument for detailed measurement of the social impact of oral disorders (Slade & Spencer, 1994a).

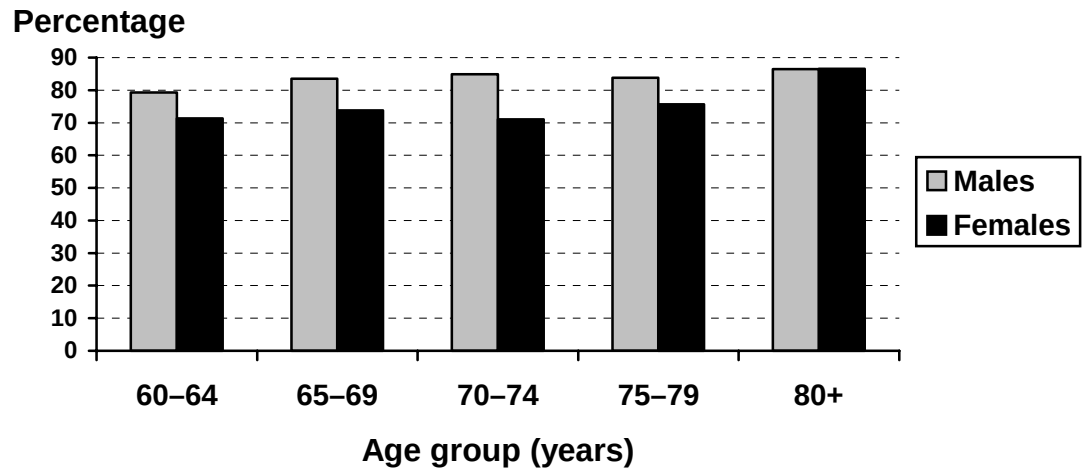
The impact of oral conditions among the baseline sample was investigated using the OHIP. More than 5% of dentate and over 10% of edentulous individuals reported profound impacts on function such as difficulties in chewing, discomfort during eating, and avoidance of some foods. Some 5% reported impacts on social roles, suggesting that a degree of handicap is caused by oral conditions among elderly people. Reported impact was greater among edentulous males and older dentate individuals. Individuals who were not regular dental attenders (amounting to over one-half of all dentate elderly people) reported greater impact. Edentulous subjects reported a greater mean number of individual impacts than their dentate counterparts (8.5 and 7.3 respectively). The high frequency of reported social impact is a reflection of the extensive levels of oral disease experience among elderly people (Slade & Spencer, 1994b).

The study also aimed to pinpoint those clinical conditions which are most directly associated with social impact. Edentulous persons reported significantly more social impact in four subscales: functional limitation, physical disability, social disability and handicap. More detailed analysis showed that, among dentate persons, tooth loss was associated with all seven dimensions of social impact. Anterior tooth loss was associated with more impact, whether or not there had been replacement of the missing teeth by prosthodontic units, while posterior tooth loss was associated with social impact only when teeth had not been replaced. Decayed root surfaces were consistently associated with higher levels of social impact, while components of periodontal attachment loss had varied effects. Despite these differences in the contribution of different oral conditions to different conceptual dimensions of the OHIP, principal components analysis of all 49 OHIP items revealed only one dimension of 'oral illness', indicating that a single quantitative measure would be appropriate where research questions are concerned with overall impact.

A smaller, nested study within SADLS investigated the temporal stability of OHIP measures by administering the (self-complete) OHIP instrument to the same 90 subjects at one-month intervals over a one-year period. Useable responses for at least nine months were provided by 67 people, and the total number of impacts formed the dependent variable in the analysis of temporal patterns. An increase or decrease of at least two impacts from one month to the next was categorised as a fluctuation, and people with year-long trends of increase or decrease in at least two impacts were identified using linear regression. Most (86.5%) subjects experienced no trend, although nearly one-half exhibited fluctuations in at least one month. Trends were more likely among denture wearers and those with 16+ missing teeth, and fluctuations were more likely among the latter. The findings demonstrate that most older adults experience periods of overall stability in the impact of oral conditions. However, a sizeable minority experience transitory fluctuations with or without an overall trend in social impacts over a 12-month period (Slade et al., 1996a).

Periodontal disease

Measurements of pocket depth and gingival recession were made at three sites per tooth (on a mean 17 teeth per subject) and used to compute loss of attachment (LOA). LOA of 4+ mm at one or more sites was observed among 89% of persons. A mean of 78% of sites per person had LOA of 2+ mm (*extent*), and the mean LOA at those sites was 3.1 mm (*severity*). Extent (Figure 2.27) and severity were greater for males and for persons aged 80+.



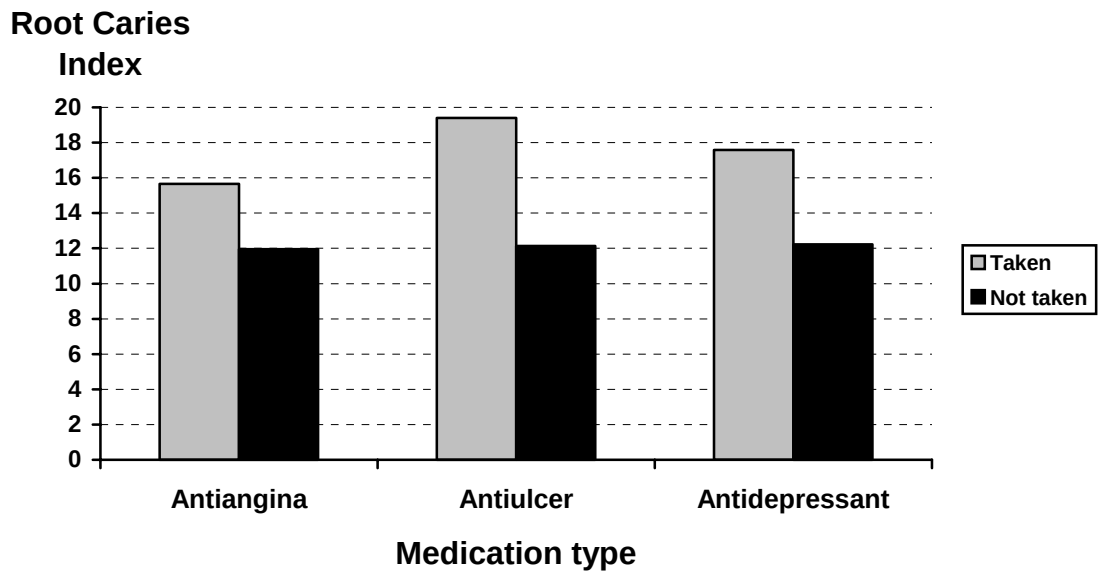
Source: South Australian Dental Longitudinal Study (1991)

Figure 2.27: Extent of attachment loss (mean percentage of sites with LOA of 2+ mm) by age group and gender – dentate only

Mesio-buccal and disto-lingual sites showed virtually identical extent of LOA, while severity was virtually identical for mid-buccal and disto-lingual sites. Patterns of gingival recession and pocket depth varied according to jaw and tooth type. The majority of LOA in the maxilla was due to pocket depth, and was greatest around first and second molars. In the mandible there was less variation in LOA among anterior and posterior teeth, and it tended to be equally divided among gingival recession and pocket depth. These findings were broadly similar to those from similar studies in North America (Slade & Spencer, 1995a).

Medication and dental caries

Subjects showed high level of use of medication, with only 31% not taking any prescription medication; while 46% took two or more drugs, and 15% took four or more. The mean number of drugs taken was 1.76, with a range from 0 to 17. The Adelaide subjects were more highly medicated than those from Mount Gambier (means of 1.8 and 1.5 respectively). Cardiovascular drugs and analgesics accounted for almost three-quarters of the medications being taken. Those who were taking three or more drugs had a higher root caries attack rate than those who were taking fewer drugs (Figure 2.28).



Source: South Australian Dental Longitudinal Study (1991)

Figure 2.28: Root Caries Index values by specific medication type for three categories of medication

Subjects who were taking antiangina drugs (particularly the organic nitrate vasodilators), antiulcer drugs (particularly the H_2-receptor antagonists) or antidepressants (particularly the cyclic antidepressants) had significantly higher root caries attack rates, suggesting that either the conditions that require treatment or the medications are a putative risk factor for dental caries in elderly people. It is intended that this will be examined more closely using the five-year caries-incidence and hyposalivation data (Thomson et al., 1995).

2.4.2 Two-year findings

Tooth-loss incidence

While cross-sectional studies have demonstrated that tooth loss is associated with functional limitation and substantial impact for older adults, there is a paucity of longitudinal data. Over the two years since the baseline examinations were conducted, a mean of 0.86 teeth per subject were lost, and 18.9% of subjects lost at least one tooth. Tooth-loss incidence was inversely associated with the number of missing teeth at baseline, but there were no differences by age or sex. Two-year tooth loss was associated with increasing impact only for those people with no root decay at baseline (Slade & Spencer, 1995b).

Periodontal attachment loss incidence

The same three sites on all teeth were observed at the two-year data collection, and this allowed the computation of periodontal loss of attachment (LOA) during the analysis, by subtracting the baseline attachment loss measurement from the two-year measurement in the same site. A few people had no sites with LOA, while the majority had a LOA increment of only 1–2 mm. Some 24% had at least one site with 3+ mm LOA, while only 9% had LOA of 4+ mm. Only a minority of people had LOA of 7+ mm, and it affected only a few sites in their mouths. These South Australian data are similar to findings among North Carolina whites. There was a higher incidence of LOA among males than among females, and among people who were smokers, although the latter finding was not statistically significant. Future analyses will examine the data using multivariate modelling to try to isolate risk factors such as cigarette smoking (Spencer, 1995).

2.4.3 References

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2.5 The National Dental Survey

2.5.1 Outline

This section examines key findings from the National Oral Health Survey of Australia (NOHSA) which took place in 1987 and 1988; this is followed by discussion of the utility of time-series data, and then the proposed National Dental Survey is introduced.

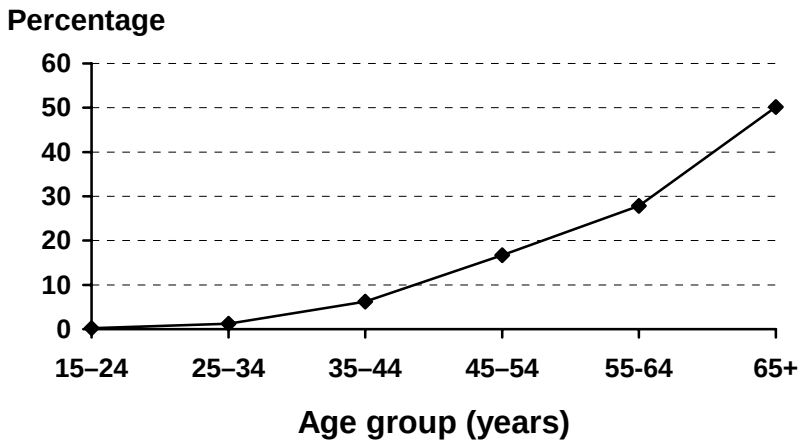
2.5.2 The National Oral Health Survey of Australia 1987–88

Up until the late 1980s, Australia was one of the few major western countries with no national oral health survey. The 1987–88 National Oral Health Survey of Australia (NOHSA) was coordinated by what was then the Commonwealth Department of Health, and implemented by State and Territory health departments and Australian Dental Association branches using available local resources (which meant that the Northern Territory and rural Western Australia were not sampled due to resource constraints). The Australian Bureau of Statistics (ABS) supplied random samples of collectors' districts directly to individual States (and the Australian Capital Territory), and eight participating households were randomly sought in each CD. The protocol aimed for all members of a selected household to be interviewed and clinically examined. In all, 6,800 households were selected; 16,897 people interviewed, and 14,432 (85.4%) dentally examined. Trained interviewers collected the social survey information, and volunteer dentists were used for the oral examinations.

Some of the key findings from NOHSA 1987–88 (Barnard, 1993) are presented in order to illustrate the usefulness of national oral health survey data.

Edentulism

Figure 2.29 shows the prevalence of edentulism by age group. A predictable pattern is manifest in these data, with the edentulism rate among the 65 years and over group being almost three times that of those aged 45–54 years. It is now accepted that such a pattern owes less to differences in oral disease experience among the various age groups than it does to gradual evolution in the culture of dentistry and the community's expectations of dental care.

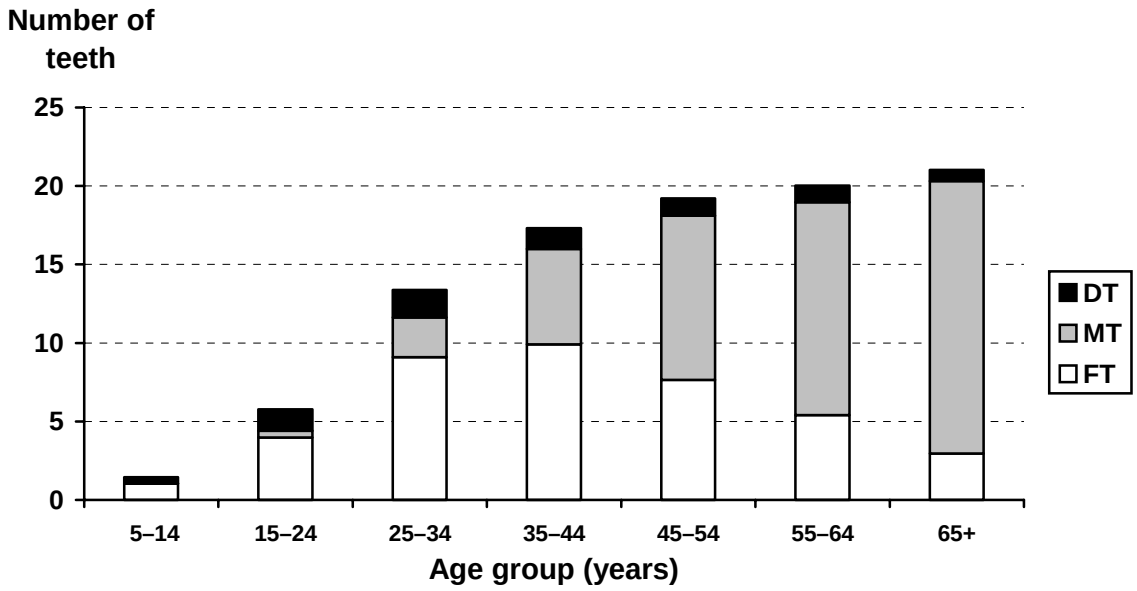


Source: National Oral Health Survey of Australia 1987–88

Figure 2.29: Percentage of edentulism by age group 1987–88

Dental caries

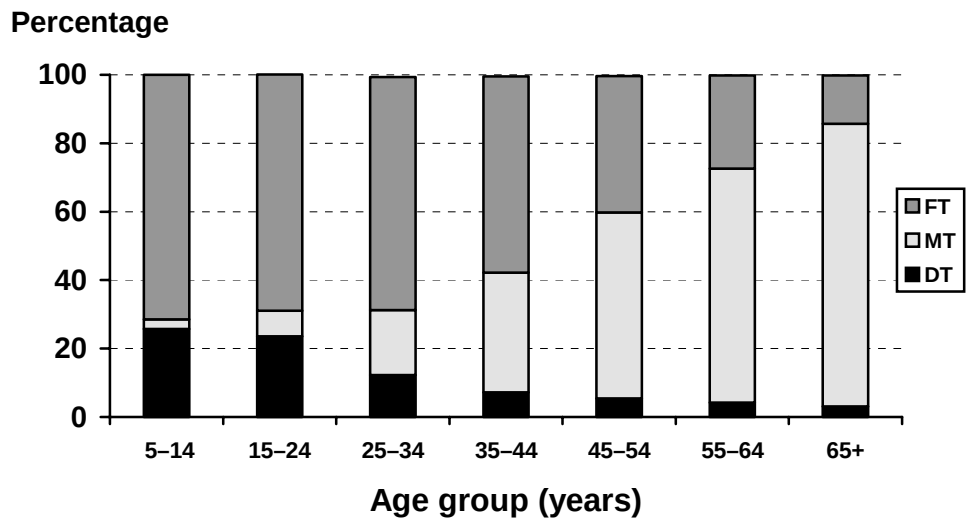
Figure 2.30 presents the mean caries experience of different age groups in 1987–88. The changes in the relative contributions of the components of the DMFT across age groups are notable, with an increase in the number of missing teeth and a decrease in the number of filled teeth.



Source: National Oral Health Survey of Australia 1987–88

Figure 2.30: DMFT by age group 1987–88

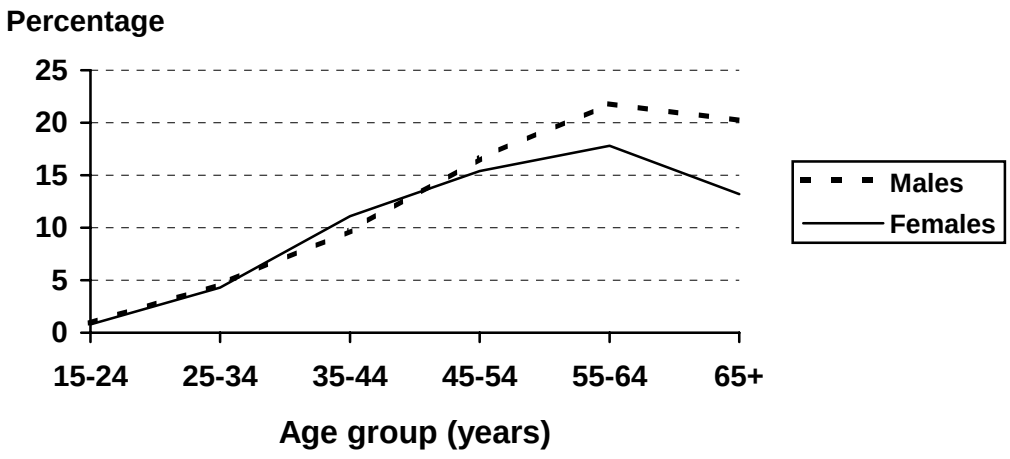
The relative contribution of decayed teeth to the index is difficult to determine in such a format, but becomes particularly obvious when the decayed, missing and filled components are plotted as a percentage of the overall DMFT for each age group (Figure 2.31). It is apparent that the pattern for each component is consistent across age groups, with the decayed and filled proportions of the DMFT index reducing, and the missing proportion showing a steady increase.



Source: National Oral Health Survey of Australia 1987–88

Figure 2.31: Percentage of contributions of DT, MT and FT to DMFT by age group

Figure 2.32 indicates that root caries prevalence—defined by the proportion of persons with one or more decayed or restored root surfaces—differed across the various age groups. There are also clear gender differences from middle age onwards, with males having greater prevalence than females.

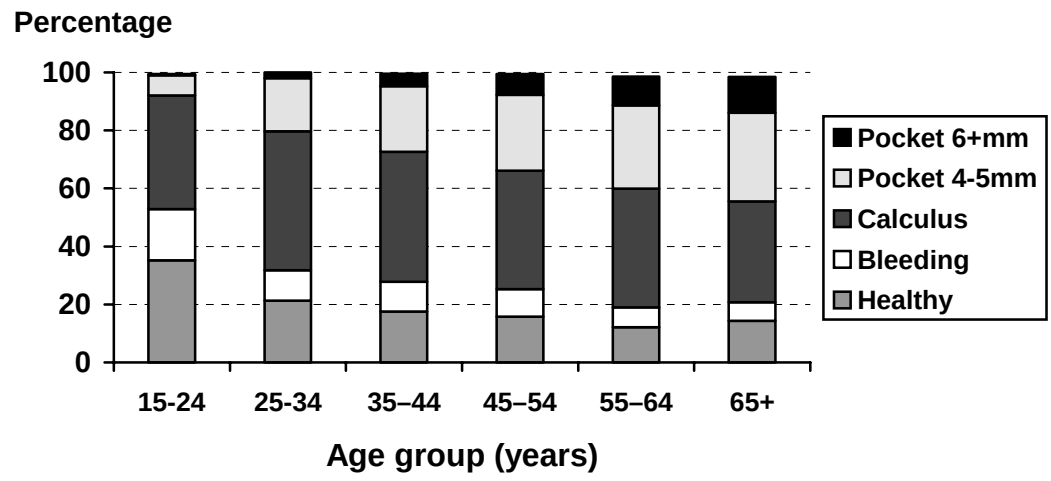


Source: National Oral Health Survey of Australia 1987–88

Figure 2.32: Percentage of root surface caries prevalence by age group and gender

Periodontal disease

The periodontal index used in 1987–88 was the Community Periodontal Index of Treatment Needs (CPITN, Ainamo et al., 1982). Figure 2.33 shows the worst mouth score across age groups, and reveals a dramatic decline across the age groups in 'healthy' as the worst mouth score, and a corresponding rise in the two pocketing scores, to the point that roughly 40% of those aged 65 or over manifested periodontitis.

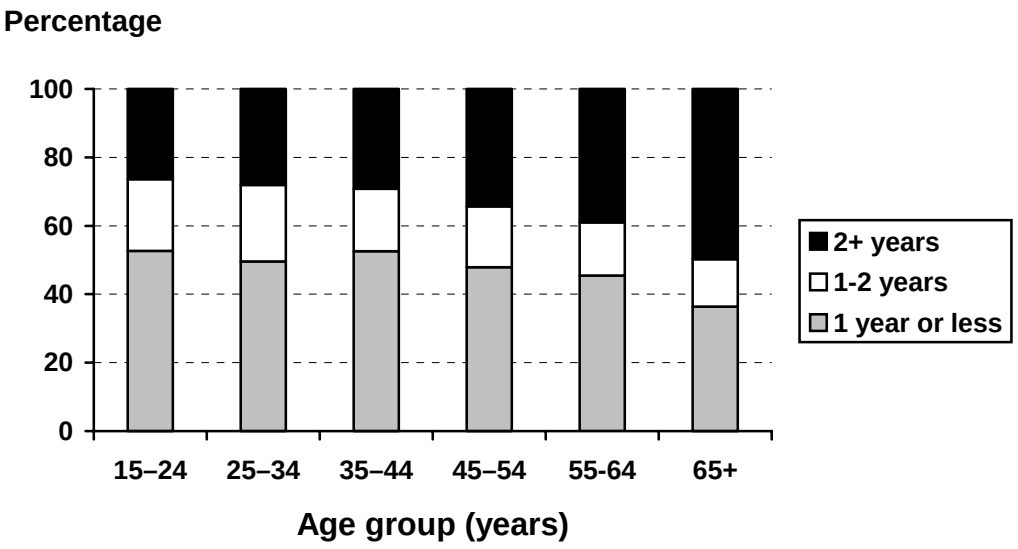


Source: National Oral Health Survey of Australia 1987–88

Figure 2.33: Percentage of persons with worst mouth CPITN score by age group

Use of dental services

Figure 2.34 presents the time since the last dental visit by age group. The data suggest a decrease in regular dental attendance as age increases.



Source: National Oral Health Survey of Australia 1987–88

Figure 2.34: Time since last dental visit by age group

This section has briefly examined some of the key findings from NOHSA 1987–88. The household data collected in that survey were limited in scope, which in turn has restricted the depth of any analyses that can be performed. An important aim of any subsequent Australian national dental surveys will be to collect more extensive social data so that more comprehensive analyses can be undertaken.

2.5.3 The utility of time-series data

The NOHSA study has been of considerable interest to dental practitioners, policy-makers and researchers, but the data are rapidly becoming dated—it is eight years since their collection. Pilot (1988) stressed that one-off cross-sectional studies are of limited value in situational analysis in oral health: being one-off 'snapshots' of a population's health status, they give no indication of temporal trends in health and ill-health, and therefore little assistance in policy development and the prioritising of services.

Countries which have undertaken sequential oral health surveys in recent years are England and Wales—1968, 1978 and 1988 (Todd & Walker, 1980; Downer, 1991) and New Zealand—1976, 1982 and 1988 (Cutress et al., 1979; Cutress et al., 1983; Hunter et al., 1992). The utility of time-series data can be demonstrated by examining some of the findings from those countries, and by using an evaluative framework which allows comparison of key indicators at each point in a time series.

Such a framework is provided by a three-level framework (New Zealand Board of Health, 1988) which monitors various indicators at three levels of intervention: primary (the prevention of disease), secondary (the treatment of disease and its sequelae), and tertiary (the restoration of function). Table 2.3 shows some of the indicators which may be used in the case of dental caries.

Table 2.3: Indicators of dental caries experience according to level of intervention (a)

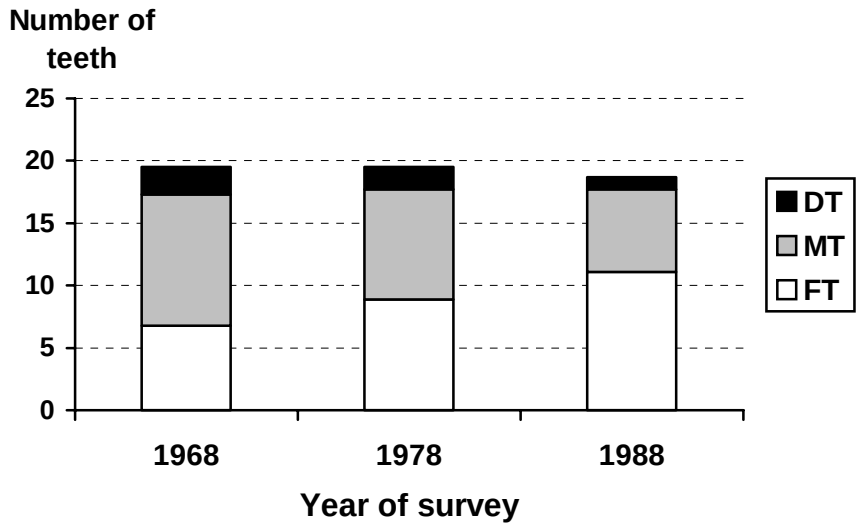
Intervention level	Examples of key indicators
Primary (prevention)	Health of the teeth (DMF Index)
Secondary (treatment)	Level of treatment (F/DMF) Restorative needs
Tertiary (rehabilitation)	Proportion of missing teeth (M/DMF) Edentulous proportion

(a) Adapted from: Dental Health Committee (1988): Barriers to oral health and oral care. Wellington: New Zealand Board of Health

The examples which follow illustrate the usefulness of time-series data when such an evaluation framework is used.

The primary level of intervention

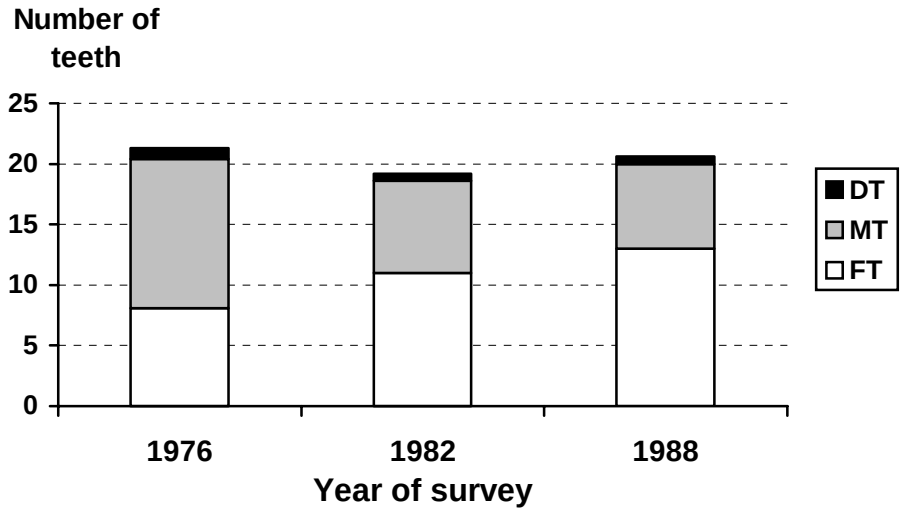
At the primary level of intervention, Figure 2.35 shows DMFT in the 35–44 age group across the 20-year period covered by the three national surveys in England and Wales. Only a small decrease in overall DMFT is observed.



Sources: Todd & Walker, 1980
Downer, 1991

Figure 2.35: DMFT among 35–44-year-olds in England and Wales across three national surveys

A similar pattern is apparent in the DMFT data shown in Figure 2.36 for the same age group across three national dental surveys in New Zealand, with only a slight decrease apparent in the mean DMFT. (NB: the 1982 survey was conducted in Auckland and Christchurch only, and would therefore have sampled from approximately one-half of the population and be biased toward non-rural populations).



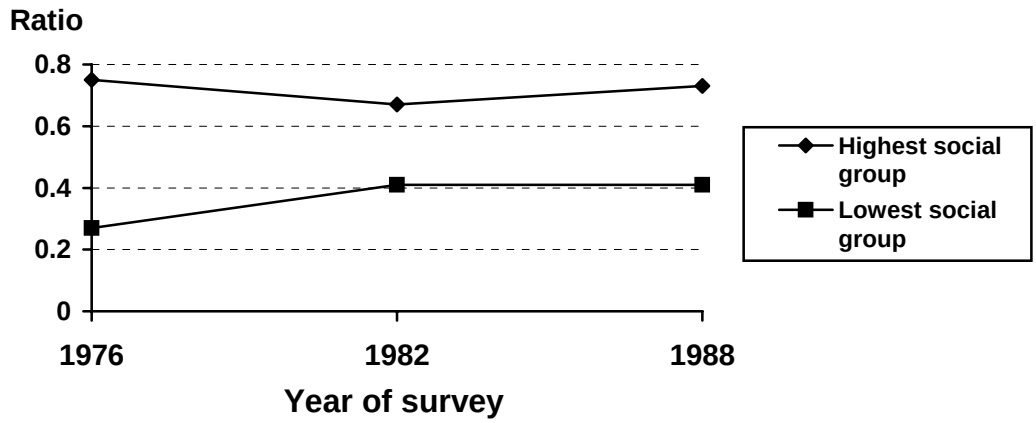
Sources: Cutress et al., 1979
Cutress et al., 1985
Hunter et al., 1992

Figure 2.36: DMFT among 35–44-year-olds in three New Zealand national dental surveys

In each national survey series, the observed decline in DMFT among the 35–44 age group was only slight, although differences in the contributions of the decayed, missing and filled components can be observed.

The secondary level of intervention

Figure 2.37 shows FT / DMFT ratios for 35–44-year-olds by social class group across the three New Zealand surveys. The overall impression is the persistence of a marked socioeconomic differential in this ratio over that 12-year period: the difference between the most advantaged and disadvantaged groups has been only slightly reduced during that time. This suggests that barriers to the utilisation of dental care persisted between 1976 and 1988 for the less advantaged individuals in comparison to the most advantaged group.

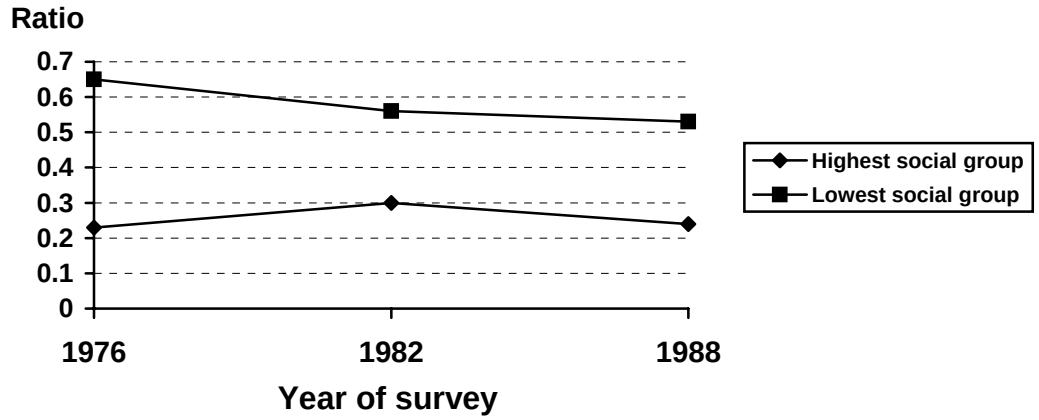


Sources: Cutress et al., 1979
Cutress et al., 1985
Hunter et al., 1992

Figure 2.37: FT/DMFT ratios in the most advantaged and disadvantaged groups of 35–44-year-olds in three New Zealand national surveys

The tertiary level of intervention

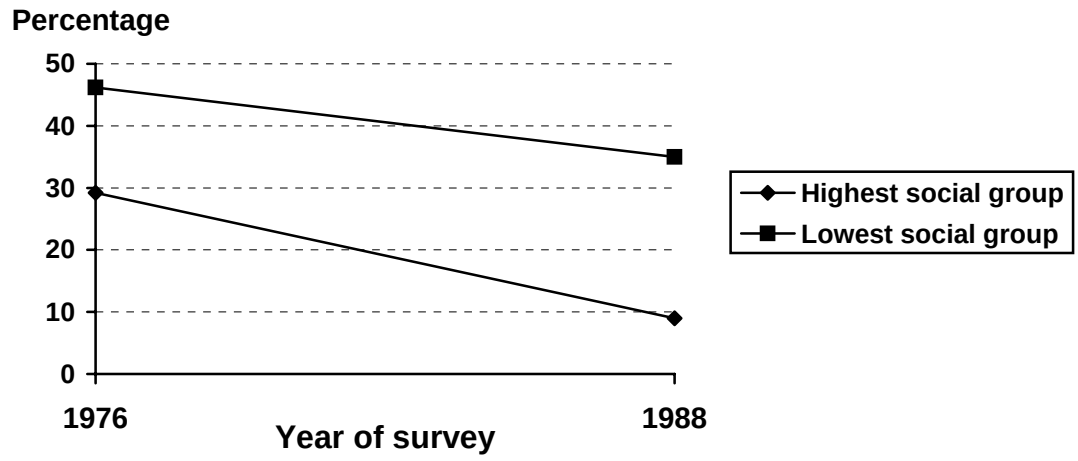
A similar picture is apparent at the tertiary level of intervention, where the number of missing teeth gives some indication of a population's oral rehabilitation requirements: there is evidence that the socioeconomic differential in the M/DMFT ratio was only slightly reduced over that 12-year period in New Zealand (Figure 2.38), and that it showed no sign of being eliminated.



Sources: Cutress et al., 1979
Cutress et al., 1985
Hunter et al., 1992

Figure 2.38: MT/DMFT ratios in the most advantaged and disadvantaged groups of 35–44-year olds in three New Zealand dental national surveys

Examination of the level of denture-wearing (for dentures of any type) reveals that the difference between the most advantaged and least advantaged groups increased over the 12 years between 1976 and 1988 (Figure 2.39), largely due to a greater decline in denture-wearing among the most advantaged group. Data on denture-wearing were not collected in 1982.



