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Oral health trends among adult public dental patients

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Oral health trends among adult public dental patients

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Edentulism

While the percentage of edentulous patients was slightly higher overall in 2001–02 (9.0%) compared to 1995–96 (7.9%), there were no significant age-specific differences in edentulism, indicating that the overall difference may be a result of the slightly older age distribution and greater percentage of patients from regional locations in 2001–02 than in 1995–96.

Overall, there were no differences in edentulism between 1995–96 and 2001–02 for either general or emergency patients.

Overall, there were no differences in edentulism between 1995–96 and 2001–02 for patients from either major city or regional/remote locations.

Caries experience

Decayed teeth

Overall, the number of decayed teeth was higher in 2001–02 (2.65 decayed teeth) compared to 1995–96 (1.97 decayed teeth) and this trend was observed consistently in each age group of adult public dental patients.

Higher numbers of decayed teeth in 2001–02 compared to 1995–96 were observed for both general and emergency care patients overall and in all age groups.

Patients from major city locations had higher overall numbers of decayed teeth in 2001–02 compared to 1995–96, reflecting increased levels of decayed teeth among patients aged 18–24, 25–44 and 45–64 years, while patients from regional/remote locations had higher overall numbers of decayed teeth in 2001–02 compared to 1995–96, reflecting increased levels of decayed teeth among patients aged 25–44 and 65+ years.

Missing teeth

Overall, the number of missing teeth was higher in 2001–02 (6.35 missing teeth) compared to 1995–96 (5.50 missing teeth) but this trend was only statistically significant among 25–44-year-old patients.

General care patients had higher numbers of missing teeth overall in 2001–02 compared to 1995–96, reflecting increased numbers of missing teeth among 25–44-year-olds. Among emergency care patients the number of teeth missing overall did not vary between 2001–02 and 1995–96, but 25–44-year-old patients showed increased numbers of missing teeth.

Patients from major city locations showed no significant difference in the overall number of missing teeth between 2001–02 and 1995–96, with higher numbers of missing teeth over time among 25–44-year-olds balanced by lower numbers among 65+-year-olds. Patients from regional/remote locations showed higher overall numbers of missing teeth in 2001–02 compared to 1995–96, reflecting increased numbers of missing teeth among 25–44, 45–64 and 65+-year-olds.

Filled teeth

Overall, the number of filled teeth was lower in 2001–02 (6.20 filled teeth) compared to 1995–96 (6.62 filled teeth) and this trend was statistically significant among patients aged 18–24 and 25–44 years.

General care patients showed no significant difference in overall numbers of filled teeth between 2001–02 and 1995–96 but 18–24 and 25–44-year-old general care patients each showed decreased numbers of filled teeth over time. Emergency care patients had lower numbers of filled teeth in 2001–02 compared to 1995–96, reflecting decreased numbers of filled teeth over time among 18–24 and 25–44-year-old emergency care patients.

Patients from major city locations showed no significant difference in the overall number of filled teeth between 2001–02 and 1995–96. However, there were decreased numbers of filled teeth over time among 25–44-year-olds and increased numbers among 65+-year-olds. Patients from regional/remote locations had lower overall numbers of filled teeth over time, reflecting decreases among 18–24, 25–44 and 45–64-year-olds.

DMF teeth

Overall, DMFT was higher in 2001–02 (15.20 decayed, missing and filled teeth) compared to 1995–96 (14.09 decayed, missing and filled teeth) but this trend was only statistically significant among 25–44-year-old patients.

Both general and emergency care patients had higher overall combined numbers of decayed, missing and filled teeth in 2001–02 compared to 1995–96, reflecting increased combined numbers of decayed, missing and filled teeth among 25–44-year-old general and emergency care patients.

Patients from both major city and regional/remote locations had higher overall combined numbers of decayed, missing and filled teeth in 2001–02 compared to 1995–96, reflecting increased combined numbers of decayed, missing and filled teeth among 25–44-year-old patients from major city locations and increased combined numbers of decayed, missing and filled teeth among 45–64 and 65+-year-old patients from regional/remote locations.

Periodontal status

Overall, there was an improvement in periodontal status of adult public dental patients over time, with a decrease in the percentage of patients who had periodontal pockets of 6+ mm in 2001–02 (10.3%) compared to 1995–96 (13.0%).

Decreased percentages of patients with periodontal pockets of 6+ mm in 2001–02 compared to 1995–96 were observed for both general and emergency care patients.

While patients from major city locations exhibited a trend towards decreased percentages of patients with periodontal pockets of 6+ mm over time, there was an increase in the percentage of patients with periodontal pockets of 6+ mm among patients from regional/remote locations.

Abbreviations and symbols

Abbreviations

CPI	Community Periodontal Index
DMFT	Decayed, missing or filled permanent teeth
MIS	(Computer) management information system
NIDR	National Institute of Dental Research
OMR	Optical mark read scan forms
WHO	World Health Organization

Abbreviations of places

ACT	Australian Capital Territory
NSW	New South Wales
NT	Northern Territory
Qld	Queensland
SA	South Australia
Tas	Tasmania
Vic	Victoria
WA	Western Australia

Symbols

–	nil or rounded to zero
n.a.	not applicable
. .	not available

Acknowledgements

This research was assisted by the Population Health Division of the Australian Government Department of Health and Ageing.

The Adult Dental Programs Survey was undertaken in collaboration with the dental authorities in the participating states/territories of Australia. The support of those dental authorities and their staff was crucial to the successful collection of data for this survey.

The Adult Dental Programs Survey 2001–02 data was collected with assistance from Dr Kaye Roberts-Thomson and Mrs Lorna Lucas at the Australian Research Centre for Population Oral Health, The University of Adelaide.

1 Background

Social inequalities in health have been highlighted through reports of associations between mortality and factors such as occupation, income, ethnic group and social class (Marmot et al. 1987; Feinstein 1993). Even in countries with universal-access policies for health care, large differences in mortality and morbidity by social class have been reported (Davey Smith et al. 1990). In 1992 the National Health Strategy identified inequalities in oral health and access to dental services as a major public health issue in Australia (National Health Strategy 1992). In October 1999 the Australian Health Ministers' Advisory Council (AHMAC) recommended that a report be prepared on 'the burden, trends and distribution of oral health problems in Australia and the trends in clinical approaches to dealing with those problems'. The report concluded that oral diseases and disorders remain prevalent and are a substantial burden on the Australian population (AHMAC 2001).

1.1 Public dental patients

Among people on low incomes, health card holders are thought to be particularly at risk of reduced oral health and access to dental services (AIHW DSRU 1993). Public patients have about twice the rate of extraction as patients in private general practice (AIHW DSRU: Brennan et al. 1997). Patients eligible for public dental care are primarily holders of government entitlement cards such as aged pensioners and the unemployed.

All Australian states and territories provide public dental services. These services are largely provided by publicly employed dentists in government clinics at minimal or no cost to the patient. These clinics are generally located in major regional centres and are often associated with district hospitals or health centres. They provide access to a restricted level of care and generally do not include all aspects of dental treatment. Government-funded dental care is not accessible to many people in the community due to limited resources and small numbers of public dental clinics remote from population growth centres. There are a large number of people waiting for general dental care at public dental services. While waiting times for emergency dental care are short, waiting times for general dental care can be extensive (e.g. estimated to be between 10 and 54 months in 2000). The time that people spend waiting for general dental care indicates that, at least in some regions, there is inadequate provision of services to meet the expectations of even the minority of people who seek care from public dental services (AHMAC 2001).

1.2 Background: oral health data on public dental patients

The Adult Dental Programs Survey provides information on the oral health of patients attending for public dental care in Australia. The survey began as a pilot study in South Australia in 1992 and was expanded to include New South Wales and Victoria as part of the Research Database into Dental Care for Adults in Australia 1992–93. The

Prospective Adult Dental Programs Survey was performed in 1995–96 as part of the Evaluation Project of the Commonwealth Dental Health Program. Since 1995–96 the Adult Dental Programs Survey has not been implemented as a national survey.

1.3 Purpose of the survey

The purpose of the survey was to describe the oral health status of patients within public dental programs. While there are variations among states/territories in details of eligibility criteria, dental patients sampled for this survey were eligible primarily because they had one of the following entitlement cards: Health Care Card, Health Benefits Card or Pensioner Concession Card. The survey excludes school dental care.

The Adult Dental Programs Survey describes the oral health status and basic demographic characteristics of patients during a course of care within the programs. The survey can answer questions such as: what levels of oral disease do patients have when they present for dental care, and do these levels differ among patient groups and geographic locations? By collecting data over a number of years, it will be possible to identify trends in oral health.

1.4 Structure and themes

The survey describes demographic and visit patterns, and oral health status of patients within public dental programs. The structure of this report reflects these themes: following the outline of methods (Chapter 2), Chapter 3 presents information on sociodemographic and visit details, and Chapter 4 discusses findings on oral health status. The major research theme is the description and comparison of oral health in 1995–96 and 2001–02, controlling for age. These results were further stratified by type of course of care and location of visit.

Some additional methodological considerations are dealt with in Appendix A (which presents the main findings restricted to states/territories that participated in both rounds of data collection), and Appendix B (which presents state/territory-specific findings). Appendix C lists publications that have been produced from each round of data collection.

2 Methods

The Adult Dental Programs Survey is a study of patients attending for public dental care. Estimates based on users of dental services are by definition restricted to those persons who were able to access dental care, and therefore may not necessarily be representative of the population eligible for public dental services who did not access public dental care during the survey period.

It should be noted that the existence of other dental schemes within states/territories might have had some effect on the data included in this report. For example, some Aboriginal persons may have been covered through separate Aboriginal dental schemes, and denture services provided through private practitioners under pensioner denture schemes might not be included.

2.1 Data collection

Data were collected from a random sample of adult patients at the beginning of a course of public dental care. The characteristics of sampled patients were initially recorded. The examining dentist then recorded oral health status. Standard criteria were used in the form of written guidelines, but there was no formal calibration. Dentists were instructed to evaluate oral health status using visual and tactile information alone, in conjunction with the definitions supplied. A periodontal probe was used to measure pocket depth (from gingival crest to the base of the pocket) and to detect subgingival calculus or bleeding.

1995–96

In 1995–96 each state and territory except New South Wales used optical mark read (OMR) scan forms to record oral health status. The remaining data on patient characteristics, visit details and service provision were either recorded on the same double-sided OMR form as the oral health data, or on data files derived from computer-based management information systems (MIS) which were linked to oral health data recorded on single-sided OMR forms. In New South Wales only the United Dental Hospital of Sydney participated in the survey, using a manual forms system designed to be compatible with the data items collected on the OMR forms. See AIHW DSRU: Brennan & Spencer (1997), and Brennan, Spencer & Slade (2000, 2001) for more details.

2001–02

In 2001–02 in each state and territory except Western Australia and South Australia, dental authorities allocated survey forms to clinics according to estimated patient volume. Patients were sampled continuously until a clinic had completed their allocated sample yield during the period 2001–02. In Western Australia patients were sampled based on selected day of birth in order to meet their sample yield. In most states/territories all clinics were included: in Victoria those clinics surveyed were selectively chosen to provide a representative coverage of urban and rural locations.

OMR scan forms were used to collect data in all states/territories except South Australia, where a computer MIS was used.

2.2 Sampling rates

Rationale for sampling rates

In 1995–96 sampling was based on date of birth. In all five mainland states a target yield of approximately 3,570 patients was determined to obtain 119 persons in each of six age groups. The aim was to provide prevalence estimates with a relative standard error of 40% or less within five subgroups of each age group for key outcome measures as low as 5% prevalence (e.g. emergency patients receiving preventive services). Smaller yields were proposed for Tasmania and the two territories in order to reduce the survey workload at clinics where patient flows were less. However, this limits the ability to make precise age-specific estimates by another level of disaggregation in these states/territories.

In 2001–02 sample size estimates were based on measures of oral health status from the 1995–96 Adult Dental Programs Survey (AIHW DSRU: Brennan & Spencer 1997). To achieve estimates of key outcome variables (e.g. caries experience by age) with a precision of 20% relative standard error or less, target yields were set of 324 patients in Tasmania and the territories and 648 patients in the other states.

Weighting

Data were weighted using the estimated number of persons aged 18 years or more from the 1996 and 1999 National Dental Telephone Interview Surveys whose last dental visit was public-funded within the last year. These weighted data are representative of the number of adults receiving public-funded dental care in each participating state/territory.

2.3 Data items

Caries experience

Instructions for coding caries experience were based on the US National Institute of Dental Research (NIDR 1987) scoring system for coronal and root caries.

Periodontal status

Periodontal status was recorded using the Community Periodontal Index (World Health Organization 1997). A score of 0 (periodontal health), 1 (gingival bleeding), 2 (calculus at any supra- or sub-gingival site), 3 (pocket of 4–5 mm) or 4 (pocket of 6 mm or more) was scored for each dentate sextant. All teeth in a sextant were examined and the most severe periodontal condition observed was recorded as the sextant score. Sextants were defined by tooth position, with molars and premolars making up four posterior sextants, and canines and incisors making up two anterior

sextants. Third molars were excluded unless they were functioning in the place of second molars. Sextants were excluded (code X) when there were no teeth present or only one tooth which could be probed. If there was only one tooth in a sextant, the score for this single tooth could be carried forward for consideration in assessing the adjacent sextant.

Visit type

Visit type was classified as 'emergency' if the course of care was initiated for relief of pain; otherwise visit type was classified as 'general'.

Location

Location of patients was classified as 'major city' or 'regional/remote' based on their residential postcode using the ASGC Remoteness classification scheme (ABS 2001).

2.4 Sample yield

Obtained yield

The obtained sample yields for each state and territory from the 1995–96 and 2001–02 surveys are presented in Table 2.1. All states/territories participated in the 1995–96 survey and all except Tasmania and the Australian Capital Territory participated in 2001–02. While the obtained sample yields varied between localities, limiting disaggregations in some specific localities, the total sample yield across all localities exceeded the target, thereby providing a sufficient sample size to achieve the desired level of precision.

Table 2.1: Sample yields by state/territory, 1995–96 and 2001–02

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	All
1995–96									
Mode of collection	Manual	MIS & OMR	OMR	MIS & OMR	MIS & OMR	OMR	MIS & OMR	OMR	
Obtained yield	874	1,040	2,628	160	753	359	26	269	6,109
2001–02									
Mode of collection	OMR	OMR	OMR	OMR	MIS	n.a.	n.a.	OMR	
Obtained yield	733	593	533	1,197	1,904	. .	. .	283	5,243

OMR: Optical mark read scan form

MIS: Computer management information system

Tooth status

Invalid tooth codes include blank and multiple marks on OMRs. A breakdown of invalid tooth status codes per examined patient by state/territory is presented in Table 2.2. In this report measures of oral health, such as caries experience using the DMFT index from both 1995–96 and 2001–02, were based on examinations which had two or less invalid tooth status codes; those with more than two invalid tooth status codes per examination were excluded. The majority of invalid codes were blanks, with only 2.9% in 1995–96 and 5.7% in 2001–02 being multiple marks. While the majority of states/territories still rely on forms to collect data, in the future it is expected that the adoption of electronic systems will reduce errors through automated completeness checks.

Table 2.2: Invalid tooth status codes per patient (%) by state/territory – dentate persons, 2001–02

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	All
1995–96									
0 invalid	97.6	89.0	82.4	71.1	77.8	69.1	80.8	74.1	83.7
1 invalid	0.5	5.4	9.0	9.4	11.2	11.6	3.9	14.1	7.7
2 invalid	0.1	1.1	3.0	3.1	3.9	2.8	0.0	2.3	2.3
3+ invalid	1.8	4.5	5.6	16.4	7.1	16.4	15.4	9.5	6.3
2001–02									
0 invalid	77.3	76.4	72.0	76.8	100.0	. .	. .	80.4	84.9
1 invalid	13.6	13.2	12.8	8.3	0.0	. .	. .	13.6	7.4
2 invalid	6.4	5.5	4.5	3.4	0.0	. .	. .	3.0	2.9
3+ invalid	2.7	4.9	10.7	11.5	0.0	. .	. .	3.0	4.8

3 Sociodemographic and visit details

Sociodemographic and visit details are listed in Table 3.1 by year of survey. The age distribution of patients was similar in both survey years, with fewer than 10% aged 18–24 years and between 26.3% and 34.1% in each of the remaining older age groups.

There was little difference between survey years in the sex distribution of patients, with approximately 45% of patients being male and approximately 55% being female.

The percentage of patients attending for an emergency course of care captured in this survey was slightly lower in 2001–02 (50.0%) compared to 1995–96 (57.5%).

There was a marked difference in percentage of patients from major city locations between 1995–96 (80.0%) and 2001–02 (54.3%). While this could reflect changes in access patterns by location over time, it is more likely the result of sampling differences between the two surveys as a result of a greater proportion of regional/remote patients being sampled in some states/territories in 2001–02. As a result, the overall trends may reflect the greater percentage of regional/remote patients in the latter survey, and may need to be confirmed by reference to the separate analyses that present comparisons over time for patients from major cities and from regional/remote locations.

Table 3.1: Sociodemographic and visit details (%) by year of survey

	1995–96	2001–02
Age of patient		
18–24 years	9.4	6.7
25–44 years	34.1	29.5
45–64 years	30.3	30.1
65+ years	26.3	33.8
Sex of patient		
Male	44.5	44.8
Female	55.5	55.2
Type of care		
Emergency	57.5	50.0
General	42.5	50.0
Location of patient		
Major city	80.0	54.3
Regional/remote	20.0	45.7

4 Oral health

This chapter presents findings related to three measures of oral health status among public dental patients – edentulism, caries experience and periodontal status.

Edentulism refers to the loss of all natural teeth. Therefore, edentulous patients are those who have lost all their natural teeth, while dentate patients are those who have at least one natural tooth.