Sources: Cutress et al., 1979
Hunter et al., 1992

Figure 2.39: Percentage wearing any denture in the most advantaged and disadvantaged groups of 35–44-year-olds in two New Zealand national dental surveys

Challenges in deriving time-series oral health data

The examples in section 2.4.3 have illustrated some of the analytical benefits of sequential national oral health surveys. Clearly, they can be a powerful evaluative tool for dental policy-makers, and time-series oral health data at a national level are a useful goal for dentistry in Australia. However, specific challenges present themselves in the generation of time-series data. Aside from the necessity to ensure that each survey provides an accurate and representative snapshot of oral health status in the population at the time of data collection—by whatever method is most likely to accomplish this at the time—there is the issue of the degree of comparability between different surveys.

From one survey to the next, there may be changes in the following aspects.

- Diagnostic practices and techniques – a prime example of this is apparent in the reliance of modern caries diagnosis on mainly visual criteria, whereas earlier surveys used a combination of tactile and visual criteria, and the sickle probe was an essential part of the examining dentist's equipment.
- Knowledge and concepts of disease – the dental profession's concepts of caries and periodontal disease change over time. For example, it is now accepted that: early carious lesions can remineralise; probing is not the best way to investigate a hitherto unrestored fissure on a permanent molar; and not every individual with gingivitis is susceptible to periodontitis. These would have been somewhat *avant garde* concepts in 1976 when the initial New Zealand and British surveys were undertaken.
- The indices which are used to record observations of dental conditions – the obvious example of this is the Community Periodontal Index of Treatment Needs (Ainamo et al., 1982), which had not been developed at the time of the first two British or New Zealand surveys.
- The characterisation of social data is no less prone to such problems. A prime example is the different class scheme used in each of the three New Zealand surveys: in 1976, a 6-interval classification based upon occupation was used, together with a 4-interval classification based upon education level; in 1982, a dichotomous scheme based on occupation was used; and in 1988, a 3-interval occupation-based index was used, as well as household income and the number of years' secondary education. Given these differences, it is possible that at least some of the persistence of the above-mentioned social class differentials may be an artefact of classification methods.

It is evident from the New Zealand and British examples that time-series data can be invaluable in the evaluation of oral health status and services, but there is also a clear message that planners of national oral health surveys should not only be concerned with looking forward so that modern methods are used to observe and classify oral conditions and social attributes, but also take care to look back at what has been used in previous surveys. Using indices or methods of measurement which enable direct comparison with previous surveys increases the value of those surveys, as well as enhancing the current one.

2.5.4 The National Dental Survey

The rationale for a National Dental Survey to be carried out has several elements.

- Changes in oral disease incidence and prevalence are occurring: there have been marked reductions in dental caries incidence among children, and in tooth loss among adults.
- Demographic changes have been occurring, not least of which are a steady 'ageing' of the population, and a continuing shift in its ethnic mix.
- The current oral health knowledge base is becoming dated; in two years' time it will be a decade since the previous national survey.
- Changes are underway in the delivery of dental services, as well as on-going debate over the appropriate mix of services required to take dentistry into the next century. Data are urgently needed to aid the prediction of work force requirements.
- The establishment of a time-series with NOHSA 1987–88 as the baseline will enrich both surveys.

Accordingly, a National Dental Survey is proposed, with the objectives of:

- estimating the prevalence of oral disease in the Australian population; and
- establishing a time-series, with NOHSA 1987–88 as the baseline survey.

The most appropriate and commonly-used method for conducting a national survey of oral health is to link a social survey of a representative population sample with an oral health data collection, where participants in the social survey undergo oral examination by a dentist.

The social survey component should be more comprehensive than that used in NOHSA 1987–88, but in the interests of comparability should include all questions used in the earlier survey. The oral health survey component should involve the examination of participants in the social survey, as well as any special groups (such as Aboriginal or Torres Strait Islanders, recent Asian immigrants, elderly immigrants, and individuals in institutions) which may be required by other agencies.

The social survey

It is intended that telephone survey methodology be employed for the social survey component of the National Dental Survey, using Random Digit Dialling to generate the numbers which will be sampled. This will circumvent the problem of silent (unlisted) numbers, which comprise some 15% of private telephone numbers in Australia (Telstra, personal communication, March 1995). The sampling frame which is used in telephone survey methodology has an associated risk of non-coverage bias, particularly where it can be shown that differences exist between households with and without telephone access which may lead to systematic bias (Trewin & Lee, 1988). However, increased telephone coverage rate in Australia in recent years (for example, from 91.3% in 1986 to 94.4% in 1991; Australian Bureau of Statistics, 1991) means that the threat of such bias has reduced to where it can, to a certain extent, be corrected by weighting at the data analysis stage.

The economics of using the telephone survey approach are favourable. Telephone surveys are cheaper to run than other methods of gathering the same information: it is estimated that the cost of the telephone interview survey approach is approximately half that of the personal interview method (Frey, 1983).

The social survey used in NOHSA 1987–88 was extremely limited, consisting only of questions about dental visits, dental insurance, tooth brushing and fluoride tablet usage. For the next national survey, it is intended to gather the information in such a way that direct comparisons can be made with the previous survey while at the same time improving the range and quality of social data.

The oral epidemiological survey

It is proposed that standard oral epidemiological techniques be used for the oral health data collection, rather than the low-cost methodology which was employed for the last survey. Table 2.4 compares the features of each methodology. It is apparent that the only real advantage of the low-cost method is its being relatively inexpensive, and that there are clear trade-offs in terms of data reliability and the control of data collection.

Table 2.4: Comparison of low-cost and standard epidemiological methods for oral health data collection

Parameter	Low-cost method	Standard method
Reliability of data	Lower	Higher
Coordination of collection	More difficult	Simpler
Field staff numbers	Greater	Fewer
Source of field staff	Volunteers	Paid examiners
Standardisation/calibration	More difficult	Easier

Table 2.5 sets out the oral epidemiological items which are to be collected. Fluorosis data will be collected from children and adolescents, and malocclusion data from adolescents only.

Table 2.5: Epidemiological data items for the National Dental Survey

Information	Data items[(a)]
Oral health status *(from examination)*	Presence/absence of individual teeth
	Coronal caries experience of individual tooth surfaces
	Root caries experience of individual tooth surfaces
	Periodontal pocket depth and recession *(NIDR, 1987)*
	Presence of oral mucosal lesions *(Kramer et al., 1980)*
	Occlusion/malocclusion *(adolescents only; FDI [Baume et al., 1973] and DAI [Cons et al., 1986] components)*
	Fluorosis *(children and adolescents only; TF [Thylstrup & Fejerskov, 1978] and Dean [Dean, 1934] indices)*
Oral health status *(from interview)*	Number of teeth *(upper and lower jaws)*
	Type of denture(s)
	Period of wearing denture(s)
	Period of wearing current denture(s)
	Perceived treatment need
	Period since last extraction

(a) Unless otherwise specified, the NIDR protocol (NIDR, 1987) is to be used for these items. The National Dental Survey manual contains comprehensive examination criteria for each of the indices for the dental examination. The National Dental Survey will also include data items on demographics and socioeconomic characteristics.

Summary

National oral health survey data are an important part of oral health policy-making and planning, and furnish invaluable data for epidemiological study. Examples have been presented from overseas surveys to demonstrate the utility of national oral health time series, and the planned National Dental Survey has been introduced. The National Dental Survey should make a substantial contribution to Australian oral epidemiology and policy-making not only in its own right, but also as the second set of observations in what is hoped will be a continuing time-series of oral health data in this country.

2.5.5 References

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3 Dental Labour Force Statistics

3.1 The National Dental Labour Force Data Collection

3.1.1 Introduction

The origins of the current dental labour force data collection can be traced back to the early 1980s when the Australian Capital Territory and Victorian Dental Boards collected annual labour force data. When DSRU was established in 1988, six States and Territories moved to routinely collect dental practitioner statistics with the cooperation of the Dental Boards. With the moves by the AIHW, in conjunction with the Australian Health Ministers' Advisory Council, to establish annual collections in a number of health occupations, the dental practitioner collection was revised to incorporate uniform data items and in 1992 all States and Territories joined the collection. These data cover dentists but do not cover auxiliary staff.

3.1.2 Purpose

The main purpose of the collection is to monitor the current levels of supply. With these data, appropriate planning is possible with informed decisions by all involved in the dental profession. In addition, the collection has enabled research in the labour force area, particularly in the preparation of projections of practising dentists.

3.1.3 Methods

Data collection

The collection is conducted via a questionnaire that is included with annual re-registration. The questionnaires are sent out by the State and Territory Dental Boards and processed in one of three ways:

- for Victoria, the Dental Board enters the data as part of their management accounting system and forwards a data file to DSRU;
- for New South Wales, Queensland and Western Australia the questionnaires are forwarded to the State health authority for data processing. A data file is then forwarded to DSRU; and
- for the remainder (namely, South Australia, Tasmania, the Northern Territory and the Australian Capital Territory) the questionnaires are forwarded directly to DSRU for data processing.

Data items

This questionnaire includes data items on practising status, hours worked, area and type of practice, specialty area and geographic location; while additional characteristics of year of birth, sex, place and year of initial qualification, and year of first registration are provided by the Dental Boards.

Preparation, analysis and reporting

When DSRU has either received the data files or questionnaires, the data are prepared as ASCII files for computer analysis with data records identified only by record number to ensure both security and confidentiality of the data.

Data files for consecutive years are matched and comparisons of practice status provide estimates of year to year movement. These changes in practice status provide inputs to the projection work with age- and sex-specific recruitment to, and wastage from, the profession.

The analysis of each data file provides the tabulations for inclusion in annual State and Territory reports plus a national report. Examples of these output are presented in the remainder of this section, while the projection model prepared in 1994 are presented in the later section on labour force models (see section 3.3).

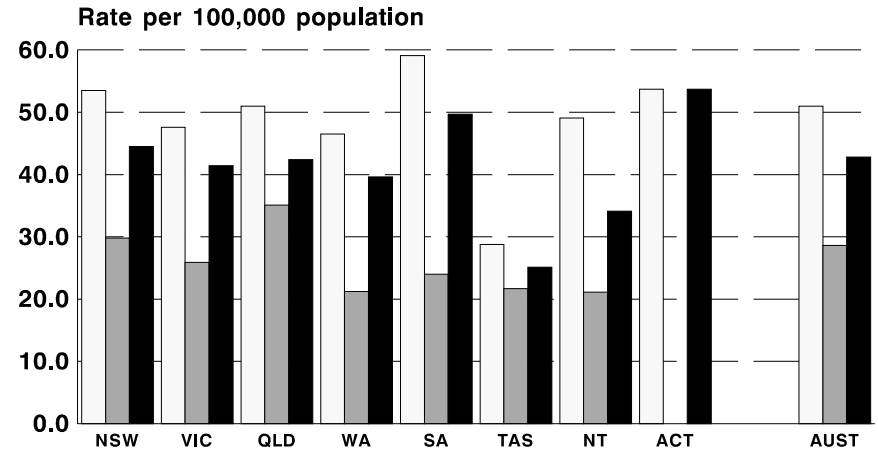
DSRU prepares State and Territory reports to present the data back to each Dental Board in a form that can be useful for them, providing an instrument for them to identify any inconsistencies in the data, and to satisfy State and Territory specific requests for information. A national report is prepared once all State and Territory data have been received by DSRU.

Data collection status

DSRU currently has all 1993 data having received the last State data file just prior to the Workshop. All State/Territory reports except New South Wales and Western Australia have been published for 1993, while the 1992 National report is the most recently published. Data for 1994 have been received by DSRU from five States and Territories, while both Territories have already provided the 1995 data.

3.1.4 Key results

The data collection covers all dentists registered in each State and Territory. However, the results presented in this section relate to those practising in 1992. There were an estimated 7,493 dentists practising in Australia in 1992 and the distribution between States and Territories are presented in the Figure 3.1. This figure shows the number of practising dentists as a rate per 100,000 estimated resident population and it can be seen that the Australian Capital Territory and South Australia have the highest rates while Tasmania and the Northern Territory have the lowest rates. When examining these rates separately for capital cities and the remainder of each State and Territory it can be seen that, with the exception of rural Queensland and Hobart, there are considerable similarities across the capital cities and remainder rates per 100,000 population.

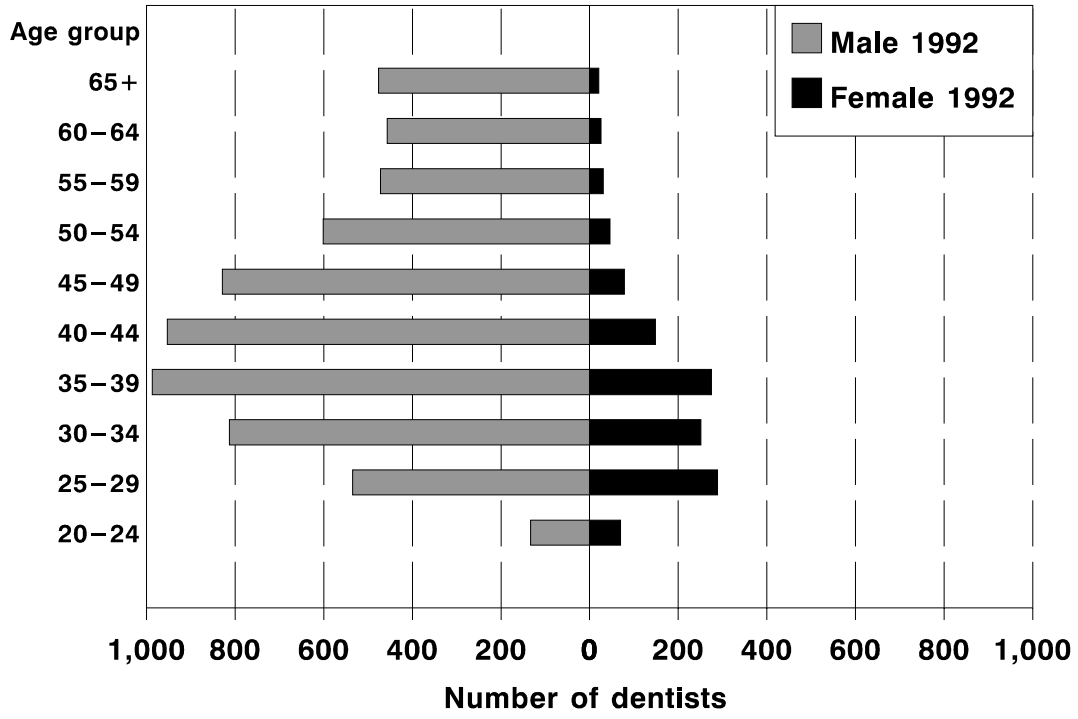


	NSW	VIC	QLD	WA	SA	TAS	NT	ACT		AUST
Capital	53.5	47.6	51.0	46.5	59.1	28.8	49.1	53.7		51.0
Rest	29.8	25.9	35.1	21.2	24.0	21.7	21.1			28.6
Total	44.5	41.4	42.4	39.6	49.7	25.1	34.1	53.7		42.8

Source: Dental Practitioner Statistics, Australia, 1992

Figure 3.1: Geographic regions, practising dentist rates per 100,000 population, 1992

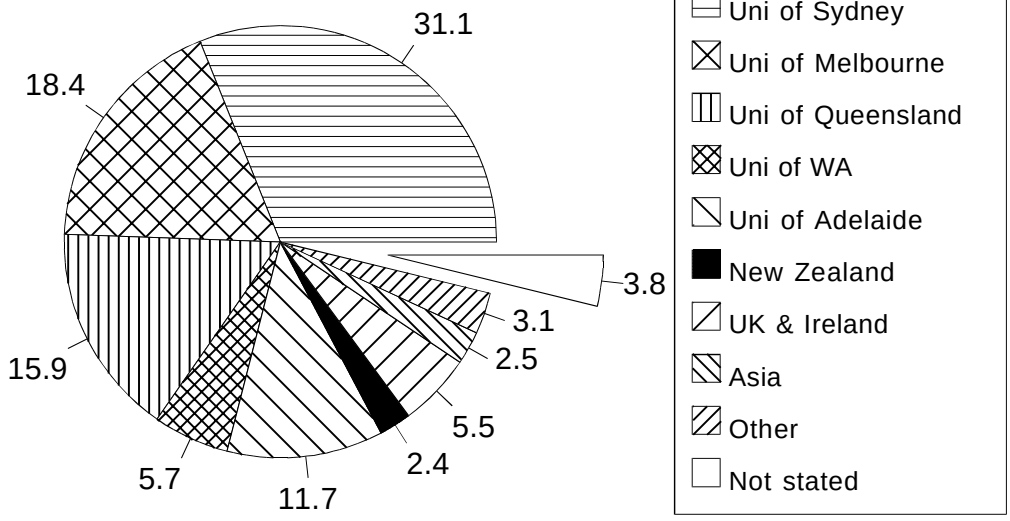
The age by sex distribution of practising dentists as shown in Figure 3.2 illustrates the dramatic difference between male and female dentists. Female dentists comprise only 16.5% of the practising dentist labour force. The majority of female dentists are in the three age ranges 25–29, 30–34 and 35–39 years. However, for male dentists the greatest numbers are in the 35–39 and 40–44 age groups, although it can be seen that there are greater numbers of male dentists (compared to female dentists) in the 25–29 and 30–34 year age groups. Lastly, it can also be seen that for the oldest three age groups there are comparatively equal numbers of male dentists and a negligible number of female dentists.



Source: Dental Practitioner Statistics, Australia, 1992

Figure 3.2: Age x sex, practising dentists, 1992

Figure 3.3 and Table 3.1 present the distribution of dentists by the Australian university or overseas country of initial qualification. In the figure it can be seen that over 80% of practising dentists received their initial qualification from an Australian university, with the largest number graduating from the University of Sydney. Of the remaining practising dentists, the majority graduated in the United Kingdom, Ireland and New Zealand, while just over 5% received their initial qualification from an Asian country or elsewhere. The following table presents the proportion of the origin of initial qualification by State and Territory. Not surprisingly, the majority of dentists in each mainland State graduated from the university in their State. In fact, nearly three-quarters of dentists practice in the same State as their initial qualification. There is no dental faculty in Tasmania or the two Territories and their dentists are predominantly from the Australian university that is geographically situated nearest to them. However, for Tasmania only 20.5% of practising dentists were from The University of Adelaide and 17.1% from the University of Melbourne. Tasmania also had over 20% with an initial qualification from the United Kingdom and Ireland.



Source: Dental Practitioner Statistics, Australia, 1992

Figure 3.3: Qualification origin, practising dentists, 1992

Table 3.1: Percentage of practising dentists, origin of initial qualification by State/Territory, 1992

Origin of initial qualification	NSW	Vic	Qld	WA	SA	Tas	NT	ACT	Total
University of Sydney	80.0	3.6	4.6	3.4	2.4	8.5	14.0	60.5	32.3
University of Melbourne	2.8	66.9	1.7	2.1	1.1	17.1	10.5	4.5	19.1
University of Queensland	3.7	3.9	81.2	1.6	1.4	13.7	12.3	16.6	16.6
University of Adelaide	1.9	5.9	2.2	1.8	87.0	20.5	35.1	5.7	12.1
University of Western Australia	0.4	0.9	0.3	68.0	0.3	3.4	7.0	0.6	5.9
Total Australian initial qualification	***88.8***	***81.2***	***90.1***	***76.9***	***92.1***	***63.2***	***78.9***	***87.9***	***86.0***
New Zealand	1.9	3.1	2.6	n.a.	1.1	5.1	1.8	1.9	2.5
United Kingdom and Ireland	4.1	6.7	5.0	n.a.	3.5	22.2	14.0	7.6	5.7
Asia	1.6	3.9	1.5	n.a.	3.0	5.1	1.8	0.6	2.6
Other	3.5	5.1	0.8	n.a.	0.3	4.3	3.5	1.9	3.2
Total overseas initial qualification	***11.2***	***18.8***	***9.9***	***23.1***	***7.9***	***36.8***	***21.1***	***12.1***	***14.0***
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Dental Practitioner Statistics, Australia, 1992

There are considerable differences between the hours worked by male and female dentists. It can be seen from Table 3.2 that nearly one-third of female dentists work less than 30 hours per week and only 7.2% report 50 or more hours per week. Conversely, less than 10% of male dentists report less than 30 hours per week and over half report 40 or more hours per week.

Table 3.2: Practising dentists, hours worked per week by sex, 1992

	Males		Females		Persons	
Hours worked per week	**No.**	**%**	**No.**	**%**	**No.**	**%**
Less than 10 hours	98	1.6	55	4.4	153	2.0
10–19 hours	137	2.2	144	11.6	281	3.8
20–29 hours	304	4.9	198	16.0	502	6.7
30–39 hours	1,891	30.2	413	33.4	2,304	30.7
40–49 hours	2,191	35.0	267	21.6	2,458	32.8
50 hours or more	1,061	17.0	89	7.2	1,150	15.3
Not stated	574	9.2	71	5.7	645	8.6
Total	**6,256**	**100.0**	**1,237**	**100.0**	**7,493**	**100.0**

Source: Dental Practitioner Statistics, Australia, 1992

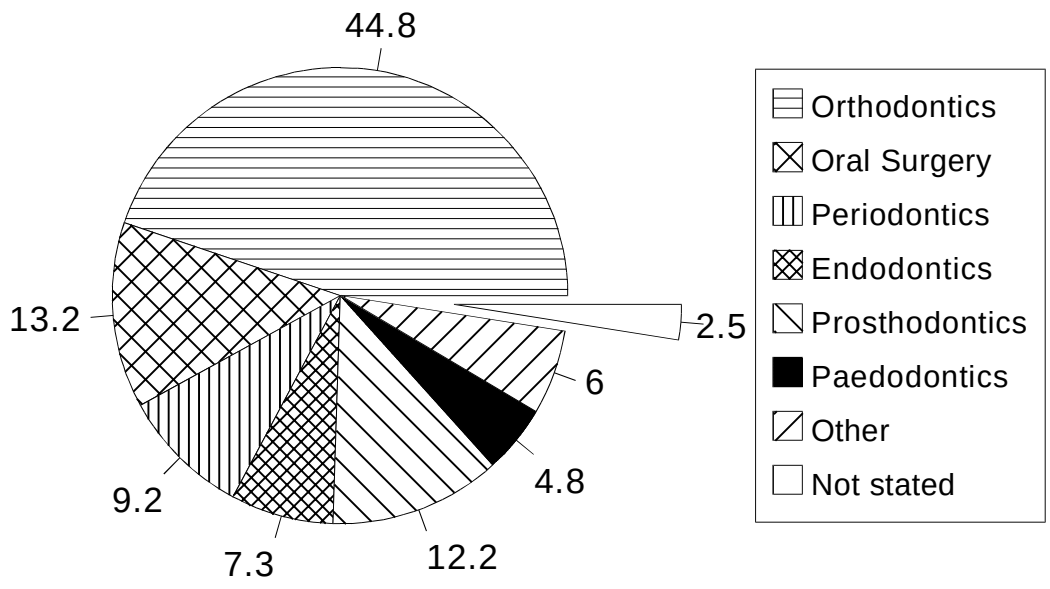
Dentists practice in a range of settings. It can be seen in Table 3.3 that nearly four out of every five practising dentists are in general practice, followed by nearly 10% who are in specialist practice. A higher percentage (10.5%) of male dentists compared to female dentists (5.6%) are in specialist practice. In addition to the 728 in specialist / restricted practice, there were 67 specialists in the other areas (mainly in teaching). Accordingly, there were nearly 800 specialist practitioners in Australia in 1992, and it can be seen from Figure 3.4 that nearly half (44.8%) were orthodontists. The next largest specialties were oral surgery and prosthodontics.

Table 3.3: Practising dentists, area of main practice* by sex,

	Males		Females		Persons	
Area of main practice	**No.**	**%**	**No.**	**%**	**No.**	**%**
General practice	4,925	78.7	1,036	83.8	5,961	79.6
Specialist/restricted practice	659	10.5	69	5.6	728	9.7
Administration	71	1.1	15	1.2	86	1.1
Teaching/education/research	130	2.1	49	4.0	179	2.4
Other	74	1.2	25	2.0	99	1.3
Not stated	397	6.3	43	3.5	440	5.9
Total	**6,256**	**100.0**	**1,237**	**100.0**	**7,493**	**100.0**

* main practice defined as practice with largest hours worked per week

Source: Dental Practitioner Statistics, Australia, 1992



Source: Dental Practitioner Statistics, Australia, 1992

Figure 3.4: Specialty areas, practising specialists, 1992

Dentists work in either a private or public sector type of practice. Within the private sector, the type of practice can be defined according to whether the dentist practises alone (solo) or in some arrangement with other dentists (partnership, associateship, assistant or locum). Table 3.4 shows that more than three-quarters are in private practice and the majority of these are in solo practice. It can also be seen that there was quite a marked difference in the type of practice of male and female dentists. A lower percentage of female dentists worked in the private sector types of practice than male dentists. In 1992, 23.0% of female dentists practised in solo practice compared to 45.9% of male dentists. The same relativity existed for associateships, while the percentages were reversed for assistant types of practice with 23.9% of female dentists compared to 7.4% of male dentists.

There was a higher percentage of female dentists in the public sector in 1992, 28.5% compared with 13.6% of male dentists. As most assistants, locums and public sector types of practice are salaried rather than self-employed practice, it is evident that a higher percentage of female dentists were in salaried employment (54.0%) than male dentists (22.0%).

Table 3.4: Practising dentists, type of main practice* by sex, 1992

	Males		Females		Persons	
Type of main practice	**No.**	**%**	**No.**	**%**	**No.**	**%**
Private sector:						
Solo	2,870	45.9	284	23.0	3,154	42.1
Partnership	599	9.6	134	10.8	733	9.8
Associateship	976	15.6	97	7.8	1,073	14.3
Assistant	463	7.4	296	23.9	759	10.1
Locum	61	1.0	20	1.6	81	1.1
Total private sector	*4,969*	*79.4*	*831*	*67.2*	*5,800*	*77.4*
Public sector:						
Dental hospital	287	4.6	120	9.7	407	5.4
Other hospital	136	2.2	57	4.6	193	2.6
School Dental Service	109	1.7	32	2.6	141	1.9
Health centre	95	1.5	44	3.6	139	1.9
Tertiary education	120	1.9	42	3.4	162	2.2
Other public (incl. defence)	104	1.7	57	4.6	161	2.1
Total public sector	*851*	*13.6*	*352*	*28.5*	*1,203*	*16.1*
Industry	10	0.2	1	0.1	11	0.1
Other	30	0.5	10	0.8	40	0.5
Not stated	396	6.3	43	3.5	439	5.9
Total	**6,256**	**100.0**	**1,237**	**100.0**	**7,493**	**100.0**

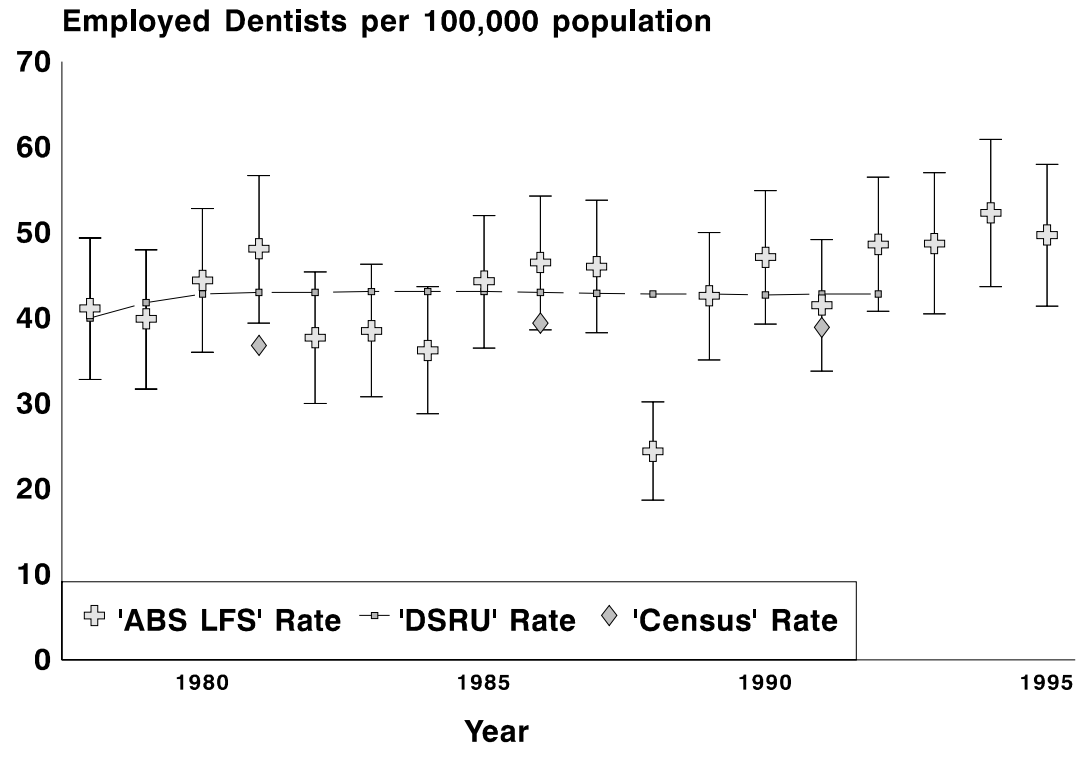
* main practice defined as practice with largest hours worked per week
School Dental Service not separately collected from other public in Victoria

Source: Dental Practitioner Statistics, Australia, 1992

There are other sources of data that relate to the dental labour force. The number of Australian university dental graduates, the overseas migration of dentists and the number of overseas qualified dentists who passed the Australian Dental Education Council (ADEC) examinations are presented in the later section on labour force models (section 3.3). In addition, the Australian Bureau of Statistics (ABS) conducts both the five-yearly Census of Population and Housing and the Monthly Population Survey. From both of these collections it is possible to obtain estimates of the total dental practitioner labour force.

It can be seen from Figure 3.5 that there are similarities in the estimates obtained from these sources, but there are also some diversities. In particular, the ABS Monthly Population Survey series shows what could be interpreted to be a number of short-term trends where it is known that the dental profession labour force structure does not make such short-term changes. Accordingly, these survey estimates should be utilised as up-to-date estimates of the dentist labour force, but not used to examine year-to-year changes. The estimate for 1988, which is clearly inconsistent with all of the other estimates, highlights the sampling variability that occurs with relatively small population estimates from the ABS Monthly Population Survey.

The Population Census results are all below the National Dental Labour Force Data Collection and do not provide any practice activity characteristics of the dental practitioner labour force.



Sources: Australian Dental Association Facts and Figures
AIHW DSRU Dental Practitioner Statistics, 1992
Australian Bureau of Statistics, Labour Force Survey (ABS LFS) (unpublished data)

Figure 3.5: Comparison of dental labour force estimates

3.1.5 Priorities

The Workshop highlighted a number of areas that need to be considered in the national dental labour force data collection:

- output from the current collection needs to include a fact sheet or 'super summary' for wide distribution. In addition, DSRU should be mindful that the timely distribution of reports enhances the value of the collection;
- operative auxiliaries (therapists, hygienists, clinical technicians) should be included in the national data collection;
- data items and classifications should be regularly reviewed to ensure that they are appropriate to the profession. For example, the classification of type of practice should be amended to reflect the Commonwealth Dental Health Program;
- differences between States and Territories in procedures could be standardised with the possible assistance of the Australian Dental Council;
- guidelines for the implementation of special purpose surveys and further analysis of the data could be prepared by DSRU;
- development of further analyses to add value to the collection effort. In particular, further examining the impact of the changing percentage of female dentists on the supply of dentist services; and
- development of a study of career paths to examine the differing careers of male and female dentists and identify variations in the work force patterns of recent graduates compared to those of earlier graduates.

3.1.6 References

AIHW Dental Statistics and Research Unit 1994. *Dental Practitioner Statistics Australia, 1992*. AIHW DSRU Series No. 6, The University of Adelaide, Adelaide.

3.2 The Longitudinal Study of Dentists' Practice Activity

3.2.1 Introduction

Historical data on the practice activity of dentists in Australia has been collected through the Australian Dental Association's Dental Practice Surveys. These surveys have shown that from the 1960s through to the 1980s there have been changes in some key measures of dentist practice activity, such as hours per year devoted to work, the number of patient visits per year, and changes in appointment times within dental practice. Such trends in practice activity need to be considered along with data on the availability of dentists (derived, for example, from dentist labour force registration statistics) as a factor influencing the capacity to supply services.

3.2.2 Purpose

The purpose of the Longitudinal Study of Dentists' Practice Activity is to obtain a periodic time series of data on practice activity which allows representative cross-sectional estimates and which follows a longitudinal subgroup of dentists over time. Such a design facilitates the recognition of patterns and trends in the practice activity of dentists. This study aims to obtain data on labour force productivity and service provision which is accurate and representative, based on a comprehensive sampling frame, and the employment of random sampling and achievement of high response rates.

3.2.3 Methods

Data collection

The study involves data collection by mailed questionnaire, with the study repeated at five-yearly intervals. The study has had three waves data collection, from 1983–84, 1988–89, and 1993–94. Up to four follow-up stages of mailings were performed following the initial mailing within each of these waves of the study. These follow-up stages are necessary in order to obtain the desired response rate.

At the initial mailing stage a cover letter, letter of support from the Australian Dental Association president, a questionnaire, and prepaid envelope were sent to each sampled dentist. Follow-up reminder letters, including replacement questionnaires and prepaid envelopes, were sent in stages of approximately four weeks to sampled dentists who had not yet responded.

In the second and third waves of the study, which were repeated five and ten years after the first wave, the package sent to each dentist at the initial mailing also included a report in the style of a newsletter which provided a summary of the research findings from the previous wave. This provided each of the dentists in the study with feedback on some of the main results, showing them an example of how the data they provided were being used.

Data items

The data items which are collected cover:

- demographic characteristics of dentists: such as age, sex, and country of birth;
- practice characteristics: these include main area of practice (such as general or restricted practice), types of specialist practice, and types of private and public practice;
- productivity variables: such as patients per day, hours per day, days per week, and weeks per year worked; and
- service provision: such as items of service provided, and characteristics of patients such as age and sex.

Data on demographic and practice characteristics, and productivity are collected using standard self-complete questionnaire methods. The data on service provision are recorded by dentists in a day log of services, which was attached to the questionnaire.

Sampling

At the initial wave of the study a random sample of 10% of male dentists and 40% of female dentists was drawn from the dental registers for each Australian State and Territory. At the two subsequent waves of the study the same dentists who were included in this sample from the original wave of the study were again incorporated into the sample.

A sample supplementation approach was also used in these subsequent waves of the study to top-up the original sample. This consisted of identifying dentists who were new to the register since the last sample was drawn, and depending on whether they were male or female, taking either a 10% or 40% sample of these additions to the register. This sample supplementation process helps to provide representative cross-sectional estimates for each wave of the longitudinal study.

Sample and response

Table 3.5 outlines the sample and response for each wave of the study, broken down into sample components. The first column of numbers consists of dentists who responded to the first wave of the study in 1983–84. For the 1983–84 wave a total of 730 dentists responded, giving a response rate of 73%.

Table 3.5: Sample and response

		Respondent 1983–84	Non-respondent 1983–84	Supplementary sample 1988–89	Supplementary sample 1993–94	Total
1983–84	Sampled	1033	..	..	..	1033
	Contacted	994	..	..	..	994
	Responded	730	..	..	..	730
1988–89	Sampled	611	184	371	..	1166
	Contacted	602	182	349	..	1133
	Responded	513	71	271	..	855
1993–94	Sampled	486	149	295	282	1212
	Contacted	469	140	261	235	1105
	Responded	378	76	184	179	817

Source: Longitudinal Study of Dentists' Practice Activity 1983–84, 1988–89, 1993–94

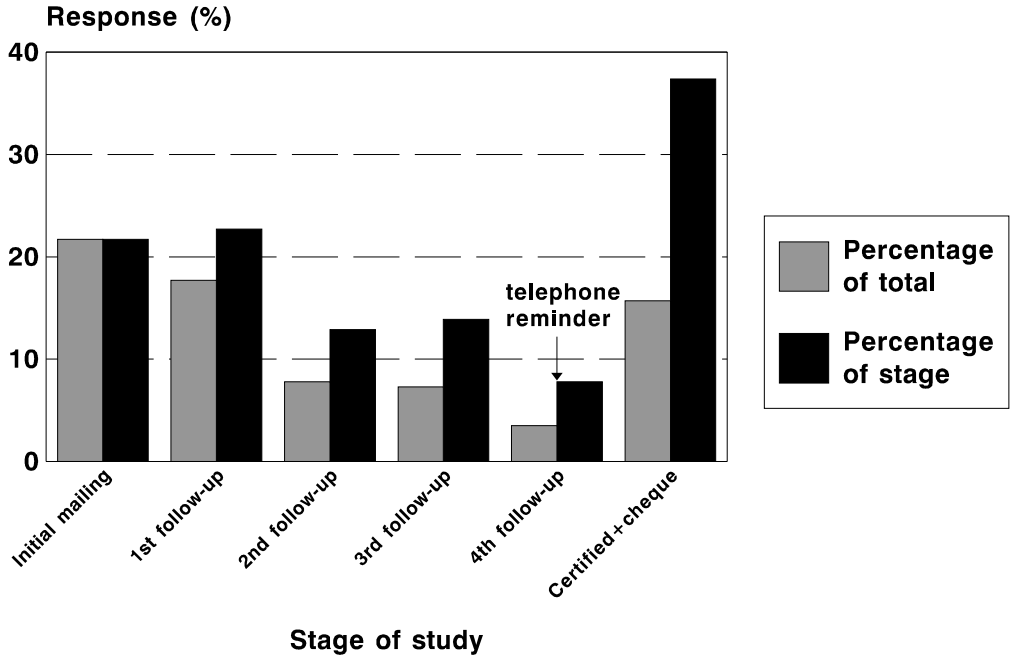
In the 1988–89 wave there were 611 dentists remaining in the sample out of the 730 who responded in the previous wave, 602 were contacted and 513 responded. The next column lists dentists who were non-respondents from the first wave, of which 184 still remained in the sample, and of the 182 who were contacted, a total of 71 responded. The third column of numbers lists dentists who were added as the sample supplementation component in 1988; of the 371 who were sampled, 349 were contacted and a total of 271 responded. The total column shows that summing across the row of respondents gives a total of 855 or a response of 75%.

The lower third of the table lists the sample and response for the third wave, collected in 1993–94. This includes the addition of an extra column representing the new sample of dentists added in 1993 as the sample supplementation component. The bottom row of the table shows that the response to this third wave of the study comprised 378 who had responded to the first wave, 76 non-respondents from the first wave, 184 sampled from the second wave, and 179 newly sampled dentists to give a total of 817 or a response of 74%.

The features of note in this table are the changing nature of the sample component over time, which maintains some of the original component but is supplemented at each wave. Also of note is the achievement of high response rates at each wave.

Response by stage, 1993–94

To achieve high response rates in mail surveys a number of follow-up reminder stages is necessary. Up to four follow-up stages were used in the first and second waves of the study to achieve response rates in excess of 70%. However, the third wave of the study, performed in 1993–94, required additional effort to achieve a comparable response rate.



Source: Longitudinal Study of Dentists' Practice Activity 1993–94

Figure 3.6: Response by stage, 1993–94

Figure 3.6 shows the response to the 1993–94 wave of the study by stage of mailing. Looking at the percentage of total response, if this is summed across each stage this yields the 74% eventually obtained. As might be expected, the percentage response tends to drop across successive stages, with co-operative, enthusiastic respondents returning their questionnaires promptly after one or two stages of mailing and additional mailings being required to elicit responses from the remainder.

However, after four follow-up stages only 61% response had been achieved in 1993–94 compared to over 70% after four follow-ups in the previous two waves of the study, collected five and ten years earlier. The fourth follow-up stage also incorporated a telephone reminder to most of the remaining sample. This attempt to boost the response, contrary to expectations, was not successful.

Hence, an alternative strategy was formulated, which involved using certified mail and a small financial incentive. This strategy was designed to increase response and was not performed as an experiment so that it is not possible to disentangle the effects of the certified mailing from the incentive. However, the certified mailing did have some noticeable benefit in identifying outstanding uncontactable addresses. The effect of the mixed strategy boosted the response by adding 15% to the total response, an effect similar in size to the first follow-up stage.

Percentage of stage represents the percentage of responses to a stage, out of the number remaining in the sample when responses from the previous stages of mailing had been removed. Taken as a percentage of the stage, rather than of the total response, the final follow-up exceeded even the level of the initial mailing. The implications are that future waves may need to adopt such strategies or accept lower response rates.

Preparation and analysis

Once data have been collected then the responses from the returned questionnaires are coded and entered as ASCII files for computer analysis. These data files are verified through double entry and manual checking of responses to ensure accuracy of the computer data records. Computer data records and questionnaires are identified only by record numbers, and not by names, to protect the security and confidentiality of the information. As a first phase of preliminary analysis the data are examined descriptively, for example to check that data are within correct ranges. This allows for any further data editing prior to subsequent analyses.

Analysis primarily involves the investigation of dependent measures such as productivity variables (for example, patients per hour) or service provision variables (such as mean numbers of preventive services) by a range of explanatory variables (which may include time of data collection, dentist age and sex). As an example, trends in practice activity (using measures of productivity and service provision) are presented in the following section at three points in time across a 10-year period.

3.2.4 Key results

The findings presented here refer to the sub-group of dentists in the study who were from private general practice, comprising responses from a total of 367 (1983–84), 481 (1988–89), and 441 (1993–94) dentists.

Age by sex of respondents

Table 3.6: Age by sex of responding dentists

	1983–84		1988–89		1993–94	
	Male	Female	Male	Female	Male	Female
Dentist age group	(%)	(%)	(%)	(%)	(%)	(%)
20–29 years	13	38	13	38	13	28
30–39 years	31	37	35	38	30	46
40–49 years	22	14	25	12	29	18
50–59 years	23	8	13	9	15	6
60+ years	11	4	14	3	13	3
Total (n)	**282**	**85**	**304**	**177**	**274**	**167**

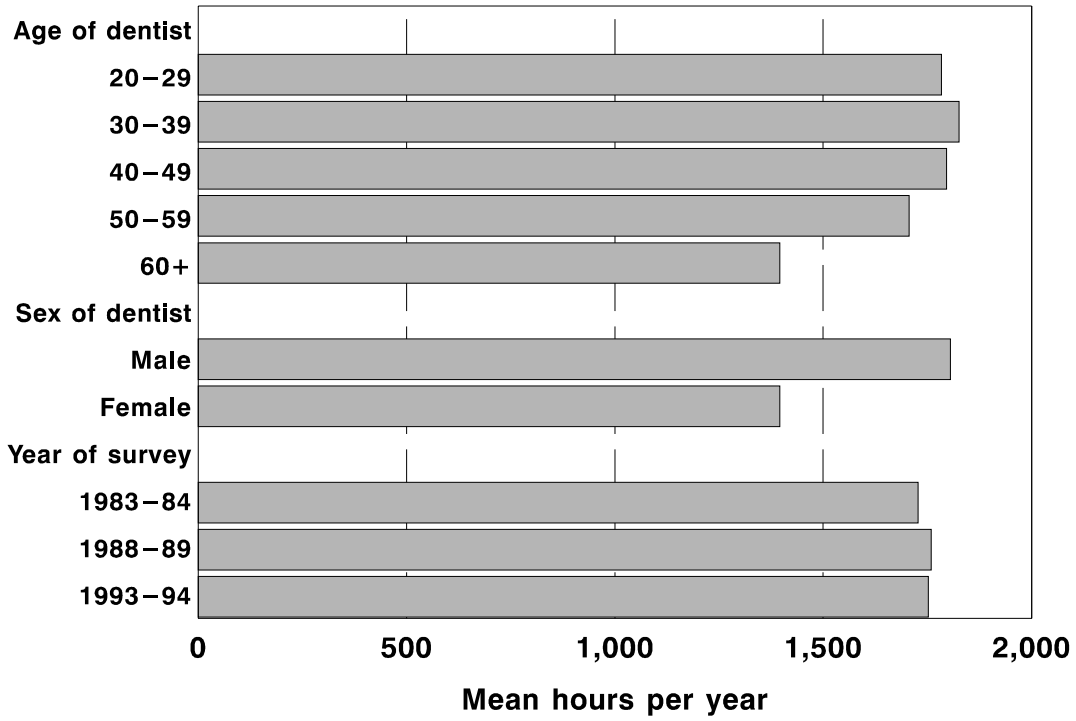
Source: Longitudinal Study of Dentists' Practice Activity 1983–84, 1988–89, 1993–94

Table 3.6 shows the age by sex distribution of responding private general practice dentists by year. Looking at 1983–84, the highest percentage of male dentists occurred in the 30–39 years age group (with 31%), the next highest percentages occurred in the 40–49 and 50–59 years age groups (with 22% and 23% respectively). For female dentists the highest percentages occurred in the two youngest age groups, aged 20–29 and 30–39 years (with 38% and 37% respectively).

Similar distributions occurred in the other two waves of the study, with some subtle changes. For male dentists there was some decline in the percentage of dentists in the 50–59 years age group, with resultant minor changes in percentage of male dentists in both older and younger age groups. For female dentists, although the two youngest age groups remained the major components across all three waves of the study, there was an increase in the percentage of female dentists in the 30–39 years age group.

These data were subsequently weighted using the estimated number of practising private general practitioners from December 1983 and 1988, with the age and sex distribution of dentists based on population census data from 1981 and 1986, and dental board registration statistics from 1992. The following results use this weighted measure, which is representative of the age and sex distribution of Australian private practice dentists at each wave of the study.

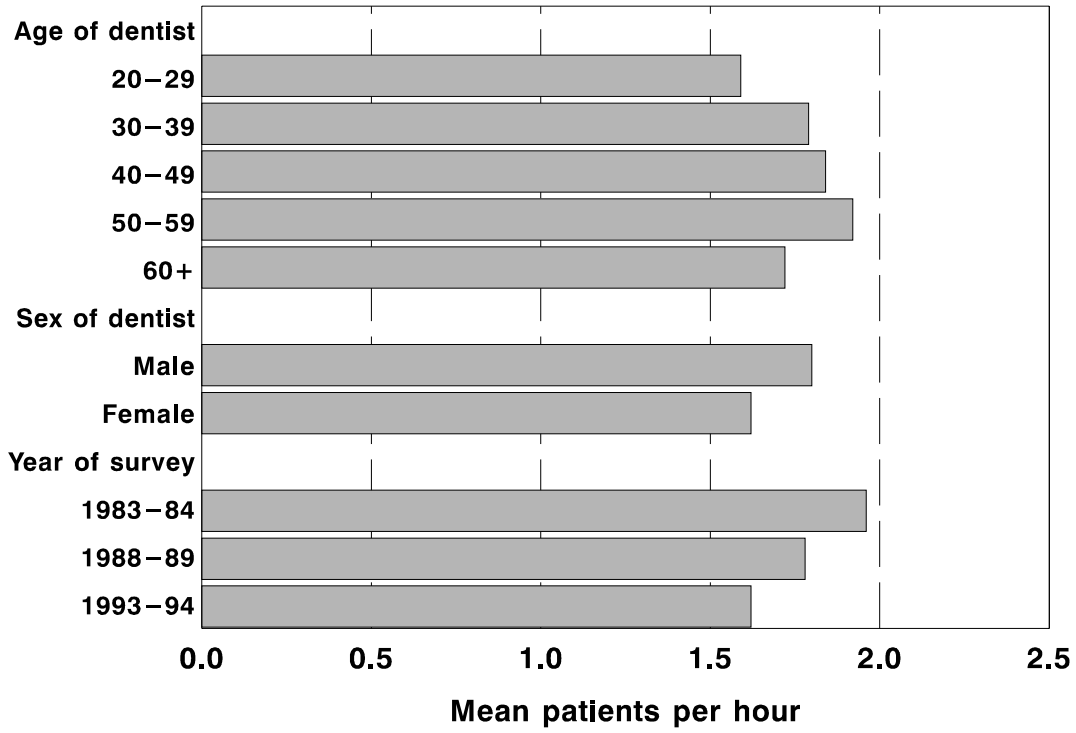
Productivity



Source: Longitudinal Study of Dentists' Practice Activity 1983–84, 1988–89, 1993–94

Figure 3.7: Hours of practice per year by age, sex, and year

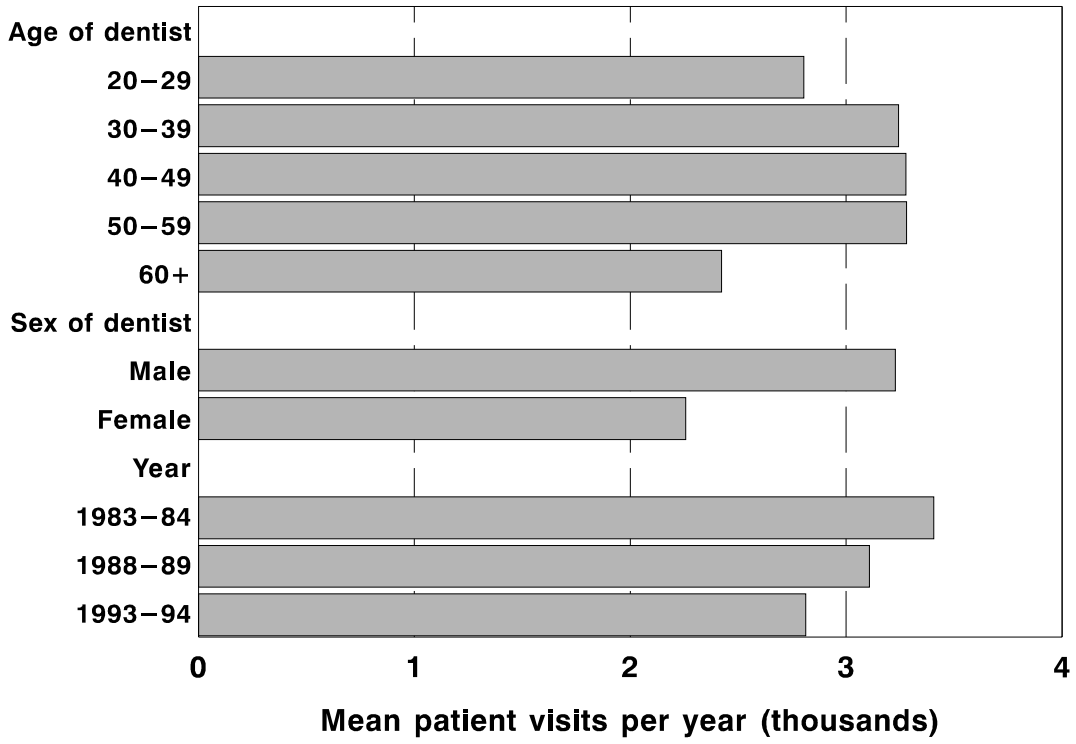
Figure 3.7 presents time devoted to work by age and sex of dentists, and by year of data collection. This measure of mean hours per year was calculated by multiplying dentists' estimates of hours per day, days per week, and weeks per year worked. Significant differences occurred for age and sex, but not for year. Hours per year worked were lower among older dentists, with the lowest level occurring for those aged 60 years or more. Comparison by sex of dentist showed that males had higher levels of annual time worked compared to female dentists. Examination by year of data collection shows that annual time worked remained steady across the three points of the 10-year period.



Source: Longitudinal Study of Dentists' Practice Activity 1983–84, 1988–89, 1993–94

Figure 3.8: Number of patients per hour by age, sex, and year

Figure 3.8 presents hourly productivity (measured as mean patients treated per hour) by dentist age and sex, and by year. This measure of patients per hour was calculated by dividing dentists' estimates of patients treated per day by hours per day worked. Significant differences occurred for age, sex and year. The number of patients per hour treated increased across dentist age groups to peak in the 50–59 year age group, before declining among older dentists. Comparison by sex of dentist showed that male dentists treated a higher number of patients per hour compared to female dentists. The trend in hourly productivity by year of data collection shows that the number of patients per hour declined across the 10-year period.



Source: Longitudinal Study of Dentists' Practice Activity 1983–84, 1988–89, 1993–94

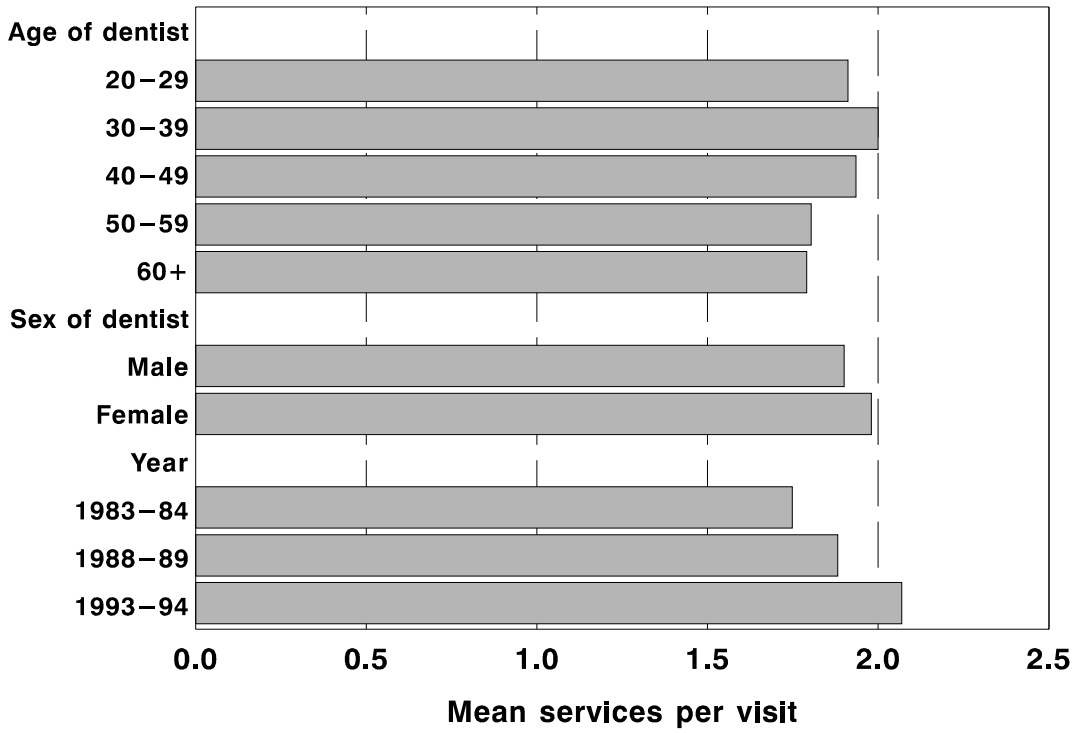
Figure 3.9: Number of patient visits per year by age, sex, and year

Figure 3.9 presents annual productivity (measured as mean patient visits per year) by dentist age, sex and year. This measure was calculated as the product of the previous measures, hours per year and patients per hour. Significant differences occurred for age, sex, and year. The number of patient visits per year was highest among dentists aged between 30–39 and 50–59 years. Annual numbers of patient visits were higher among male compared to female dentists. The pattern by year of data collection indicated declining levels of annual visits across the 10-year study period.

To summarise these findings, dentists have continued to work the same amount of time annually but there has been a decline in the number of patients treated per hour, which is reflected in the observed decrease in annual patient visits. These findings are consistent with historical trends in dentist practice activity which have shown that annual time worked has remained stable since the mid-1970s while patient visits per year have declined since the 1960s.

Service provision

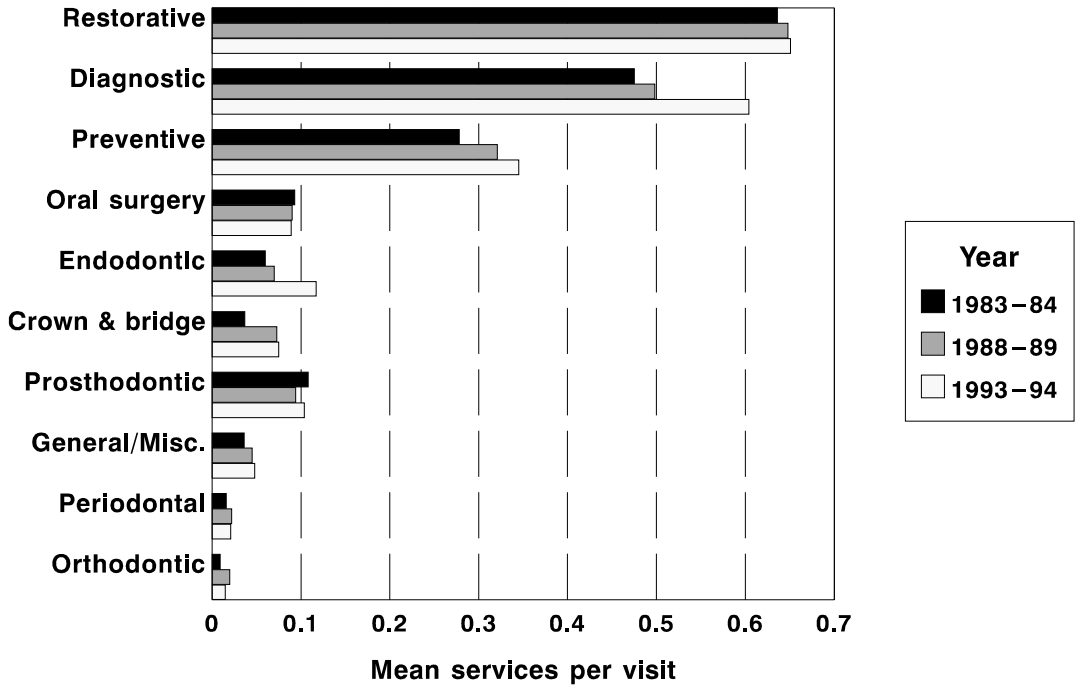
The total number of services provided per visit by dentist age, sex, and year are presented in Figure 3.10. These, and the following results, were derived from the log of services provided on a self-selected typical day of practice, where dentists recorded treatment provided and patient characteristics.



Source: Longitudinal Study of Dentists' Practice Activity 1983–84, 1988–89, 1993–94

Figure 3.10: Total services by age, sex, and year

Older dentists (aged 50–59 and 60+ years) provided lower mean numbers of services per visit than younger dentists. There was no difference between male and female dentists in total services provided per visit, and, in contrast to annual productivity, the number of services per visit increased across the 10-year period. This finding is consistent with historical trends towards increased length of appointment times since the 1970s.

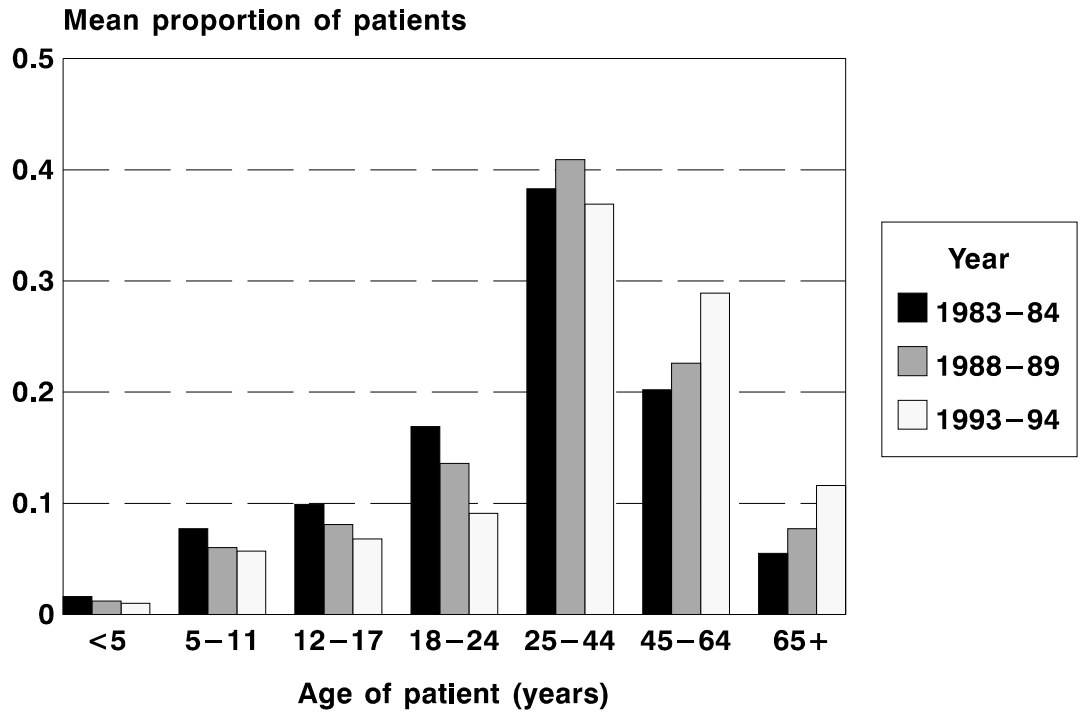


Source: Longitudinal Study of Dentists' Practice Activity 1983–84, 1988–89, 1993–94

Figure 3.11: Service areas by year

To provide a picture of which kinds of treatment are contributing to the observed increase in total services provided per visit, Figure 3.11 shows the mean number of services at a visit by main areas of service. The classification of treatment items into areas is based on the Australian Dental Associations' Schedule of Dental Services. In all three study years restorative, diagnostic, and preventive services were the highest ranked areas of service.

Comparison by year within each of the ten areas listed revealed that significant differences between years occurred in five of the ten areas. Diagnostic services increased over the last half of the study period, preventive services showed small but steady increases across the study period, endodontic services increased over the second half of the period, crown and bridge treatment showed increases in the first half of the period, as did items in the general / miscellaneous area.



Source: Longitudinal Study of Dentists' Practice Activity 1983–84, 1988–89, 1993–94

Figure 3.12: Mean proportion of patients for each age group by year

Figure 3.12 shows the proportion of patients treated from different age groups by year. In all three study years over the period the highest proportion of patients were from the 25–44 years age group. Significant decreases occurred in the proportion of younger patients (aged 12–17 and 18–24 years) and increases occurred for the proportion of older patients (in the 45–64 and 65+ years age groups).

In interpreting these trends, the declining levels of tooth loss being observed among the Australian population have been associated with an increased pool of teeth at risk of dental disease, particularly among older patients. This may result in increased use of services by older patients. These patients may have complex treatment needs which require more services and take longer to complete, providing some explanation for the observed decline in practice productivity and increased services provided. However, increased change-over time between patients associated with sterilisation of equipment and infection control procedures may also be a contributing factor.

3.2.5 Reporting procedures

Reporting procedures for this study have included both publication and conference presentations. Publication has been pursued through both newsletters and scientific articles. This allows for data to be circulated to different target audiences, with brief, more simple presentations distributed through the DSRU newsletter, and more technical analyses being pursued through scientific journals.

Conference presentations provide the opportunity to present new data and receive critical feedback prior to proceeding with publication. Conference presentations based on data from this study have been made to the International Association for Dental Research and the Public Health Association of Australia.

Another form of reporting involves providing results in response to direct requests for information. This may involve new analyses and computer runs to produce output, along with relevant comments regarding the data to aid interpretation.

3.2.6 Priorities

Additional priorities in relation to this study include further analysis and reporting of these findings. In particular, priorities include analysis of age, period, and cohort effects, and further analysis of practice styles. These analyses can utilise the longitudinal nature of the study design.

The current wave of this study was supported by a Research and Development Grant from the Commonwealth Department of Human Services and Health. Longer-term priorities will include the maintenance of the ongoing five-yearly collection in 1998–99, and pursuit of funding support for such activities.

The periodic repetitions of this study provide opportunities not only to follow dentists over time but also to collect a set of core data items which can be maintained across successive waves of the study. When comparing a time series of studies, lack of standardisation can make comparisons over time difficult to interpret. This study has the advantage of employing a standardised collection instrument which promotes comparability.

Apart from the maintenance of a core set of standard data items over time, this study also allows the flexibility of adding new items which may have become important since the last wave of the study. The 1993–94 wave of the study included enhancements to the data collected on service provision to include some additional information on patient characteristics recorded in the service log, such as number of teeth and insurance status.

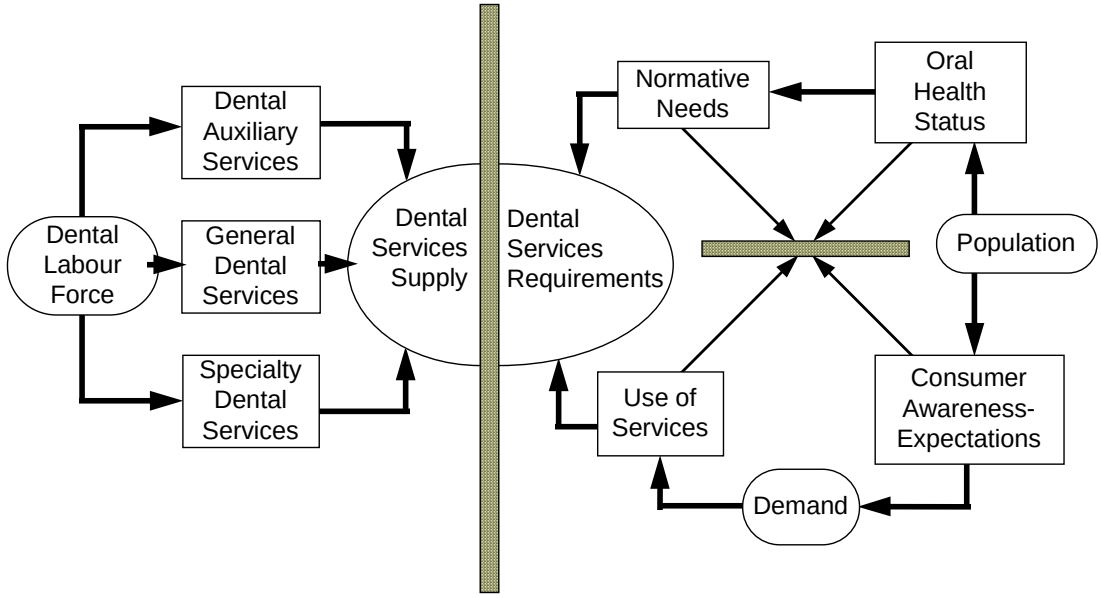
In addition to the types of analyses presented in this section, the data from this study relating to labour force participation and productivity, such as time devoted to work, has also been used by the DSRU in conjunction with other data sets, such as from the Dental Labour Force Registration statistics to estimate levels of full-time equivalent dentists. These estimates have been used in models to produce projections of dentist supply.

3.3 Dental Labour Force Models

This section:

- provides an overview of the main relationships in the supply and requirement for dental services;
- draws attention to available data; and
- raises some pertinent issues which might be given more attention in dental labour force modelling.

3.3.1 Conceptual models



Source: After DeFriese & Barker (1982)

Figure 3.13: Schematic model of supply and requirements for dental services

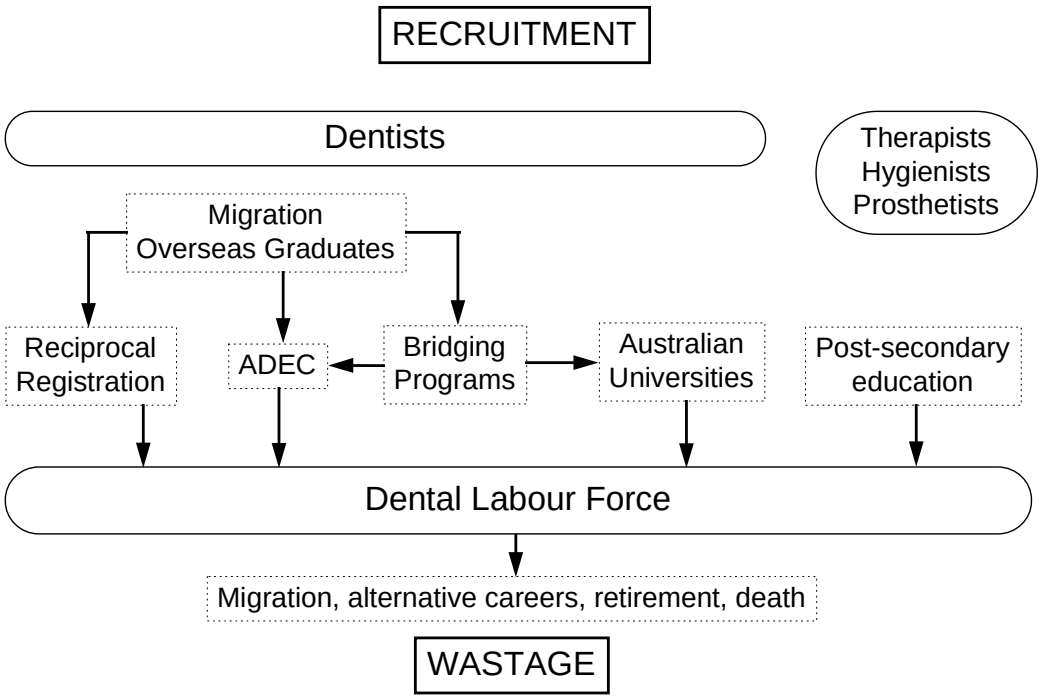
A useful basic schema to relate supply and requirements for dental services, and subsequently, the dental labour force, is the model proposed by DeFriese & Barker (1982). The model, presented in Figure 3.13 begins at the periphery with the head count of the dental labour force and the population, but endeavours to work toward common units of capacity to supply and requirement for dental services. The model illustrates:

- the complexity on the supply side introduced by multiple levels of personnel and the conversion of personnel numbers to services supplied;
- the complexity on the requirement side of reconciling needs and demands for dental services, both of which interact with the other; and
- the interface between supply and requirement, where decisions on the appropriateness of their balance will reflect social, economic and political interests.