Caries experience refers to the level of dental decay and is measured using the DMFT index, which records the number of decayed (D), missing (M) and filled (F) permanent teeth.

Periodontal status refers to the condition of the gums and is measured using the Community Periodontal Index (CPI). The most severe periodontal status recorded using the CPI is the presence of periodontal pockets of 6+ mm, and this measure is presented as the percentage of patients with one or more 6+ mm periodontal pockets.

Each oral health measure is presented initially by time of study and age of patient, as there is a relationship between oral health and age. Then each oral health measure is presented by time of study and type of care and location, broken down by age of patient.

4.1 Edentulism

Edentulism 1995–96 and 2001–02: by age

Edentulism is presented in Figure 4.1 and Table 4.1 by year and age. In both survey years the percentage of edentulous patients showed a characteristic pattern of being higher among older age groups. While the percentage of edentulous patients was slightly higher overall over time, none of the age specific comparisons were statistically significant.

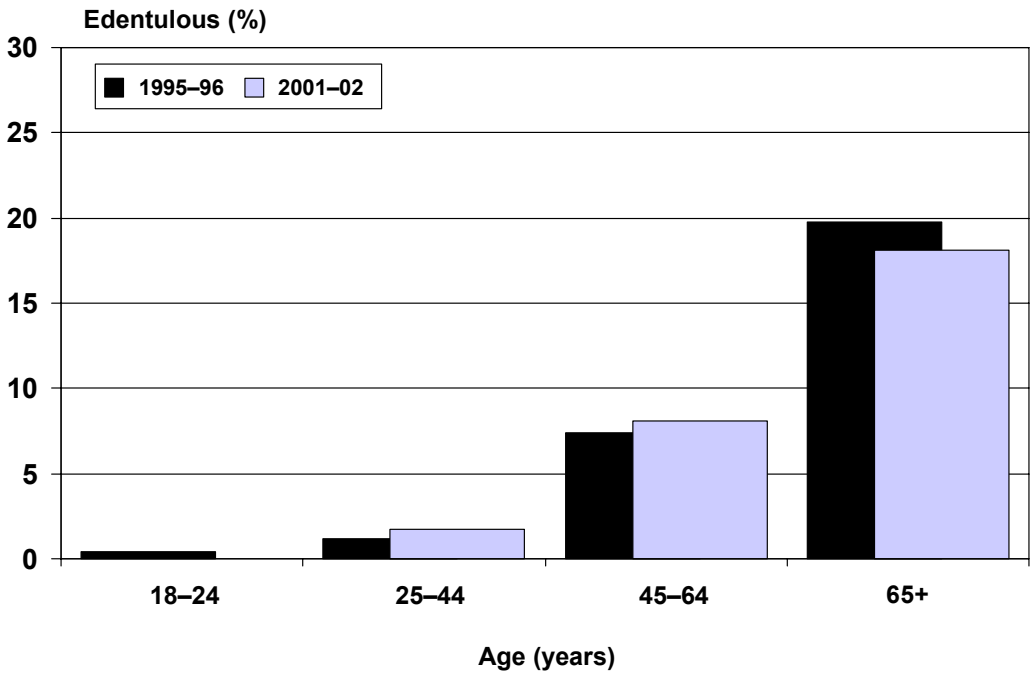

Figure 4.1: Edentulism (%) by year and age

Table 4.1: Edentulism (%) by year and age

	1995–96	2001–02	P
Age of patient	**n=5,897**	**n=5,006**	
18–24 years	0.4	0.0	ns
25–44 years	1.2	1.7	ns
45–64 years	7.4	8.1	ns
65+ years	19.8	18.1	ns
All	**7.9**	**9.0**	*

*(P<0.05), ns (not statistically significant) χ^2 test

Edentulism 1995–96 and 2001–02: by age and type of care

Edentulism is presented in Figure 4.2 and Table 4.2 by year and age for general care patients. The only significant age-specific difference was a lower percentage of edentulous patients in 2001–02 among patients aged 65 years or more.

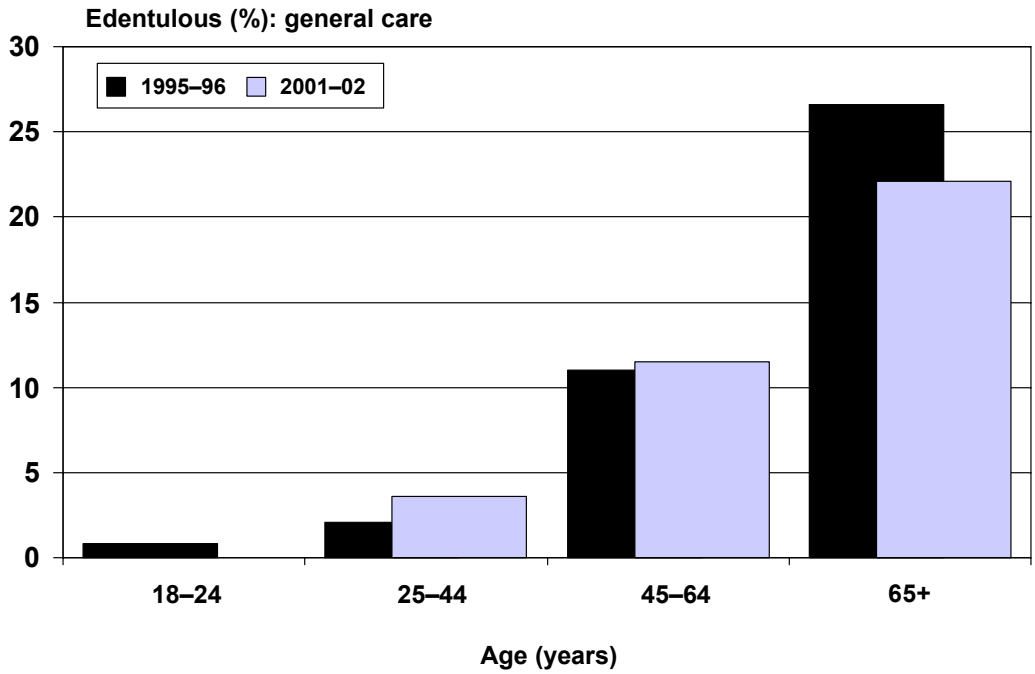

Figure 4.2: Edentulism (%) by year and age – general care

Table 4.2: Edentulism (%) by year and age – general care

	1995–96	2001–02	P
Age of patient	**n=2,830**	**n=2,753**	
18–24 years	0.8	0.0	ns
25–44 years	2.1	3.6	ns
45–64 years	11.0	11.5	ns
65+ years	26.6	22.1	*
All	**11.9**	**13.3**	**ns**

*(P<0.05), ns (not statistically significant) χ^2 test

Edentulism is presented in Figure 4.3 and Table 4.3 by year and age for emergency care patients. There were no significant age-specific differences between the two survey years for emergency care patients.

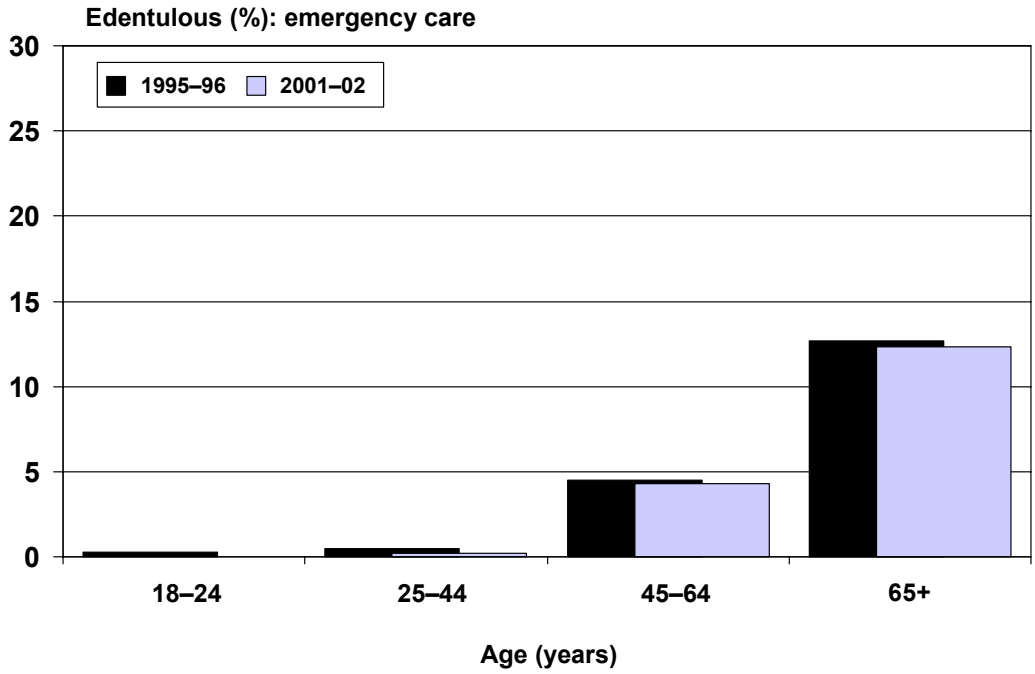

Figure 4.3: Edentulism (%) by year and age – emergency care

Table 4.3: Edentulism (%) by year and age – emergency care

	1995–96	2001–02	P
Age of patient	**n=3,042**	**n=2,189**	
18–24 years	0.3	0.0	ns
25–44 years	0.5	0.2	ns
45–64 years	4.5	4.3	ns
65+ years	12.7	12.3	ns
All	**4.6**	**4.7**	**ns**

ns (not statistically significant) χ^2 test

Edentulism 1995–96 and 2001–02: by age and location

Edentulism is presented in Figure 4.4 and Table 4.4 by year and age for patients from major city locations. There were no significant age-specific differences between the two survey years for patients from major city locations.

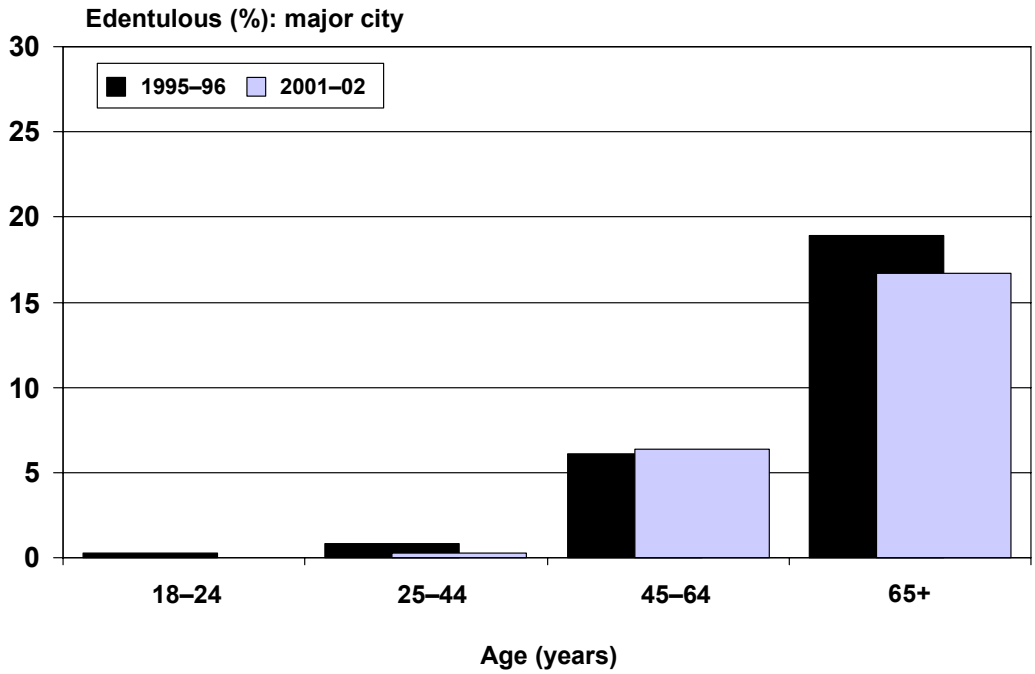

Figure 4.4: Edentulism (%) by year and age – major city patients

Table 4.4: Edentulism (%) by year and age – major city patients

	1995–96	2001–02	P
Age of patient	**n=3,873**	**n=2,897**	
18–24 years	0.3	0.0	ns
25–44 years	0.8	0.3	ns
45–64 years	6.1	6.4	ns
65+ years	18.9	16.7	ns
All	**7.4**	**8.4**	**ns**

ns (not statistically significant) χ^2 test

Edentulism is presented in Figure 4.5 and Table 4.5 by year and age for patients from regional/remote locations. The only significant age-specific difference between the two survey years for regional/remote patients was a lower percentage of edentulism in 2001–02 among 45–64-year-olds.

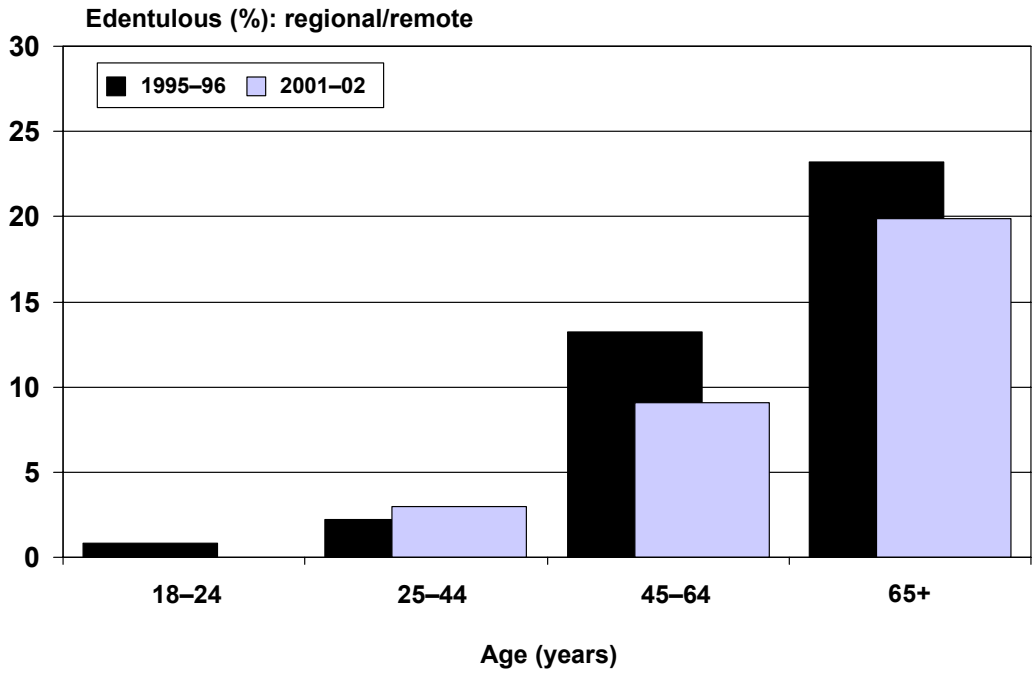

Figure 4.5: Edentulism (%) by year and age – regional/remote patients

Table 4.5: Edentulism (%) by year and age – regional/remote patients

	1995–96	2001–02	P
Age of patient	**n=1,959**	**n=1,991**	
18–24 years	0.8	0.0	ns
25–44 years	2.2	3.0	ns
45–64 years	13.2	9.1	*
65+ years	23.2	19.9	ns
All	**9.6**	**9.3**	**ns**

*(P<0.05), ns (not statistically significant) χ^2 test

4.2 Caries experience

Caries experience 1995–96 and 2001–02: by age

Caries experience is presented in Figure 4.6 and Table 4.6 by year and age of patient. Overall, there were increases in the mean number of decayed and missing teeth over time, resulting in a higher mean number of decayed, missing and filled teeth (DMFT) between the two survey years. However, numbers of filled teeth were lower in 2001–02 compared to 1995–96.

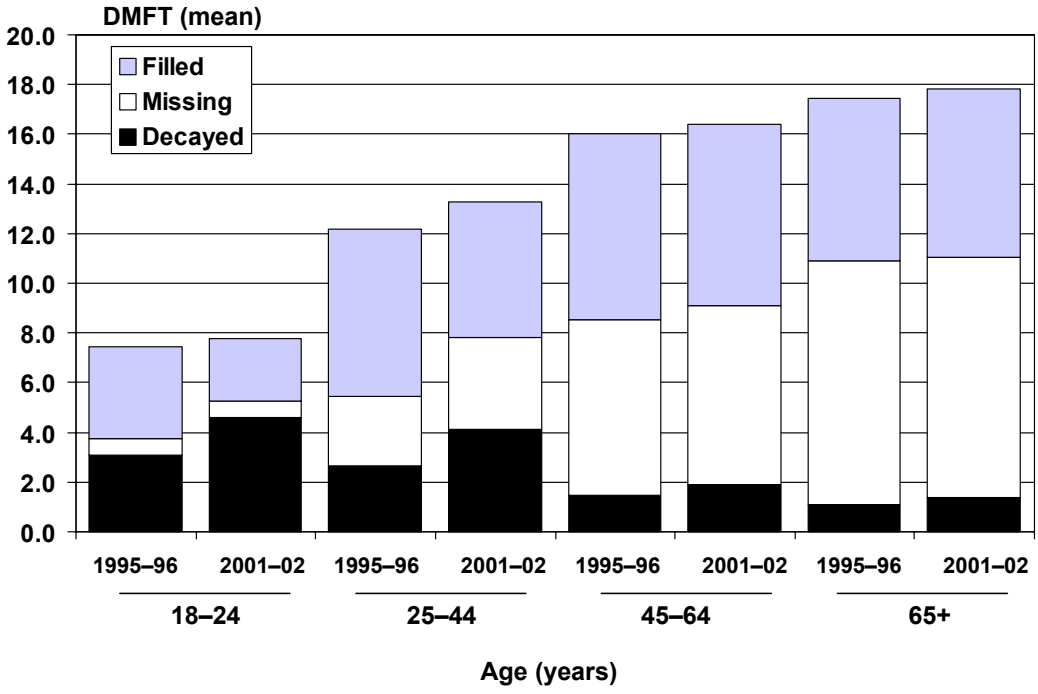

Figure 4.6: Caries experience by year and age of patient

The higher overall number of decayed teeth in 2001–02 was observed among all age groups of patients. Higher numbers of missing teeth in 2001–02 were only observed at a statistically significant level among 25–44-year-old patients. Lower numbers of filled teeth in 2001–02 were observed at a statistically significant level among patients aged 18–24 and 25–44 years. Overall DMFT was significantly higher in 2001–02 among 25–44-year-old patients.