A number of aspects of this basic schema need to be examined in more detail.

The dental work force

The dental work force is the most frequently examined aspect of the schema, yet even here there are still a number of shortcomings. The most obvious shortcoming is the almost exclusive preoccupation with dentists, while the dental auxiliaries, including dental therapists, hygienists and prosthetists, have received little attention. [DSRU recently introduced the collection of participation and practice activity data for therapists and hygienists.]



Source: AIHW DSRU

Figure 3.14: Schematic model of recruitment and wastage

Figure 3.14 presents an overview of the recruitment and wastage of dentists from the dental labour force in Australia. Dentists are recruited via three different pathways. The most common pathway is via graduation of Australian citizens or permanent residents from Australian universities. Most graduates are obtaining their first professional qualification, but a small number are overseas qualified dentists graduating from Australian degree programs after undertaking a bridging program. Alternatively, overseas qualified dentists migrate to Australia under a range of skill, family re-union or refugee categories. Overseas qualified dentists from a limited number of countries, United Kingdom, Ireland and New Zealand, gain access to practise in Australia under reciprocal registration arrangements. Overseas qualified dentists from all other countries are required to pass the Australian Dental Examination Council examinations, with or without undertaking a bridging program, or to gain entry into an Australian university bridging program as a preliminary activity to reading for an Australian degree.

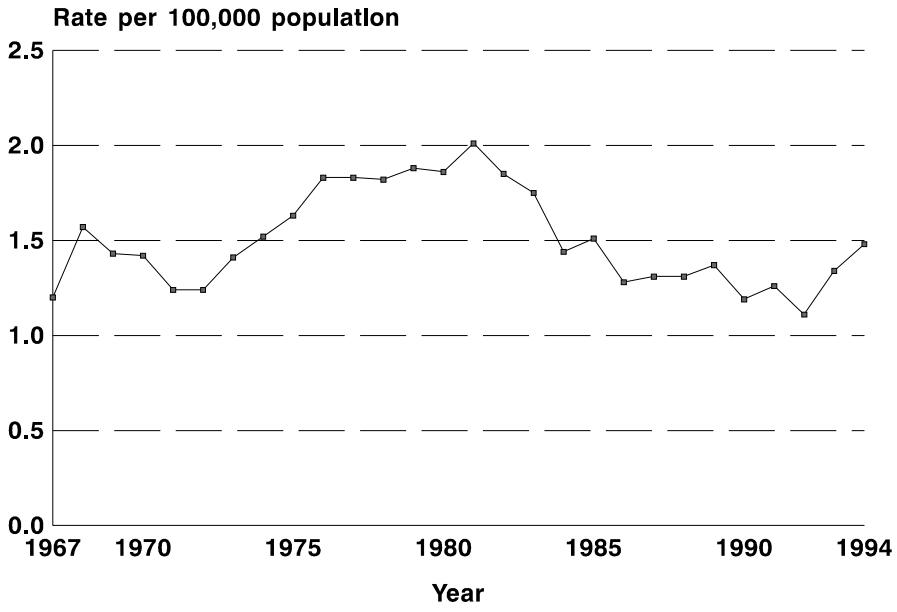
While these are the mechanisms for recruiting dentists to the dental labour force, there are also a range of mechanisms by which dentists are lost or wasted from the labour force each year. These include migration out of Australia, choice of an alternative career, retirement, or death. The dental labour force numbers represent the dynamic interplay of these recruitment and wastage mechanisms. The magnitude of dentist recruitment and wastage varies over time leading to changes in the net growth or contraction of the supply of dentists.

3.3.2 Supply of dental practitioners

In the earlier section on the dental labour force (section 3.1), the composition and practice activity of the current dental labour force was discussed. In this section the levels of course completions and migration of dental practitioners are presented as inputs to a series of projections of dentists that have been developed by DSRU.

Course completions

Figure 3.15 presents course completions as a rate per 100,000 population for the period 1967 to 1994. It can be seen that the graduation levels in the late 1980s and early 1990s have returned to the low levels experienced at the beginning of this time series at between 1.0 and 1.5 course completions per 100,000 population.

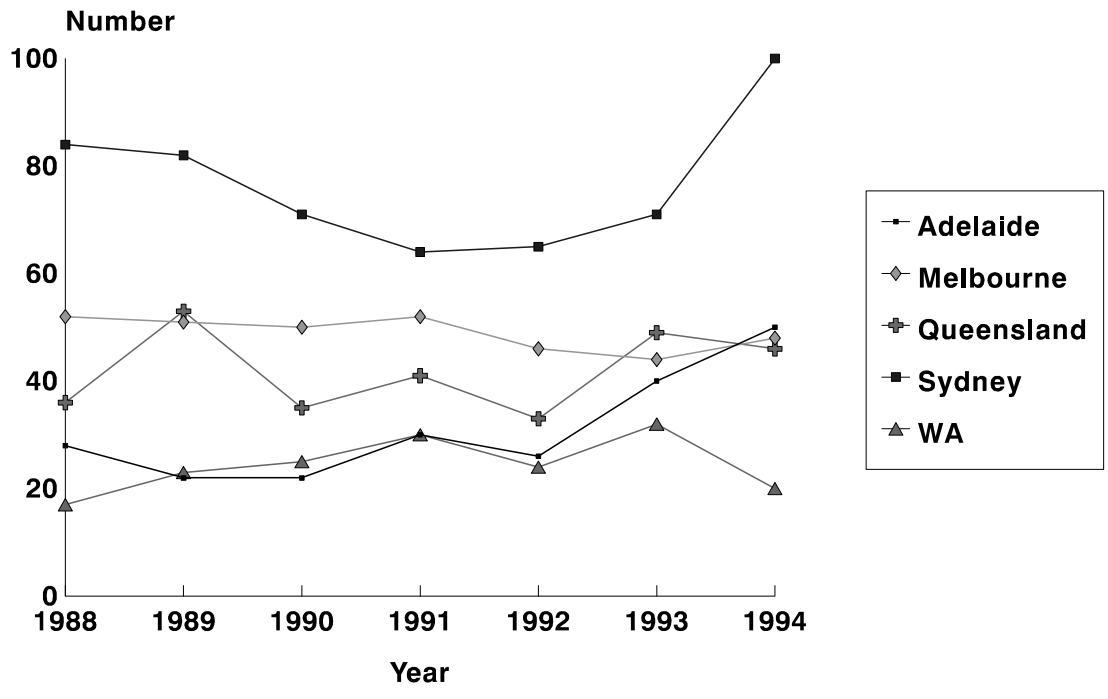


Source: DEET, unpublished data (personal communication, 1995)

Figure 3.15: Dentistry course completions, 1967 to 1994

To examine the course completions in recent years in more detail, Figure 3.16 presents the number of graduates from the Australian universities from 1988 to 1994. It can be seen that over this period The University of Sydney has graduated the highest numbers, while the fewest have graduated from the University of Western Australia. The remaining three universities have produced similar graduate numbers, although The University of Adelaide had fewer graduates in the late 1980s and early 1990s than the University of Melbourne and the University of Queensland. In 1993 and 1994 both Sydney and Adelaide showed major increases in graduate numbers. In the case of Sydney this increase will not be sustained as the undergraduate class sizes have now been reduced and graduate numbers are expected to return to between 60 and 70. It is expected that the graduation levels for Adelaide will remain at this higher level as the undergraduate class sizes have been maintained with full fee paying overseas students and bridging course students (overseas trained dental practitioners) added to the course.

Full fee paying overseas students should not be included in estimates of recruitment. Also caution is required in including bridging course students in estimates of recruitment if they have already been counted in net migration gain estimates.



Source: DEET, unpublished data (personal communication, 1995)

Figure 3.16: Dentistry course completions by university, 1988 to 1994

Table 3.7 presents course completions by sex for each year from 1988 to 1994. It is somewhat surprising to observe that there have been far more male graduates than female graduates in recent years. Only in 1992 did the percentage of female graduates reach over 40% and this was the year of lowest graduate numbers.

It can also be seen from this table that, with the exception of 1994, the numbers of course completions were in a narrow range of 194 to 236 (averaging 216). The situation in 1994 was inflated by the large number of Sydney graduates. Accordingly, it can be expected that over the next few years the number of graduates will be approximately 235 per year.

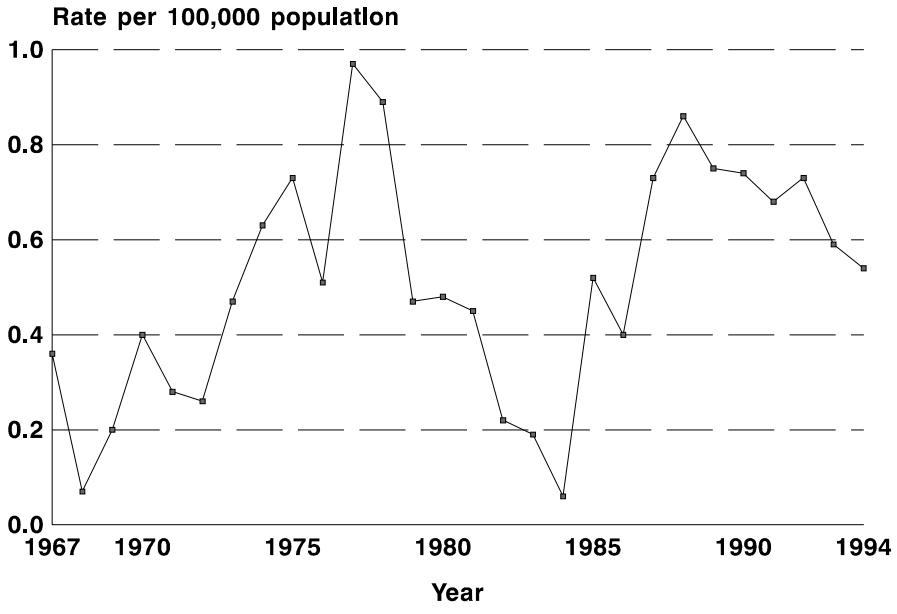
Table 3.7: Course completions by university, 1988 to 1994

Year	Male	Female	Total	% Female
1988	141	76	217	35.0
1989	146	85	231	36.8
1990	130	73	203	36.0
1991	143	74	217	34.1
1992	114	80	194	41.2
1993	148	88	236	37.3
1994	n.a.	n.a.	264	

Source: DEET, unpublished data (personal communication, 1995)

Overseas migration

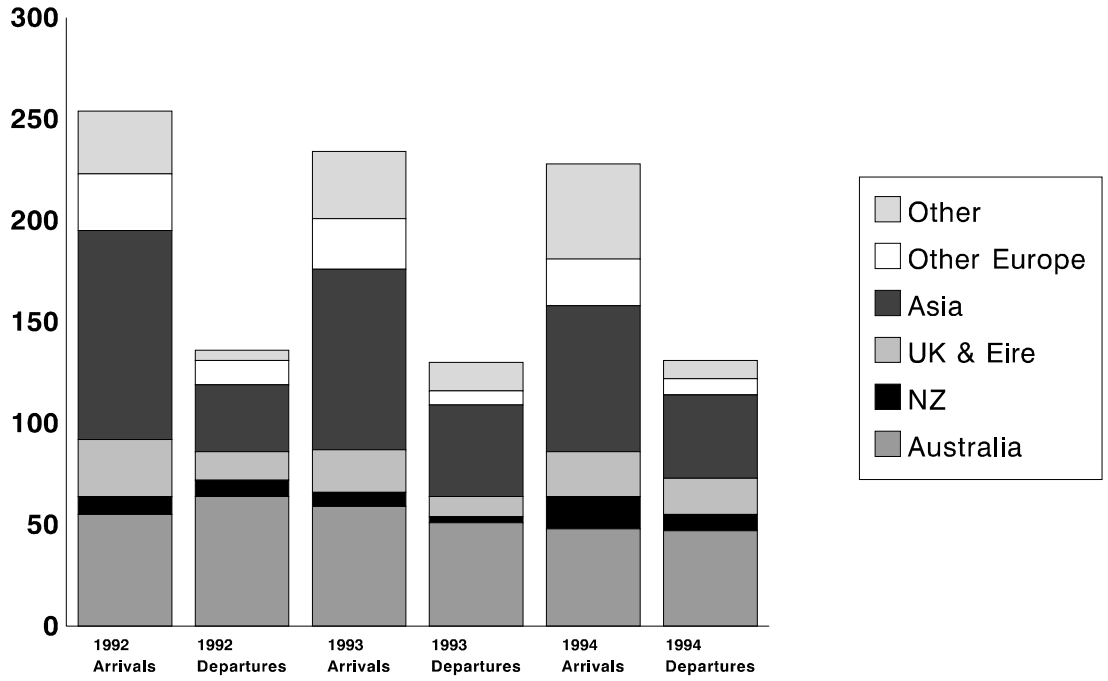
There have been dramatic differences in the rate of net overseas migration in the period 1967 to 1994. From Figure 3.17 it can be seen that in the late 1960s / early 1970s and the early 1980s there were periods of extremely low net overseas migration gain of dental practitioners. Relatively higher rates occurred in the late 1970s and again in the late 1980s.



Source: DEET, unpublished data (personal communication, 1995)

Figure 3.17: Dentists' net permanent/long-term migration, 1967 to 1994

In recent years only overseas dentists from the United Kingdom, Ireland and New Zealand have been granted registration on the basis of their initial qualification. Dental practitioners from all other countries gain registration only after being granted a certificate from the Australian Dental Examining Council (ADEC). [In 1996 this function was transferred to the Australian Dental Council.] Figure 3.18 presents the county of birth of arrivals and departures. It can be seen that there are similar levels of arrivals and departures for the Australian, New Zealand and the United Kingdom & Eire migrants, while arrivals far exceed departures for the other countries of birth. Accordingly, it can be seen that the current level of net migration makes a minor contribution to the supply of dental practitioners.



Source: ABS, unpublished data

Figure 3.18: Migration by country of birth, 1992 to 1994

In recent years the number of ADEC passes (Table 3.8) has been close to 30 per year, although there were fewer than this in the early 1980s, and the highest number in the series presented was 37 in 1990. It can be seen that although the rate of net overseas migration has experienced relatively large fluctuations, the recent examination of arriving dentists by country of birth and ADEC passes would indicate that this area has contributed to the supply of dental practitioners in a more stable manner.

Table 3.8: ADEC passes, 1983 to 1994

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
# Sat	14	19	23	24	46	58	47	78	53	36	85	61
# Passed	7	8	13	13	27	23	25	37	26	25	30	30

Source: DEET, unpublished data (personal communication, 1995)

Recruitment summary

When these data are combined it can be seen from Table 3.9 that the specific areas of the recruitment of dental practitioners have totalled 225, 289 and 307 respectively in the last three years. However, these totals have not been discounted for the twenty or so full fee paying overseas graduates or double counting of overseas qualified dentists completing the bridging program and BDS at The University of Adelaide. Further, in the future this level of recruitment can be expected to have approximately 35 less graduates as Sydney returns to approximately 65 graduates each year. Accordingly, these recent data would lead to the conclusion that annual recruitment of approximately 250 to 260 is likely if there are no changes to the existing patterns of education, migration and certification of overseas trained dentists.

Table 3.9: Summary of recruitment, 1992 to 1994

Year	Course completions	Net migration [Aust, NZ, UK & Eire]	ADEC	Total	Rate per 100,000
1992	194	6	25	225	**1.29**
1993	236	23	30	289	**1.64**
1994	264	13	30	307	**1.72**

Sources: DEET
ABS unpublished data

3.3.3 Projections of dental practitioners

Projection procedures

In 1994 DRSU prepared a series of projections based on the 1992 National Dental Labour Force Data Collection and annual recruitment and wastage from the dental labour force over the preceding four years. The semi-markov model used was based on the work of Bartholomew and Forbes *(Statistical Techniques for Manpower Planning*, John Wiley & Sons, Chichester, 1979) and had the following characteristics.

- Projections were prepared separately for male and female dentists.
- The age (five year ranges) by sex distribution at 1992 was used as the base year.
- Age-specific annual recruitment and wastage were determined from the 1988 to 1992 National Dental Labour Force Data Collection.
- An annual recruitment total of 300 was used.
- Conversion to full-time equivalent (FTE) was made using results from the Longitudinal Study of Dentists' Practice Activity.

The model takes the base age distribution and calculates the population of dentists for each subsequent year by ageing the distribution by a year, deducting a percentage of each age group in accordance with the wastage rates for each age group and adding the recruitment numbers for each age group.

Projection results

The findings of the projection series are presented in Table 3.10, Figure 3.19 and Figure 3.20. If the levels of recruitment and wastage rate remain constant then it can be

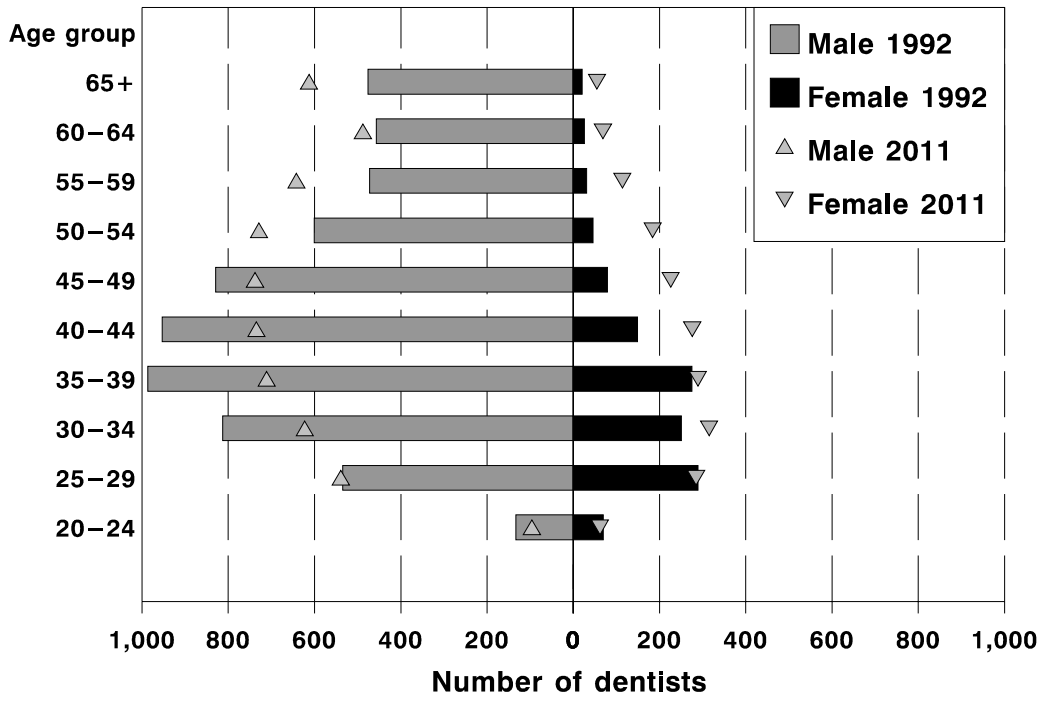
seen that the number of practising dentists will increase to a peak of 7,838 in 2006 before steadily decreasing to a situation where at the end of this series (2031) there would be approximately the same number as present. It can also be seen in the following table that the percentage of female dentists will gradually rise from one in six (16.5% in 1992) to one in four (25.3% in 2016).

Table 3.10: Dentist projections, 1992 to 2031

Year	Male	Female	Total	5-year change	% Female
1992	6256	1237	7493	n.a.	16.5
1996	6265	1425	7690	197	18.5
2001	6210	1619	7829	139	20.7
2006	6069	1769	7838	9	22.6
2011	5912	1876	7788	-50	24.1
2016	5756	1948	7704	-84	25.3
2021	5620	1992	7612	-92	26.2
2026	5512	2018	7530	-82	26.8
2031	5433	2033	7466	-64	27.2

Source: AIHW DSRU

The change in the age distribution is evident from Figure 3.19 where the large numbers of dentists who are currently aged in their 30s and 40s will have either retired or will be close to retirement in 2011. The assumption of a steady state recruitment (of 300) then provides fewer dentists to replace these age cohorts.



Source: AIHW DSRU

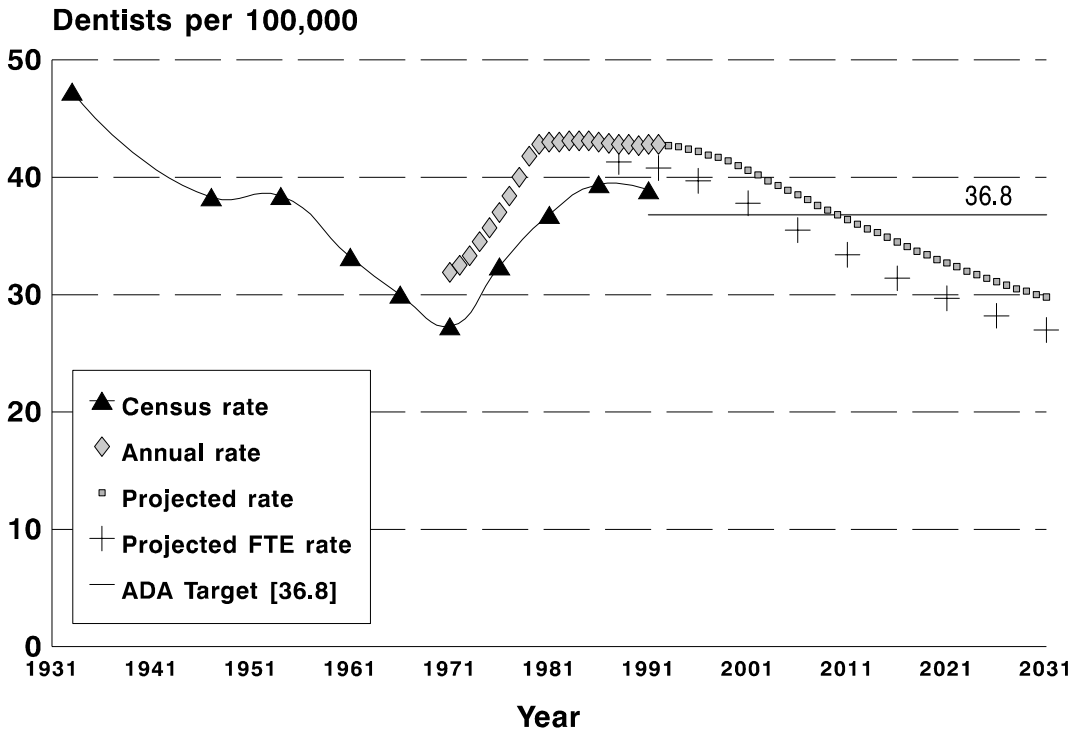
Figure 3.19: Dentists' age by sex practising 1992 and projections 2011

Of the OECD countries, Australia is second to Canada in per capita population growth. By 2031 the Australian Bureau of Statistics (ABS) projections of the estimated resident population range from between 23.9 to 25.2 million (ABS, Catalogue Number

3222.0). Accordingly, no matter what outcome, there will be at least an increase of six million in Australia's population. The DSRU dentist projection series was converted to the rate of dentists per 100,000 using the ABS median population projection series (Series C). It can be seen from Figure 3.20 that over the period of this projection series, if recruitment and wastage remain unchanged, then the rate will decrease from 43 per 100,000 in the 1980s / early 1990s down to approximately 30 per 100,000 in 2031.

This figure includes the historical data derived from the Australian Population Censuses back to 1933, annual rates prepared by Professor Barnard from 1971 and continued by DSRU from 1988, the Australian Dental Association (ADA) target of 36.8 dentists per 100,000 population (or 1 dentist per 2,720 population), the projection series and the FTE dentist projection series. This figure shows that over this 100-year period there are two large movements downwards: firstly, in the 1950s / 1960s, and secondly, over the period of the projection series; and a large movement upwards in the 1970s.

In 1992 the ADA Dental Health Services Committee established a future target of 36.8 dentists per 100,000. It can be seen that this projection series would intersect the target in approximately ten years, while the FTE rate will achieve this target a little earlier. However, the projection and FTE series will continue to decline below the ADA target rate if the levels of recruitment and wastage remain at the current levels.



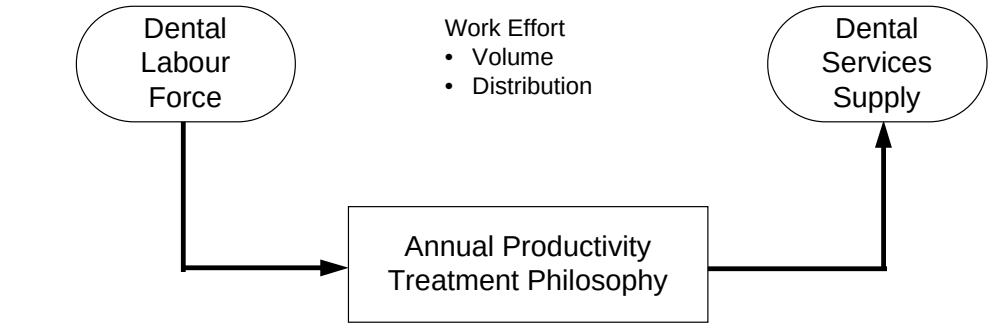
Sources: ABS unpublished data
ADA Dental Health Services Committee, 1990
AIHW DSRU

Figure 3.20: Dentists in Australia, rate per 100,000, 1933 to 2031

3.3.4 Issues in modelling supply

In introducing the basic schema to relate supply and requirements for dental services, a number of complexities on the supply side that derive from the multiple levels of personnel and the conversion of personnel numbers to services supplied were outlined.

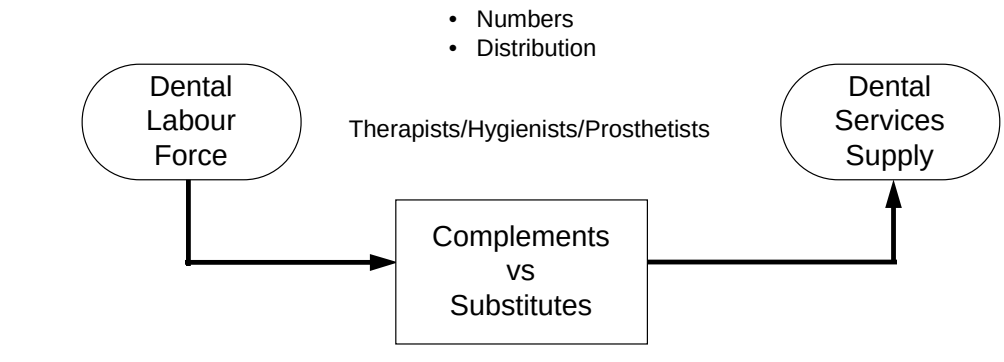
Figure 3.21 presents a simplification of the relationship between numbers in the dental labour force and dental services supply. This relationship is modified by the annual productivity and treatment philosophy of dentists. Annual productivity itself is the product of both participation (hours per year) and productivity (visits per hour). These areas have been examined in the Longitudinal Study of Dentists' Practice Activity from which age- and sex-specific estimates of annual productivity are available. These estimates can be applied to any given number and distribution by age and sex of dentists in the labour force. A further aspect of dental services supply is the characterisation of supply in terms of the total volume and distribution of labour effort across different areas of dental service, e.g. prevention, endodontics or intervention level, i.e. primary, secondary and tertiary. To convert services to common units a work effort or relative value unit has been modified from earlier Canadian work (Clappison et al., 1965).



Source: AIHW DSRU

Figure 3.21: General dental services

An important component to understanding supply is the role of auxiliaries in producing dental services. Figure 3.22 illustrates the key issues that need to be addressed. These are the numbers and age and sex distribution of auxiliaries who are active in the supply of dental services, and an understanding of the extent to which each type of auxiliary, therapist, hygienist or prosthetist, complements or substitutes for a dentist.

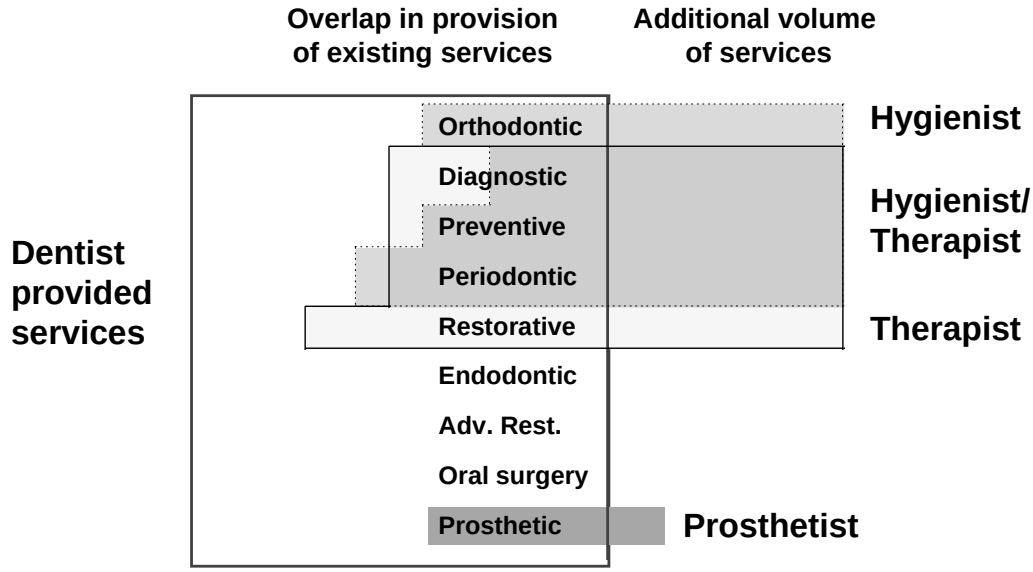


Source: AIHW DSRU

Figure 3.22: Auxiliary dental services

Improved data on the numbers and distribution of auxiliaries is planned through annual collections of practice activity data direct from each type of auxiliary. However, the extent to which auxiliaries complement or substitute for a dentist has received little direct study in Australia. Figure 3.23 illustrates the concept of substitutes and complements in the supply of dental services for therapists, hygienists and prosthetists. The degree of substitution of auxiliary for dentist in the production of different areas of services is represented by the overlapping areas. The degree of complementary activity in the production of additional services is represented by the extension of the area of different services. However, this figure is purely schematic. Little empirical data exist to assess the extent to which each auxiliary is substituting or complementing a dentist. This is clearly an area for further supplementary research.

In order to proceed with the modelling of supply of dental services it is necessary to limit the projecting of supply to services that can be provided by general practice dentists. The impact of specialist dentists is not distinguished from general practice dentists. Specialist dentist numbers are included in the supply of dentists and converted to the supply of dental services (dental visits) together with general practice dentists. The role and input of auxiliaries is not included in the projection of supply of services. This necessarily underestimates the supply of dental services, but, because of both the relatively low number of auxiliaries in comparison to dentists and the mixed substitution or complementary input in the supply of services, this underestimation may not be marked.



Source: AIHW DSRU

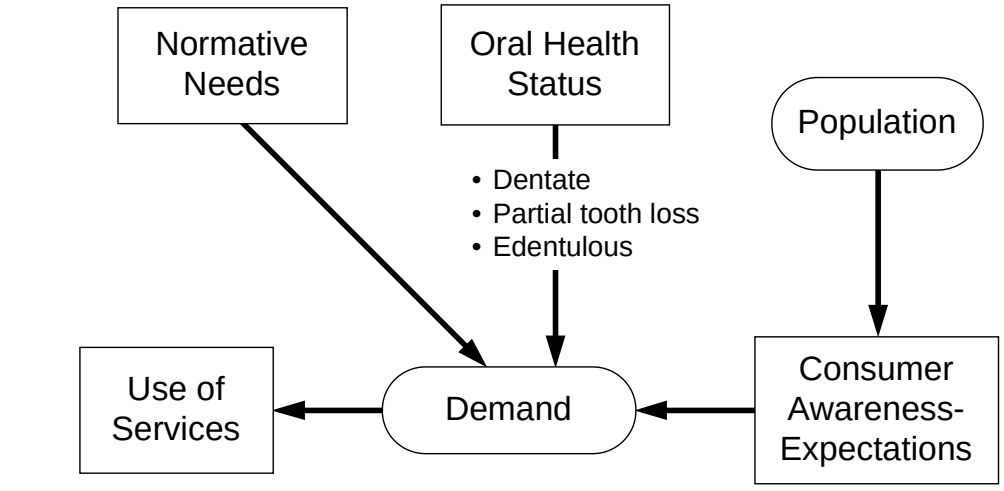
Figure 3.23: Substitutes versus complements

3.3.5 Issues for modelling requirement for services

Oral health status, needs and demand for dental services interact to create the requirement for dental services. The complexity and conundrums involved in these interactions are daunting. For instance, while it is intuitively appealing to link improved oral health status and reduced restorative needs to lower demand for services it is also observed that:

- high socioeconomic groups with lower disease experience use services more than low socioeconomic groups; and
- improvements in child oral health have been accompanied by increasing percentages of children making visits (Davies et al., 1985; Waldman, 1989).

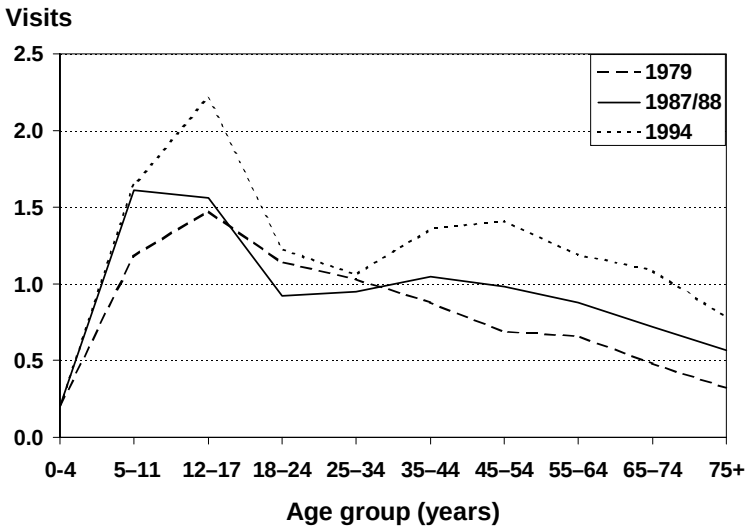
Efforts to model the requirement for dental services are basically reductions of this complex situation to understandable and reasonably simple relations between population estimates, need and demand for dental services. Needs-based approaches use either direct or indirect estimates of dental need, tempered by expected effective demand for dental services. Demand-based approaches use data on effective demand (use of services) adjusted for changes in influential factors such as dental need. The approach used in this model of the requirement for dental services is a demand-based, needs modified projection. The basic factors are presented in Figure 3.24. The model begins with the population, whose demand for dental services is shaped primarily by consumers' awareness and expectations and by the underlying oral health status and normative needs. Demand is satisfied by the use of services, which can be measured in dental visits, the same unit of measurement used for the capacity to supply dental services.