Table 4.6: Caries experience by year and age of patient

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=566**		**n=262**		
Decayed	3.07	(0.16)	4.61	(0.34)	**
Missing	0.68	(0.07)	0.67	(0.09)	ns
Filled	3.68	(0.17)	2.47	(0.19)	**
DMFT	7.44	(0.24)	7.75	(0.40)	ns
25–44 years	**n=1,857**		**n=1,267**		
Decayed	2.65	(0.07)	4.14	(0.14)	**
Missing	2.80	(0.10)	3.68	(0.15)	**
Filled	6.73	(0.13)	5.46	(0.14)	**
DMFT	12.18	(0.16)	13.27	(0.20)	**
45–64 years	**n=1,427**		**n=1,379**		
Decayed	1.48	(0.06)	1.89	(0.08)	**
Missing	7.04	(0.20)	7.22	(0.22)	ns
Filled	7.51	(0.16)	7.31	(0.16)	ns
DMFT	16.03	(0.20)	16.41	(0.20)	ns
65+ years	**n=1,123**		**n=1,468**		
Decayed	1.07	(0.05)	1.36	(0.06)	**
Missing	9.84	(0.25)	9.69	(0.25)	ns
Filled	6.54	(0.16)	6.79	(0.15)	ns
DMFT	17.45	(0.24)	17.84	(0.22)	ns
All	**n=4,973**		**n=4,376**		
Decayed	1.97	(0.04)	2.65	(0.06)	**
Missing	5.50	(0.10)	6.35	(0.12)	**
Filled	6.62	(0.08)	6.20	(0.08)	**
DMFT	14.09	(0.11)	15.20	(0.12)	**

SE Standard error

**(P<0.01), ns (not statistically significant) General Linear Model

Caries experience 1995–96 and 2001–02: by age and type of care

Caries experience is presented in Figure 4.7 and Table 4.7 by year and age among general care patients. Overall, general care patients showed higher numbers of decayed and missing teeth and higher DMFT in 2001–02 compared to 1995–96. However, there was no significant difference in the overall number of filled teeth over time among general care patients.

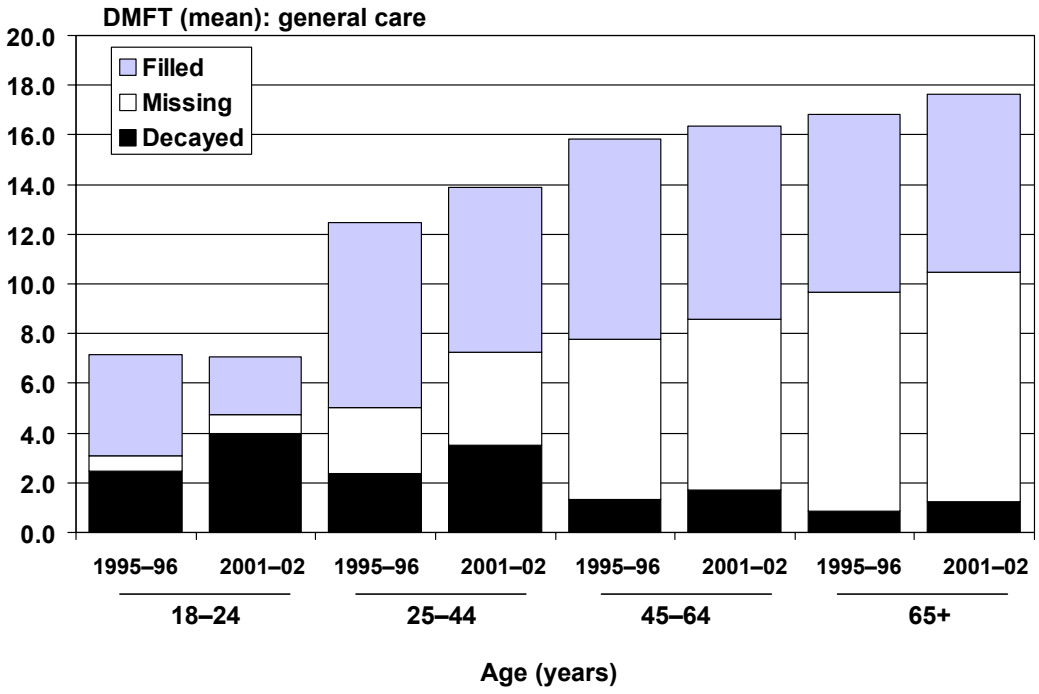

Figure 4.7: Caries experience by year and age of patient – general care

Significantly higher numbers of decayed teeth were observed among general care patients in all age groups in 2001–02 compared to 1995–96. Numbers of missing teeth were only higher at a statistically significant level in 2001–02 compared to 1995–96 for 25–44-year-old general care patients. Lower numbers of filled teeth were observed at a statistically significant level in 2001–02 compared to 1995–96 among general care patients aged 18–24 and 25–44 years. Overall DMFT was significantly higher in 2001–02 compared to 1995–95 for 25–44-year-old general care patients.

Table 4.7: Caries experience by year and age of patient – general care

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=205**		**n=86**		
Decayed	2.46	(0.22)	3.99	(0.71)	**
Missing	0.60	(0.11)	0.76	(0.20)	ns
Filled	4.12	(0.29)	2.32	(0.38)	**
DMFT	7.17	(0.38)	7.07	(0.78)	ns
25–44 years	**n=859**		**n=584**		
Decayed	2.39	(0.11)	3.53	(0.20)	**
Missing	2.64	(0.15)	3.72	(0.23)	**
Filled	7.43	(0.19)	6.63	(0.23)	**
DMFT	12.47	(0.23)	13.88	(0.29)	**
45–64 years	**n=632**		**n=804**		
Decayed	1.32	(0.08)	1.71	(0.11)	**
Missing	6.45	(0.30)	6.86	(0.29)	ns
Filled	8.08	(0.24)	7.80	(0.21)	ns
DMFT	15.84	(0.30)	16.38	(0.26)	ns
65+ years	**n=569**		**n=890**		
Decayed	0.84	(0.07)	1.25	(0.07)	**
Missing	8.84	(0.35)	9.22	(0.31)	ns
Filled	7.13	(0.22)	7.16	(0.20)	ns
DMFT	16.81	(0.34)	17.63	(0.28)	ns
All	**n=2,265**		**n=2,364**		
Decayed	1.69	(0.05)	2.15	(0.08)	**
Missing	5.14	(0.15)	6.56	(0.17)	**
Filled	7.28	(0.12)	7.03	(0.12)	ns
DMFT	14.12	(0.16)	15.74	(0.16)	**

SE Standard error

**(P<0.01), ns (not statistically significant) General Linear Model

Caries experience is presented in Figure 4.8 and Table 4.8 by year and age among emergency care patients. Overall, emergency care patients showed higher numbers of decayed teeth and DMFT, but lower numbers of filled teeth, in 2001–02 compared to 1995–96. Overall, numbers of missing teeth among emergency care patients were not significantly different between the two survey years.

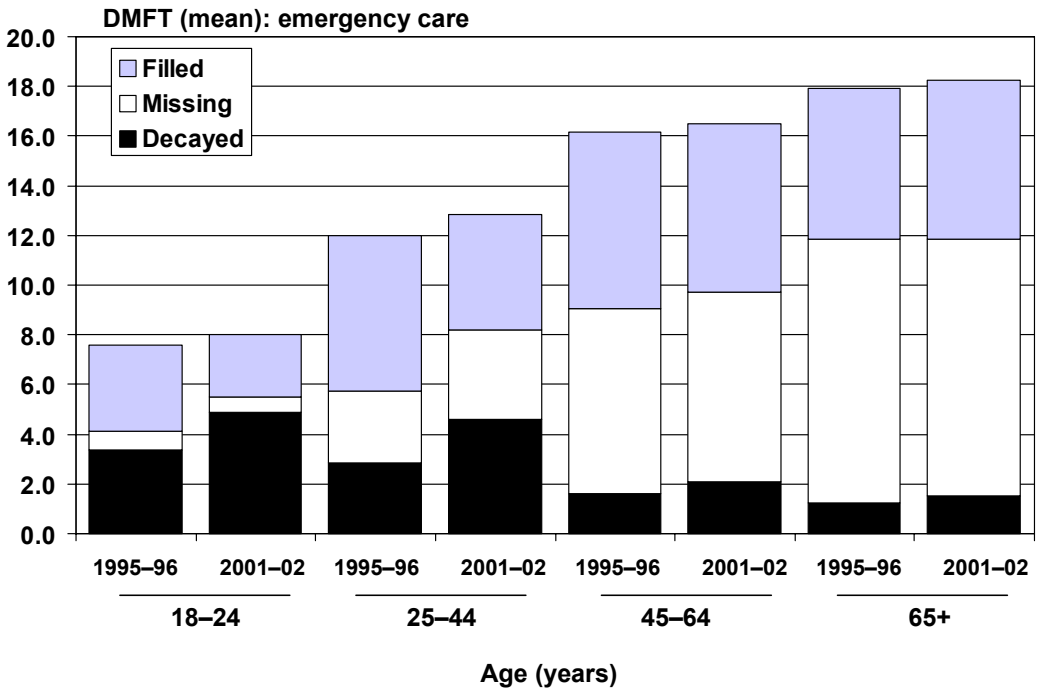

Figure 4.8: Caries experience by year and age of patient – emergency care

Higher numbers of decayed teeth were observed at a statistically significant level in 2001–02 compared to 1995–96 among all age groups of emergency care patients. While overall numbers of missing teeth were not significantly different over time, the number of missing teeth was significantly higher in 2001–02 compared to 1995–96 among 25–44-year-old emergency care patients. Numbers of filled teeth were significantly lower in 2001–02 compared to 1995–96 for emergency care patients aged 18–24 and 25–44 years. DMFT was significantly higher in 2001–02 compared to 1995–96 for 25–44-year-old emergency care patients.

Table 4.8: Caries experience by year and age of patient – emergency care

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=361**		**n=174**		
Decayed	3.38	(0.22)	4.86	(0.38)	**
Missing	0.73	(0.08)	0.64	(0.10)	ns
Filled	3.47	(0.20)	2.53	(0.22)	**
DMFT	7.58	(0.31)	8.03	(0.46)	ns
25–44 years	**n=992**		**n=672**		
Decayed	2.83	(0.10)	4.58	(0.19)	**
Missing	2.91	(0.14)	3.63	(0.21)	**
Filled	6.24	(0.17)	4.61	(0.17)	**
DMFT	11.97	(0.23)	12.82	(0.29)	*
45–64 years	**n=792**		**n=561**		
Decayed	1.60	(0.08)	2.09	(0.13)	**
Missing	7.45	(0.26)	7.63	(0.34)	ns
Filled	7.12	(0.21)	6.78	(0.24)	ns
DMFT	16.17	(0.26)	16.50	(0.33)	ns
65+ years	**n=551**		**n=551**		
Decayed	1.23	(0.08)	1.52	(0.10)	*
Missing	10.60	(0.36)	10.33	(0.41)	ns
Filled	6.09	(0.22)	6.38	(0.23)	ns
DMFT	17.93	(0.35)	18.23	(0.37)	ns
All	**n=2,696**		**n=1,958**		
Decayed	2.16	(0.06)	3.14	(0.09)	**
Missing	5.75	(0.14)	6.14	(0.18)	ns
Filled	6.16	(0.10)	5.44	(0.12)	**
DMFT	14.07	(0.16)	14.73	(0.19)	**

SE Standard error

*(P<0.05), **(P<0.01), ns (not statistically significant) General Linear Model

Caries experience 1995–96 and 2001–02: by age and location

Caries experience is presented in Figure 4.9 and Table 4.9 by year and age among patients from major city locations. Overall, patients from major city locations showed significantly higher numbers of both decayed teeth and DMFT in 2001–02 compared to 1995–96.

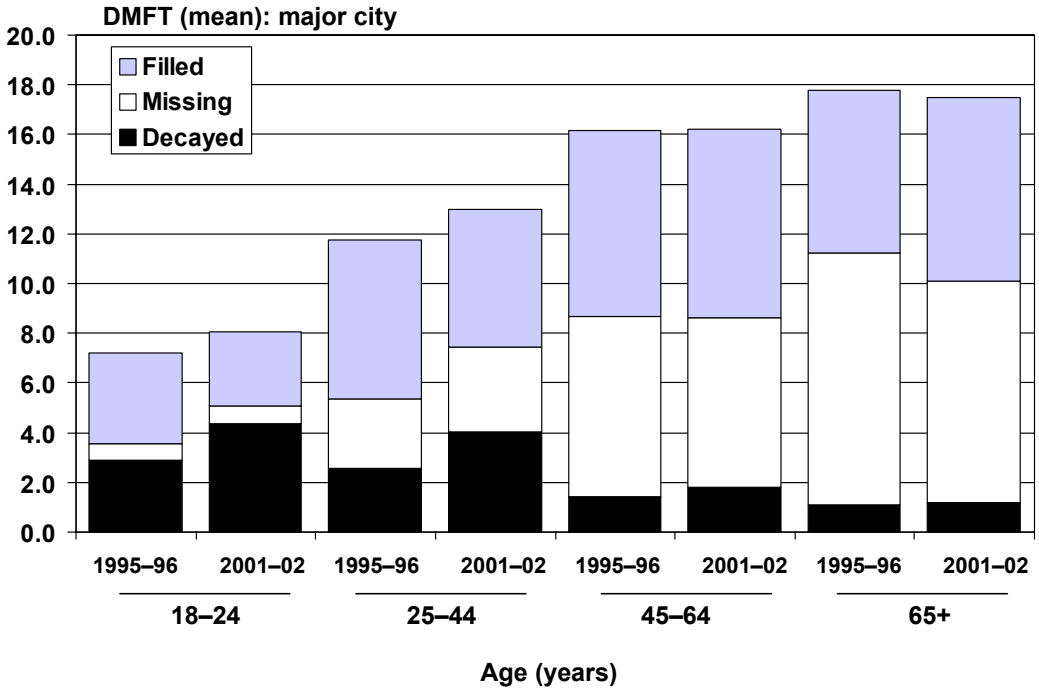

Figure 4.9: Caries experience by year and age of patient – major city patients

Higher numbers of decayed teeth were observed for major city patients aged 18–24, 25–44 and 45–64 years in 2001–02 compared to 1995–96 at a statistically significant level. Missing teeth were significantly higher in 2001–02 compared to 1995–96 among 25–44-year-olds but were significantly lower for major city patients aged 65 years or more. Numbers of filled teeth showed a similar pattern to that observed for missing teeth with major city patients aged 25–44 years having significantly lower numbers of fillings but those aged 65 years or more having higher numbers of fillings in 2001–02 compared to 1995–96. DMFT was significantly higher in 2001–02 compared to 1995–96 for 25–44-year-old major city patients.

Table 4.9: Caries experience by year and age of patient – major city patients

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=354**		**n=131**		
Decayed	2.89	(0.20)	4.34	(0.51)	**
Missing	0.68	(0.08)	0.73	(0.16)	ns
Filled	3.63	(0.22)	2.99	(0.33)	ns
DMFT	7.21	(0.31)	8.06	(0.60)	ns
25–44 years	**n=1,128**		**n=649**		
Decayed	2.54	(0.09)	4.04	(0.20)	**
Missing	2.83	(0.13)	3.42	(0.21)	*
Filled	6.36	(0.16)	5.51	(0.19)	**
DMFT	11.74	(0.21)	12.98	(0.28)	**
45–64 years	**n=978**		**n=799**		
Decayed	1.41	(0.06)	1.80	(0.11)	**
Missing	7.27	(0.24)	6.83	(0.29)	ns
Filled	7.49	(0.19)	7.57	(0.21)	ns
DMFT	16.17	(0.24)	16.20	(0.28)	ns
65+ years	**n=826**		**n=964**		
Decayed	1.09	(0.06)	1.20	(0.07)	ns
Missing	10.13	(0.29)	8.89	(0.30)	**
Filled	6.54	(0.18)	7.41	(0.18)	**
DMFT	17.75	(0.28)	17.50	(0.27)	ns
All	**n=3,286**		**n=2,543**		
Decayed	1.87	(0.05)	2.41	(0.08)	**
Missing	5.77	(0.13)	6.17	(0.16)	ns
Filled	6.50	(0.10)	6.62	(0.11)	ns
DMFT	14.14	(0.14)	15.20	(0.16)	**

SE Standard error

*(P<0.05), **(P<0.01), ns (not statistically significant) General Linear Model

Caries experience is presented in Figure 4.10 and Table 4.10 by year and age among patients from regional/remote locations. Overall, patients from regional/remote locations had significantly higher numbers of decayed and missing teeth and higher DMFT in 2001–02 compared to 1995–96, but numbers of filled teeth were lower over time.

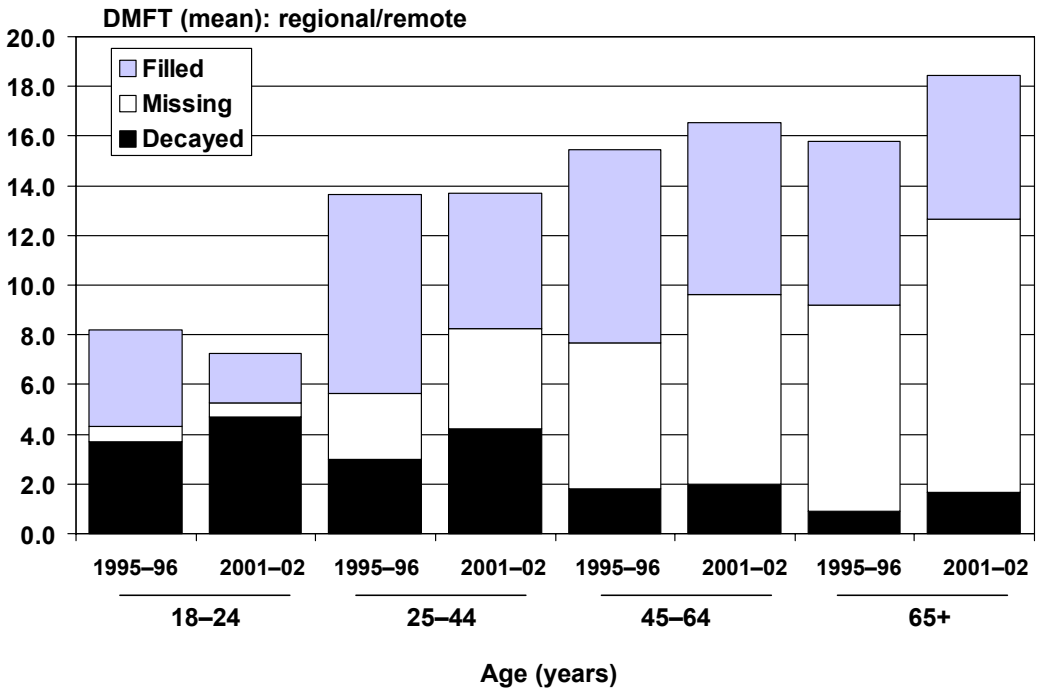

Figure 4.10: Caries experience by year and age of patient – regional/remote patients

Higher numbers of decayed teeth were observed at a statistically significant level in 2001–02 compared to 1995–96 for regional/remote patients aged 25–44 and 65+ years. Numbers of missing teeth were significantly higher in 2001–02 compared to 1995–96 for regional/remote patients aged 25–44, 45–64 and 65+ years. Numbers of filled teeth were significantly lower in 2001–02 compared to 1995–96 for regional/remote patients aged 18–24, 25–44 and 45–64 years. DMFT was significantly higher in 2001–02 compared to 1995–96 among regional/remote patients aged 45–64 and 65+ years.

Table 4.10: Caries experience by year and age of patient – regional/remote patients

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=203**		**n=124**		
Decayed	3.72	(0.31)	4.70	(0.47)	ns
Missing	0.61	(0.11)	0.55	(0.10)	ns
Filled	3.89	(0.25)	2.02	(0.21)	**
DMFT	8.23	(0.39)	7.27	(0.53)	ns
25–44 years	**n=703**		**n=604**		
Decayed	2.98	(0.14)	4.24	(0.20)	**
Missing	2.66	(0.17)	4.03	(0.23)	**
Filled	7.99	(0.21)	5.41	(0.21)	**
DMFT	13.63	(0.25)	13.69	(0.29)	ns
45–64 years	**n=439**		**n=539**		
Decayed	1.79	(0.13)	2.00	(0.13)	ns
Missing	5.90	(0.35)	7.64	(0.36)	**
Filled	7.77	(0.30)	6.88	(0.25)	*
DMFT	15.46	(0.37)	16.52	(0.32)	*
65+ years	**n=289**		**n=471**		
Decayed	0.90	(0.09)	1.68	(0.12)	**
Missing	8.31	(0.53)	10.98	(0.44)	**
Filled	6.57	(0.33)	5.76	(0.26)	ns
DMFT	15.77	(0.53)	18.41	(0.39)	**
All	**n=1,634**		**n=1,738**		
Decayed	2.36	(0.08)	2.97	(0.10)	**
Missing	4.34	(0.16)	6.53	(0.19)	**
Filled	7.20	(0.14)	5.66	(0.13)	**
DMFT	13.91	(0.19)	15.16	(0.19)	**

SE Standard error

*(P<0.05), **(P<0.01), ns (not statistically significant) General Linear Model

4.3 Periodontal status

Periodontal status 1995–96 and 2001–02: by age

Periodontal status is presented in Figure 4.11 and Table 4.11 by year and age of patient. Overall, the percentage of patients with periodontal pockets of 6+ mm was lower in 2001–02 compared to 1995–96, reflected in significantly lower percentages among 45–64 and 65+-year-olds.

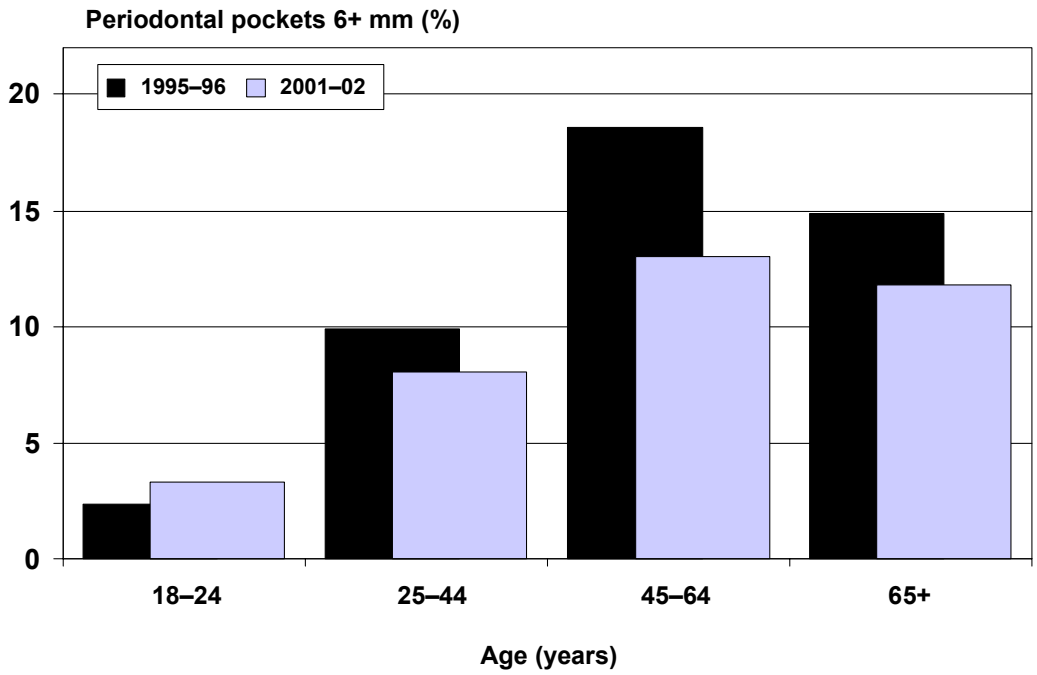

Figure 4.11: Periodontal pockets 6+ mm (%) by year and age of patient

Table 4.11: Periodontal pockets 6+ mm (%) by year and age of patient

	1995–96	2001–02	P
Age of patient	**n=4,945**	**n=4,208**	
18–24 years	2.4	3.3	ns
25–44 years	9.9	8.1	ns
45–64 years	18.6	13.0	**
65+ years	14.9	11.8	*
All	**13.0**	**10.3**	**

*(P<0.05), **(P<0.01), ns (not statistically significant) χ^2 test

Periodontal status 1995–96 and 2001–02: by age and type of care

Periodontal status is presented in Figure 4.12 and Table 4.12 by year and age of patient for those receiving general care. Overall, a slightly lower percentage of general care patients had periodontal pockets of 6+ mm in 2001–02 compared to 1995–96. However, this pattern was not observed consistently in all age groups of general care patients, with a higher percentage of 18–24-year-olds, and a lower percentage of 25–44 and 45–64-year-olds, having periodontal pockets of 6+ mm in 2001–02 compared to 1995–96.

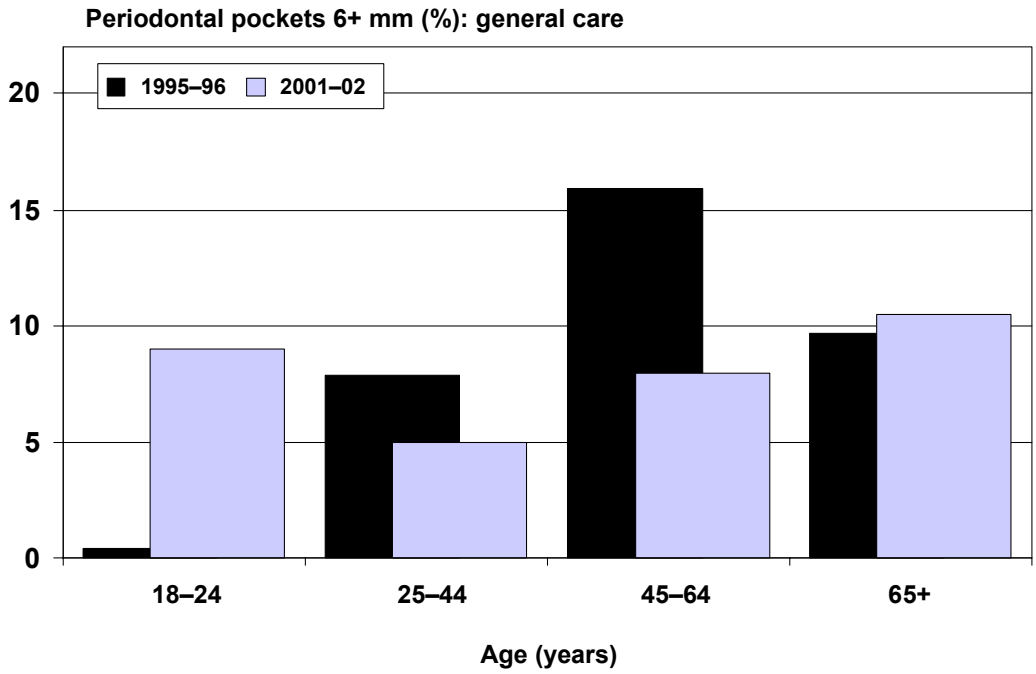

Figure 4.12: Periodontal pockets 6+ mm (%) by year and age of patient – general care

Table 4.12: Periodontal pockets 6+ mm (%) by year and age of patient – general care

	1995–96	2001–02	P
Age of patient	**n=2,255**	**n=2,294**	
18–24 years	0.4	9.0	**
25–44 years	7.9	5.0	*
45–64 years	15.9	8.0	**
65+ years	9.7	10.5	ns
All	**10.2**	**8.1**	*

*(P<0.05), **(P<0.01), ns (not statistically significant) χ^2 test

Periodontal status is presented in Figure 4.13 and Table 4.13 by year and age of patient for those receiving emergency care. Overall, a slightly lower percentage of emergency care patients had periodontal pockets of 6+ mm in 2001–02 compared to 1995–96. This pattern was observed at a statistically significant level only among 65+-year-olds.

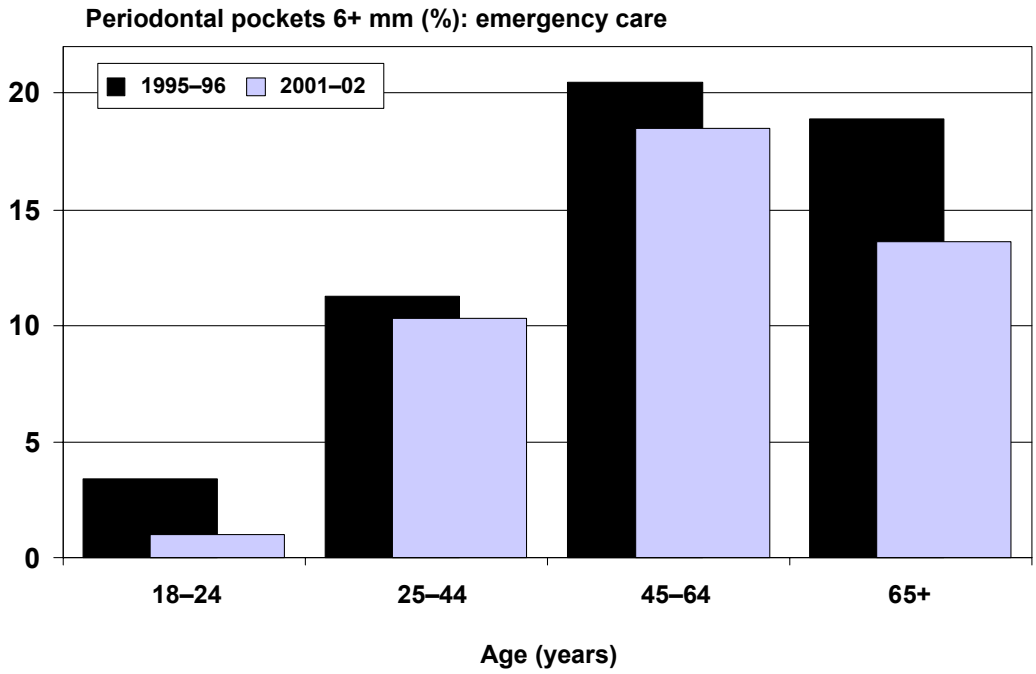

Figure 4.13: Periodontal pockets 6+ mm (%) by year and age of patient – emergency care

Table 4.13: Periodontal pockets 6+ mm (%) by year and age of patient – emergency care

	1995–96	2001–02	P
Age of patient	**n=2,681**	**n=1,881**	
18–24 years	3.4	1.0	ns
25–44 years	11.3	10.3	ns
45–64 years	20.5	18.5	ns
65+ years	18.9	13.6	**
All	**14.8**	**12.5**	*

*(P<0.05), **(P<0.01), ns (not statistically significant) χ^2 test

Periodontal status 1995–96 and 2001–02: by age and location

Periodontal status is presented in Figure 4.14 and Table 4.14 by year and age of patient for patients from major city locations. Overall, a lower percentage of major city patients had periodontal pockets of 6+ mm in 2001–02 compared to 1995–96. This pattern was observed in all age groups of major city patients aged 25–44 years and older.

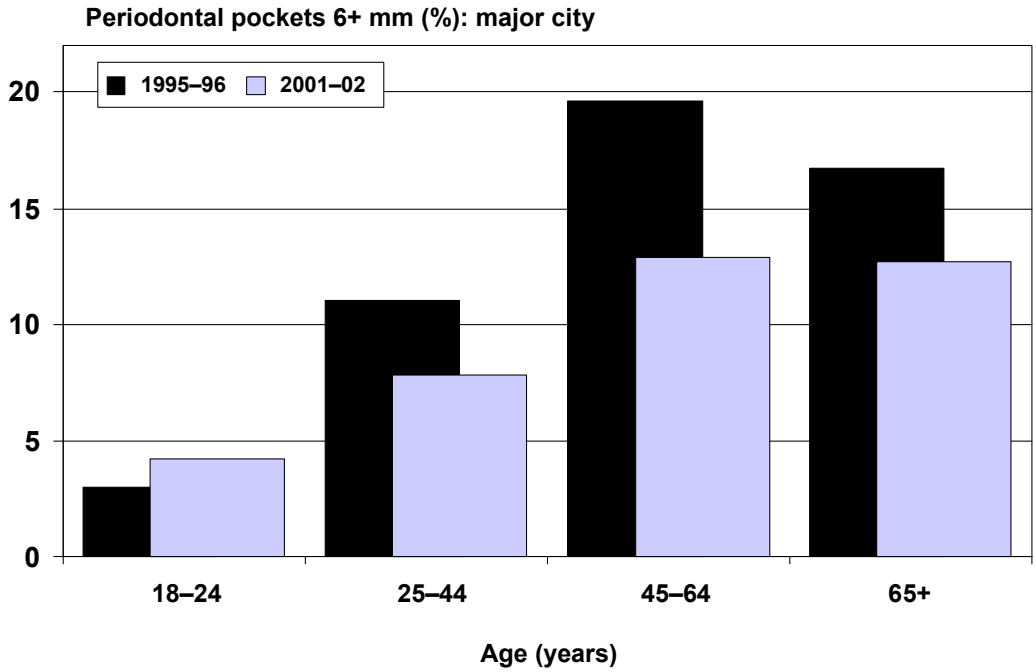

Figure 4.14: Periodontal pockets 6+ mm (%) by year and age of patient – major city patients

Table 4.14: Periodontal pockets 6+ mm (%) by year and age of patient – major city patients

	1995–96	2001–02	P
Age of patient	**n=3,343**	**n=2,460**	
18–24 years	3.0	4.2	ns
25–44 years	11.0	7.8	*
45–64 years	19.6	12.9	**
65+ years	16.7	12.7	*
All	**14.3**	**10.8**	**

*(P<0.05), **(P<0.01), ns (not statistically significant) χ^2 test

Periodontal status is presented in Figure 4.15 and Table 4.15 by year and age of patient for patients from regional/remote locations. There was a slight overall increase in the percentage of regional/remote patients with periodontal pockets of 6+ mm between the two survey years, with the only significant age-specific increase in the percentage of regional/remote patients with periodontal pockets of 6+ mm observed among 65+-year-olds.