Source: AIHW DSRU

Figure 3.24: Modelling of requirement for dental services

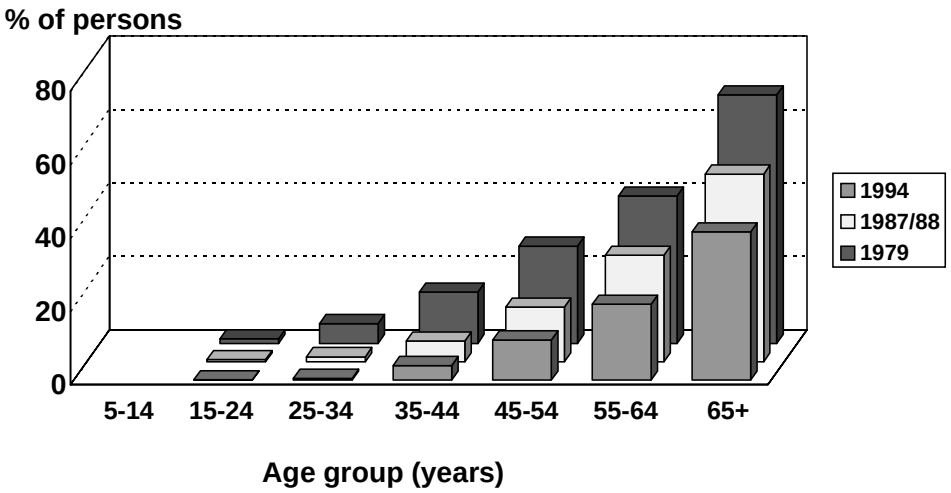
Demand for dental services by age group can be tracked from three data sources: the ABS Special Supplementary Survey 1 in 1979; the National Oral Health Survey of Australia in 1987–88; and the National Dental Telephone Interview Survey in 1994. Figure 3.25 presents the changing per capita demand. Per capita demand increased for all age groups other than 0–4 and 25–34-year-olds. The proportional increases in per capita demand were substantial for all adult age groups over 35 years.



Sources: ABS Special Supplementary Survey 1, 1979
National Oral Health Survey of Australia 1987–88
1994 National Dental Telephone Interview Survey

Figure 3.25: Per capita demand for dental care by age

The changing pattern of tooth loss and edentulism has a substantial influence on per capita demand. Per capita demand among the dentate is approximately three times as high as that of contemporary edentulous adults. Therefore, changes in the prevalence of edentulism are linked to changes in demand. Figure 3.26 illustrates the changes occurring in the age-specific prevalence of edentulism in Australia. There have been substantial declines in the prevalence of edentulism for middle-aged and older adults. For all age groups 35 and over, the projected decline in edentulism leads to increases in the projected per capita demand.



Sources: ABS Special Supplementary Survey 1, 1979
Barnard PD. National Oral Health Survey of Australia 1987–88
AIHW DSRU. 1994 National Dental Telephone Interview Survey

Figure 3.26: Edentulism 1979–1994

3.3.6 Priorities

A number of areas need to be considered in labour force models.

- The sensitivity of the projection series to changes in recruitment and wastage.
- The impact of different modelling methods and different inputs.
- The need to examine the characteristics of under-graduates and particularly the age of graduates.
- Separate investigations of the supply and requirements in rural areas.
- The impact of technology on demand.
- Examination of the complementary and substitute nature of the dental auxiliary labour force.
- Monitoring the requirement for dental services.

3.3.7 References

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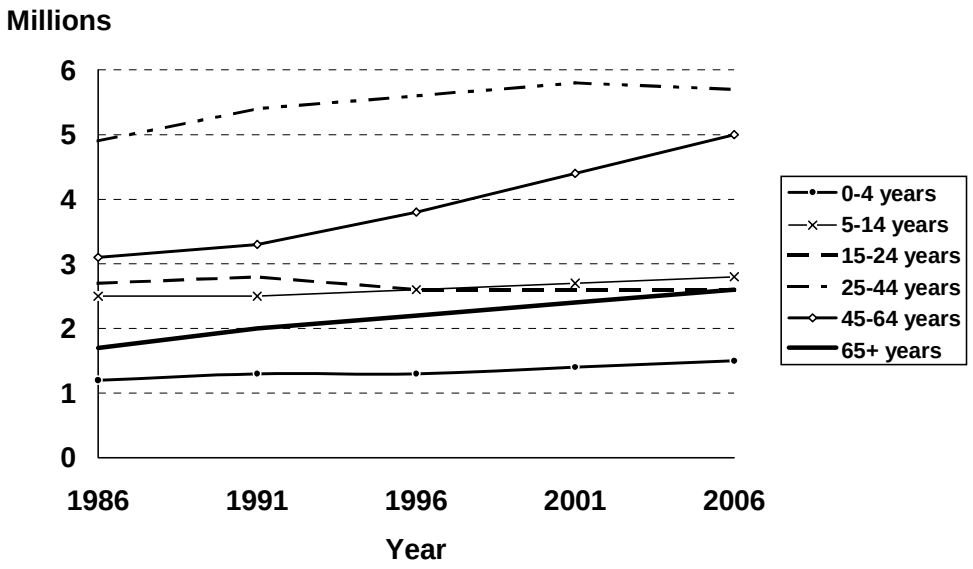
4 Access to Adult Dental Care

4.1 The changing environment

Dental public health in Australia has had a traditional focus on children. Concern over the oral health of children led to both the fluoridation of many public water supplies and the clinical trial and introduction of toothpaste with fluoride. Shortages of dental labour force were associated with difficulties in access to dental care for children, addressed through the development of the School Dental Services. However, a combination of changes in demography and the success of public policy on improving the oral health and access to dental care enjoyed by children has seen the focus of dental public health shift to a greater balance between children and adults.

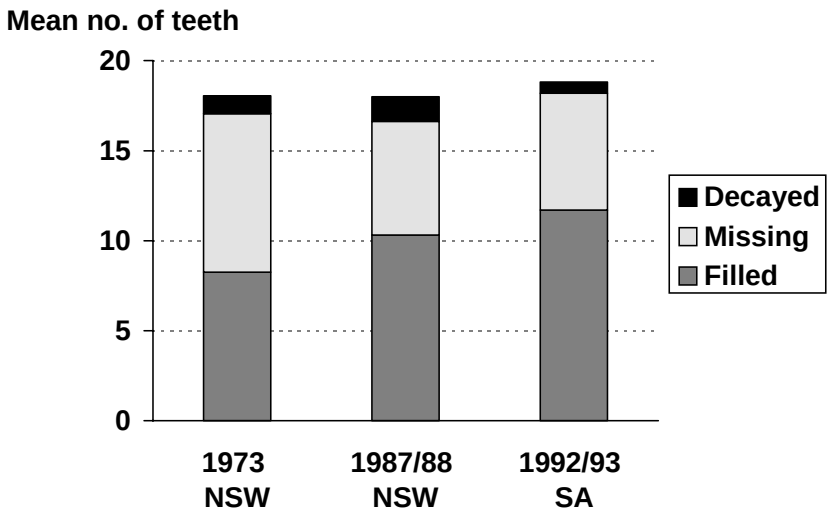


Sources: 1986–1991 ABS 3201.0
1996–2006 ABS 3222.0 Series C

Figure 4.1: Population of Australia 1986 to 2006

Figure 4.1 presents a line graph for the Australian population by age group across the period 1986 to 2006. Several demographic shifts are important in shaping the environment for dental public health. First, there is a small increase in the absolute numbers of 0–4, 5–14 or 15–24-year-olds across the 20 year period. This stability in number maintains a need for the prevention and treatment of oral diseases in children and young adults. Second, the absolute numbers and relative increases in the size of the 25–44 and 45–64 years old age groups, and the smaller absolute size, but large relative increase in the 65+ years old age group over the period clearly draws attention to the lack of information available to assist policy development on adult and older adult oral health and access to dental care.

Adults' oral health has not shown the same dramatic improvements as seen among children. The one area of improvement has been a marked decline in the prevalence of edentulism. Figure 3.26 illustrated the decline in the prevalence of edentulism by age-group from 1979 to 1994. In all adult age groups 25 years and over there has been a large decrease in the prevalence of edentulism. Adults are retaining their natural teeth, and greater numbers of them. Edentulism and tooth loss have always reflected the interplay of oral disease, patient access to care preferences and provider treatment philosophy. The decline in edentulism has more to do with patient and provider expectations than to changes in the experience of oral disease. Hence, a decline in the prevalence of edentulism need not be matched by improvements in other measures of oral health.



Sources: International Collaborative Study I. Sydney and surrounds
National Oral Health Survey of Australia 1987–88 (unpublished data)
AIHW DSRU, Research Database on Dental Care in Australia

Figure 4.2: Time trend for 35–44-year-old Australian adults

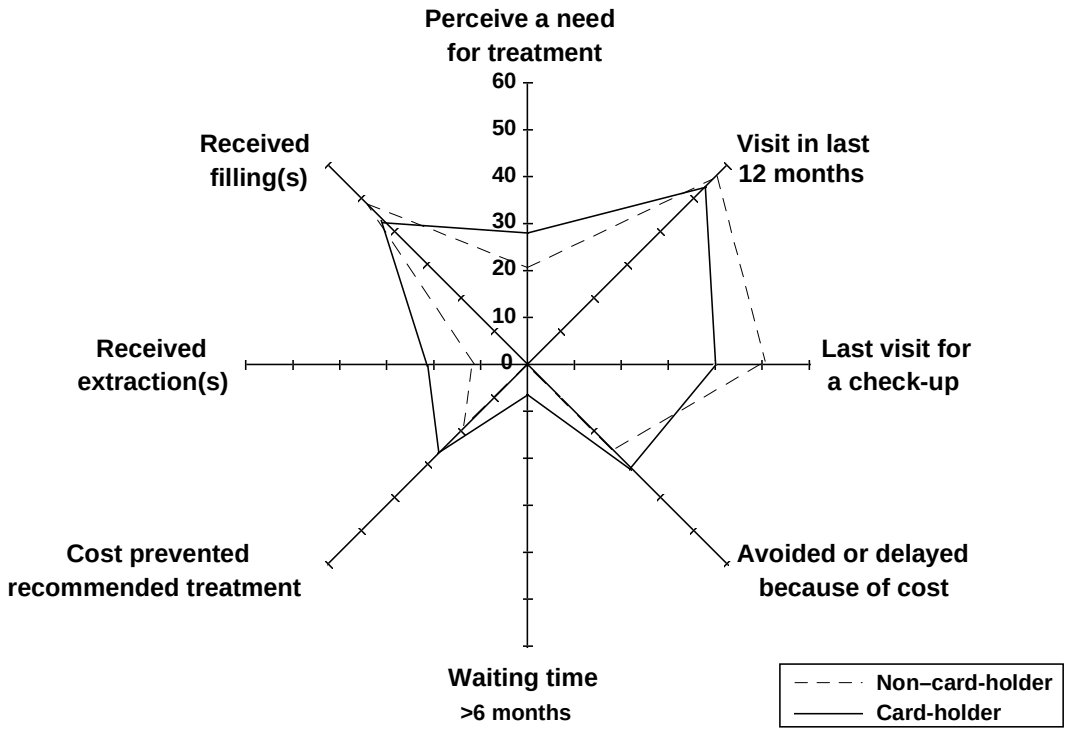
Figure 4.2 illustrates the lack of improvement in caries experience in 35–44-year-old Australian adults over a comparable period, 1973 to 1992/93. Total caries experience, measured by the number of decayed, missing and filled permanent teeth, changed little over the period. This is despite these 35–44-year-old adults spending some proportion of their lifetime in areas with fluoridated water supplies and using toothpaste with fluoride.

In effect, the status of many 35–44-year-olds was caste in their childhood and young adult years. What has changed among these cohorts of middle-aged adults is the management of their disease experience. Over the period there is an increase in the number of filled teeth and a decrease in the number of missing teeth. Untreated decayed teeth are a small proportion of the cumulative caries experience at all three points in time.

Middle-aged adults are maintaining more teeth, but those teeth still had widespread and extensive disease experience. It is therefore not surprising that adults per capita

demand for dental care has increased over time. These adults are moving from an era where the emphasis was on keeping teeth for life to another era where the emphasis is on keeping the life in teeth. Such a community perspective is entirely compatible with overall increases in demand for dental care. Figure 3.25 illustrated the change in age-specific per capita demand over the period 1979 to 1994. Children have high per capita demand, which increased somewhat over the period. Per capita demand falls away among 18–24 and 25–34-year-olds, where there is little evidence of change over the period. All adult age groups 35 years and over show substantial increases in per capita demand between 1979 and 1994. Adults, who are more likely to be dentate and retain more teeth, are using dental services at greater rates.

However, two issues are still fundamental to shaping the public policy response. First, while per capita demand among adults has increased, it is still well below the rate of children. The per capita demand among adults remains at levels below what has been expressed by children in order for them to satisfy their preventive and curative needs. Second, the mean per capita demand hides wide variation in access to dental care. This is illustrated in Figure 4.3 through a simple comparison of health card versus non–card-holders.



Source: AIHW DSRU. 1994 National Dental Telephone Interview Survey

Figure 4.3: Radar chart of card-holders versus non–card-holders

Figure 4.3 indicates that a lower percentage of card-holders perceive a need for treatment, visited in the last 12 months, or last visited for a check-up. Further, a higher percentage of card-holders avoided or delayed visiting because of cost, waited longer than 6 months for general dental care, found cost prevented them proceeding with recommended treatment, and received extractions at their last visit. In contrast, a

lower percentage of card-holders received restorations at their last visit than non–card-holders. Health card-holders are at a dental disadvantage.

For this disadvantage to be minimised or eliminated DSRU needs to give a new priority to developing data collections for:

- documenting the burden of disease and access to care among adults;
- assisting public dental policy in the transition from child to adult target groups; and
- assisting in the control and evaluation of new programs for adult dental care.

The focus of those data collections needs to be on equity in access to dental care. Access is a broad concept that includes the availability, obtainability and comprehensiveness of dental care. Hence, there is a requirement for data collections among adults that can identify the following types of information:

- who uses dental care;
- when do they use dental care;
- where do they use dental care;
- why do they use dental care;
- what is their oral health;
- what services do they receive; and
- how satisfied are they with the dental care they receive?

This information is needed to understand the dental care process patients of the public dental services and make comparisons with the general population. It is this set of priorities, focus, and types of information that has shaped the activities of DSRU in the monitoring and evaluation of adult access to dental care described in the following sections.

4.2 National Dental Telephone Interview Survey

4.2.1 Introduction

In 1992 the National Health Strategy recognised a lack of availability of detailed time series data on the use of dental services and the oral health status of the Australian adult population. They also identified that the past collection of such information had been a relatively ad hoc process. The poor quality and lack of relevant data was seen to have limited the capacity to formulate constructive targets and to have impeded policy development and program planning. It was therefore suggested that a more systematic approach to data collection be implemented.

As a result of the recommendations of the National Health Strategy, DSRU undertook in 1992–93 the development of the Research Database on Dental Care in Australia. This was the beginning of a more systematic and integrated effort in the collection of data related to adult oral health. The National Dental Telephone Interview Survey (NDTIS)

has since become a part of this effort for improved data among the Australian adult population.

4.2.2 Purpose

The purpose of the NDTIS data collection is to:

- collect basic features of oral health and dental care within the Australian population;
- provide information on the broader parameters of dental health and access to services;
- monitor the extent of social inequalities within the dental sector; and
- investigate the underlying reasons behind dental behaviours, and the consequences of these behaviours.

4.2.3 Methods

Data items

The telephone survey collects a wide range of data items and includes data on:

- Oral status
  - dentate status
  - the number of missing teeth
  - denture use
- Visit details
  - time since last dental visit
  - place of dental visits in the last two years
  - reason for, and the place of, the last visit
  - number of visits, extractions, scales, and fillings, in the last 12 months
  - reasons for extractions
  - time waited for the last dental visit
  - reasons why persons eligible for public-funded dental care received care in the private sector
  - usual reason for, and frequency of, dental visits
- Perceived needs
  - perceived need for a dental visit
  - types of treatment perceived to be needed
  - urgency of the visit
  - likelihood of making the visit
- Social impact of dental health
- Hardship and affordability difficulties associated with dental care
- Sociodemographic and economic details
  - age and sex
  - residential location
  - card-holder status
  - indigenous status, language spoken, and country of birth

- educational status
- annual household income
- dental insurance

Survey design

The NDTIS is a stratified random sample of Australian residents aged five years and over. Telephone numbers are selected at random from the electronic white pages by DSRU.

To date there have been two sampling strategies that have been implemented.

- In 1994 there were thirteen separate regional samples drawn – each of the five mainland State capital cities formed their own region; the five non-capital city regions of the mainland States formed another five; and Tasmania, the Australian Capital Territory and the Northern Territory formed the remaining three regions.
- In 1995, a smaller sample had been planned and there were only eight regional samples defined, one region corresponding to each State or Territory.

In each of the surveys the number of telephone numbers initially sampled from each region was determined so that there was an expected yield of 600 participants per region.

Data collection and analysis

DSRU directly manages and implements all phases of the data collection process. The NDTIS runs from early January through to March or early April. Around thirty interviewers are employed for the survey. Interviews are primarily conducted between 2 p.m. and 9 p.m. on weekdays, and between 10 a.m. and 4 p.m. on Saturdays, South Australian time. In 1995 a completed interview took an average of 9 minutes, and the majority of interviews took between 5 and 15 minutes. On average, an interviewer completed 3.1 interviews an hour.

Interviews are conducted on eight computer workstations using computer-assisted telephone interviewing techniques – whereby questions are read directly from the computer screen, and responses are entered directly onto the database. Question sequencing is fully automated, and skips questions that do not need to be asked based on the responses to previous questions. For example, people who respond that they are edentulous are not later asked for the number of teeth they have. Therefore the computer program ensures that questions that should not be asked are never included, and questions that should be asked are never missed. Data are checked at the time they are entered to ensure that only valid responses are entered. A response to a question must be entered to allow the program to proceed, thus the answer to one question cannot be entered inadvertently in another question's response field (as may happen in a paper-based survey). The need for subsequent scanning or data entry is eliminated through direct data entry at the time of the interview.

Before telephoning households, a primary approach letter explaining the nature and purpose of the study is sent to the household about 10 days prior to the initial phone

call. This is to inform people of the impending phone call and to legitimise the survey, thus improving the participation rate. Up to six calls on differing days and times are attempted to make initial contact with the household (excluding calls that are engaged). After six consecutive calls resulting in no answer the number is then abandoned. Once contact with a household is achieved, a person aged five years or more is chosen at random from the household. This is achieved by identifying the person with the last birthday who is aged five years or more and similarly the person with the next birthday—one of these two people is then chosen at random by the computer as the target (a person who is the sole occupant of the house is automatically the target for that household). If the target person is at home they are interviewed then (if possible), otherwise a call back time is arranged and up to a further six calls are made in an attempt to contact the target person. Proxy interviews are conducted when the person is aged 15 years or less, or if the target person is unable to answer questions over the phone, if they were deaf for example. Some interviews are conducted in languages other than English when possible. If the target person has been unable to be contacted a proxy interview may be conducted as an absolute last resort.

Preparation

After data collection the database is prepared for analysis. This involves weighting the data to correct for biases that result from the sampling design and the differing response rates by age and sex. A sole occupant of a household is automatically the target, whereas a person from a household with five persons aged five years or more only has a 20% chance of being selected as the target person. This differing probability of selection results in an under-representation of persons from larger households; weighting by household size corrects for this problem. The data are then weighted for the region from which the person lives. For example, a person from New South Wales represents a far greater number of people than does someone from a less populous State or Territory, so the data are weighted to reflect this. Finally the data are weighted by the age and sex of the respondent so that the weighted data matches the age and sex distribution of the estimated resident population of each region as defined by the Australian Bureau of Statistics (ABS).

Direct data entry and automated question sequencing lead to little or no chance of errors occurring, such as missing a question that should have been asked, or entering answers in the response field of another question. Therefore, the amount of data cleaning required is minimal when compared with the possible inconsistencies that can occur when using optical mark read forms or mailed questionnaires. Occasionally people may call back after the interview to inform us of misinformation provided during the interview. For example, they actually have five teeth missing in their upper jaw, and not four as they reported during the interview. This is recorded and corrected before the data are analysed. Before analysis can begin new variables must be computed. For example, variables for differing age group classifications are calculated from age.

After weighting the data and making some minor corrections the data is then ready to be analysed for reports and information requests. Most analyses conducted are descriptive in nature, although some multivariate analyses are performed to control for potential confounders such as age. Over time it is expected that the number of more sophisticated and multivariate analyses performed will increase.

Participation

As was discussed above, a larger sample size was obtained for the 1994 survey, with around 4000 more people sampled in 1994 than in 1995. This was the result of thirteen regional samples in 1994 and only eight in 1995. Excluded phone numbers consist of numbers that were out of service and numbers that were out of scope, for example numbers not serving as a residential number, businesses or nursing homes. Non-contact numbers are those at which an answer was never obtained, or a household in which the target person was never able to be contacted and interviewed. Many of these numbers are likely to be numbers at which no-one was residing during the period of the survey. Most refusals occur at the household level before a target person was identified, with the minority of refusals occurring after the identification of the target person. The participation rate in 1994 was 71.6%, and in 1995 it was 69.8%. These participation rates include the non-contacts working against the participation rate. If non-contacts are ignored the participation rates for 1994 and 1995 are 75.4%, and 75.2% respectively.

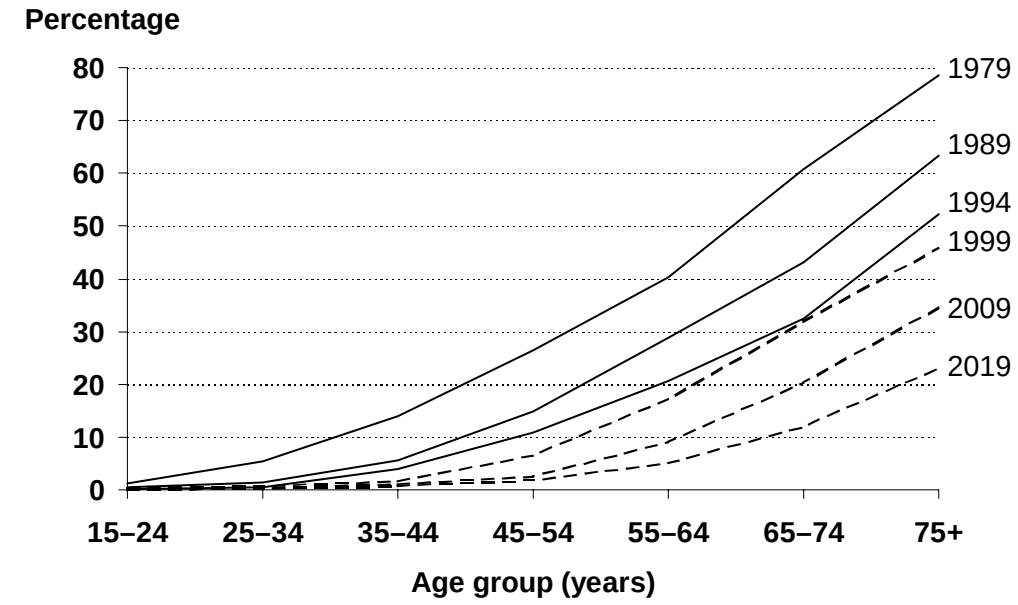
Table 4.1: Participation in the 1994 and 1995 National Dental Telephone Interview Surveys

	1994	1995
Number of telephone subscribers sampled	12522	8509
Excluded	1373	1204
Sub-total	*11149*	*7305*
Outcome		
Non-contact	557	526
Refusals	2605	1678
Participants	7987	5105
Participation rate	71.6%	69.8%

Sources: 1994 National Dental Telephone Interview Survey
1995 National Dental Telephone Interview Survey

4.2.4 Key results

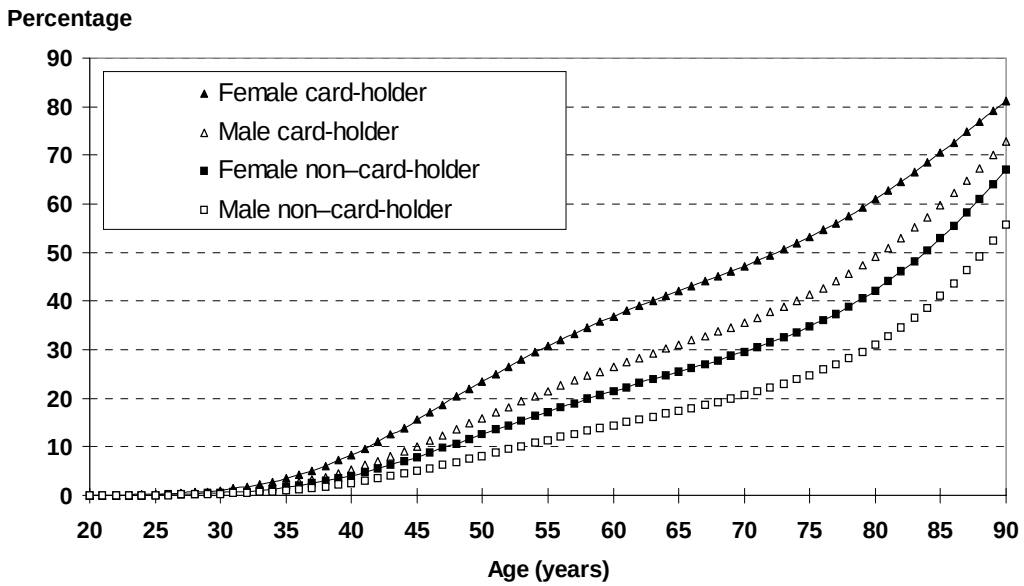
In this section a variety of results from the NDTIS will be presented, using a wide range of the data items collected.



Sources: 1979 Special Supplementary Survey
1987–88 National Oral Health Survey of Australia projections
1989–90 National Health Survey
1994 National Dental Telephone Interview Survey

Figure 4.4: Projections of the percentage of Australians with no natural teeth

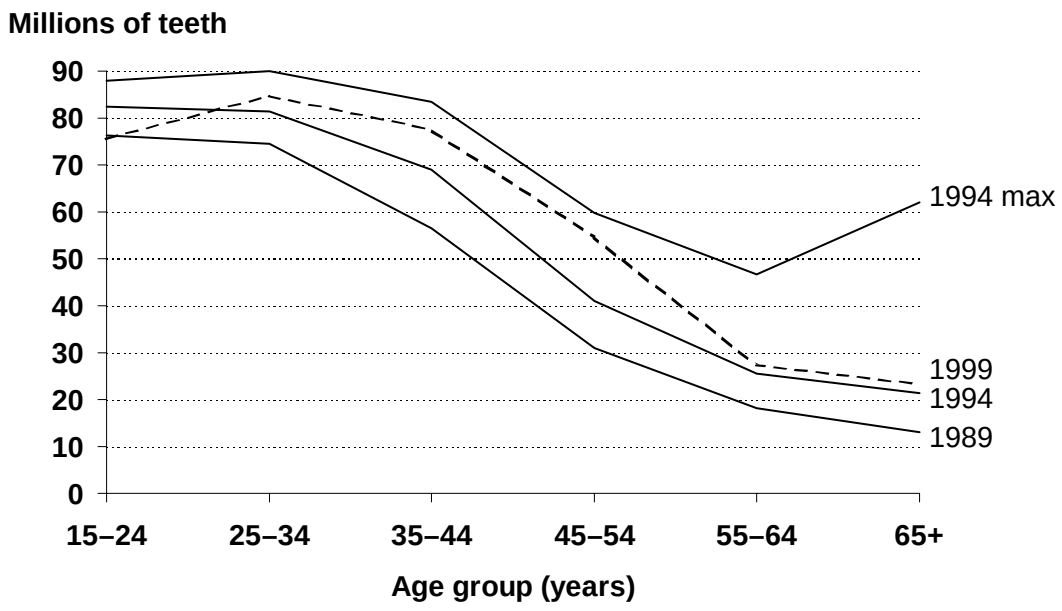
Figure 4.4 is an update of the figure contained in *Improving Dental Health in Australia* (National Health Strategy, 1992, p.29) with the edentulism estimates from the 1994 telephone survey added. The projected edentulism rates for 1999, 2009, and 2019, are based on estimates obtained from the National Oral Health Survey Australia 1987–88. It is evident from the 1994 data that edentulism rates have continued to fall as was predicted, and may actually be decreasing at a rate more rapidly than was previously projected. The decline in edentulism is most rapid among older age groups, for which edentulism is declining at around one-and-a-half to two percentage points per year. This rapid decline in edentulism, coupled with the rapid increase in the number of older adults in the population, is leading to an increasing need for dental care among older adults.



Source: 1994 National Dental Telephone Interview Survey

Figure 4.5: Percentage of persons edentulous, controlling for age, sex and card-holder status

Figure 4.5 shows estimates based on a multivariate model of edentulism that controls for age, sex, and card-holder status, and is based on the data from the 1994 telephone survey. When comparing card-holders and non–card-holders it is important to remember that they are quite different groups of people. Compared with non–card-holders, card-holders have a substantially higher percentage of older adults (e.g. pensioners), and also a greater percentage of young adults (e.g. young unemployed). Additionally, a greater proportion of card-holders are female than is the case for non–card-holders. So, if only the overall edentulism rates for card-holders and non–card-holders are compared, then the comparison will be misleading in the sense that any differences may in fact be due to the differing age distributions, rather than differing edentulism rates. This model controls for the potential confounders of age and sex. After controlling for age and card-holder status, females were found to have a higher edentulism rate than males, and had 1.6 times the odds of being edentulous. Similarly (controlling for age and sex), card-holders had a higher edentulism rate than did non–card-holders. Card-holders had 2.1 times the odds of being edentulous when compared with non–card-holders.

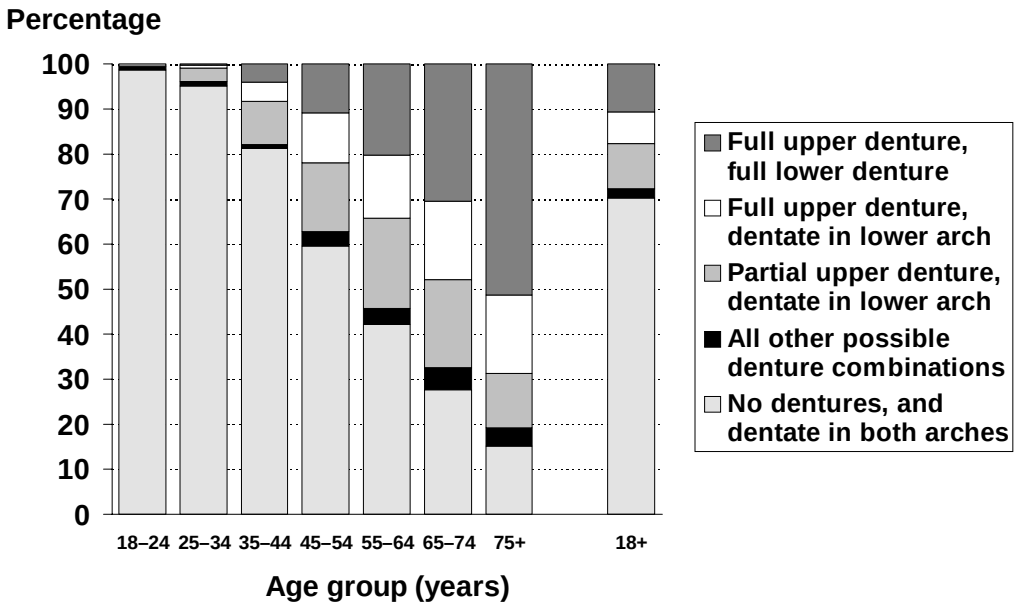


Sources: 1987–88 National Oral Health Survey of Australia projections
1994 National Dental Telephone Interview Survey

Figure 4.6: Estimated number of natural teeth present in Australia, 1989, 1994 and 1999

Figure 4.6 shows the estimated number of teeth present in the Australian population by age group. The continuing rapid growth of the population of older adults, linked with declining edentulism and extraction rates, is likely to result in correspondingly dramatic and rapid increases in the demand for dental care by older Australians. The uppermost line in Figure 4.6 (labelled '1994 max') represents the theoretical maximum number of teeth in 1994. That is, the number of teeth there would have been in 1994 if everyone in Australia had retained all of their natural teeth (32 multiplied by the population size). The line labelled '1994' is the estimated number of teeth present in the 1994 Australian population. Therefore, the difference between the '1994 max' line and the '1994' line is the total number of teeth missing from the Australian population of 1994. The '1989' solid line at the bottom of the graph shows the estimated number of teeth in 1989, and the dashed line is an estimate for 1999 based on the 1989 data. The 1999 projection was already exceeded by 1994 for the 15–24-year-old age group, and the age groups 55 years and over had nearly reached the projections for 1999.

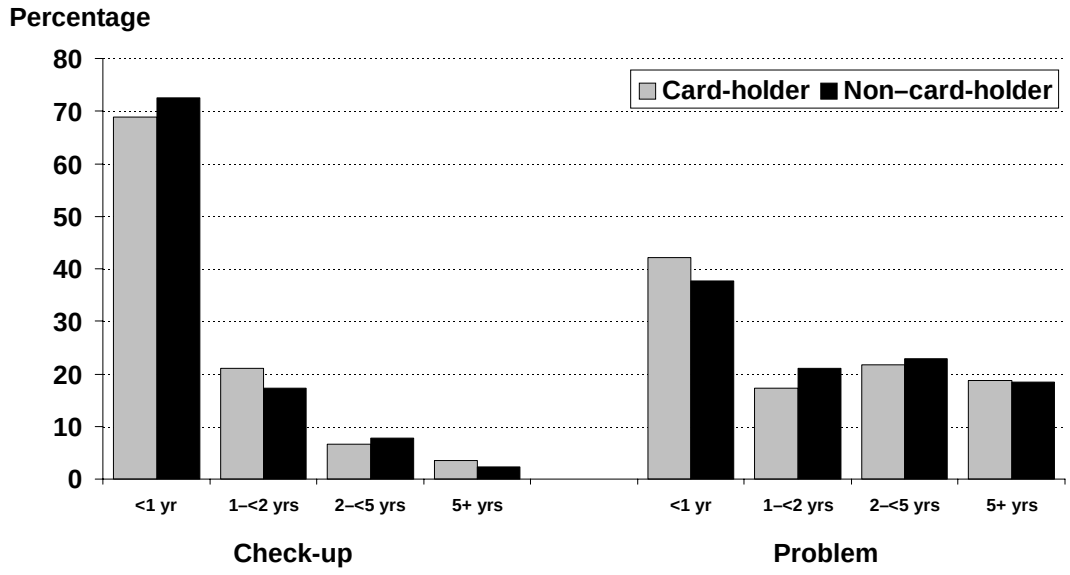
In the five years from 1989 to 1994 there was an increase of 18.8% in the total number of teeth present in Australia among persons aged 15 years and over. Alternatively, for every five teeth present in 1989, there was nearly another one by 1994. The greatest increases are observed among older adults. From 1989 to 1994 there was a 62.1% increase in the number of teeth in the 65 years and over population, an increase of around 12% more teeth per year for this group. Overall there were estimated to be approximately 50 million more teeth in Australia in 1994 than in 1989 among persons 15 years and over.