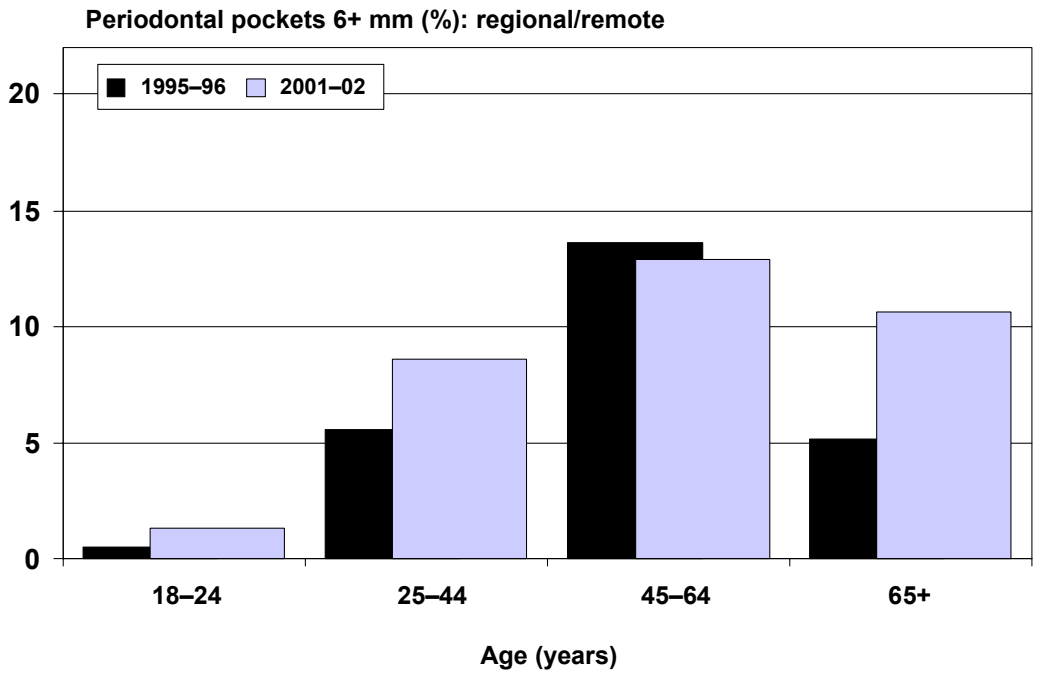

Figure 4.15: Periodontal pockets 6+ mm (%) by year and age of patient – regional/remote patients

Table 4.15: Periodontal pockets 6+ mm (%) by year and age of patient – regional/remote patients

	1995–96	2001–02	P
Age of patient	**n=1,548**	**n=1,647**	
18–24 years	0.5	1.3	ns
25–44 years	5.6	8.6	ns
45–64 years	13.6	12.9	ns
65+ years	5.2	10.6	*
All	**7.2**	**9.8**	*

*(P<0.05), ns (not statistically significant) χ^2 test

5 Discussion

This chapter sets the context of the results in relation to a range of interpretational issues, and discusses the oral health findings with reference to other published data from the scientific literature.

5.1 Interpretational issues

This section considers issues associated with the monitoring survey approach adopted in the Adult Dental Programs Survey, the study population from which the sample was drawn, comparison with population-based studies, geographic coverage, survey participation and state/territory-specific findings.

Monitoring survey approach

This study reports the results of national surveys of the oral health of patients receiving public-funded dental care during the periods 1995–96 and 2001–02. These results need to be interpreted in view of the fact that this was a monitoring survey rather than an oral epidemiological survey. As such there was no attempt at calibration of dentists and no measurement of reliability of the measures.

The use of general practitioners to collect epidemiological data has been investigated previously in the UK as a possible alternative to conventional surveys of adult dental health (Clarkson et al. 1995). They found that mean numbers of filled teeth and sound teeth and the proportion of patients with 21 or more teeth were all similar to those found in the 1988 UK national survey of oral health. It was therefore concluded that the collection of data by general practitioners was feasible, and had construct and internal validity. However, they caution that the findings on a convenience sample of regularly attending adults could not replace traditional adult dental health surveys.

Study population

When comparing the results presented here with those of other studies, it must be considered that this study was a survey of patients attending for public-funded dental care. The study population consists of health card holders, which represent a low income group. Therefore the findings are not intended to be representative of the entire Australian population. It is expected that this group would have different levels of disease, including more untreated disease. Another consideration is that these findings are restricted not only to health card holders, but to those health card holders who are eligible for care and have obtained such care.

Comparison with population-based studies

Other Australian studies may provide relevant comparisons, particularly the *National Oral Health Survey of Australia* (NOHSA) *1987–88*. NOHSA provides data on the oral health status of 14,430 examined persons aged five years or more from seven of the eight states/territories (Barnard 1993). However, NOHSA is a survey of the general

population, rather than patients attending public-funded dental care. Hence, some differences are expected due to the different study populations.

Comparisons over time (e.g. between 1987–88, 1995–96 and 2001–02) may also be influenced by trends in the population, mainly towards improved oral health. For example, there has been a dramatic decline in the percentage of edentulous adults (ABS 1979; AIHW DSRU: Carter et al. 2001), and caries experience among children has declined since the 1970s (Spencer et al. 1994), although in the latter half of the 1990s improvements in child oral health had ceased (AIHW DSRU: Armfield et al. 2003).

Geographic coverage

There was some difference in geographic coverage of the survey between the two survey years. The major difference was that New South Wales was represented in 1995–96 by data from the United Dental Hospital of Sydney and hence was entirely metropolitan, whereas in 2001–02 the sample was drawn from both metropolitan and non-metropolitan clinics. Other more subtle differences in geographic coverage may have occurred in other states/territories, resulting in the lower observed overall percentage of the sample comprising major city patients in 2001–02 compared to 1995–96. Therefore, overall trends need to be compared against trends within major city and regional/remote locations in order to confirm whether they are consistent or whether variation by location has influenced the overall trends.

Survey participation

Another issue concerns the fact that, while 1995–96 was a complete national survey, the 2001–02 survey did not include data from Tasmania or the Australian Capital Territory. Appendix A presents main findings that were restricted to states/territories that participated in both rounds of data collection in order to verify the main findings.

State/territory-specific findings

While the overall estimates have been weighted to represent the data from each state/territory in proportion to the number of public patients from each jurisdiction, the overall findings may not necessarily be representative of the pattern within each state or territory. Hence Appendix B lists the main findings for each state/territory. Further details on state/territory-specific findings are published elsewhere (AIHW DSRU: Brennan & Spencer 1997; 2003).

5.2 Oral health findings

This section outlines the oral health trends from the 1995–96 and 2001–02 Adult Dental Programs Surveys in terms of edentulism, caries experience and periodontal status.

Edentulism

Tooth loss is considered as the dental equivalent of mortality, reflecting the end stage of disease, as well as other factors such as the attitudes of patients and providers,

availability and accessibility of care, and prevailing dental treatment philosophies (Weintraub & Burt 1985). Among the oral health factors associated with extraction, diagnosis of periodontal disease has been accepted as a major cause of tooth loss among adults (Weintraub & Burt 1985), while a history of previous tooth loss has been associated with further extractions (Eklund and Burt 1994; Holst et al. 1992). However, caries remained the major cause of tooth loss due to the higher prevalence of this condition (Brennan, Spencer & Szuster 2001).

Oral health trends in the population have indicated a decline in tooth loss over recent decades, with the percentage of persons with no natural teeth among those aged 65 years or more decreasing from 66.6% in 1979 (ABS 1979) to 40.0% in 1994 (AIHW DSRU: Carter et al. 1994) and 33.4% in 1999 (AIHW DSRU: Carter et al. 2001). However, there was little change in the percentage of edentulous public patients treated between 1995–96 and 2001–02.

The stability in the percentage of edentulous public patients over time may reflect the patient-based rather than population-based nature of the survey – a higher percentage of the population are edentulous but may be less likely to use dental services than persons who have some natural teeth. Also, the existence and availability of denture schemes within state/territory health services may serve to maintain denture services to edentulous patients at stable levels. The extent to which state/territory health services outsource denture patients to private providers may also influence the recording of the percentage of edentulous public patients.

Caries experience

Dental caries, which is caused by acid-producing bacteria that live in the mouth, can progress from demineralisation of the tooth or root and lead to cavities, infection of the tooth pulp, abscess formation, fracture of the tooth and tooth loss (AIHW 2002).

Caries has been implicated as the main cause of tooth extraction among adults in a range of countries including Japan (Morita et al. 1994), Hong Kong (Corbet & Davies 1991), Canada (Stephens et al. 1991), UK (Hull et al. 1997), Norway (Klock & Haugejorden 1991) and Australia (Brennan, Spencer & Szuster 2001). Studies such as those from Singapore (Ong et al. 1996) and Italy (Angelillo et al. 1996) have indicated that both caries and periodontal disease account for similar percentages of extractions. However, a number of studies have demonstrated that periodontal disease becomes a more important reason for extraction among older adults, e.g. among those over 40 years (Ong et al. 1996) or 50 years of age (Hull et al. 1997).

One of the most distinctive trends in oral health among public patients between 1995–96 and 2001–02 was the increased number of decayed teeth. This trend was observed among patients aged 18–24, 25–44 and 45–64 years from major city locations and among patients aged 25–44 and 65+ years from regional/remote locations. Numbers of decayed teeth reflect the incidence of dental caries and access to dental services to receive treatment.

Numbers of missing teeth among public patients showed a less consistent trend than that observed for decayed teeth, with increased overall numbers of missing teeth over time evident only among 25–44-year-old patients. However, the implication of this finding is that public patients are showing the opposite trend to that which we would

expect to see in this age group based on population trends. There was no consistent pattern among public patients from major city locations, with increased numbers of missing teeth over time among 25–44-year-old patients balanced by decreased numbers of missing teeth among patients aged 65 years or more. However, there was a consistent trend for tooth loss among patients from regional/remote locations, who showed increased numbers of missing teeth over time among 25–44, 45–64 and 65+-year-olds.

Trends for fillings among public patients were similar to that observed for missing teeth – while there was no consistent overall trend, there were differences by geographic location. Patients from major city locations showed no consistent trends, with decreased numbers of filled teeth over time among 25–44-year-olds, possibly reflecting slowly improving caries experience in young adults, and increased numbers of filled teeth over time among 65+-year-olds, possibly as a result of increased tooth retention in older adults. However, patients from regional/remote locations had decreased numbers of filled teeth over time among 18–24, 25–44 and 45–64-year-olds.

Periodontal status

Periodontal diseases involve inflammation of the periodontal tissues, which can be associated with recession of the gums or formation of periodontal pockets in the gums (AIHW 2002). These periodontal pockets can lead to advanced destruction of tooth support, resulting in tooth mobility, formation of gum abscesses and tooth loss.

There was an overall trend towards improved periodontal status of adult public dental patients over time, with the percentage of patients who had periodontal pockets of 6+ mm lower in 2001–02 compared to 1995–96. Patients from major city locations exhibited a similar trend towards improved periodontal status, as measured by a decrease in percentages of patients with periodontal pockets of 6+ mm over time. However, patients from regional/remote locations showed an opposite trend towards worse periodontal status, as indicated by an increase in the percentage of patients with periodontal pockets of 6+ mm.

5.3 Discussion of main findings

While there has been extensive documentation of the oral health status of children in Australia, there has been less emphasis on adults (Spencer et al. 1994). There have been population surveys of self-reported measures of edentulism among Australian adults (ABS 1979; AIHW DSRU: Carter et al. 1994; 2001). However, there have been few studies documenting oral health measures such as caries experience and periodontal conditions among adults.

The only national level population data are from the National Oral Health Survey of Australia conducted in 1987–88 (Barnard 1993). Other surveys of adult oral health have been restricted to limited geographic regions within Australia. For example, there have been surveys reported from Brisbane (Powell & McEniery 1988), Melbourne (Spencer et al. 1988), and Adelaide (Mount et al. 1987).

Comparison with the general population: caries

Although the study populations differ between this study and NOHSA 1987–88, a comparison of the studies indicates higher levels of untreated disease for public patients than for the general population. For example, public patients aged 18–24 and 25–44 years in 2001–02 had, on average, over 4 decayed teeth compared with between 1.1 and 1.8 decayed teeth among similarly aged persons sampled from the Australian population in 1987–88 (Barnard 1993). While this difference may be expected from a comparison between population estimates and a patient-based survey drawn from a socioeconomically disadvantaged group, the findings indicate a higher unmet need for treatment of dental caries within this group of public patients. Comparisons with patients from private general practice show lower levels of decay from similarly aged private patients: 2.3 decayed teeth among 18–24-year-olds and 2.0 decayed teeth among 25–44-year-olds in 1998–99 (AIHW DSRU: Brennan & Spencer 2002).

While this trend is inconsistent with the population-wide trends towards improved oral health in terms of decreased tooth loss among adults, there is the possibility that retention of teeth may increase treatment needs through a subsequent increase in the pool of teeth at risk of oral disease (Spencer & Lewis 1988). There is also some evidence that caries experience among Australian children has worsened in recent years (AIHW DSRU: Armfield et al. 2003).

As the population grows, the numbers of children and young adults are changing minimally, but there are substantial increases in numbers of middle-aged and older adults (NHMRC Expert Advisory Panel 1993). These adults are tending to retain their teeth. The pool of children and young adults at risk of oral diseases will be maintained, while the pool of middle-aged to older adults at risk of oral diseases, and hence in potential need of dental services, will increase. Reductions in the levels of tooth loss have been linked with increased treatment needs, especially in the elderly (Douglass 1988). In the USA a greater need for adult dental services is predicted, with expected increases in diagnostic, preventive, adult operative, fixed prosthodontic, endodontic and orthodontic services, along with declines in extractions, complete dentures and children's operative dentistry (Douglass & Furino 1990). In Australia, changing patterns of practice have been tracked through the 1980s and 1990s, and are consistent with an increasing orientation towards prevention of disease and maintenance of a natural dentition (Brennan et al. 1998).

Projections of dentist to population ratios for the USA have exhibited an increase over time, while the ratio of dentists to teeth at risk has decreased as the growth in population, combined with the increased retention of teeth has overwhelmed the growth in numbers of dentists (Douglass & Furino 1990). Proponents of such scenarios imply that the retention of more teeth over time will be associated with more disease (i.e. an increased need and demand for dental care). This theory was examined in a cross-sectional study by Joshi et al. (1996), who found that 70+-year-old subjects who retained higher numbers of teeth had more periodontal disease and dental caries experience, and reported a past pattern of visiting the dentist more frequently. These findings provide support for the 'consequences of success' argument that improved oral health manifested in the form of greater tooth retention, coupled with demographic trends, leads to an increased pool of teeth at risk, which has flow-on effects on need and demand for care.

Overall caries experience in the deciduous dentition increased from 1996 to 1999 among 6-year-old children in Australia, reflecting increased levels of decayed teeth (AIHW DSRU: Armfield et al. 2003). Prior to these findings, national monitoring surveys of child dental health had documented substantial and continuous reductions in caries experience since the 1970s (Spencer et al. 1994). Analysis of caries experience in the permanent dentition among Australian 12-year-old children has indicated that between 1965 and 1995 neither fluoride supplements nor total sugar consumption showed strong concomitant variation with caries experience, but both toothpaste with fluoride and lifetime exposure to fluoridated water showed strong concomitant variation, and hence could be considered as plausible contributors to the reduction in caries experience over that period (AIHW 1998).

One possible explanation for the increase in caries experience among children since 1996 may be the introduction of low fluoride toothpaste, as this has been linked to a reduction in dental fluorosis, although not to caries experience in Western Australia (Riordan 2002). Another possible explanation could be reductions in exposure to fluoridated water, possibly as a result of increased consumption of bottled water. A relationship has been demonstrated between caries experience and lifetime exposure to fluoridated drinking water, not only among children (Slade et al. 1996) but also among young adults (Grembowski et al. 1992; Hopcraft & Morgan 2003).

While there is limited ability to compare caries trends over time within Australia, international comparisons of trends in caries experience provide some background against which to judge the current findings. Data from the UK Adult Dental Health Survey have shown that dentate adults had fewer missing teeth and more sound teeth in 1998 than in 1978 (Nunn et al. 2000). The average number of decayed teeth decreased from 1.9 in 1978 to 1.1 in 1998, and the number of filled teeth remained fairly constant over time. In the USA younger adults aged 18–34 and 35–54 years experienced a decline in dental caries as measured by the average number of teeth without decay or fillings between 1971–74 and 1988–94 (US Department of Health and Human Services 2000).

Comparison with public patients: periodontal status

Comparisons of the prevalence of periodontal conditions from this study may be made with other Australian studies of public dental patients. Compared with a study in Sydney in 1984 (Sivaneswaran & Barnard 1987), there was a slightly lower percentage of periodontal pockets (e.g. among 65+-year-olds, 11.8% in 2001–02, 14.9% in 1995–96 and 15.0% in 1984 had pockets 6+ mm). The high prevalence of periodontal disease from the Sydney study was associated with the low socioeconomic status of the patients. The present study also showed a lower prevalence of periodontal pockets compared to public-funded patients from New South Wales, Victoria and South Australia in 1992–93 (e.g. among 65+-year-olds, 17.4% had pockets of 6+ mm) (AIHW DSRU: Slade & Hoskin 1993). Note for comparison that 15% of 65+-year-old persons sampled from the population in the UK had periodontal pockets in 1998 (Morris et al. 2001), which is similar to the point estimates observed for Australian public patients prior to the 2001–02 survey. Earlier US data (US Department of Health and Human Services 2000) from 1988–94 showed higher levels of 6+ mm pocketing: 23.4% and 29.5% among 65–74 and 75+-year-olds respectively.

These comparisons could point to improved periodontal status between the study periods, or to different prevalence levels among the successively wider population subgroups compared. Differences in diagnostic judgement could also be operating, as large numbers of uncalibrated examiners were used in the present study and in the findings reported from 1992–93. While this may account for some misclassification bias, it does not suggest why there would be a systematic difference in recording of periodontal status over time.

A trend towards improved periodontal health has been confirmed in an independent study (Wright et al. 1994): a longitudinal study of a random household sample of adults from Melbourne indicated a trend towards improved periodontal health between 1985 and 1990. Such a finding suggests that other possibilities such as changes in risk factors over time may account for the change in periodontal status. Oral hygiene has been linked to the aetiology of periodontitis (Amarasena et al. 2002) and there is a large volume of evidence for smoking as a risk factor for periodontitis (e.g. Albandar et al. 2000; Bergstrom 2003; Bergstrom et al. 2000; Calsina et al. 2002; Genco 1996; Hashim et al. 2001; Hyman & Reid 2003; Johnson & Slach 2001; Kinane & Chestnutt 2000; Kinane & Marshall 2001; Machuca et al. 2000; Tomar & Asma 2000; van der Weijden et al. 2001). While there are few data available to assess whether oral hygiene behaviours have changed over the period of the study, and it is possible for oral hygiene behaviours to specifically target periodontal disease rather than caries, it is plausible to expect that general changes in oral hygiene might influence both caries and periodontal disease. The observation that caries experience worsened while periodontal status improved among public dental patients over the study period suggests that a factor specific to periodontal disease, such as tobacco use, was operating.

Recent data have shown that the proportion of the Australian population aged 14 years and over who reported that they smoke declined from around 30% in 1991 to 25% in 2001 (AIHW 2003). While there has been some focus on the role of the dental profession in smoking cessation (Rikard-Bell, Donelly & Ward 2003; Rickard-Bell, Groenlund & Ward 2003), there has also been recognition that the underlying determinants of oral diseases could be addressed through a common risk factor approach directed at the whole population rather than on disease-specific at-risk groups (Sheiham & Watt 2000). It may be that the operation of a range of mechanisms such as family physician cessation strategies (Young et al. 2002), anti-smoking campaigns (Wakefield et al. 2003), workplace smoking bans (Fichtenberg & Glantz 2002), smoking cessation and counselling quit-lines (Miller et al. 2003) and banning tobacco sponsorship (Holman et al. 1997) have all had an impact on periodontal health of the population.

Geographic location

Differences in health status have been reported by geographic location in Australia. For example, Australians aged between 25 and 64 years living outside of capital cities have been shown to experience higher mortality than capital city residents, particularly for avoidable deaths (AIHW 1994). In terms of oral health, higher levels of edentulism have been reported in non-capital city locations compared with capital cities (AIHW DSRU: Carter et al. 1994).

The findings of this study showed improved periodontal status among public patients over time, but the trend towards lower percentages of patients with periodontal pockets of 6+ mm was not observed for patients from regional/remote locations. While health card holders in general face financial barriers to oral health care, the removal of financial barriers alone may not be sufficient to achieve equity in care when other factors such as geographic remoteness remain (Humphreys 1988). Distance has been proposed as a significant environmental factor influencing health in Australia, through the association of remoteness and distributional inequity in health services (Brownlea & Taylor 1984). Another consideration may be that risk factors such as tobacco smoking vary by geographic location.

Less favourable patterns of service provision have been observed among public-funded dental patients in non-urban locations (Brennan et al. 1996). In the UK, regional variations in extraction rates have been associated with supply of dentists per capita (Ashford 1978). In Australia the availability of dentists is considerably lower outside major urban locations (AIHW DSRU: Szuster & Spencer 1997). Water fluoridation coverage also varies geographically, dominated by its introduction in state/territory capital cities (Spencer 1996).

While public patients from both major city and regional/remote locations showed a trend towards increased numbers of decayed teeth over time, only public patients from regional/remote locations showed consistent trends towards increased numbers of missing teeth and decreased numbers of filled teeth over time.

5.4 Conclusions

- There was little change in the percentage of edentulous public patients over time, with no overall change in edentulism for emergency or general care patients, or for patients from major city or regional/remote locations.

- There were increased numbers of decayed teeth over time among public patients for both emergency and general care patients and for patients from major city and regional/remote locations.

- Only public patients from regional/remote locations showed a trend towards both increased numbers of missing teeth and decreased numbers of filled teeth. In contrast, patients from major city locations showed no overall change over time in numbers of missing or filled teeth. Emergency patients showed a trend towards lower overall numbers of filled teeth over time, while general care patients showed a trend towards higher overall numbers of missing teeth over time.

- Overall periodontal status improved over time among both emergency and general care public patients. Improved periodontal status was also observed among patients from major city locations but patients from regional/remote locations showed a trend towards worse periodontal status over time.

6 References

AHMAC (Australian Health Ministers' Advisory Council) 2001. Oral health of Australians: national planning for oral health improvement. Adelaide: South Australian Department of Human Services.

AIHW (Australian Institute of Health and Welfare) 1994. Australia's Health 1994. Canberra: AIHW.

AIHW (Australian Institute of Health and Welfare) 1998. Australia's Health 1998. Canberra: AIHW.

AIHW (Australian Institute of Health and Welfare) 2002. Statistics on drug use in Australia 2002. AIHW cat. no. PHE 43, Drug Statistics Series no. 12. Canberra: AIHW.

AIHW (Australian Institute of Health and Welfare) 2003. Chronic diseases and associated risk factors in Australia, 2001. Canberra: AIHW.

AIHW Dental Statistics and Research Unit (DSRU) 1993. Dental Care for Adults in Australia. Proceedings of a Workshop. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Armfield JM, Roberts-Thomson KF & Spencer AJ 2003. The Child Dental Health Survey, Australia 1999. Trends across the 1990s. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Brennan DS & Spencer AJ 1997. Prospective Adult Dental Programs Survey, 1995–96. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Brennan DS & Spencer AJ 2002. Dentists' practice activity in Australia: 1983–84 to 1998–99. Canberra: AIHW.

AIHW DSRU: Brennan DS & Spencer AJ 2003. Adult Dental Programs Survey 2001–02. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Carter KD, Stewart J, Davies M, Szuster F, Allister J, Slade G & Spencer AJ 1994. National Dental Telephone Interview Survey 1994. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Carter KD, Stewart J & Spencer AJ 2001. National Dental Telephone Interview Survey 1999. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide, [Data tables on website at: <http://www.adelaide.edu.au/socprev-dent/dsru>.

AIHW DSRU: Slade GD & Hoskin G 1993. Provision of dental care to client groups. In: Dental care for adults in Australia. Proceedings of a workshop. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide. Chapter 7, 43–52.

AIHW DSRU: Szuster FSP & Spencer AJ 1997. Dental practitioner statistics Australia, 1994. Adelaide: The University of Adelaide.

Albandar JM, Streckfus CF, Adesanya MR & Winn DM 2000. Cigar, pipe, and cigarette smoking as risk factors for periodontal disease and tooth loss. Journal of Periodontology 71:1874–81.

Amarasena N, Elkanayaka AN, Herath L & Miyazaki H 2002. Tobacco use and oral hygiene as risk indicators for periodontitis. Community Dentistry and Oral Epidemiology 30:115–23.

Angelillo IF, Nobile CG & Pavia M 1996. Survey of reasons for extraction of permanent teeth in Italy. Community Dentistry and Oral Epidemiology 24:336–40.

Ashford JR 1978. Regional variations in dental care in England and Wales. British Dental Journal 145:275–83.

Australian Bureau of Statistics 1979. Dental health (persons aged 15 years or more) February – May 1979. ABS Cat. no. 4339.0. Canberra: ABS.

Australian Bureau of Statistics 2001. Outcomes of ABS views on remoteness consultation, Australia. ABS. ABS Cat. no. 1244.0.00.001. Canberra: ABS.

Barnard PD 1993. National Oral Health Survey of Australia, 1987–88. Canberra: Australian Government Publishing Service.

Bergstrom J 2003. Tobacco smoking and risk for periodontal disease. Journal of Clinical Periodontology 30:107–13.

Bergstrom J, Eliasson S & Dock J 2000. Exposure to tobacco smoking and periodontal health. Journal of Clinical Periodontology 27:61–8.

Brennan DS, Spencer AJ & Slade GD 1996. Provision of dental services in urban, rural and remote locations. Community Dental Health 13:157–62.

Brennan DS, Spencer AJ & Slade GD 1997. Service provision among adult public dental services patients: baseline data from the Commonwealth Dental Health Program. Australian and New Zealand Journal of Public Health 21:40–4.

Brennan DS, Spencer AJ & Slade GD 2000. Caries experience of public-funded dental patients in Australia 1995–96: type of care and geographic location. Australian Dental Journal 45:37–45.

Brennan DS, Spencer AJ & Slade GD 2001. Prevalence of periodontal conditions among public-funded dental patients in Australia. Australian Dental Journal 46:114–21.

Brennan DS, Spencer AJ & Szuster FSP 1998. Service provision trends between 1983–84 and 1993–94 in Australian private general practice. Australian Dental Journal 43:331–6.

Brennan DS, Spencer AJ & Szuster FSP 2001. Provision of extractions by main diagnoses. International Dental Journal 51:1–6.

Brownlea AA & Taylor CM 1984. Australia's environment and its influences on health. Social Science and Medicine 18:901–7.

Calsina G, Ramon JM & Echeverria JJ 2002. Effects of smoking on periodontal tissues. Journal of Clinical Periodontology 29:771–6.

Clarkson JE, Worthington HV & Holloway PJ 1995. Adult dental surveys: a different approach. Community Dental Health 12:65–9.

Corbet EF & Davies WI 1991. Reasons given for tooth extraction in Hong Kong. Community Dental Health 8:121–30.

Davey Smith G, Bartley M & Blane D 1990. The Black report on socioeconomic inequalities in health 10 years on. British Medical Journal 301:373–7.

Douglass CW 1988. Implications of demographic and dental disease changes for the financing of geriatric dental services. Health Matrix 6:113–8.

Douglass CW & Furino A 1990. Balancing dental service requirements and supplies: epidemiologic and demographic evidence. Journal of the American Dental Association 121:587–92.

Eklund SA & Burt BA 1994. Risk factors for total tooth loss in the United States; longitudinal analysis of national data. Journal of Public Health Dentistry 54:5–14.

Feinstein JS 1993. The relationship between socioeconomic status and health: a review of the literature. Millbank Quarterly 71:279–322.

Fichtenberg CM & Glantz SA 2002. Effect of smoke-free workplaces on smoking behaviour: systematic review. British Medical Journal 325:188.

Genco RJ 1996. Current view of risk factors for periodontal diseases. Journal of Periodontology 67:1041–9.

Grembowski D, Fiset L & Spadafora A 1992. How fluoridation affects adult dental caries. Journal of the American Dental Association 123:49–54.

Hashim R, Thomson WM & Pack AR 2001. Smoking in adolescence as a predictor of early loss of periodontal attachment. Community Dentistry and Oral Epidemiology 29:130–5.

Holman CD, Donovan RJ, Cort B, Jalleh G, Frizzell SK & Carroll AM 1997. Banning tobacco sponsorship: replacing tobacco with health messages and creating health-promoting environments. Tobacco Control 6:115–21.

Holst D, Petersen PE & Grytten J 1992. Health services research in oral health care: an empirical example. Scandinavian Journal of Dental Research 100:77–80.

Hopcraft MS & Morgan MV 2003. Exposure to fluoridated drinking water and dental caries experience in Australian army recruits, 1996. Community Dentistry and Oral Epidemiology 31:68–74.

Hull PS, Worthington HV, Clerehugh V, Tsirba R, Davies RM, Clarkson JE 1997. The reasons for tooth extractions in adults and their validation. Journal of Dentistry 25: 233–7.

Humphreys JS 1988. Social provision and service delivery: problems of equity, health, and health care in rural Australia. Geoforum 19:323–38.

Hyman JJ & Reid BC 2003. Epidemiologic risk factors for periodontal attachment loss among adults in the United States. Journal of Clinical Periodontology 30:230–7.

Johnson GK & Slach NA 2001. Impact of tobacco use on periodontal status. Journal of Dental Education 65:313–21.

Joshi A, Douglass CW, Feldman H, Mitchell P & Jette A 1996. Consequences of success: do more teeth translate into more disease and utilization? Journal of Public Health Dentistry 56:190–7.

Kinane DF & Chestnutt IG 2000. Smoking and periodontal disease. Critical Reviews in Oral Biology and Medicine 11:356–65.

Kinane DF & Marshall GJ 2001. Periodontal manifestations of systemic disease. Australian Dental Journal 46:2–12.

Klock KS & Haugejorden O 1991. Primary reasons for extraction of permanent teeth in Norway: changes from 1968 to 1988. Community Dentistry and Oral Epidemiology 19:336–41.

Machuca G, Rosales I, Lacalle JR, Machuca C & Bullon P 2000. Effect of cigarette smoking on periodontal status of healthy young adults. Journal of Periodontology 71:73–8.

Marmot MG, Kogevinas M & Elston MA 1987. Social/economic status and disease. Annual Review of Public Health 8:11–35.

Miller C, Wakefield M & Roberts L 2003. Uptake and effectiveness of the Australian telephone Quitline service in the context of a mass media campaign. Tobacco Control 12:53–8.

Morita M, Kimura T, Kanegae M, Ishikawa A, Watanabe T 1994. Reasons for extraction of permanent teeth in Japan. Community Dentistry and Oral Epidemiology 22:303–6.

Morris AJ, Steele J & White DA 2001. The oral cleanliness and periodontal health of UK adults in 1998. British Dental Journal 191:186–92.

Mount G, Walker B & Roder D 1987. Dental health and treatment needs of middle-aged and older patients attending 21 general practitioners. Australian Dental Journal 32: 166–70.

NHMRC Expert Advisory Panel 1993. The impact of change in oral health status on dental education, workforce, practices and services in Australia. Canberra: Commonwealth of Australia.

National Health Strategy 1992. Improving Dental Health in Australia. Background Paper No. 9. Canberra: Department of Health, Housing and Community Services.

National Institute of Dental Research (NIDR) 1987. Oral health of United States adults. USA: US Department of Health and Human Services, National Institutes of Health.

Nunn J, Morris J, Pine C, Pitts NB, Bradnock G & Steele J 2000. The condition of teeth in the UK in 1998 and implications for the future. British Dental Journal 189:639–44.

Ong G, Yeo JF & Bhole S 1996. A survey of reasons for extraction of permanent teeth in Singapore. Community Dentistry and Oral Epidemiology 24:124–7.

Powell RN & McEniery TM 1988. The Brisbane statistical division survey of adult dental health 1984. 3. Dental health status and treatment needs. Australian Dental Journal 33:109–15.

Rickard-Bell G, Donelly N & Ward J 2003. Preventive dentistry: what do Australian patients endorse and recall of smoking cessation advice by their dentists? British Dental Journal 194:159–64.

Rickard-Bell G, Groenlund C & Ward J 2003. Australian dental students' views about smoking cessation counselling and their skills as counsellors. Journal of Public Health Dentistry 63:200–6.

Riordan PJ 2002. Dental fluorosis decline after changes to supplement and toothpaste regimens. Community Dentistry and Oral Epidemiology 30:233–40.

Sheiham A & Watt RG 2000. The Common Risk Factor Approach: a rational basis for promoting oral health. Community Dentistry and Oral Epidemiology 28:399–406.

Sivaneswaran S & Barnard PD 1987. Periodontal assessment using the Community Periodontal Index of Treatment Needs at Westmead Hospital, Sydney, 1984. Australian Dental Journal 32:11–6.

Slade GD, Spencer AJ, Davies MJ & Stewart JF. Caries experience among children in fluoridated Townsville and non-fluoridated Brisbane. Australian and New Zealeand Journal of Public Health 1996 20:623–9.

Spencer AJ 1996. Water fluoridation in Australia. Community Dental Health 13:27–37.

Spencer AJ, Davies MJ, Slade GD & Brennan DS 1994. Caries prevalence in Australasia. International Dental Journal 44:415–23.

Spencer AJ & Lewis JM 1988. The delivery of dental services: information, issues and directions. Community Health Studies XII:16–30.

Spencer AJ, Wright FAC, Brown DF, Hammond RH & Lewis JM 1988. A socio-dental study of adult periodontal health: Melbourne 1985. Melbourne: Department of Preventive and Community Dentistry, The University of Melbourne.

Stephens RG, Kogon SL & Jarvis AM 1991. A study of the reasons for tooth extraction in a Canadian population sample. Journal of the Canadian Dental Association 57:501–4.

Tomar SL & Asma S 2000. Smoking-attributable periodontitis in the United States: findings from NHANES III. National Health and Nutrition Examination Survey. Journal of Periodontology 71:743–51.

US Department of Health and Human Services 2000. Oral Health in America: A Report of the Surgeon General. Rockville, MD: US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health.

Van der Weijden GA, de Slegte C, Timmerman MF & van der Velden U 2001. Periodontitis in smokers and non-smokers: intra-oral distribution of pockets. Journal of Clinical Periodontology 28:955–60.

Wakefield M, Freeman J & Donovan R 2003. Recall and response of smokers and recent quitters to the Australian National Tobacco Campaign. Tobacco Control 12:15–22.

Weintraub JA & Burt BA 1985. Oral health status in the United States: tooth loss and edentulism. Journal of Dental Education 49:368–76.

World Health Organization (WHO) 1997. Oral health surveys: basic methods. Fourth edition. Geneva: WHO.

Wright FAC, Hammond RH & Lewis JM 1994. Changes in periodontal conditions of adults from Melbourne, Australia. International Dental Journal 44:207–14.

Young JM, D'Este C & Ward JE 2002. Improving family physicians' use of evidence-based smoking cessation strategies: a cluster randomisation trial. Preventive Medicine 35:572–83.