Source: 1994 National Dental Telephone Interview Survey

Figure 4.7: Denture use by age group

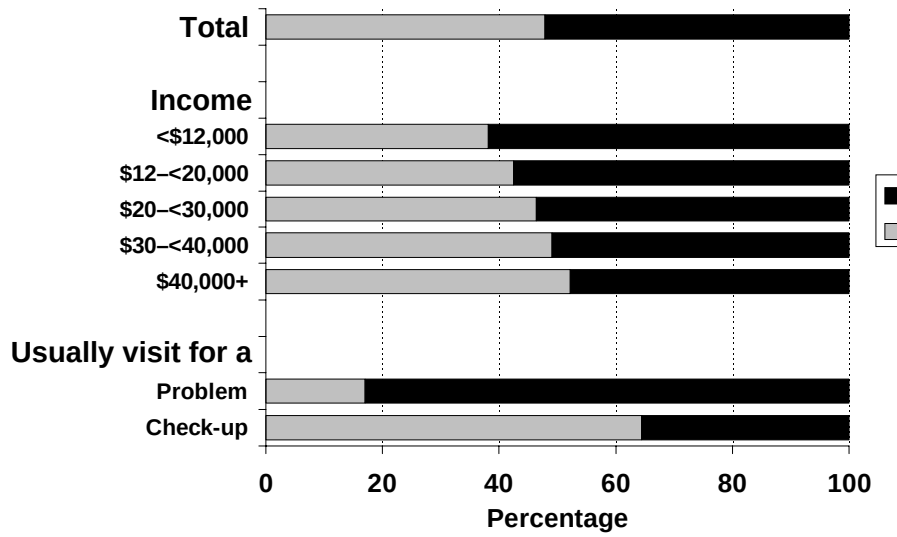
Figure 4.7 shows patterns of denture use by the Australian population. As expected, denture use is strongly associated with age, older age groups experiencing higher levels of denture usage than younger age groups. A little over 80% of 35–44-year-old persons have no dentures, compared with around 15% of persons aged 75 years or more. The prevalence of persons with full upper and lower dentures is closely matched to edentulism rates (see Figure 4.4). Denture use also increases with increasing age among persons who are dentate. Overall, about 30% of all persons aged 18 or more have at least one denture, about 10% have partial dentures but not full dentures, and about 10% have full upper and lower dentures. Over time it would be expected that the percentage of persons with full upper and lower dentures to decline with the decline in edentulism rates, resulting in an increase in the percentage of persons with no dentures, and an increase in partial denture usage.



Source: 1994 National Dental Telephone Interview Survey

Figure 4.8: Usual reason for visit by time since last dental visit – dentate adults

In the telephone survey persons were asked what was their usual reason for making a dental visit, in response to a dental problem, or for a check-up. Figure 4.8 presents the time since a person's last dental visit by their usual reason for making a dental visit. Card-holders and non–card-holders who usually visit for a check-up have much the same distribution in the time since last dental visit. Similarly, card-holders and non–card-holders who usually visit for a problem also have much the same distribution in the time since last visit. However, differences in the time since last dental visit are quite marked between those who usually visit for a check-up and those who usually visit for a problem. Approximately 70% of those who usually visit for a check-up did attend in the preceding 12 months compared with about 40% of those who usually visit for a problem. Nearly 90% of persons who usually visit for a check-up had visited within two years, while almost 20% of those who usually visit for a problem had not visited for five or more years. When controlling for the usual reason for a dental visit, card-holders and non–card-holders appear much the same in the time since last visiting. However, overall differences between card-holders and non–card-holders arise when the usual reason for visiting is ignored because card-holders are more likely to report that they usually visit for a problem than do non–card-holders.

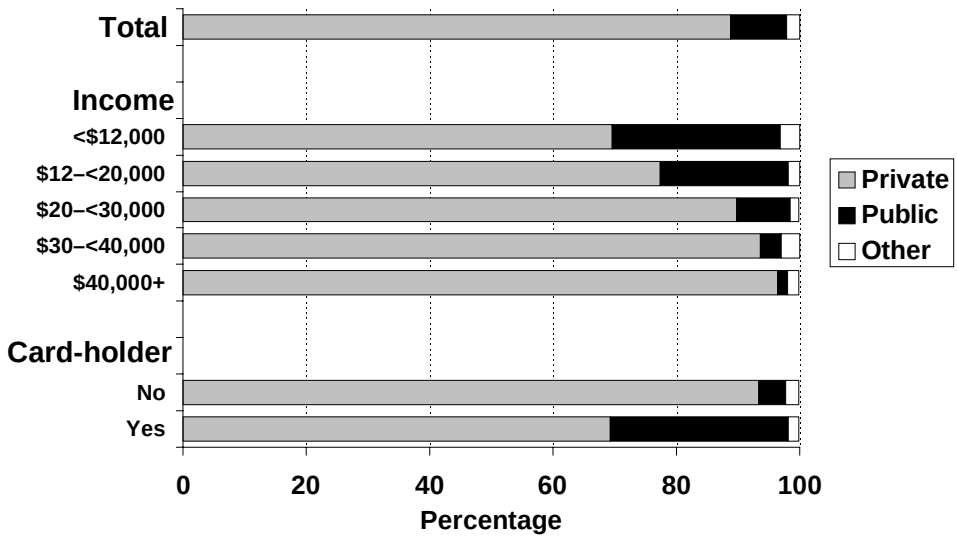


Source: 1994 National Dental Telephone Interview Survey

Figure 4.9: Reason for last dental visit by income and usual reason for a dental visit – dentate adults who visited in the last 12 months

Figure 4.9 shows the reason for the last dental visit, whether for a check-up or a problem, among dentate adults who had made a dental visit in the previous 12 months. Overall, 47.8% of people made their last dental visit for a check-up. When the reason for last dental visit is split by annual household income a clear trend becomes evident. Only 38.1% of those from households of less than $12,000 per annum last visited for a check-up, and 61.9% for a problem. The percentage who last visited for a check-up then steadily increased with increasing income, reaching 52.1% among those from households of $40,000 or more per annum.

The bottom pair of bars splits this group by their usual reason for making a dental visit. Among persons who usually visit for a problem, 83% who visited in the last 12 months last visited for a problem, indicating a strong match between their usual reason for visiting a dentist and their last dental visit. However, the association was weaker among those who usually visit for a check-up, where 64.4% of this group last visited for a check-up. If someone who usually visits for a check-up develops a problem, then they are more likely to be compelled to visit than a person who usually visits for a problem is to make a visit for a check-up. Hence the correspondence of usual reason and last reason is lower for those who usually visit for a check-up.

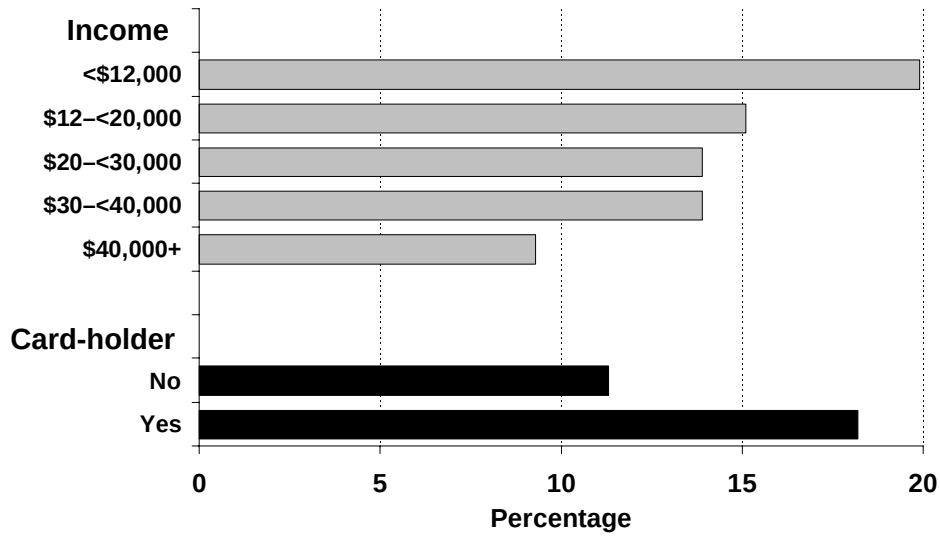


Source: 1994 National Dental Telephone Interview Survey

Figure 4.10: Place of last dental visit – dentate adults who visited in the last 12 months

Figure 4.10 shows the place of last dental visit—private, public, or other—among dentate adults whose last dental visit was in the previous 12 months. Overall, 88.8% of this group last visited a private clinic and 9.1% a public dental clinic. An association between place of last dental visit and annual household income can be observed. The use of private clinics ranged from 69.6% among those from households of less than $12,000 per annum up to 96.4% of those from households of $40,000 or more per annum. The income group with the highest public use was the less than $12,000 per annum group of whom 27.3% visited a public clinic, which declined to 1.6% among the highest income grouping. Nearly all non–card-holders (93.4%) last visited a private clinic, while only 28.9% of card-holders last visited a public clinic.

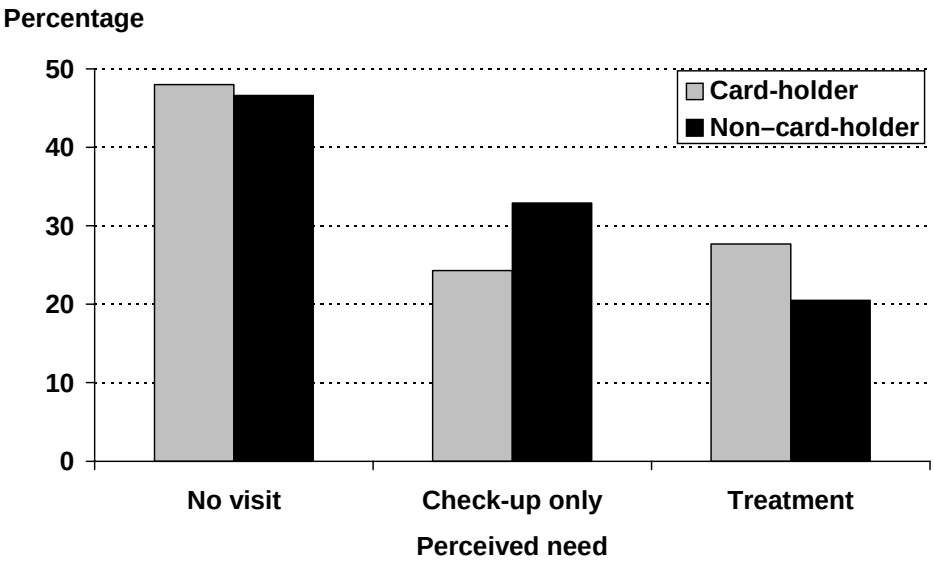
It is appropriate to raise some issues regarding data definitions at this point. The income question in the telephone survey asks for annual household income, not individual income. It is therefore possible that a person with a low personal income who is eligible for public-funded dental care may at the same time report a high annual household income. So a person from a high income household who reports that they last visited a public clinic does not necessarily imply a contradiction. Similarly, non–card-holders who reported their last dental visit was at a public clinic may have been eligible at that time but are no longer, and some card-holders who last visited a private practice may not have been eligible for public-funded dental care at the time of that dental visit.



Source: 1995 National Dental Telephone Interview Survey

Figure 4.11: Social impact: avoidance of some foods by income and card-holder status – dentate adults,

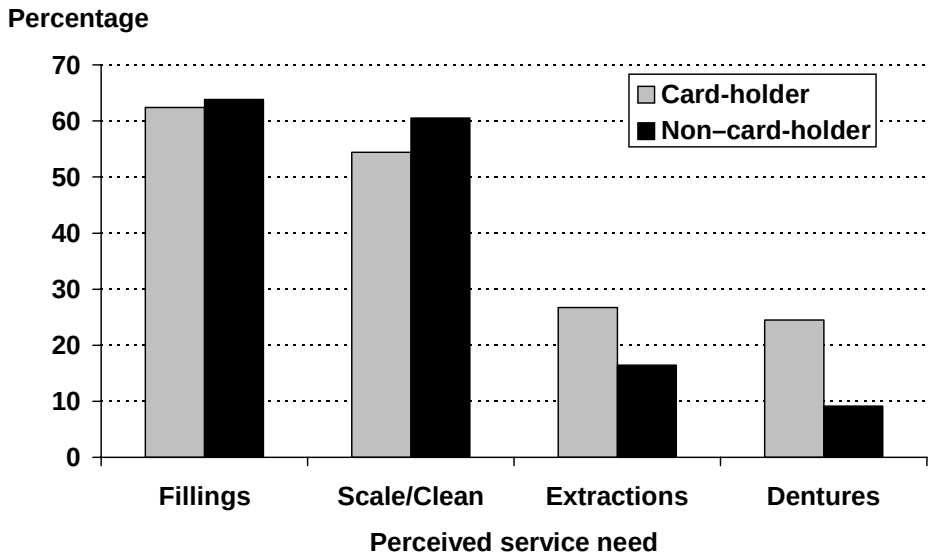
Avoidance of some foods because of problems with one's teeth, mouth or dentures is one of four questions asked that relate to social impact. There was more than a two-fold difference in the avoidance of some foods between the highest and lowest income groups. Among dentate adults from households of less than $12,000 per annum, 19.9% reported avoiding some foods sometimes, often, or very often in the last 12 months, compared with 9.3% of dentate adults from the highest income group. Given the substantial differences in impact across income groupings, and the poorer income profile of card-holders, it follows that card-holders suffered greater avoidance of some foods (18.2%), than did non–card-holders (11.3%).



Source: 1994 National Dental Telephone Interview Survey

Figure 4.12: Perceived need for a dental visit – dentate adults

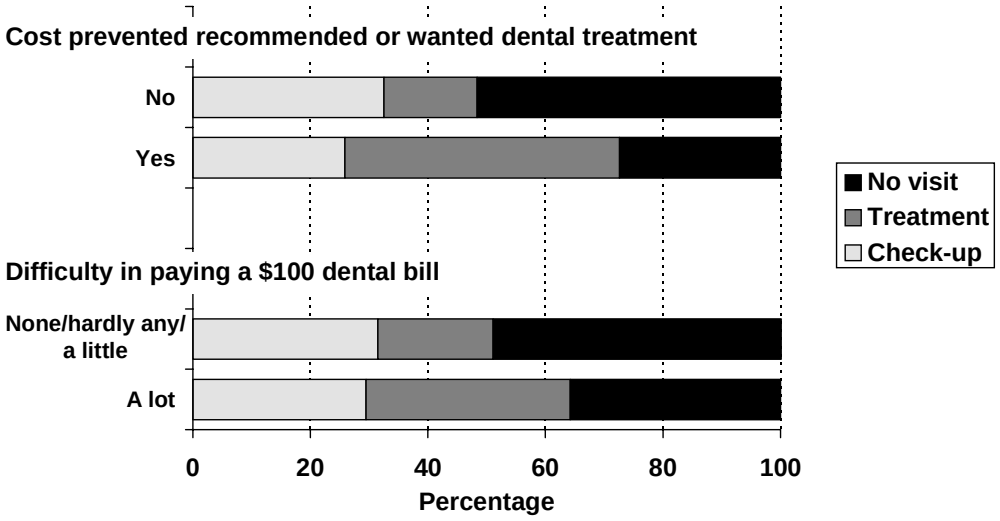
Persons were asked whether they thought they needed to make a dental visit, and, if so, what they thought they would require at that visit. A similar percentage of dentate adult card-holders and non–card-holders reported that they did not currently require a dental visit, 48.0% of card-holders and 46.6% of non–card-holders responding in this way. That is, approximately equal percentages of card-holders and non–card-holders felt the need to make a dental visit. However, the type of visit perceived to be required was quite different between card-holders and non–card-holders. Non–card-holders were more likely to perceive the need for a check-up only (32.9%) than were card-holders (24.3%); while 27.7% of card-holders perceived a need for some treatment at the visit, compared with 20.5% of non–card-holders.



Source: 1994 National Dental Telephone Interview Survey

Figure 4.13: Treatment perceived to be needed – dentate adults who perceived the need for treatment

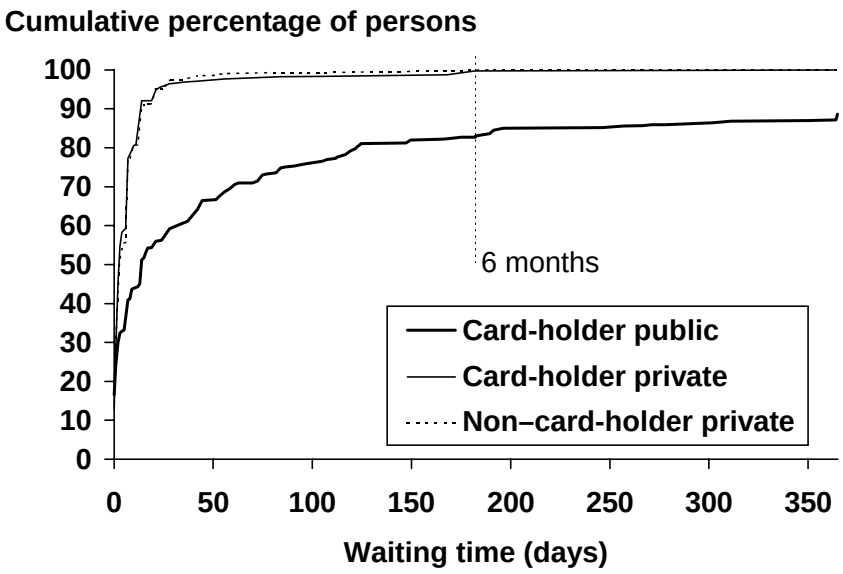
If dental treatment was perceived to be required at the dental visit, persons were then asked what treatments they thought they needed. The percentage of people perceiving the need for a range of treatments among those who perceived a need is shown in Figure 4.13. There was little difference by card-holder status in the perceived need for fillings. Non–card-holders had a slightly greater perceived need for a scale and clean than did card-holders. Among card-holders who perceived a need for treatment, 26.7% thought that they required an extraction or extractions at that visit, compared with 16.4% of non–card-holders. The need for dentures to be made or repaired was substantially higher for card-holders (24.5%) than was the case for non–card-holders (9.1%). This result was to be expected, given the older age profile, higher tooth loss and higher denture usage, among card-holders.



Source: 1994 National Dental Telephone Interview Survey

Figure 4.14: Perceived need by affordability and hardship – dentate adults

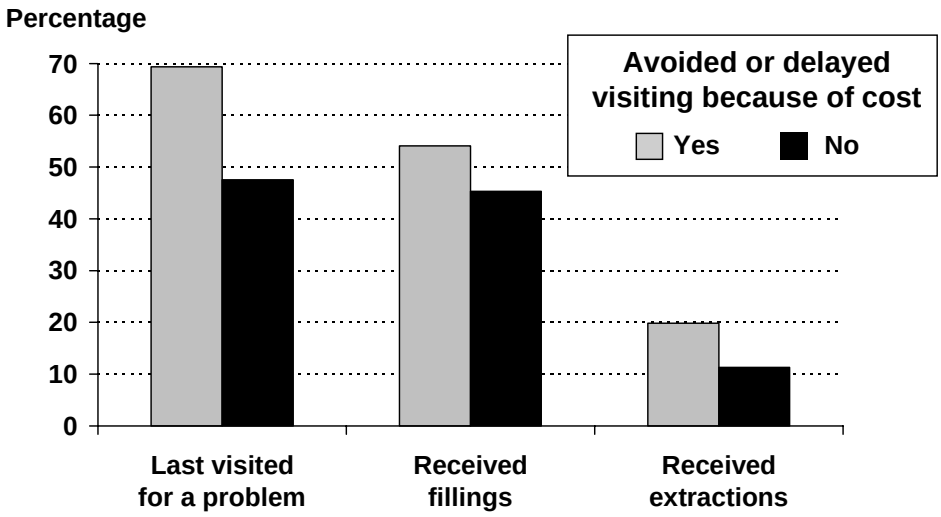
Figure 4.14 presents perceived need by affordability and hardship. Two of the questions which addressed this issue were whether the cost had prevented access to any wanted or recommended dental treatment; and whether the respondent would experience difficulty paying a $100 dental bill. There were large differences in the perceived need for a dental visit and the type of visit required when comparing persons for whom cost had prevented dental treatment that was recommended or wanted in the last 12 months with those who reported no such barrier. Nearly one-half (46.7%) of persons for whom cost had prevented treatment, perceived a need for dental treatment, compared with 15.9% of those for whom cost had not prevented treatment. Those for whom cost had not prevented dental treatment that was recommended or wanted had a far greater percentage reporting the need for a check-up only, and were more likely to perceive no need for a dental visit. Differences between those who would have a lot of difficulty in paying a $100 dental bill, and those who would have none, hardly any or a little difficulty, were less marked. However, a greater percentage of those who would have a lot of difficulty perceived the need for treatment, and were less likely to require only a check-up.



Source: 1994 National Dental Telephone Interview Survey

Figure 4.15: Waiting time distribution from initial contact to visit – dentate adults whose last dental visit was less than two years ago

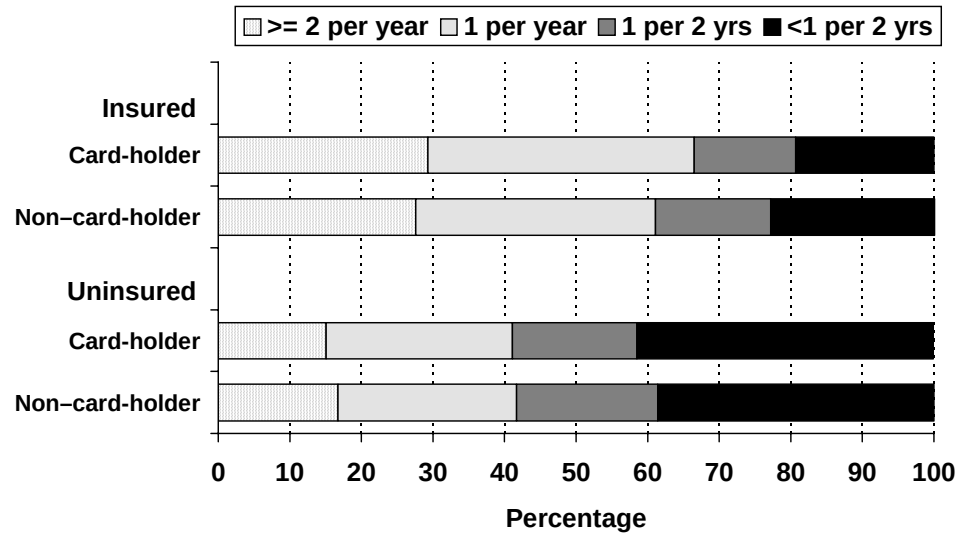
Figure 4.15 shows the cumulative waiting time distribution by place of last visit and card-holder status. The horizontal axis shows the number of days waited from the time of initially contacting the dental clinic or hospital to the time of the dental visit. There was little discernible difference between card-holders who went private, and non–card-holders who went privately. Nearly all persons who went privately had their visit within one month of initially contacting the dental clinic. Whereas for card-holders visiting a public clinic around 60% had visited within one month, and about 20% waited for six months or more for their last dental visit.



Source: 1994 National Dental Telephone Interview Survey

Figure 4.16: Type of dental care received by avoidance or delay of visiting because of cost – dentate adults whose last dental visit was less than 12 months ago

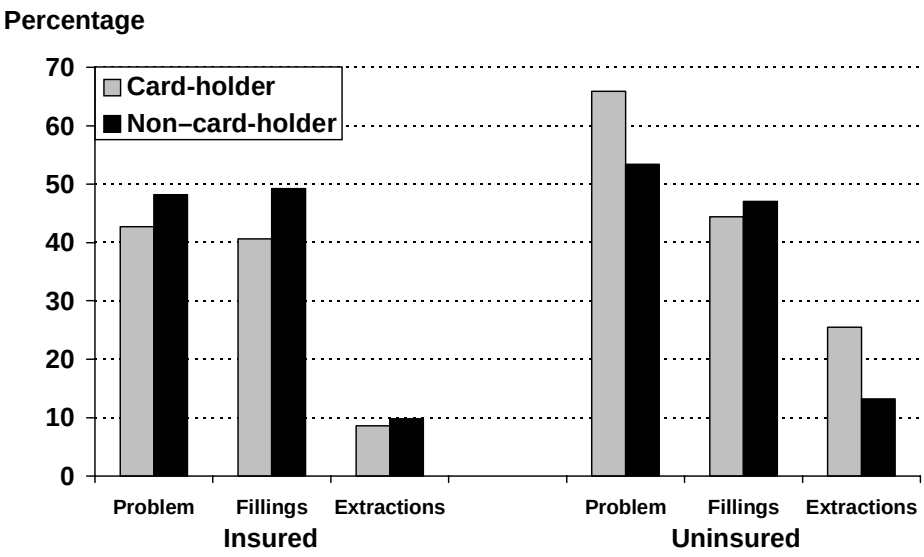
Figure 4.16 presents types of dental care received by dentate adults whose last visit was in the previous 12 months. The data is further subdivided by whether or not the person reported that they had avoided or delayed visiting because of the cost in the previous 12 months. Persons who had avoided or delayed visiting were more likely to have last visited for a problem, to have received fillings, or to have had an extraction(s).



Source: 1994 National Dental Telephone Interview Survey

Figure 4.17: Usual frequency of dental visits – dentate adults

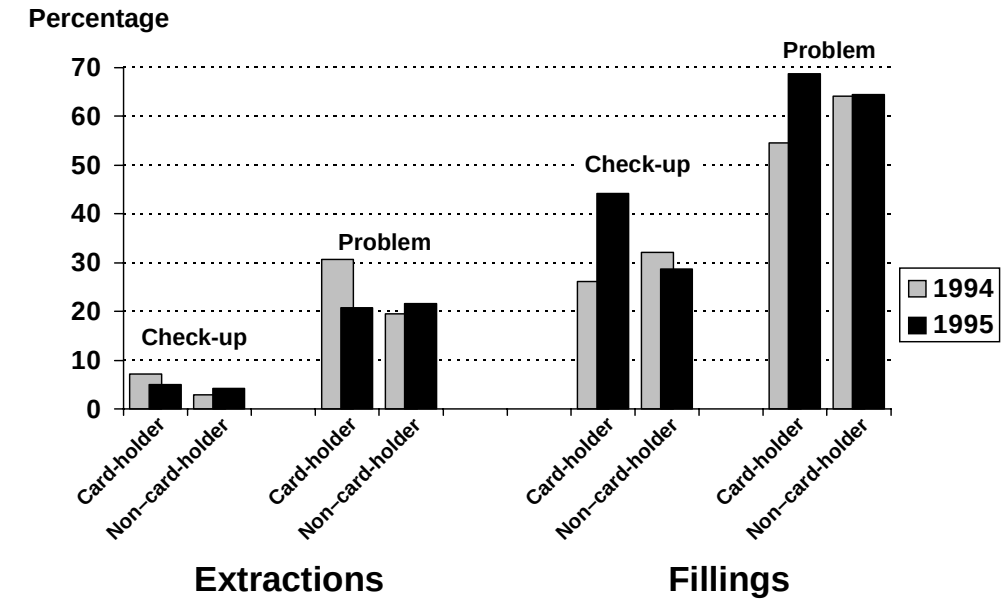
Respondents were asked their usual frequency of dental visits. Figure 4.17 is similar to Figure 4.8 in that it shows the similarities of card-holders and non–card-holders when controlling for a single other variable. Differences between insured card-holders and insured non–card-holders are relatively small when compared with the differences between insured and uninsured persons. Insured card-holders actually reported a slightly more frequent visiting pattern than did insured non–card-holders. About 63% of insured persons reported a visit frequency of at least once a year (the two left segments of the bars), compared with around 41% of uninsured persons. Approximately 20% of insured persons said they visited less than once every two years, while uninsured persons were twice this with about 40% reporting that they usually visit less than once every two years. Even though card-holders and non–card-holders appear quite similar when controlling for insurance status, the difference between them becomes evident when it is further considered that nearly 50% of non–card-holders are insured compared with about 20% of card-holders.



Source: 1994 National Dental Telephone Interview Survey

Figure 4.18: Type of dental care received by card-holder status – dentate adults whose last dental visit was less than 12 months ago

Figure 4.18 examines the type of dental care received by dentate adults who received care in the last 12 months, by insurance and card-holder status. Insured card-holders were less likely to have last visited for a problem, and were less likely to have received a filling than were insured non–card-holders. However, uninsured card-holders were more likely to have last visited for a problem than uninsured non–card-holders. Among uninsured card-holders who visited in the previous 12 months, 25.5% had an extraction compared with 13.2% of uninsured non–card-holders. Overall, insurance status had a larger effect with respect to reason for last visit, receipt of fillings, and extractions, for card-holders, than it did for non–card-holders. It would appear that insured card-holders received more appropriate dental care than uninsured card-holders. This could be the result of insurance enabling access to more timely and appropriate care, or could reflect a greater financial ability to afford dental care.



Sources: 1994 National Dental Telephone Interview Survey
1995 National Dental Telephone Interview Survey

Figure 4.19: Extractions and fillings by reason for last visit – dentate adults whose last visit was <12 months ago

Figure 4.19 examines extractions and fillings by the reason for the last dental visit by card-holder status and year of survey. Between 1994 and 1995 there was little movement for non–card-holders. The largest change was in the percentage who received fillings among those whose last visit was for a check-up, which fell from 32.1% in 1994 to 28.7% in 1995. This is compared with the comparatively large shifts among card-holders. There was a slight decline in the percentage of card-holders who had an extraction and last visited for a check-up. Among card-holders who last visited for a problem, 30.6% had an extraction in 1994, which dropped to 20.7% in 1995. At the same time, among card-holders who last visited for a check-up, 26.2% received a filling in 1994 increasing to 44.2% in 1995. A similar increase was observed among card-holders who last visited for a problem, the percentage receiving fillings increasing from 54.5% in 1994 to 68.7% in 1995. After one year of the Commonwealth Dental Health Program, a more favourable pattern of care was observed among card-holders, that is, from 1994 to 1995 there had been a shift in care from extractions towards restorations.

In the NDTIS there is not a perfect correspondence between reason for last visit and treatments received. Treatments received include all treatments received in the last 12 months, all of which were not necessarily at the last visit. For example, some of the extractions in the check-up group, may actually have occurred at a prior visit for a problem.

4.2.5 Reporting procedures

Results of the telephone interview survey are disseminated in a variety of differing formats: technical reports, that are comprised of a set of standard tables ranging across the majority of areas of data collected from the surveys; newsletters and research reports which provide concise summaries of research findings, and are generally restricted to a particular area of interest; and a third medium of data dissemination is through journal articles. It is intended that, as the collection and basic reporting becomes more routine, a greater focus can be given to more detailed investigation of specific issues. Findings from the surveys are also reported at conferences or at workshops. Results from the surveys are also generated as the result of information requests, where interested parties make a request for information of a more specific and detailed nature.

4.2.6 Additional priorities

Future priorities for the NDTIS could include:

- more rigorous definitions and questioning in the survey to obtain more specific and detailed data that could be analysed at a finer level;
- a move to random digit dialling for the survey to include persons who have unlisted telephone numbers;
- a review of the periodicity of the survey, possibly once every two years would be more appropriate and allow greater time between surveys to analyse the data to a greater extent;
- analysis of the surveys across time to examine the dynamics of changes from one survey to the next;
- integration of the telephone survey data with data from other sources to build a more comprehensive and cohesive interpretation of the data collected; and
- increasing depth of analysis of the data collected.

4.2.7 References and related publications

AIHW DSRU 1993. Dental care for adults in Australia: proceedings of a workshop. Adelaide: AIHW.

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AIHW DSRU 1995. *Commonwealth Dental Health Program research report 2*. Adelaide: AIHW.

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Allister JH et al. 1995. *Commonwealth Dental Health Program baseline evaluation report 1994*. Adelaide: AIHW.

Carter KD 1995. *National dental telephone interview survey 1995.* Adelaide: AIHW.

Carter KD et al. 1994. *National dental telephone interview survey 1994*. Adelaide: AIHW.

National Health Strategy 1992. *Improving dental health in Australia*. Canberra: National Health Strategy: Background Paper No. 9.

4.3 Dental Satisfaction Survey

4.3.1 Introduction

Consumer satisfaction with health care is an issue when evaluating health care programs. The investigation of patient satisfaction as a measure in health care was addressed in the 1970s (Hulka et al., 1971 and Ware et al., 1976). Surveys were designed to obtain information on the utilisation and assessment of medical care and to identify unmet needs.

Care that is less satisfactory to the consumer has been shown to be less effective. Links exist between satisfaction and health behaviours such as appointment keeping, seeking care, understanding and retention of instructions, intention to comply with recommended treatment, and medication use. Neglect in any of these behaviours could be detrimental to dental health status.

Satisfaction with dental care is not an area in which a substantial pool of information exists.

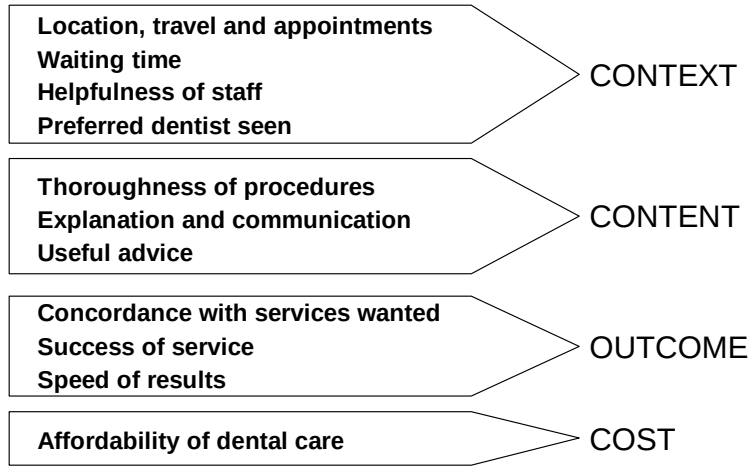
The purpose of the Dental Satisfaction Survey was to:

- examine differences in the levels of satisfaction with dental care in a cross-sectional survey of the Australian population; and
- identify and investigate changes over time in the satisfaction levels of card-holders participating in the Commonwealth Dental Health Program.

It is meaningless to know that patients are satisfied without knowing what they are satisfied with. Therefore, it is necessary for questionnaires measuring satisfaction to be divided into sub-scales or dimensions that are meaningful for the purposes of the study.

The questionnaire, consisting of 24 items in 1994 and 31 items in 1995, was designed to cover the dimensions of:

- **context** of the dental visit (which included location, travel and appointments; waiting time; helpfulness of clinic staff; and seeing the preferred dentist);
- **content** of the visit (which included the thoroughness of procedures carried out; explanations and communication during treatment; and usefulness of advice);
- **outcome** (which related to concordance with the desired services; the success of the treatment in terms of problems solved; and speed of improvement in oral health); and
- **cost** (which related to the affordability of dental care) was included in the 1995 survey, and will be presented as a separate section.



Source: Dental Satisfaction Survey 1995

Figure 4.20: Satisfaction items tested

Figure 4.20 shows how the items tested were grouped into four sub-scales. There were also a few unrelated items, such as the friendliness of the dentist, and pain issues, that were included in overall **satisfaction**—the mean score for the 24 items used in the initial Dental Satisfaction Survey in 1994.

It is also important that appropriate rating scale approaches are used. The participants were asked to rate all aspects of their most recent dental visit or visits on a five-point Likert type scale, with '1' indicating strong disagreement through to '5' indicating strong agreement.

Dental satisfaction was estimated by calculating the mean score for each group of items, so that the range for each sub-scale was one to five.

The items tested in the survey consisted of randomly ordered positive statements, such as 'I was satisfied with the dental care I received'; and negative statements, such as 'There were other dental problems I had that were not treated.'

This approach ensured that participants considered their response to each statement, rather than circling the 'agree' response to every item, minimising the effect of a response set.

Negative statements were corrected for the direction of response, so that a value of one on the second statement above was converted to a five, indicating strong agreement that all of the respondent's dental problems had been treated.

The choice of a general (indirect) or a personal (direct) approach to the topics is also important. An example of each type of statement follows:

Direct statement

- I was able to make the dental visit as promptly as I felt was necessary.

Indirect statement

- Dentists do not explain treatment options.

Respondents consistently rate their own care more favourably than they rate health care providers in general. The indirect approach has been criticised as measuring a different domain of satisfaction, measuring more generalised attitudes and even life satisfaction. The items in the questionnaire were presented as statements referring to the respondent's direct personal experience at their last dental visit or series of visits.

4.3.2 The sample/method

The Dental Satisfaction Survey approached a sub-sample of respondents to the National Dental Telephone Interview Survey. The sub-sample consisted of dentate adults who had visited the dentist in the previous 12 months. It was assumed that there would be a difference in the level of satisfaction expressed by card-holders and non–card-holders; to assess the difference, the sample was drawn selecting all card-holders, and one in four non–card-holders, achieving approximately equal numbers in each group.

Participants were chosen randomly at the time of the telephone interview. At the end of the interview those selected were told that they had been chosen for a second survey, and their names and addresses were checked against the details held on file, alterations being made when necessary.

Features of Dillman's 'total design method' (Dillman, 1978) were employed to maximise the response rate. This included personalisation of the approach letter and three follow-ups, each of which was posted after two to three weeks had elapsed since the previous approach.

The participation in the 1994 and 1995 surveys are shown in Table 4.2.

Table 4.2: Participation in the Dental Satisfaction Surveys

	1994	1995
Number selected	1332	700
Excluded	44	13
Undeliverable	27	19
Sub-total	*1261*	*668*
Refusals	18	9
Questionnaires returned	1063	576
Response rate	**84.3%**	**86.2%**

Sources: 1994 Dental Satisfaction Survey
1995 Dental Satisfaction Survey

The 1994 National Dental Telephone Interview Survey was sampled over thirteen sites, while the 1995 NDTIS, across eight sites, resulted in a smaller sample. The number of participants selected to receive Dental Satisfaction Surveys was correspondingly lower in 1995 (700 persons) than in 1994 (1332 persons).

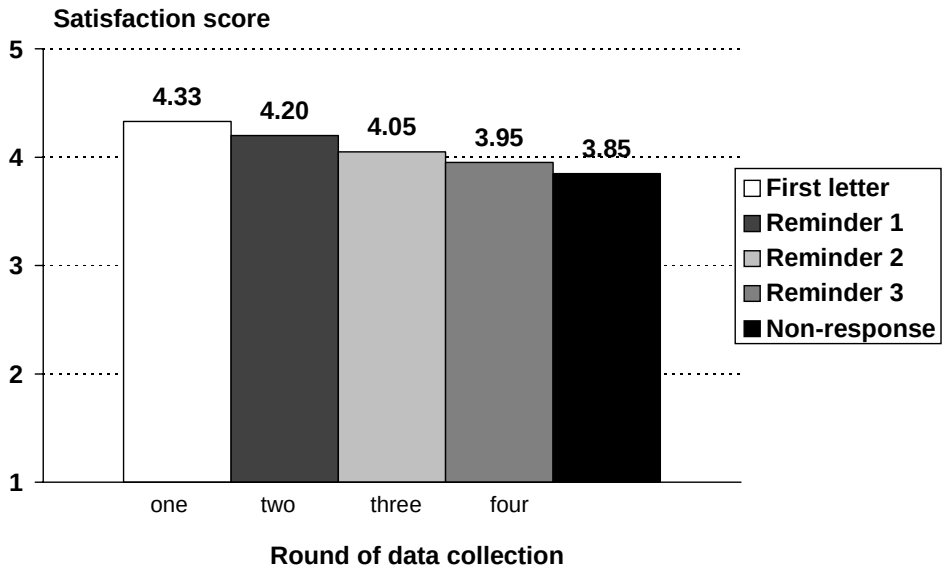
A number of returned questionnaires were excluded due to various reasons such as selection errors, language difficulties, sight-impaired respondents, or survey forms defaced. A small number were returned undelivered because the participant had moved since the telephone interview, and some refusals were recorded at the time of the interview.

The response rate was 84.3% in 1994 and 86.2% in 1995. These response rates were very high for a mailed questionnaire, but it should be noted that respondents had previously shown their willingness to participate in the telephone interview survey.

Low response rates are common in mailed surveys; more self-motivation is required than for telephone or personal interviews. It is generally accepted (Dillman, 1991) that the higher the response rate, the lower the risk of producing biased results.

Sociodemographic and dental visiting behavioural characteristics collected during the telephone interview were matched with the satisfaction data, and were also available on individuals selected for the survey who failed to respond. A range of social and behavioural variables were investigated for non-response and early or late response trends.

Figure 4.21 shows the variations of mean satisfaction score (on a scale of 1 to 5) by round of data collection.



Source: 1995 Dental Satisfaction Survey

Figure 4.21: Mean satisfaction score by round of data collection, and predicted satisfaction of non-respondents

Comparison of means showed that lower levels of satisfaction were associated with successive mailing round.

If non-respondents are assumed to form a continuum with late respondents, their predicted satisfaction can be estimated. A mean score for non-respondents was predicted using an ordinary least squares regression model, the regression equation based on the round of mailing, age, site of visit, dental insurance, language (English or other), reason for visit, avoidance of dental visits, and employment status. The black bar represents the predicted mean satisfaction score of non-respondents; the declining satisfaction scores across round of data collection show that a slightly inflated satisfaction score would have been obtained if rigorous follow-up procedures had not

been employed. As it was, the cumulative satisfaction score for the sample was 4.22, and it is predicted that it would only have dropped to 4.17 if the mean score for the non-respondents was as predicted. Non-respondent effects are therefore likely to be very small.

4.3.3 Data preparation and analysis

DSRU are directly involved in the collection of data, the telephone interviews as previously described in section 4.1, the mailing and follow-up of Dental Satisfaction Surveys, and the data entry of survey responses.

The preparation of the data for analysis involved the following steps:

- cleaning the data by checking for obvious discrepancies;
- the difference in the sampling method for the 1994 NDTIS and the 1995 NDTIS was accounted for by weighting the data by State and location to enable comparisons between the two surveys;
- to minimise the number of cases omitted from the analysis, substitution values for missing data items were calculated using ordinary least squares regression models; and
- coding of comments (areas for comment were provided on the back of the questionnaire). All comments were coded into 23 major categories, based on the most frequently-occurring types. The comment types were then grouped into the conceptual categories of context, content, outcome, and other.

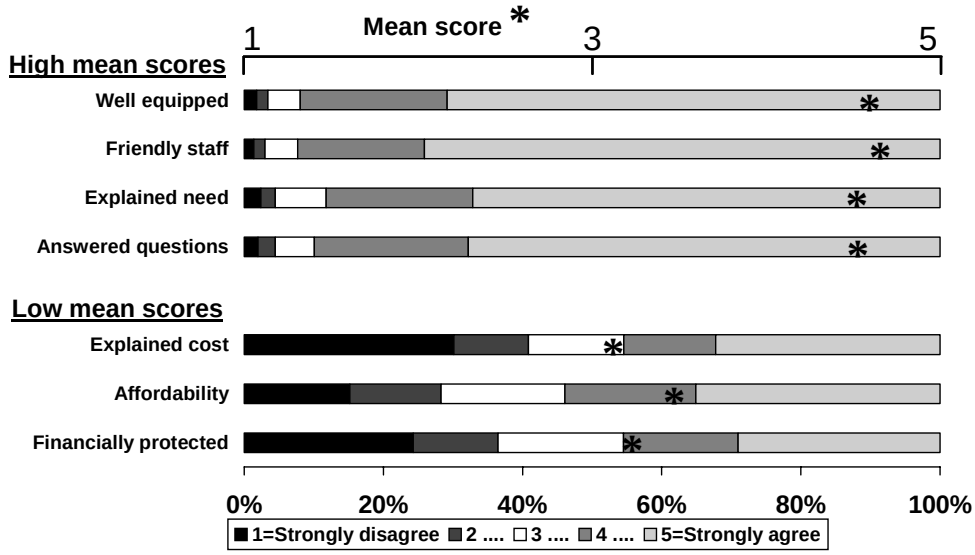
Analysis of data included:

- bivariate analysis (chi-square; comparison of means); and
- multivariate analysis (ordinary least square regression; factor analysis; reliability analysis).

Key findings in the Dental Satisfaction Survey include:

- card-holders have lower satisfaction levels than non–card-holders;
- greater differences in satisfaction levels were observed by place of last visit, i.e. by public or private, than by card-holder status (the majority of card-holders receive care from private practitioners);
- differences in individual items between public and private patients; and
- all dentally disadvantaged groups displayed lower levels of satisfaction.

Responses to the individual items of the survey indicated overall levels of satisfaction rather than explicit dissatisfaction with any item.



Source: 1995 Dental Satisfaction Survey

Figure 4.22: Highest and lowest mean scores for individual items

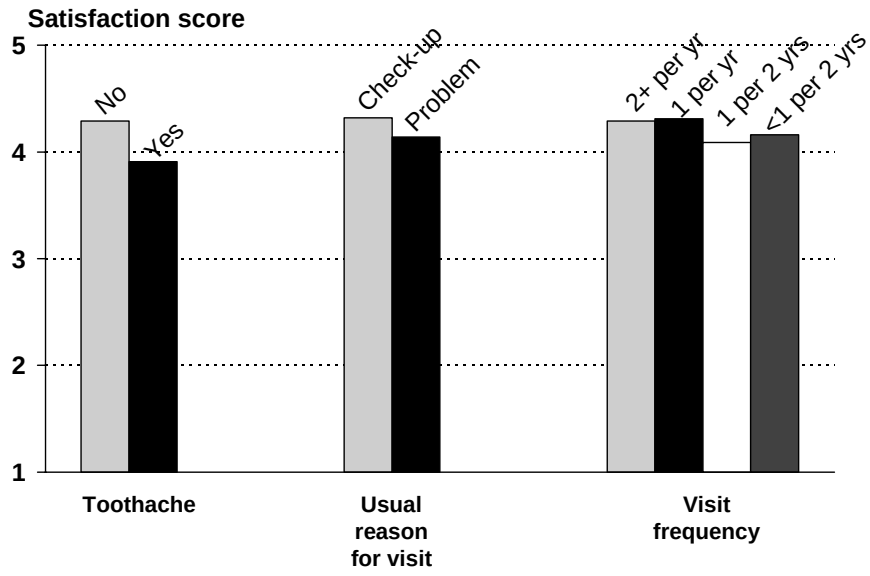
The responses to those individual items registering the highest and lowest mean scores are shown in Figure 4.22. The bars represent the percentage of respondents scoring each of the five values; with strongly disagree and disagree closest to the left axis, while the areas representing strongly agree occur at the right-hand end of the figure. The asterisk marks the mean score for each item; the value of the mean score may be read from the x-axis at the top of the figure.

The highest levels of satisfaction for individual items were expressed for well-equipped dental surgery, the friendliness of the clinic staff, explanation of the treatment needed, and the dentist answering questions. The lowest levels of satisfaction were recorded for explanation of cost of treatment, affordability of care, and financial protection from possible dental expenses.

The measures of dental satisfaction developed in the survey should be applied with an orientation towards group profiles, i.e. means, rather than satisfaction at an individual level. The focus is on broad sub-groups of persons, e.g. card-holders, age groups, or ethnic groups. The variables investigated for associations with the satisfaction scales included:

- sociodemographic and economic details—sex, age group, country of birth, language spoken at home, income, and education;
- social impact of dental health—toothache, uncomfortable with dental appearance, avoidance of some foods;

- financial constraints—avoiding dental visits, financial burden of dental visits, reported difficulty with a $100 dental bill;
- dental visiting—reason for last visit and usual reason for dental visiting, usual frequency of visits;
- perceived need of a dental check-up / treatment;
- place of last visit and health card status; and
- oral status and services received—number of teeth, the number of fillings and extractions received in the previous 12 months, and waiting time.

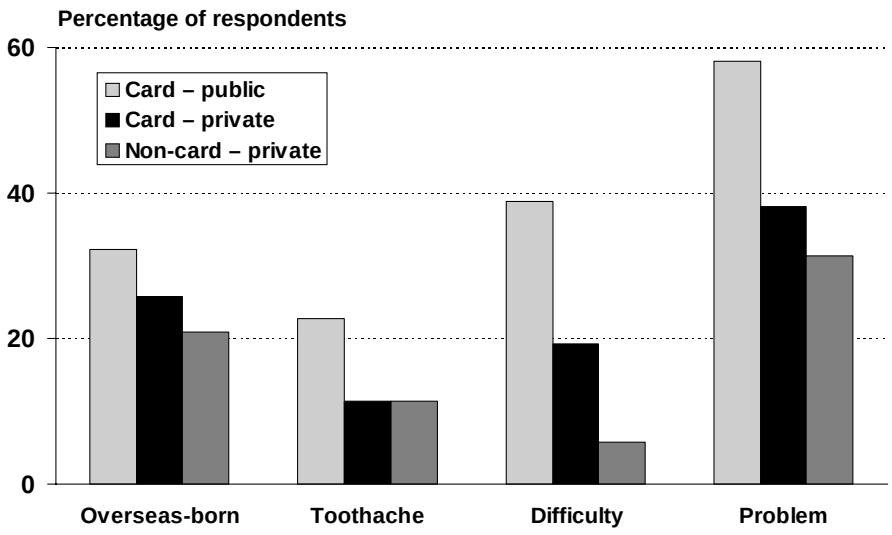


Source: 1995 Dental Satisfaction Survey

Figure 4.23: Mean satisfaction score by toothache frequency, usual reason for visit and usual frequency of dental visits

The effect of having toothache (yes = very often, often and sometimes; no = hardly ever and never) in the previous 12 months is shown in Figure 4.23. The difference between those who have and have not experienced toothache is greatest in the outcome category. The results of dental treatment have been less satisfactory, an effect reported generally by those respondents who reported any of the varieties of social impact measured. This figure also shows the effect of dental visiting patterns *viz.* usual reason for visit and usual frequency of dental visits. Those individuals who usually visit for a check-up consistently rate their satisfaction higher than those who visit in response to a problem. Respondents who were in the habit of making dental visits one or more times per year had higher mean satisfaction scores than those who visit less frequently.

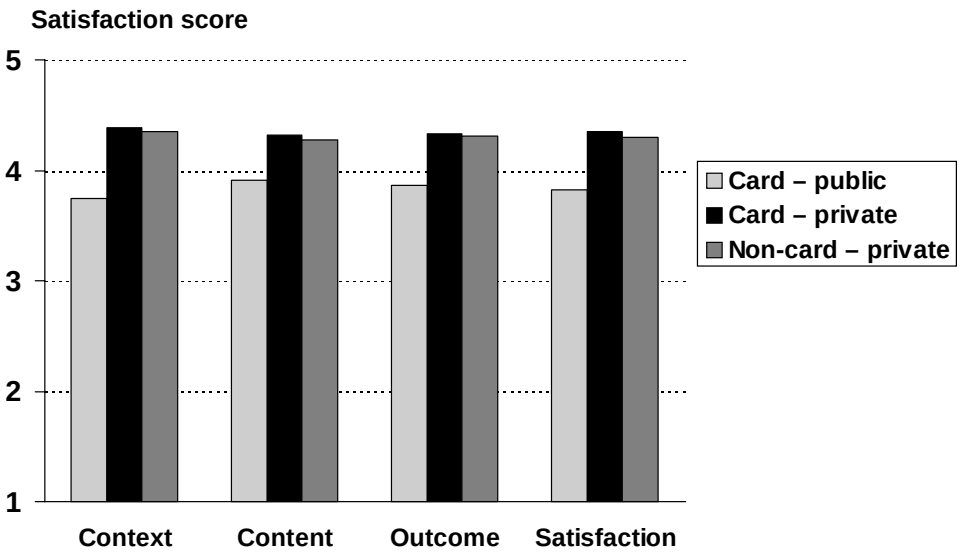
Multivariate analysis of all of the variables that had a significant bivariate association with any of the satisfaction scales was carried out to investigate independent associations. Ordinary least squares regression analysis showed that a range of independent associations existed. The strongest of these were age and the place of last visit—higher levels of satisfaction occurred with older age, and lower scores were associated with having received care at a public clinic.



Source: 1995 Dental Satisfaction Survey

Figure 4.24: Percentage of respondents by place of last visit by country of birth, toothache, difficulty paying a $100 dental bill, and a problem as usual reason for dental visits

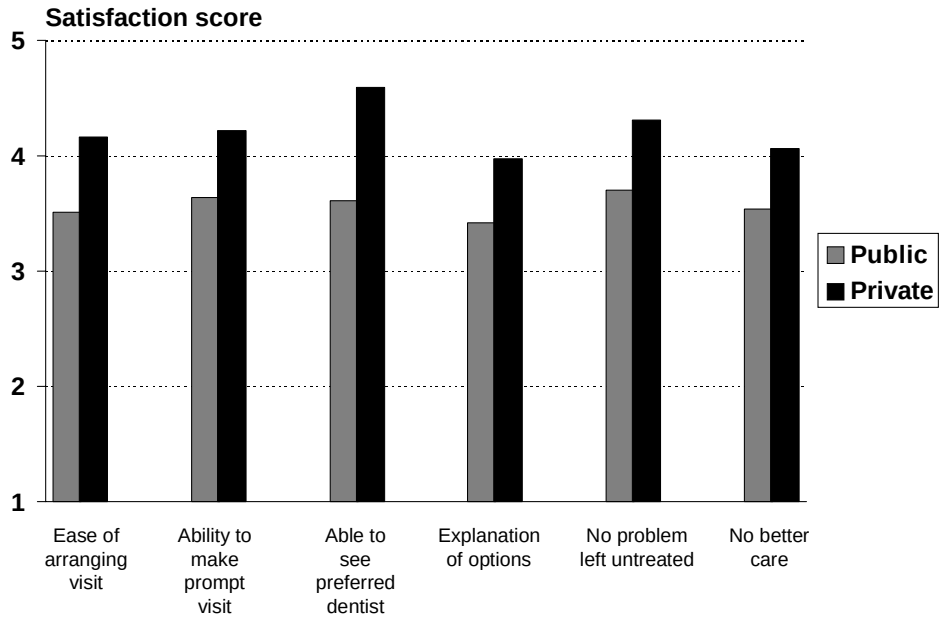
A number of those variables that exhibited an independent association with lower satisfaction scores have been plotted against card status and the place of last visit in Figure 4.24. A higher proportion of card-holders, particularly those who attended a public clinic, were born overseas; and twice the proportion of public patients reported experiencing toothache. Almost 40% of public patients reported that they would have great difficulty paying a $100 bill, compared to almost 20% of card-holders who sought care in the private sector, and around 5% of non–card-holders. The distribution of respondents who usually visit for a dental problem showed an almost two-fold difference between public patients and private non–card-holder patients.



Source: 1994 Dental Satisfaction Survey

Figure 4.25: Mean satisfaction scores for conceptual sub-scales by card status and place of last visit

Differences in satisfaction existed between card-holders and non–card-holders, but even greater differences existed by place of last visit. This can be attributed to the fact that in the 12 months prior to the 1994 survey approximately two-thirds of card-holders visited a private clinic, and their levels of satisfaction were found to be very similar to non–card-holders using private clinics. Figure 4.25 shows that users of public clinics recorded significantly lower satisfaction scores on all sub-scales than users of private practices. The largest difference in mean scores was recorded on the context sub-scale, highlighting waiting time, clinic location, appointment and preferred dentist issues.



Source: 1994 Dental Satisfaction Survey

Figure 4.26: Mean satisfaction scores for individual items by place of last visit

Because of the similarity in scores between card-holders and non–card-holders who used private practices, the mean satisfaction scores for individual items was investigated to determine differences between public and private patients. Figure 4.26 presents those items for which the difference was greatest in the 1994 survey. On a scale of 1 = strongly disagree to 5 = strongly agree, recipients of public care, although satisfied, had a score more than 0.5 points lower than private patients for these items. The items concerned were ease of arranging an appointment, ability to make a prompt visit, seeing the preferred dentist, explanation of treatment options, number of dental problems untreated, and believed that the care could not have been better.

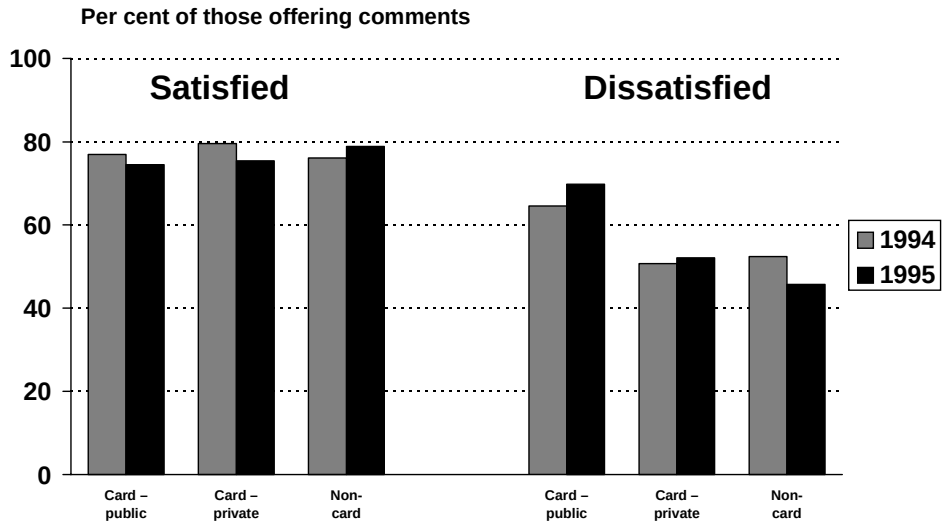
4.3.4 Satisfied and dissatisfied comments

Some examples of the comments made in the area provided on the back of the survey form have been included. Almost two-thirds of the respondents to the survey included comments regarding aspects of their recent dental care.

The dissatisfied comments that occurred most frequently were concerned with cost in the private sector and waiting time in the public sector, while service and caring providers were key areas in which satisfaction was expressed.

Comments were made on a range of topics and included:

- 'Homely, relaxed, friendly and very patient staff – nothing was too much trouble'
- '(Good) advice about tooth and gum care'
- 'Having visited a Government. clinic I received all the treatment I needed and am thankful for it … you do not always see the same dentist but their service is good'
- 'He didn't wear gloves or a mask. The surgery had old fashioned equipment and wasn't very clean'
- 'I don't go to dentists (unless desperate) – it is too costly even though cost is minimal for pensioners'
- 'Treated in a friendly way – put at ease'
- 'He explains things to me'
- 'I am an old age pensioner. The treatment I got was good but impersonal … I was just an old bludger on the system'
- 'The waiting period was extremely long'
- 'I was not told how much the treatment would cost. I was just hit with an enormous bill after my visit …'
- 'My dentist wears a mask and gloves and an autoclave'



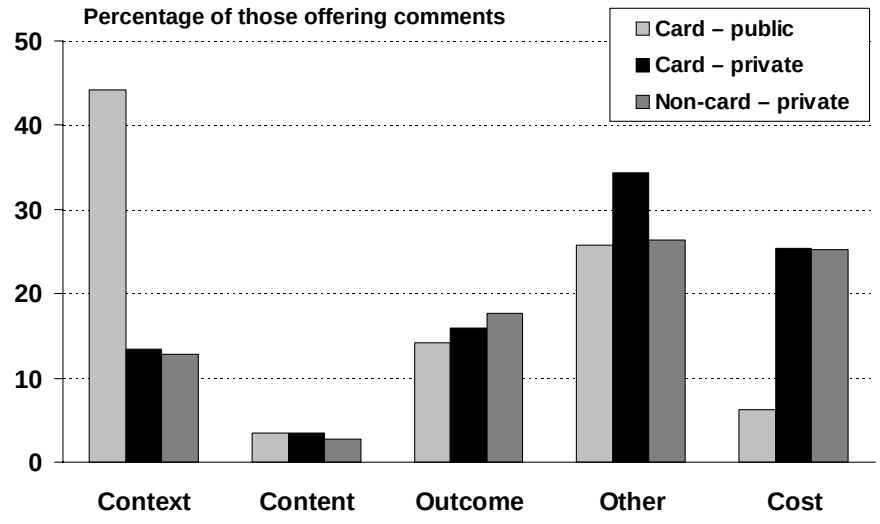
Source: 1994 Dental Satisfaction Survey
1995 Dental Satisfaction Survey

Figure 4.27: Distribution of satisfied and dissatisfied comments by place of last visit

The distribution of satisfaction and dissatisfaction by place of last visit for the 1994 and 1995 surveys is shown in Figure 4.27. The bars represent the proportion of those participants who made comments. There was very little difference in the frequency of satisfied comments, with between 76% and 80% of each group proffering one or more 'satisfied' comment(s).

The frequency of comments indicating dissatisfaction was similar among card-holders and non–card-holders who attended private practices, but there were higher levels of dissatisfaction expressed by card-holders who were recipients of public care.

Comments indicating dissatisfaction were grouped into conceptual categories to further identify areas of concern.



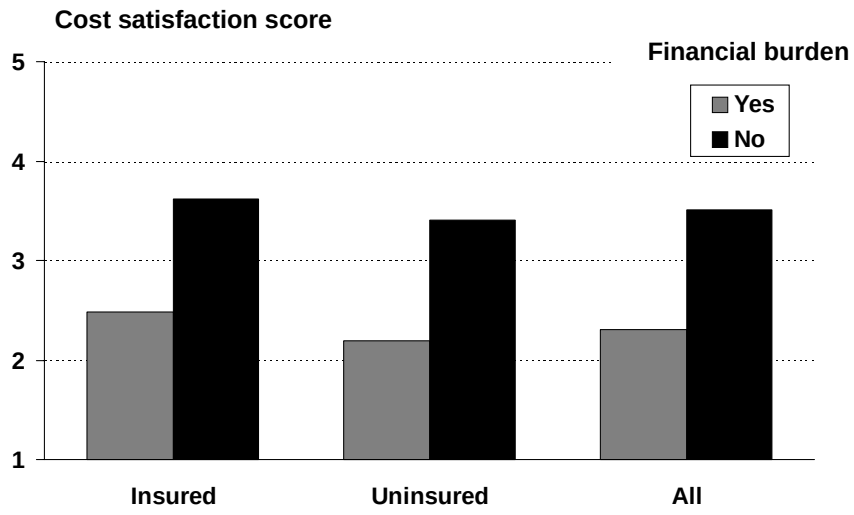
Source: 1994 Dental Satisfaction Survey

Figure 4.28: Distribution by conceptual category of dissatisfied comments by card status and place of last visit

The comment types were grouped into the conceptual categories of context, content, outcome, and other. There were large differences between those receiving public care and those receiving private care in the category of context, or appointment-related issues. Dissatisfied comments were made by 44.2% of recipients of public care compared with less than 15% of private patients. These comments were chiefly concerned with waiting time in the public sector.

Cost comments were included in the category of 'other comments', but they have also been brought out separately in the column at the far right of the graph. Dissatisfaction with the cost of dental care was obviously an issue of concern among private patients.

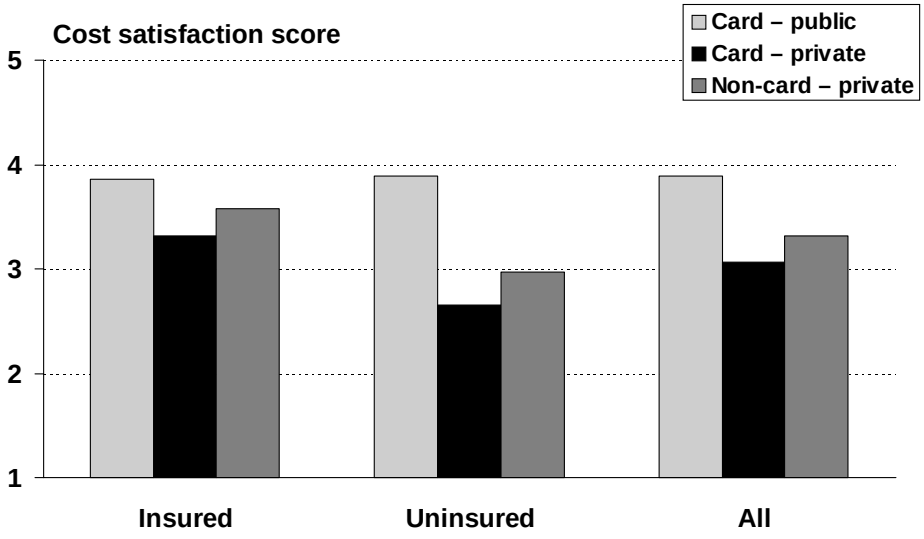
4.3.5 Satisfaction with cost



Source: 1995 Dental Satisfaction Survey

Figure 4.29: Satisfaction with cost by financial burden and insurance status

The levels of satisfaction with cost were much lower than the other dimensions of satisfaction measured by the Dental Satisfaction Survey. Figure 4.29 shows the cost satisfaction scores of respondents who reported that their dental care was a large burden to them during the previous 12 months and those who did not experience a financial burden, broken down by insurance status. There is a considerable difference between the two groups, with those reporting hardship expressing greater dissatisfaction with the affordability of their dental care.



Source: 1995 Dental Satisfaction Survey

Figure 4.30: Satisfaction with cost by card status, place of last visit and insurance status

Figure 4.30 represents cost satisfaction scores plotted against the card status and place of last visit by insurance status. Card-holders who received care in public clinics, whether insured or uninsured, were far more satisfied with the affordability of their dental care than non–card-holders and card-holders who sought care from private practitioners. Insured persons reported higher levels of satisfaction with the cost of their recent dental care than those who were uninsured. The greatest difference in satisfaction with the cost of dental care exists between the card-holders who received care from public clinics and uninsured card-holders who received care in the private sector.

4.3.6 Reporting

The DSRU produces the following reports on the Dental Satisfaction Survey.

Publications:

- technical reports
  - 1994 Dental Satisfaction Report
  - 1995 Dental Satisfaction Report
- research reports
- scientific articles

Conference presentations

Other

The Dental Satisfaction Survey contributes to the evaluation of CDHP.

4.3.7 Priorities

Priorities for the Dental Satisfaction Survey include the following.

- Improving the data—this can be achieved by maintaining the high response level by:
  - the use of incentives, such as 'scratchies' or theatre passes to the first participants to reply, which might be considered if the response rate fell
  - the possible use of certified mail for third reminders to ensure that all mail that is wrongly addressed is returned to DSRU and not thrown away (these cases at present are included among non-respondents)
  - more stress placed on the importance of care when interviewers are checking addresses.
- Additional items—more questions may be added to the survey to cover a wider scope of issues. Such a change is possible, but there is the possibility of altering the survey in such a way as to affect the response rate. The wording of existing items is reviewed after each survey; modifications are made if there is an obvious problem with the understanding of a particular statement. Changes are kept to a minimum to ensure reasonable comparability of results from successive surveys.
- The Dental Satisfaction Survey was developed with the intention of integrating it with the Adult Dental Programs Survey—this has not happened yet, but is one of the priorities under consideration.

A shortened version of the satisfaction questionnaire, consisting of five of the original items, has been developed from the 1994 survey for use with other behavioural studies. This modified 5-item satisfaction scale had a high correlation with the score on the 24-item satisfaction scale (Pearson $r^2 = 0.88$). Internal reliability of the five items was high (Cronbach $\alpha = 0.81$).

It is envisaged that the Dental Satisfaction Survey will be used in client satisfaction surveys for auditing of patient care in public clinics.

4.3.8 Evaluation of changes in satisfaction levels over time

The evaluation of changes in satisfaction levels will involve comparison of the results of successive satisfaction surveys, and identification of key areas where increases or decreases in satisfaction scores may have occurred. Evidence of improvement in satisfaction would be expected to include:

- increases in satisfaction scores across individual items; and
- increases in mean satisfaction scores across sub-scales, particularly context score (appointment issues).

Changes in satisfaction levels may only be evident when the mean scores over time are compared by characteristics such as ethnicity, persons using public care, age group, language or employment status.

4.4 The Adult Dental Programs Survey

4.4.1 Introduction

In the section on adult oral health reference was made to the gaps in the collection of adult oral health data with regard to the lack of attention directed towards particular groups of adults within the Australian population. The group that is the focus of the Adult Dental Programs Survey are patients attending public-funded dental care. These patients are card-holders, who may face issues in accessing dental care relating to the comprehensiveness of services delivered. Data from this survey may be used to explore such aspects as the timeliness and appropriateness of care.

4.4.2 Purpose

The purpose of the Adult Dental Programs Survey is to describe levels of dental attendance and service provision within public-funded dental programs. This includes examination of access issues for these card-holders who attend for public-funded dental treatment. This involves investigation of service provision patterns by a range of patient and visit factors. Such investigations may be analysed through both prospective and cross-sectional survey designs.