Appendix A: Main findings restricted to states/territories that participated in both rounds of data collection

Comparisons of trends in oral health between 1995–96 and 2001–02 may potentially be influenced by the different levels of participation in the two surveys, i.e. the inclusion of all states/territories in 1995–96 and the non-inclusion of Tasmania or the Australian Capital Territory in 2001–02. In order to assess whether this difference influenced the results, the main findings are presented here restricted to only those states/territories that participated in both rounds of data collection.

Edentulism

Edentulism is presented in Table A.1 by age and year of survey restricted to those states/territories that participated in both rounds of data collection. These findings are very similar to the overall data (see Table 4.1) in terms of point estimates. The only difference in terms of statistical significance is that the marginally significant difference from Table 4.1 (a P-value of 0.0357) was no longer significant at the P<0.05 level when restricted to those states/territories that participated in both rounds of data collection.

Table A.1: Edentulism (%) by year and age

	[(a)]1995–96	2001–02	P
Age of patient	**n=5,526**	**n=5,006**	
18–24 years	0.5	0.0	ns
25–44 years	1.2	1.7	ns
45–64 years	7.6	8.1	ns
65+ years	20.2	18.1	ns
All	**8.2**	**9.0**	**ns**

(a) Excludes Tasmania and ACT as they did not provide data in 2001–02.

ns (not statistically significant) χ^2 test

Caries experience

Caries experience is presented in Table A.2 by age and year of survey restricted to those states/territories that participated in both rounds of data collection. As for the overall data (see Table 4.6), significant increases in the number of decayed teeth were observed overall and in each age group of patients. The trends for missing teeth were also consistent with the overall data, showing a significant overall increase in missing teeth that was reflected in increased numbers of missing teeth over time among 25–44-year-old patients. The trends for filled teeth were consistent with the overall data, showing significant decreases overall and for patients aged 18–24 and 25–44 years. Caries experience as measured by DMFT showed a similar pattern to that observed for the overall data with a significant increase in the combined numbers of decayed, missing and filled teeth overall and among patients aged 25–44 years.

Table A.2: Caries experience by year and age of patient

	[(a)]1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=523**		**n=262**		
Decayed	3.11	(0.17)	4.61	(0.34)	**
Missing	0.70	(0.07)	0.67	(0.09)	ns
Filled	3.56	(0.17)	2.47	(0.19)	**
DMFT	7.37	(0.25)	7.75	(0.40)	ns
25–44 years	**n=1,705**		**n=1,267**		
Decayed	2.59	(0.08)	4.14	(0.14)	**
Missing	2.75	(0.10)	3.68	(0.15)	**
Filled	6.74	(0.13)	5.46	(0.14)	**
DMFT	12.08	(0.17)	13.27	(0.20)	**
45–64 years	**n=1,361**		**n=1,379**		
Decayed	1.47	(0.06)	1.89	(0.08)	**
Missing	7.16	(0.20)	7.22	(0.22)	ns
Filled	7.47	(0.16)	7.31	(0.16)	ns
DMFT	16.10	(0.20)	16.41	(0.20)	ns
65+ years	**n=1,078**		**n=1,468**		
Decayed	1.07	(0.05)	1.36	(0.06)	**
Missing	9.91	(0.26)	9.69	(0.25)	ns
Filled	6.55	(0.16)	6.79	(0.15)	ns
DMFT	17.54	(0.25)	17.84	(0.22)	ns
All	**n=4,667**		**n=4,376**		
Decayed	1.95	(0.04)	2.65	(0.06)	**
Missing	5.57	(0.10)	6.35	(0.12)	**
Filled	6.61	(0.08)	6.20	(0.08)	**
DMFT	14.13	(0.12)	15.20	(0.12)	**

(a) Excludes Tasmania and ACT as they did not provide data in 2001–02.

SE Standard error

**(P<0.01), ns (not statistically significant) General Linear Model

Periodontal status

The percentage of patients with periodontal pockets of 6+ mm is presented in Table A.3 by age and year of survey restricted to those states/territories that participated in both rounds of data collection. These findings are very similar to the overall data (see Table 4.11) both in terms of point estimates and statistical significance, showing a small overall decrease over time in the percentage of patients with periodontal pockets of 6+ mm, as reflected among patients aged 45–64 and 65+ years.

Table A.3: Periodontal pockets 6+ mm (%) by year and age of patient

	[(a)]1995–96	2001–02	P
Age of patient	**n=4,730**	**n=4,208**	
18–24 years	2.6	3.3	ns
25–44 years	10.0	8.1	ns
45–64 years	18.7	13.0	**
65+ years	15.1	11.8	*
All	**13.1**	**10.3**	**

(a) Excludes Tasmania and ACT as they did not provide data in 2001–02.

*(P<0.05), **(P<0.01), ns (not statistically significant) χ^2 test

Appendix B: State/territory-specific main findings

This section presents state/territory-specific findings in order to assess whether the national trends were observed consistently in all states/territories.

Edentulism

Edentulism is presented in Table B.1 by survey year and age of patient for New South Wales. In general, the New South Wales data showed lower percentages of edentulous patients overall and within most age groups compared to the national data (see Table 4.1). New South Wales showed a negligible change in edentulism over time while the national trend showed a small but significant increase in edentulism among patients presenting for public dental services.

Table B.1: Edentulism (%) by year and age – New South Wales

	1995–96	2001–02	P
Age of patient	**n=824**	**n=700**	
18–24 years	0.0	0.0	ns
25–44 years	0.0	0.7	*
45–64 years	3.3	3.8	ns
65+ years	8.6	11.9	ns
All	**3.4**	**4.6**	**ns**

*(P<0.05), ns (not statistically significant) χ^2 test

Edentulism is presented in Table B.2 survey year and age of patient for Victoria. In general the Victorian data showed similar percentages of edentulism compared to the national data (see Table 4.1). A significant overall increase in the percentage of edentulous patients was consistent with the national trend but the size of the increase was larger in Victoria.

Table B.2: Edentulism (%) by year and age – Victoria

	1995–96	2001–02	P
Age of patient	**n=1,020**	**n=494**	
18–24 years	0.0	0.0	ns
25–44 years	1.7	2.9	ns
45–64 years	8.0	15.7	**
65+ years	17.7	20.8	ns
All	**7.1**	**12.4**	**

**(P<0.01), ns (not statistically significant) χ^2 test

Edentulism is presented in Table B.3 by survey year and age of patient for Queensland. In general the Queensland data showed higher percentages of edentulous patients compared to the national data (see Table 4.1). The lack of any age-specific changes in edentulism over time in Queensland was consistent with the national age-specific trends. Queensland showed no significant overall change in percentage of edentulous patients over time while the national data showed a small but statistically significant increase in the percentage of edentulous patients.

Table B.3: Edentulism (%) by year and age – Queensland

	1995–96	2001–02	P
Age of patient	**n=2,529**	**n=499**	
18–24 years	1.1	0.0	ns
25–44 years	2.5	3.2	ns
45–64 years	14.2	10.1	ns
65+ years	27.7	23.0	ns
All	**13.2**	**12.2**	**ns**

ns (not statistically significant) χ^2 test

Edentulism is presented in Table B.4 by survey year and age of patient for Western Australia. The percentage of edentulous patients in Western Australia was lower overall and in most age groups compared to the national data (see Table 4.1). This lower percentage of edentulous patients in Western Australia was particularly marked in 1995–96, while the percentage of edentulous patients in 2001–02 was closer to the national estimates. The overall trend in Western Australia towards an increased percentage of edentulous patients mirrored the national trend but, despite the increase, the percentage of edentulous patients in Western Australia remained lower than the national estimate for 2001–02.

Table B.4(a): Edentulism (%) by year and age – Western Australia

	1995–96	2001–02	P
Age of patient	**n=157**	**n=1,158**	
18–24 years	0.0	0.0	ns
25–44 years	0.0	0.0	ns
45–64 years	2.3	3.2	ns
65+ years	3.3	13.6	**
All	**1.3**	**6.8**	**

**(P<0.01), ns (not statistically significant) χ^2 test

The lower percentage of edentulous patients in Western Australia may indicate that under-sampling of edentulous patients occurred, particularly in 1995–96, which could potentially influence the observed overall trends. Hence, the analysis was repeated excluding Western Australia (and also Tasmania and the Australian Capital Territory as they did not participate in both rounds of data collection). The findings are similar to the overall data (see Table 4.1 and Table A.1), with no significant changes over time in any age group. The overall point estimates were also similar – 7.9% in 1995–96 and 9.0% in 2001–02 from Table 4.1 and 8.2% and 9.0% respectively from Table A.1. Hence, the inclusion or exclusion of Western Australia had little effect on the overall findings.

Table B.4(b): Edentulism (%) by year and age – excluding Western Australia(1)

	1995–96	2001–02	P
Age of patient	**n=5,369**	**n=3,848**	
18–24 years	0.5	0.0	ns
25–44 years	1.3	1.8	ns
45–64 years	8.0	8.7	ns
65+ years	21.2	18.7	ns
All	**8.8**	**9.3**	**ns**

(1) Also excluding Tasmania and the Australian Capital Territory as they did not participate in both rounds of data collection.

ns (not statistically significant) χ^2 test

Edentulism is presented in Table B.5 by survey year and age of patient for South Australia. The percentage of edentulous patients in South Australia was higher than the national estimates in 1995–96 but similar to the national estimates in 2001–02 (see Table 4.1). South Australia showed a significant decrease in the overall percentage of edentulous patients over time that was reflected in significantly lower percentages of edentulous patients aged 45–64 and 65+ years in 2001–02 compared to 1995–96. This trend over time was in contrast to the national trend, which showed a small but statistically significant increase in the percentage of edentulous patients.

Table B.5(a): Edentulism (%) by year and age – South Australia

	1995–96	2001–02	P
Age of patient	**n=744**	**n=1,904**	
18–24 years	2.4	0.0	ns
25–44 years	2.3	0.6	ns
45–64 years	13.1	5.1	**
65+ years	39.7	18.7	**
All	**19.4**	**9.0**	**

**(P<0.01), ns (not statistically significant) χ^2 test

The higher percentage of edentulous patients in South Australia may indicate that over-sampling of edentulous patients occurred in 1995–96, which could potentially influence the observed overall trends. Hence, the analysis was repeated excluding South Australia (and also Tasmania and the Australian Capital Territory as they did not participate in both rounds of data collection). The findings are similar to the overall data (see Table 4.1 and Table A.1), with no significant changes over time in any age group. While the overall point estimates in 1995–96 were decreased when South Australia was excluded – 6.5% in 1995–96 cf. 7.9% and 8.2% respectively from Table 4.1 and Table A.1 – the difference was not marked. Hence, the inclusion or exclusion of South Australia had little effect on the overall findings.

Table B.5(b): Edentulism (%) by year and age – excluding South Australia(1)

	1995–96	2001–02	P
Age of patient	**n=4,782**	**n=3,102**	
18–24 years	0.3	0.0	ns
25–44 years	1.0	1.8	ns
45–64 years	6.9	8.6	ns
65+ years	15.9	18.0	ns
All	**6.5**	**9.0**	**

(1) Also excluding Tasmania and the Australian Capital Territory as they did not participate in both rounds of data collection.

ns (not statistically significant) χ^2 test

The effect of excluding both Western Australia and South Australia produced little effect on the overall findings, with no significant differences over time in any age group and similar point estimates – 7.0% in 1995–96 and 9.3% in 2001–02 (compared to 7.9% in 1995–96 and 9.0% in 2001–02 from Table 4.1 and 8.2% and 9.0% respectively from Table A.1).

Edentulism is presented in Table B.6 by survey year and age of patient for the Northern Territory. In general the percentage of edentulous patients was lower in the Northern Territory compared to the national data (see Table 4.1). There were no significant age-specific changes in the percentage of edentulous patients over time either for the Northern Territory or nationally. The percentage of edentulous patients was higher in 2001–02 compared to 1995–96. This difference was not statistically significant for the Northern Territory but it was significantly different for the national estimates.

Table B.6: Edentulism (%) by year and age – Northern Territory

	1995–96	2001–02	P
Age of patient	**n=252**	**n=251**	
18–24 years	0.0	0.0	ns
25–44 years	0.7	1.4	ns
45–64 years	8.5	7.4	ns
65+ years	11.1	14.3	ns
All	**2.4**	**7.2**	**ns**

ns (not statistically significant) χ^2 test

Caries experience

Caries experience is presented in Table B.7 by survey year and age of patient for New South Wales. The New South Wales trends for decayed teeth were consistent with the national data (see Table 4.6) showing significant increases over time overall and for each age group of patients. Missing teeth showed a significant decrease over time among 25–44-year-old New South Wales patients as in the national data, but the New South Wales patients did not show a significant overall increase in missing teeth as observed in the national data. Numbers of filled teeth were significantly lower overall and among 18–24 and 25–44-year-olds for both New South Wales patients and the national data. DMFT was higher among 25–44-year-olds in New South Wales as in the national data but, unlike the national trends, there was no overall difference in DMFT for New South Wales.

Table B.7: Caries experience by year and age of patient – New South Wales

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=54**		**n=46**		
Decayed	2.00	(0.36)	6.02	(1.13)	**
Missing	0.94	(0.20)	0.61	(0.14)	ns
Filled	3.26	(0.54)	1.70	(0.37)	*
DMFT	6.20	(0.78)	8.33	(1.20)	ns
25–44 years	**n=270**		**n=270**		
Decayed	2.34	(0.17)	5.01	(0.32)	**
Missing	2.91	(0.24)	3.92	(0.34)	*
Filled	6.19	(0.32)	4.10	(0.25)	**
DMFT	11.14	(0.43)	13.03	(0.46)	*
45–64 years	**n=263**		**n=167**		
Decayed	1.21	(0.10)	2.61	(0.29)	**
Missing	8.71	(0.43)	8.38	(0.64)	ns
Filled	7.38	(0.35)	6.54	(0.42)	ns
DMFT	17.30	(0.40)	17.54	(0.56)	ns
65+ years	**n=194**		**n=168**		
Decayed	1.03	(0.12)	1.59	(0.18)	**
Missing	11.67	(0.52)	10.57	(0.79)	ns
Filled	6.70	(0.37)	5.83	(0.42)	ns
DMFT	19.40	(0.48)	17.99	(0.64)	ns
All	**n=781**		**n=651**		
Decayed	1.61	(0.08)	3.58	(0.19)	**
Missing	6.90	(0.25)	6.55	(0.32)	ns
Filled	6.51	(0.19)	5.01	(0.19)	**
DMFT	15.03	(0.28)	15.14	(0.32)	ns

SE Standard error

*(P<0.05), **(P<0.01), ns (not statistically significant) General Linear Model

Caries experience is presented in Table B.8 by survey year and age of patient for Victoria. In Victoria the only significant increase in the number of decayed teeth was observed among 25–44-year-olds, while the national data (see Table 4.6) showed significant increases in all age groups. The number of missing teeth showed a significant overall increase over time for Victoria as in the national data, reflecting significant increases in missing teeth among 25–44-year-olds as in the national data as well as among 45–64 and 65+-year-olds. In contrast to the national data, which showed a significant decrease in the number of fillings over time overall and among 18–24 and 25–44-year-olds, the Victorian data showed no significant changes over time in the number of filled teeth in any age group. In Victoria there were significant increases in DMFT overall and among patients aged 25–44, 45–64 and 65+ years, while the national trends also showed a significant overall increase in DMFT, reflecting increased DMFT among
25–44-year-olds.

Table B.8: Caries experience by year and age of patient – Victoria

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=115**		**n=40**		
Decayed	3.40	(0.40)	4.77	(0.78)	ns
Missing	0.45	(0.09)	0.77	(0.29)	ns
Filled	3.43	(0.31)	3.30	(0.59)	ns
DMFT	7.28	(0.44)	8.85	(0.95)	ns
25–44 years	**n=321**		**n=129**		
Decayed	2.85	(0.17)	3.62	(0.33)	*
Missing	3.04	(0.28)	6.84	(0.59)	**
Filled	5.60	(0.27)	5.88	(0.46)	ns
DMFT	11.49	(0.41)	16.34	(0.60)	**
45–64 years	**n=297**		**n=126**		
Decayed	1.75	(0.12)	1.45	(0.23)	ns
Missing	6.52	(0.46)	11.03	(0.76)	**
Filled	6.22	(0.31)	5.87	(0.51)	ns
DMFT	14.49	(0.48)	18.36	(0.69)	**
65+ years	**n=174**		**n=121**		
Decayed	1.32	(0.15)	1.69	(0.26)	ns
Missing	10.13	(0.71)	14.74	(0.83)	**
Filled	5.17	(0.35)	5.09	(0.44)	ns
DMFT	16.61	(0.71)	21.53	(0.70)	**
All	**n=907**		**n=416**		
Decayed	2.27	(0.10)	2.51	(0.17)	ns
Missing	5.21	(0.25)	9.82	(0.43)	**
Filled	5.44	(0.16)	5.40	(0.25)	ns
DMFT	12.92	(0.27)	17.74	(0.40)	**

SE Standard error

*(P<0.05), **(P<0.01), ns (not statistically significant) General Linear Model

Caries experience is presented in Table B.9 by survey year and age of patient for Queensland. In Queensland there was an overall increase in the number of decayed teeth, reflecting increased numbers of decayed teeth among 25–44 and 65+-year-olds, while the national trends (see Table 4.6) showed increased numbers of decayed teeth in all age groups. There was no change over time in the overall number of missing teeth in Queensland, in contrast to the national data which showed a significant increase in the number of missing teeth. There was a significant decrease in the number of missing teeth among 25–44-year-olds in Queensland, in contrast to a significant increase among 25–44-year-olds in the national data. There was a significant decrease over time in the overall number of filled teeth in Queensland, reflecting decreased numbers of filled teeth over time among 18–24 and 25–44-year-olds, as was observed for the national data. In Queensland DMFT showed no significant change over time but there was a significant decrease over time among 25–44-year-olds, in contrast to the national data which showed a significant increase in DMFT over time overall and among 25–44-year-olds.