4.4.3 Methods

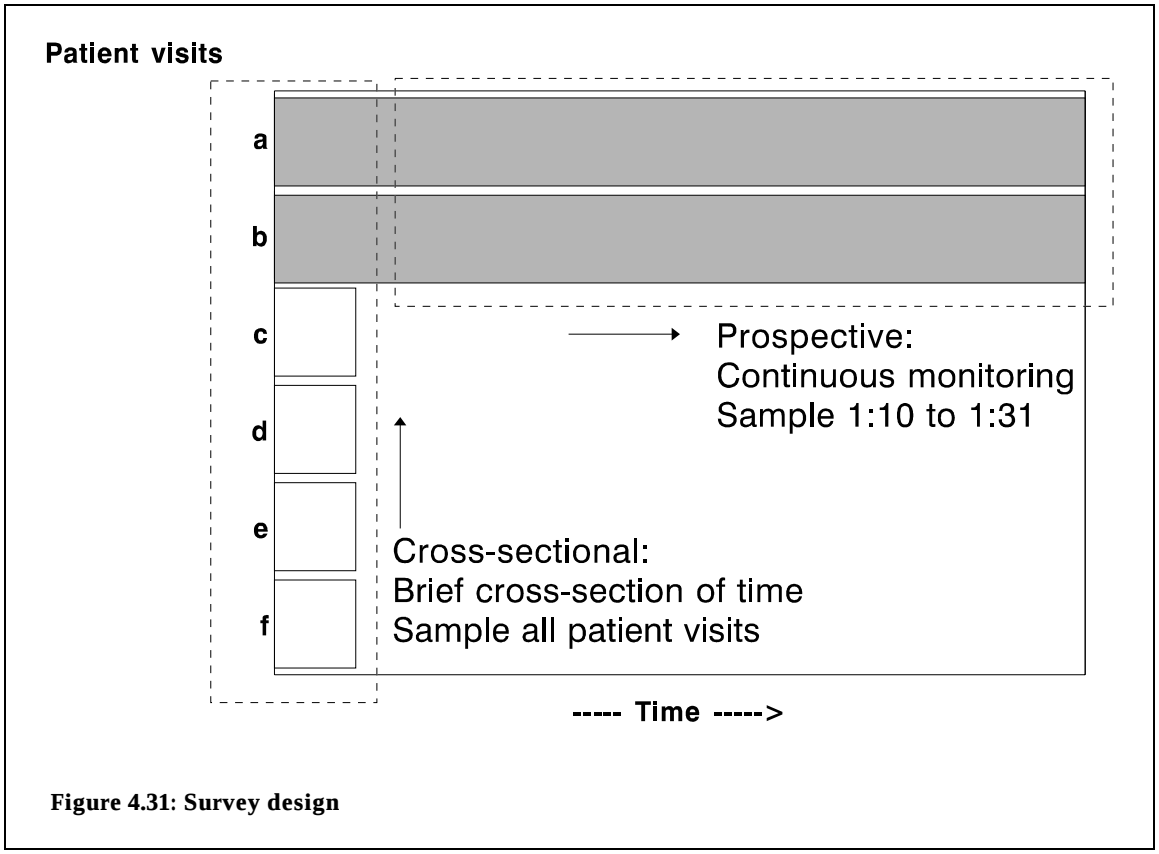
Data items

The data items collected through the Adult Dental Programs Survey can be grouped into four categories:

1. oral health: including data on caries experience, periodontal status, and dental prosthetics;
2. patient characteristics: including age, sex, Aboriginality, card status, country of birth, language spoken, and residential postcode;
3. visit details: including type of care (such as emergency or scheduled visits), time since last course of care, number of visits in the last year, and waiting time; and
4. services provided: including treatment items received by patients.

Survey design

These data items are being collected through two different survey designs that are represented graphically in Figure 4.31. In the Prospective Adult Dental Programs Survey data items from all four groups (i.e. oral health, patient characteristics, visit details and service provision) are collected continuously over time from a sample of patients, ranging from 1-in-10 to 1-in-31.



In contrast, the Adult Dental Programs Survey (Cross-sectional) differs in that it is collected on all patients over a brief cross-section of time each year, the period sampled varies from about one to two weeks. In this cross-sectional survey design, oral health status is not collected, but all of the remaining data items (covering patient and visit details, and service provision) are collected.

Sampling

The rationale for sample size is the same in both the cross-sectional and the prospective survey, although the sampling duration and intensity differs. Sampling rates are calculated to result in sufficient numbers of patients to provide estimates with a precision of a relative standard error of 40% or less for parameters as low as 5% (such as emergency patients receiving preventive services) for each of six age groups and allowing for disaggregation by five levels of another factor, such as region. Consequently, 119 x 5 disaggregations x 6 age groups = 3,570 courses of care per State / Territory. To avoid unreasonable workloads in States or Territories that have smaller patient flows, a sample of only 119 for each of six age groups is sought in these locations, providing target yields of 714 patient visits.

Data collection

To summarise how these data are collected, Table 4.3 presents a breakdown of the similarities and differences between the two approaches to the data collection. Both surveys sample patients undergoing public-funded dental care and are collected primarily by staff of State or Territory dental services.

Table 4.3: Data collection

	Prospective	Cross-sectional
Target population:	Public-funded patients	Public-funded patients
Sample unit:	Course of care	Visit
Data items:		
1. Oral health	Yes	No
2. Patient characteristics	Yes	Yes
3. Visit details	Yes	Yes
4. Service items	Yes	Yes
Design:		
– duration of survey	Ongoing monitoring (continuous)	Cross-section (brief slice of time)
– sampling intensity	Low (1:10 to 1:31)	High (all patients)

The prospective survey samples patients attending for care at the beginning of a course of care. Oral health status is then recorded by the examining dentist. Patient and visit details are also recorded, as are the services received throughout the course of care. The cross-sectional survey samples a cross-section of patient visits. Oral health data are not recorded, but all other data items are collected.

There are design differences in terms of sampling duration and intensity. The prospective survey is an ongoing monitoring survey that continuously samples patients but at a low intensity, which varies between States and Territories. The cross-sectional survey is of short duration but higher intensity, sampling all patients during a brief cross-sectional slice of time.

In States or Territories that have computer management information systems (MIS) the cross-sectional data can be sampled directly from these existing records and so the clinic staff are unaware that the survey is taking place. In places where there are no computer systems the manual recording of data on to optical mark read (OMR) scan forms is necessary, and the continuous collecting of the prospective survey may be temporarily suspended while the cross-sectional data is being collected.

Service provision issues

In this section on access issues in adult dental care the focus is on the cross-sectional survey, having already presented findings and methodological aspects of the collection of oral health data in the section on adult oral health.

The difference between the use of course of care and visit as the unit of analysis between the two survey designs is noteworthy, especially when examining patterns of service provision. A course of care for one or more related conditions may require several visits. Collection of course of care may be preferred as it is considered a more natural unit of clinical practice, representing an episode of care. The need for this unit of analysis in the prospective survey is also linked to the requirement of collecting oral health status of patients as they present for care and following their subsequent treatment. In a cross-sectional survey, collection of such a unit would not be feasible due to factors such as time constraints.

One implication is that greater numbers of services are expected when using course of care, and this would be reflected in higher levels of measures such as mean service provision and percentage of persons receiving a particular service. However, a measure such as percentage of total services for a particular service type would not be affected. The calculation of such measures of service provision is possible when service data are collected as individual items of service.

The collection of service provision as service items is also important as it allows the flexibility of recoding into areas of service. For example, the main areas of service under the Australian Dental Association's Schedule of Dental Services could be followed. However, other schemes of coding could be adopted.

Preparation

Data items can be recorded on OMR scan forms. These forms are forwarded to the DSRU where they are scanned to produce ASCII data files for subsequent computer processing and analysis. Alternatively, data may be derived from computer management information systems from States or Territories that have these systems.

Analysis

Statistical analysis includes examination of patterns of service provision and dental attendance in terms of a range of explanatory variables encompassing patient and visit details (such as type of course of care and geographic location), and controlling for potential confounding factors (such as age).

To illustrate such analyses the following section presents some results that extend some earlier findings which indicated high levels of emergency care and extraction of teeth for patients in public-funded dental programs.

4.4.4 Key results

The results presented cover two issues in the area of provision of services. One issue relates to service provision among indigenous and non-indigenous Australians, and the other relates to persons in rural and remote locations. Both examples are drawn from the 1994 Adult Dental Programs Survey (Cross-sectional).

Geographic location

Table 4.4 introduces some characteristics of the sample, showing the number of visits and age distribution, by geographic location. This classification as urban, rural and remote was based on the residential postcode of patients and the Remote/Rural Areas Classification Scheme of the Commonwealth Department of Human Services and Health.

Table 4.4: Visits and age by location

	Urban	Rural	Remote	All
Visits				
Number	7596	2268	366	10230
Percentage	74.3	22.3	3.6	
Age (%)				
<35 years	32.4	43.8	44.8	35.4
35–54 years	28.9	31.0	32.0	29.5
55+ years	38.7	25.3	23.2	35.2

Source: Adult Dental Programs Survey (Cross-sectional) 1994

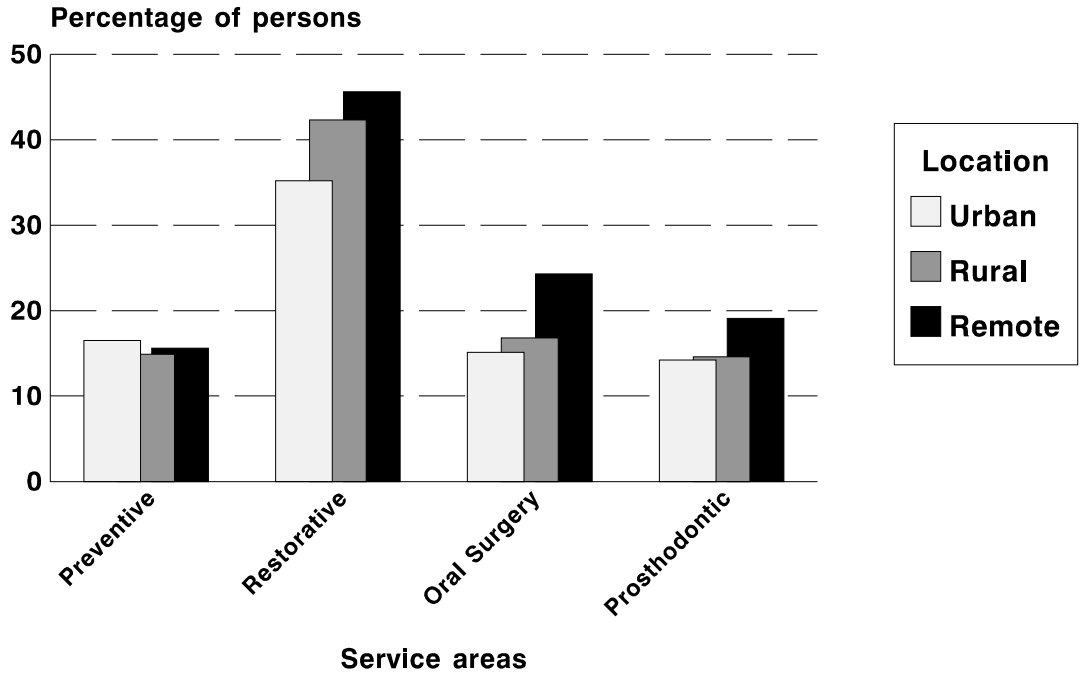
The analysis by location is based on 10,230 visits made by dentate patients. The percentage of visits were 74.3% from urban locations, 22.3% rural, and 3.6% remote. The age distribution shows that for all cases 35.4% were in the youngest age group. A similar level occurred in urban locations (32.4%), however both rural and remote locations had younger age distributions (with 43.8 and 44.8% respectively).

Table 4.5: Sex and visit status by location

	Urban	Rural	Remote	All
Sex (%)				
Male	43.6	43.3	42.7	43.5
Female	56.4	56.7	57.3	56.5
Visit (%)				
Emergency	38.9	40.4	45.3	39.5
Non-emergency	61.1	59.6	54.7	60.5

Source: Adult Dental Programs Survey (Cross-sectional) 1994

Table 4.5 presents some additional characteristics of the sample for sex of patient and visit status, by location. Females comprised 56.5% of visits overall, with similar percentages occurring in each geographic location. For visit status, overall, emergencies made up 39.5% of visits, ranging from 38.9% in urban locations, 40.4% in rural, to 45.3% in remote locations.



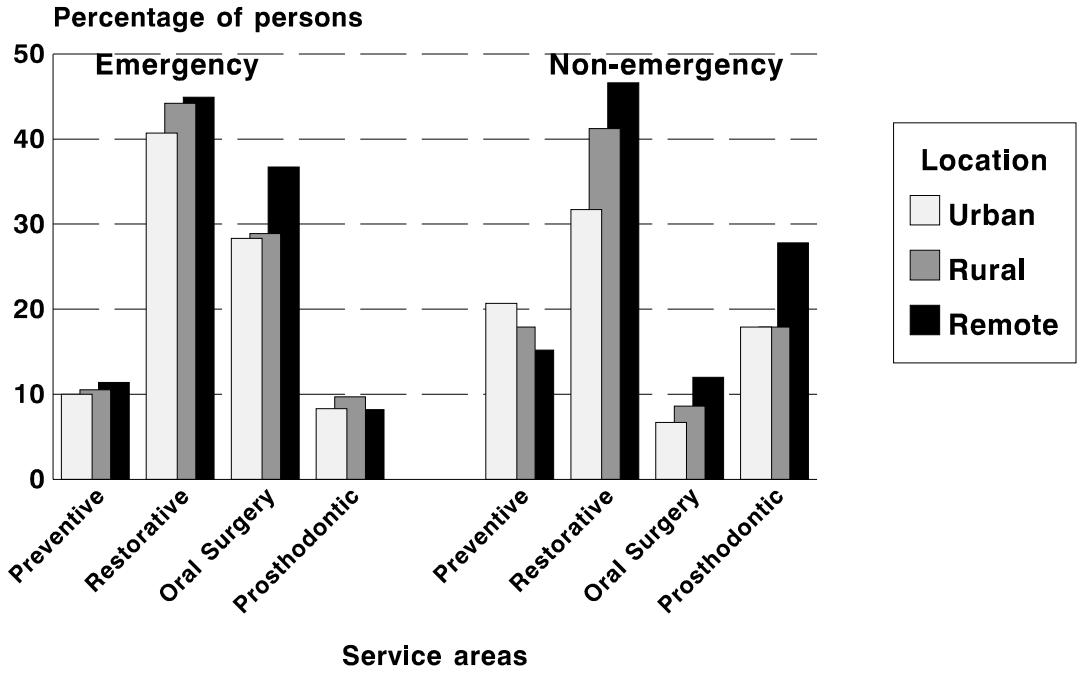
Source: Adult Dental Programs Survey (Cross-sectional) 1994

Figure 4.32: Service areas by location

Figure 4.32 presents the percentage of persons receiving services at a visit by geographic location for the selected service areas of preventive, restorative, oral surgery, and prosthodontic. These service areas were chosen as they comprise a large percentage of total services and they represent a range of treatment intervention levels. Under this classification oral surgery refers primarily to the extraction of teeth.

Significant differences between locations occurred for the restorative, oral surgery and prosthodontic areas of service. In each of these areas higher percentages of persons received services in remote locations, with the lowest percentages in urban locations.

This indicates a less favourable pattern of services for patients outside urban locations, with a higher percentage of patients receiving fillings, extractions and denture services at remote compared to urban locations.



Source: Adult Dental Programs Survey (Cross-sectional) 1994

Figure 4.33: Service areas by location split by emergency status

Figure 4.33 shows the same service areas by locations but split by emergency status. For emergency visits, there were no significant differences between locations in the percentage of persons receiving services within any area of service. However, for non-emergency visits significant differences between locations occurred in all four areas.

For preventive services the highest percentage occurred for patients in urban locations while the lowest percentage occurred in remote locations. The percentage of patients from rural locations was between the two. Gradients in percentage of service received were also evident for restorative and oral surgery services, with the lowest percentages occurring at urban locations and the highest at remote locations. For prosthodontic services both urban and rural patients received lower percentages compared to remote locations.

Table 4.6: Logistic regression analysis of service areas by location and age for non-emergency visits

	Preventive Odds ratio	Restorative Odds ratio	Oral Surgery Odds ratio	Prosthodontic Odds ratio	Reference category
Location					**Urban**
Rural	0.8	1.4	1.3	1.3	1.0
Remote	0.6	1.7	1.8	2.6	1.0
Age					**55+ years**
<35 years	1.4	1.6	1.3	0.1	1.0
35–54 years	1.3	1.6	0.9	0.4	1.0

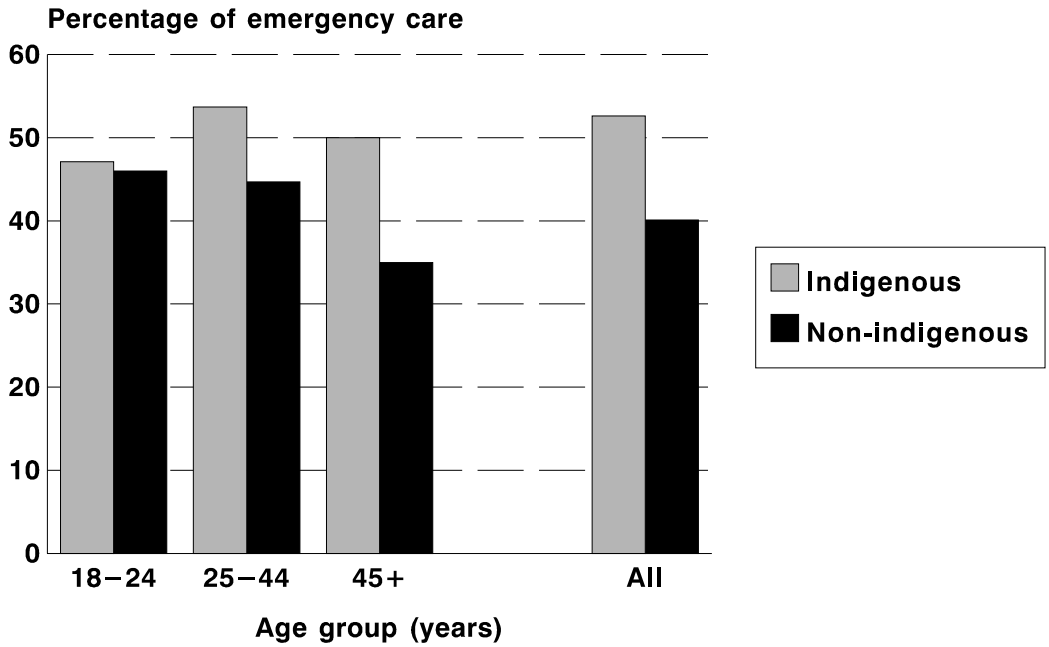
Source: Adult Dental Programs Survey (Cross-sectional) 1994

Table 4.6 quantifies the results presented for non-emergency visits from Figure 4.33 through the use of multiple logistic regression, which models the variation in service provision by geographic location while controlling for the effect of age. There were significant differences by age group, with younger patients more likely to receive preventive, restorative, and oral surgery services but less likely to receive prosthodontic services compared to the reference category of those aged 55 years or more.

Significant differences were also present between geographic locations. For preventive services, patients at rural and remote locations were 0.8 and 0.6 times less likely to receive services compared to the reference category of urban location. Patients at rural and remote locations were 1.4 and 1.7 times more likely to receive restorative care compared to urban patients. For oral surgery services, patients at rural locations were 1.3 times more likely to receive an extraction compared to patients at urban locations, while patients at remote locations were 1.8 times more likely to have a tooth extracted. A similar gradient occurred for prosthodontic care, with patients at rural locations 1.3 times, and patients at remote locations 2.6 times, more likely to receive these services compared to urban locations.

Indigenous status

Figure 4.34 shows the percentage of persons attending for emergency care for indigenous and non-indigenous patients by age. For all ages combined, a higher percentage of indigenous persons received emergency care, with 52.6% compared to 40.1% for non-indigenous persons. This difference in percentage of persons attending for emergency care was only apparent among older adults aged 25–44 and 45 years or more.

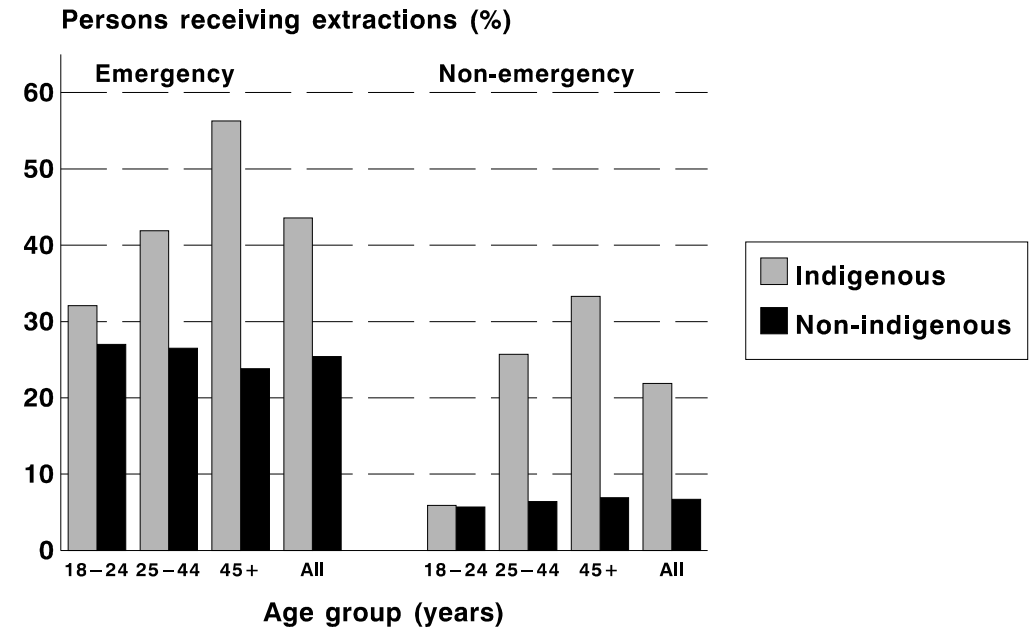


Indigenous = Aboriginal and Torres Strait Islander

Source: Adult Dental Programs Survey (Cross-sectional) 1994

Figure 4.34: Emergency visits by indigenous status and age

Figure 4.35 shows the percentage of indigenous and non-indigenous dentate persons receiving extractions when attending for emergency or non-emergency care by age group. A higher percentage of dentate persons received extractions when attending for emergency care compared with non-emergency care.

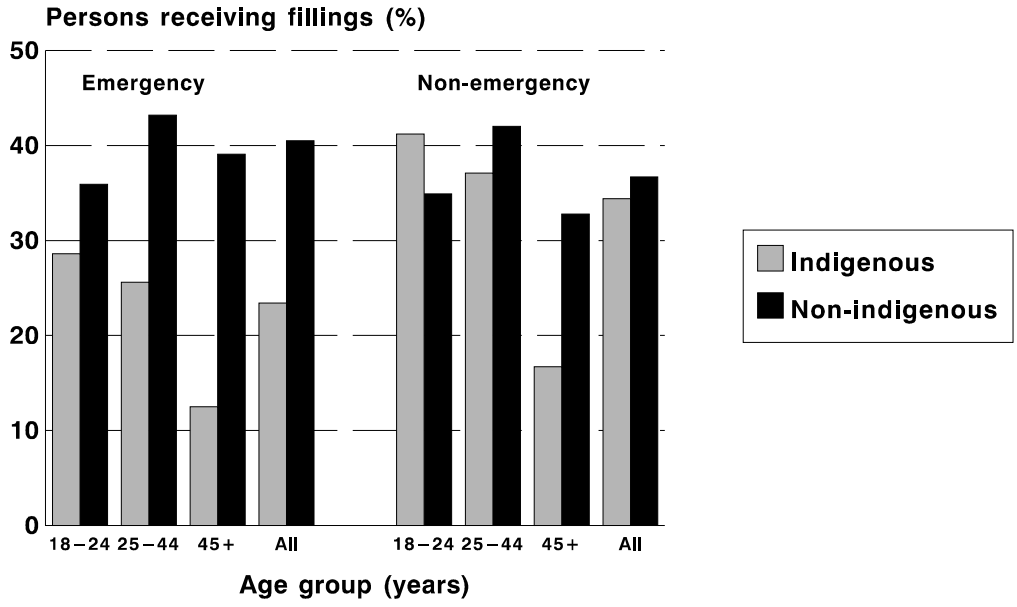


Indigenous = Aboriginal and Torres Strait Islander

Source: Adult Dental Programs Survey (Cross-sectional) 1994

Figure 4.35: Extractions by indigenous status and age by emergency status

However, for both emergency and non-emergency treatment, a markedly higher percentage of indigenous persons received extractions in the age groups 25–44 and 45 years or more, compared with non-indigenous persons. For emergency care among persons aged 45 years or more, over half of the indigenous patients received an extraction (56.3%) compared to under a quarter for non-indigenous patients (23.8%). For non-emergency care, in the same age group of 45 years or more, indigenous persons were over four times more likely to receive an extraction compared with non-indigenous persons (33.3% compared with 6.9%).



Indigenous = Aboriginal and Torres Strait Islander

Source: Adult Dental Programs Survey (Cross-sectional) 1994

Figure 4.36: Fillings by indigenous status and age by emergency status

Figure 4.36 shows the percentage of dentate persons receiving fillings when attending for emergency or non-emergency care for indigenous and non-indigenous patients by age. For indigenous persons, the percentage receiving fillings tends to decline across age groups for both emergency and non-emergency care. For non-indigenous patients this trend was not apparent, with the percentage receiving fillings remaining at a high level across age groups. These trends by age result in the gap in receipt of fillings widening between indigenous and non-indigenous persons across age groups. This disparity was most marked for those who received emergency care in the age group 45 years or more, with 12.5% of indigenous patients receiving fillings compared with 39.1% for non-indigenous patients.

4.4.5 Reporting procedures

Proposed reporting procedures of data from this survey include publication in three main styles.

- Technical reports, incorporating standard tables. For example, the Adult Dental Programs Survey (Cross-sectional) 1994 was published in March 1995.
- Briefer reports in the form of research reports or newsletters have also been produced. For example the findings presented in this report on services provided to indigenous patients have been summarised in the Commonwealth Dental Health Program Research Report 2, published in July 1995. These research reports are designed to provide a more concise presentation of main findings.
- Another form of publication is scientific articles in journals, providing more technical analysis of specific subjects.

Another reporting procedure involves presentation of conference papers. Data from the 1994 Adult Dental Programs Survey (Cross-sectional) has been presented to the International Association of Dental Research in both 1994 and 1995. Information is also reported through specific requests for information.

4.4.6 Additional priorities

Priorities in regard to the Adult Dental Programs Survey (Cross-sectional) overlap many of those outlined in relation to the prospective survey of oral health.

The cross-sectional survey was collected across all States and Territories in Australia during 1994. However, there were some variations in data items that restricted comparability or precluded some analyses. Difficulties arising from the implementation of computer management information systems in a number of States have hindered progress in the 1995 survey. These problems with information systems also affect the ability to collect and analyse oral health data from the prospective survey.

At present cross-sectional data for 1995 have been received from Western Australia (which was collected from their computer MIS), and from Queensland and Northern Territory (who collected data manually on OMR scan forms). Computer data from Dental Basics MISs are expected for the remaining States, except New South Wales which expects to utilise existing MIS data.

Priorities include:

- in the short-term, to achieve complete implementation of data collection across all States or Territories (this is essential to complete the 1995 report); and
- in the medium-term, annual repetitions of the cross-sectional survey are necessary to provide a time series that will allow trends to be observed; hence the recognition of the need for further collection in 1996.

Potential applications of this data include:

- evaluation of the Commonwealth Dental Health Program over four years;
- examination of State or Territory service provision patterns; and
- analysis of service provision variation by geographic location (such as regions within States).

4.4.7 Editorial note

Since the Workshop was presented the data collection for the evaluation of the Commonwealth Dental Health Program has been finalised. Findings have been presented in a number of publications that are listed below:

Technical reports:

Brennan DS, Slade GD, Davies MJ & Spencer AJ 1994. *Adult Dental Programs Survey (Cross-sectional) 1994.* Adelaide: AIHW.

Brennan DS & Spencer AJ 1996. *Adult Dental Programs Survey (Cross-sectional) 1995*. Adelaide: AIHW.

Brennan DS & Spencer AJ 1997. *Adult Dental Programs Survey (Cross-sectional) 1996*. Adelaide: AIHW.

Newsletters:

AIHW DSRU 1997. Newsletter Vol. VIII, No. 1, February 1997.

5 Clearing house activities

5.1 Introduction

The decision to establish DSRU in the mid-1980s by the National Committee on Health and Vital Statistics included the establishment of a clearing house for dental statistics. An integral and steadily increasing part of DSRU's role is to provide a clearing house capacity to a wide-range of stake-holders. This section presents the data sets held by DSRU, the publications produced, and a summary of the requests for information that have been received. To conclude, a discussion of security, confidentiality and future developments is presented.

5.2 DSRU data sets

The following data sets are collected and maintained by DSRU:

- Child Dental Health Survey (1989 to present);
- Child Fluoride Study (1991 to present);
- National Dental Telephone Interview Survey (1994 to present);
- Adult Dental Programs Survey (1994 to present);
- Dental Satisfaction Survey (1994 to present);
- National Dental Labour Force Survey (1988 to present);
- Longitudinal Study of Dentists' Practice Activity (1983/84, 1988/89, 1993/94); and
- South Australian Dental Longitudinal Study (1991 to present).

In addition, DSRU has collected or made a major contribution to the following 'one-off' data sets:

- Nursing Caries Study, 1989;
- Oral and Maxillofacial Surgeons Work Force Study, 1990;
- National Oral Health Survey, (1992 SA Follow-up); and
- Research Database, 1992/93.

DSRU is also the custodian of unit record files of the following data sets:

- Child Dental Health Survey, 1977 to 1988;
- National Oral Health Survey of Australia, 1987–88; and
- Australian Longitudinal Study of Ageing (1991 to present).

5.3 Publications

A number of publications are prepared by DSRU:

- Dental Statistics and Research Series;
- newsletters;
- Dental Statistics and Research Reports;
- CDHP research reports;
- State / Territory reports for the Child Dental Health Survey and the National Dental Labour Force Survey;
- technical reports; and
- published papers.

From these publications the majority of requests for information are able to be satisfied.

To specifically act as a resource to document the many and varied data collections available in dental public health, DSRU prepared the Inventory of Dental Public Health Data Collections in Australia 1980–1990. This report includes 71 entries and was published as number 3 in the Dental Statistics and Research series.

5.4 Requests for information

To provide an idea of the volume and distribution of the requests for information, in the last six months there were 42 requests for information and the following percentage of requests were related to the various data collection areas:

- Child Dental Health Statistics – 33%
- CDHP Evaluation Project – 40%
- National Dental Labour Force – 50%
- Longitudinal Study of Dentists' Practice Activity – 24%
- Other areas – 36%

A number of requests seek information from more than one data collection area and also require extra resources and the production of specific computer tabulations and analyses.

In addition to requests for information on the specific data sets held by DSRU, staff report that they have become increasingly involved with the provision of other statistical and demographic data, plus requests for advice on the collection and analysis of data.

Access to DSRU information has been freely available with no costs charged to those requesting the information. This has included all publications that have remained free of charge.

5.5 Support to other organisations

DSRU not only has a role in the collection, analysis and provision of data but also has been called to support other organisations in relation to issues to do with dental statistics. In particular, dental questions that have been included in Australian Bureau of Statistics data collections have been prepared in consultation with DSRU. The Commonwealth and State/Territory Governments and the Australian Dental Association have also received input from DSRU into their dental data collection activities.

5.6 Security and confidentiality

All information collected by DSRU is covered under the AIHW Act, and in particular Section 29 which prohibits the release of any information that could identify any respondent. In addition, no names and addresses are included in the data files, with records identified by a unique number. All survey materials are held in two locked storage areas.

5.7 Future developments

The Workshop considered that the following initiatives could be examined:

- extension of the publication mailing list;
- development of fact sheets/summary information, especially to respondents;
- preparation of a 1985 to 1995 inventory of data collections;
- wider dissemination of findings, e.g. through a world-wide web home page; and
- convening of a stakeholders' workshop every two years.

AIHW Dental Statistics and Research Series

1. *The Child Dental Health Survey, Australia 1989*
2. *The Child Dental Health Survey, Australia 1990*
3. *Inventory of Dental Public Health Data Collections in Australia, 1980–1990*
4. *The Child Dental Health Survey, Australia 1991*
5. *The Child Dental Health Survey, Australia 1992*
6. *Dental Practitioner Statistics, Australia 1992*
7. *The Child Dental Health Survey, Australia 1993*
8. *Dental Practitioner Statistics, Australia 1993*
9. *The Child Dental Health Survey, Australia 1994*
10. *The Child Dental Health Survey, Australia 1995*
11. *Dental Practitioner Statistics, Australia 1994*
12. *Dental Hygienist Labourforce, Australia 1996*
13. *Dental Therapist Labourforce, Australia 1996*
14. *Population estimates, standard errors and hypothesis tests from the 1987/88 National Oral Health Survey of Australia*
15. *Adult Access to Dental Care – Migrants*
16. *Adult Access to Dental Care – Indigenous Status*
17. *Adult Access to Dental Care – Rural and Remote Dwellers*
18. *Australia's Oral Health and Dental Services*

AIHW Dental Statistics and Research Reports

Dental Care for Adults in Australia: Proceedings of a Workshop (1993)

Commonwealth Dental Health Program, Baseline Evaluation Report 1994 (1995)

Commonwealth Dental Health Program, Evaluation Report 1994–1996 (1997)

Copies of the above reports can be obtained from:

The AIHW Dental Statistics and Research Unit
The University of Adelaide
SOUTH AUSTRALIA 5005

Fax: (08) 8303 4858
Tel: (08) 8303 4051
E-mail: aihw.dsru@dentistry.adelaide.edu.au
Website: http://www.adelaide.edu.au/socprev-dent/dsru

BACK COVER TEXT

Australia's Oral Health and Dental Services was developed from papers presented at the AIHW Dental Statistics and Research Unit Workshop on Dental Statistics in Australia. Each presentation at the Workshop discussed the purpose, methods, findings and dissemination of dental statistics collected by the Unit.

Topics included in this report are:

- child oral health
- effectiveness of fluorides
- adult oral health
- a proposed National Dental Survey
- the dentist and dental auxiliary labour force
- changes in dentist practice activity
- access to adult dental care, particularly among health card-holders
- clearing house activities

This report provides a record of the material presented at the Workshop, and will be informative and stimulating to those who have an interest in improving the oral health and well-being of Australians. The report should also promote discussion of dental statistics in Australia and how they might be improved.