Table B.9: Caries experience by year and age of patient – Queensland

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=257**		**n=31**		
Decayed	3.84	(0.29)	3.87	(0.61)	ns
Missing	0.86	(0.12)	0.52	(0.24)	ns
Filled	3.74	(0.23)	2.81	(0.58)	*
DMFT	8.45	(0.37)	7.19	(0.92)	ns
25–44 years	**n=725**		**n=115**		
Decayed	2.81	(0.13)	4.03	(0.52)	**
Missing	2.75	(0.17)	1.86	(0.39)	**
Filled	8.08	(0.21)	6.12	(0.51)	**
DMFT	13.65	(0.25)	12.01	(0.66)	**
45–64 years	**n=564**		**n=127**		
Decayed	1.78	(0.12)	2.01	(0.25)	ns
Missing	5.63	(0.31)	4.67	(0.66)	ns
Filled	8.20	(0.26)	7.88	(0.53)	ns
DMFT	15.60	(0.33)	14.56	(0.63)	ns
65+ years	**n=523**		**n=120**		
Decayed	1.00	(0.08)	1.38	(0.21)	*
Missing	7.41	(0.38)	7.03	(0.80)	ns
Filled	7.07	(0.24)	7.38	(0.56)	ns
DMFT	15.47	(0.40)	15.79	(0.79)	ns
All	**n=2,069**		**n=393**		
Decayed	2.20	(0.07)	2.55	(0.20)	*
Missing	4.48	(0.15)	4.24	(0.36)	ns
Filled	7.32	(0.13)	6.81	(0.30)	*
DMFT	14.00	(0.18)	13.61	(0.40)	ns

SE Standard error

*(P<0.05), **(P<0.01), ns (not statistically significant) General Linear Model

Caries experience is presented in Table B.10 by survey year and age of patient for Western Australia. In contrast to the national data (see Table 4.6), there was a significant overall decrease in the number of decayed teeth in Western Australia, reflecting a significant decrease in the number of decayed teeth among 65+-year-olds. The number of missing teeth showed no significant overall change over time for Western Australia despite decreased numbers of missing teeth being observed among 25–44, 45–64 and 65+-year-olds, while the national data showed a significant increase over time in the number of missing teeth, reflecting increased numbers of missing teeth among 25–44-year-olds. Numbers of filled teeth showed a significant overall increase over time in Western Australia, reflecting increased numbers of filled teeth among 65+-year-olds. In contrast, the national data showed a significant overall decrease in the number of filled teeth over time, reflecting decreased numbers of fillings among 18–24 and 25–44-year-olds. There was no significant change over time in overall DMFT in Western Australia although DMFT decreased over time among 45–64-year-olds, while the national data showed a significant overall increase in DMFT, reflecting increased DMFT over time among 25–44-year-olds.

Table B.10: Caries experience by year and age of patient – Western Australia

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=14**		**n=44**		
Decayed	4.07	(0.87)	3.75	(0.66)	ns
Missing	0.21	(0.15)	0.45	(0.17)	ns
Filled	4.71	(1.41)	2.45	(0.37)	ns
DMFT	9.00	(1.43)	6.66	(0.74)	ns
25–44 years	**n=57**		**n=203**		
Decayed	2.58	(0.46)	3.01	(0.29)	ns
Missing	2.63	(0.52)	1.60	(0.22)	*
Filled	7.84	(0.77)	7.97	(0.42)	ns
DMFT	13.05	(0.99)	12.58	(0.42)	ns
45–64 years	**n=35**		**n=315**		
Decayed	1.37	(0.38)	1.02	(0.12)	ns
Missing	8.63	(1.26)	5.63	(0.45)	**
Filled	8.77	(1.22)	9.31	(0.35)	ns
DMFT	18.77	(1.22)	15.96	(0.42)	**
65+ years	**n=23**		**n=396**		
Decayed	1.30	(0.39)	0.77	(0.08)	**
Missing	10.13	(1.89)	7.40	(0.43)	**
Filled	6.78	(1.15)	8.94	(0.28)	**
DMFT	18.22	(1.66)	17.11	(0.39)	ns
All	**n=129**		**n=958**		
Decayed	2.19	(0.26)	1.46	(0.09)	**
Missing	5.33	(0.61)	5.27	(0.25)	ns
Filled	7.57	(0.54)	8.56	(0.19)	**
DMFT	15.09	(0.70)	15.29	(0.24)	ns

SE Standard error

*(P<0.05), **(P<0.01), ns (not statistically significant) General Linear Model

Caries experience is presented in Table B.11 by survey year and age of patient for South Australia. There was a small but statistically significant increase in the overall number of decayed teeth in South Australia despite the only significant age-specific change over time being a decreased number of decayed teeth among 25–44-year-olds, while the national data (see Table 4.6) showed significant increases over time in the number of decayed teeth in all age groups. The overall number of missing teeth increased over time in South Australia reflecting increased numbers of missing teeth among 25–44 and 45–64-year-olds. This was similar to the national trends which showed a significant overall increase in the number of missing teeth, reflecting increased numbers of missing teeth among 25–44-year-olds. The overall number of filled teeth decreased over time in South Australia but this trend was not observed consistently in each age group, with decreased numbers of filled teeth over time observed among 18–24 and 45–64-year-olds and increased numbers of filled teeth observed among 25–44-year-olds. The national data also showed a significant overall decrease in the number of fillings, reflecting decreased numbers of filled teeth over time among 18–24 and 25–44-year-olds. In South Australia overall DMFT increased over time, reflecting increased DMFT among 45–64 and 65+-year-olds, while the national data also showed a significant overall increase in DMFT, reflecting increased DMFT over time among 25–44-year-olds.

Table B.11: Caries experience by year and age of patient – South Australia

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=40**		**n=88**		
Decayed	2.13	(0.63)	2.77	(0.41)	ns
Missing	1.05	(0.43)	1.31	(0.27)	ns
Filled	3.55	(0.62)	1.85	(0.28)	**
DMFT	6.73	(1.12)	5.93	(0.63)	ns
25–44 years	**n=199**		**n=482**		
Decayed	2.91	(0.17)	1.22	(0.17)	**
Missing	3.39	(0.19)	4.51	(0.54)	**
Filled	6.55	(0.23)	9.10	(0.45)	**
DMFT	12.85	(0.31)	14.83	(0.51)	ns
45–64 years	**n=162**		**n=558**		
Decayed	1.22	(0.17)	1.54	(0.11)	ns
Missing	4.51	(0.54)	7.09	(0.31)	**
Filled	9.10	(0.45)	7.93	(0.25)	**
DMFT	14.83	(0.51)	16.57	(0.34)	**
65+ years	**n=156**		**n=604**		
Decayed	0.85	(0.14)	1.08	(0.07)	ns
Missing	8.37	(0.70)	9.45	(0.33)	ns
Filled	7.33	(0.49)	7.46	(0.22)	ns
DMFT	16.54	(0.61)	18.00	(0.34)	*
All	**n=557**		**n=1,732**		
Decayed	1.53	(0.11)	1.83	(0.07)	**
Missing	4.37	(0.29)	6.59	(0.18)	**
Filled	7.92	(0.25)	7.07	(0.13)	**
DMFT	13.82	(0.30)	15.49	(0.20)	**

SE Standard error

*(P<0.05), **(P<0.01), ns (not statistically significant) General Linear Model

Caries experience is presented in Table B.12 by survey year and age of patient for the Northern Territory. In contrast to the national data (see Table 4.6), the Northern Territory trends showed a significant overall decrease over time in the number of decayed teeth, reflecting decreased numbers of decayed teeth among 25–44 and 45–64-year-olds. There was no significant change over time in the overall numbers of missing teeth in the Northern Territory but decreased numbers of missing teeth were observed over time among 25–44 and 45–64-year-olds, while the national trends showed a significant increase over time in the overall number of missing teeth, reflecting increased numbers of missing teeth among 25–44-year-olds. There was a significant overall increase in the number of filled teeth over time in the Northern Territory, reflecting increased numbers of filled teeth over time among 25–44 and 45–64-year-olds. In contrast, the national data showed a significant decrease in the overall number of filled teeth over time, reflecting decreases in the number of filled teeth among 18–24 and 25–44-year-olds. There were no significant changes in DMFT over time in the Northern Territory, while the national data showed a significant overall increase in DMFT over time, reflecting increases in DMFT among 25–44 year-olds.

Table B.12: Caries experience by year and age of patient – Northern Territory

	1995–96		2001–02		
	Mean	**(SE)**	**Mean**	**(SE)**	**P**
18–24 years	**n=43**		**n=13**		
Decayed	3.56	(0.51)	1.85	(0.64)	ns
Missing	0.35	(0.15)	0.15	(0.15)	ns
Filled	2.60	(0.44)	2.15	(0.64)	ns
DMFT	6.51	(0.65)	4.15	(0.76)	ns
25–44 years	**n=133**		**n=68**		
Decayed	4.30	(0.43)	2.49	(0.43)	**
Missing	2.10	(0.38)	0.72	(0.40)	*
Filled	3.56	(0.39)	7.12	(0.64)	**
DMFT	9.96	(0.65)	10.32	(0.64)	ns
45–64 years	**n=40**		**n=86**		
Decayed	3.60	(0.73)	1.74	(0.29)	**
Missing	5.95	(1.30)	2.23	(0.60)	**
Filled	3.32	(0.76)	6.73	(0.58)	**
DMFT	12.87	(1.48)	10.71	(0.68)	ns
65+ years	**n=8**		**n=59**		
Decayed	1.13	(0.61)	1.00	(0.26)	ns
Missing	7.13	(3.61)	5.17	(0.98)	ns
Filled	5.50	(2.67)	6.56	(0.66)	ns
DMFT	13.75	(3.14)	12.73	(0.81)	ns
All	**n=224**		**n=226**		
Decayed	3.92	(0.31)	1.78	(0.19)	**
Missing	2.63	(0.37)	2.42	(0.38)	ns
Filled	3.41	(0.30)	6.54	(0.35)	**
DMFT	9.95	(0.51)	10.74	(0.41)	ns

SE Standard error

*(P<0.05), **(P<0.01), ns (not statistically significant) General Linear Model

Periodontal status

Periodontal status is presented in Table B.13 by survey year and age of patient for New South Wales. The percentage of patients with periodontal pockets of 6+ mm was generally lower than the national estimates for 1995–96 but higher than the national estimates for 2001–02 (see Table 4.11). The trends over time for New South Wales of significant increases in the overall percentage of patients with periodontal pockets of 6+ mm are also in contrast to the national data, which showed a significant decrease.

Table B.13: Periodontal pockets 6+ mm (%) by year and age of patient – New South Wales

	1995–96	2001–02	P
Age of patient	**n=768**	**n=609**	
18–24 years	0.0	9.3	**
25–44 years	6.7	14.7	**
45–64 years	12.4	18.9	**
65+ years	17.0	17.9	ns
All	**10.7**	**16.3**	**

**(P<0.01), ns (not statistically significant) χ^2 test

Periodontal status is presented in Table B.14 by survey year and age of patient for Victoria. In general there were higher percentages of patients with periodontal pockets of 6+ mm in Victoria during 1995–96 compared to the national estimates (see Table 4.11), but lower percentages of patients with periodontal pockets of 6+ mm during 2001–02 compared to the national estimates. The overall trend in Victoria of a decrease in the percentage of patients with periodontal pockets of 6+ mm was of a greater magnitude than the national trend.

Table B.14: Periodontal pockets 6+ mm (%) by year and age of patient – Victoria

	1995–96	2001–02	P
Age of patient	**n=908**	**n=403**	
18–24 years	4.3	2.5	ns
25–44 years	18.8	5.6	**
45–64 years	32.2	10.8	**
65+ years	23.5	12.7	**
All	**22.3**	**8.9**	**

**(P<0.01), ns (not statistically significant) χ^2 test

Periodontal status is presented in Table B.15 by survey year and age of patient for Queensland. In general the percentage of patients with periodontal pockets of 6+ mm was lower in Queensland compared to the national estimates (see Table 4.11). There were no significant changes over time in the percentage of patients with periodontal pockets of 6+ mm for Queensland, while the national trends showed a small but statistically significant overall decrease in the percentage of patients with periodontal pockets of 6+ mm.

Table B.15: Periodontal pockets 6+ mm (%) by year and age of patient – Queensland

	1995–96	2001–02	P
Age of patient	**n=2,132**	**n=364**	
18–24 years	1.9	0.0	ns
25–44 years	3.8	2.0	ns
45–64 years	9.0	9.7	ns
65+ years	4.8	6.9	ns
All	**5.2**	**5.8**	**ns**

ns (not statistically significant) χ^2 test

Periodontal status is presented in Table B.16 by survey year and age of patient for Western Australia. In general the percentage of patients with periodontal pockets of 6+ mm was higher for Western Australia during 1995–96 compared to the national estimates (see Table 4.11), but the percentage of patients with periodontal pockets of 6+ mm was lower for Western Australia during 2001–02 compared to the national estimates. The overall trend in Western Australia towards a decrease over time in the percentage of patients with periodontal pockets of 6+ mm was consistent with the national estimates, but the change was of greater magnitude in Western Australia compared to the small decrease observed from the national data. Age-specific decreases in the percentage of patients with periodontal pockets of 6+ mm were observed among 25–44 and 45–64-year-olds from Western Australia and among 45–64 and 65+-year-olds nationally.

Table B.16: Periodontal pockets 6+ mm (%) by year and age of patient – Western Australia

	1995–96	2001–02	P
Age of patient	**n=136**	**n=987**	
18–24 years	7.1	0.0	ns
25–44 years	17.0	4.3	**
45–64 years	35.3	12.8	**
65+ years	17.2	10.6	ns
All	**20.6**	**9.5**	**

**(P<0.01), ns (not statistically significant) χ^2 test

Periodontal status is presented Table B.17 by survey year and age of patient for South Australia. In general the percentage of patients with periodontal pockets of 6+ mm was lower in South Australia compared to the national data (see Table 4.11). While the percentage of patients with periodontal pockets of 6+ mm tended to be lower in 2001–02 compared to 1995–96 among South Australian patients, the differences were not statistically significant. In contrast, the national data showed a statistically significant overall decrease in the percentage of patients with periodontal pockets of 6+ mm.

Table B.17: Periodontal pockets 6+ mm (%) by year and age of patient – South Australia

	1995–96	2001–02	P
Age of patient	**n=572**	**n=1,628**	
18–24 years	0.0	0.0	ns
25–44 years	5.7	5.3	ns
45–64 years	12.8	11.1	ns
65+ years	12.7	10.3	ns
All	**9.3**	**8.6**	**ns**

ns (not statistically significant) χ^2 test

Periodontal status is presented in Table B.18 by survey year and age of patient for the Northern Territory. In general the percentage of patients with periodontal pockets of 6+ mm was higher in the Northern Territory compared to the national data during 1995–96 (see Table 4.11) but was lower compared to the national data in 2001–02. The overall trend over time for the Northern Territory of a decrease in the percentage of patients with periodontal pockets of 6+ mm was similar to the overall trend from the national data, but the magnitude of the change was greater for the Northern Territory. Age-specific decreases in the percentage of patients with periodontal pockets of 6+ mm were observed for 25–44, 45–64 and 65+-year-olds from the Northern Territory but were only observed among 45–64 and 65+-year-olds nationally.

Table B.18: Periodontal pockets 6+ mm (%) by year and age of patient – Northern Territory

	1995–96	2001–02	P
Age of patient	**n=214**	**n=217**	
18–24 years	4.9	0.0	ns
25–44 years	15.2	0.0	**
45–64 years	34.2	12.2	**
65+ years	28.6	3.8	*
All	**17.3**	**5.5**	**

*(P<0.05), **(P<0.01), ns (not statistically significant) χ^2 test

Appendix C: Publications from the Adult Dental Programs Survey

Adult Dental Programs Survey 1992–93

Newletters

AIHW Dental Statistics and Research Unit 1993. *AIHW DSRU Newsletter*. Vol IV, No. 1, May 1993. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

Reports

AIHW Dental Statistics and Research Unit 1993. *A research database on dental care in Australia*. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW Dental Statistics and Research Unit 1993. *Dental care for adults in Australia. Proceedings of a workshop*. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

Adult Dental Programs Survey (cross-sectional) 1994–96

Newsletters

AIHW Dental Statistics and Research Unit 1995. CDHP Research Report 1. March 1995. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW Dental Statistics and Research Unit 1995. CDHP Research Report 2. August 1995. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

Reports

AIHW Dental Statistics and Research Unit 1996. Provision of public dental services to Aboriginal and Torres Strait Islander patients. In: Australia's health 1996. Canberra: AGPS 177–9.

AIHW DSRU: Brennan DS, Slade GD, Davies MJ & Spencer AJ 1994. Adult Dental Programs Survey (cross-sectional) 1994. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Allister JH, Brennan DS, Carter KD, Davies M, Slade GD, Spencer AJ et al. 1995. Commonwealth Dental Health Program baseline evaluation report 1994. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Brennan DS & Spencer AJ 1996. Adult Dental Programs Survey (cross-sectional) 1995. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Brennan DS & Spencer AJ 1997. Adult Dental Programs Survey (cross-sectional) 1996. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Brennan DS, Carter KD, Stewart JF & Spencer AJ 1997. Commonwealth Dental Health Program evaluation report 1994–96. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

Scientific articles

Brennan DS, Spencer AJ & Slade GD 1996. Provision of public dental services in urban, rural and remote locations. Community Dental Health 13:157–62.

Brennan DS 1996. Geographic location and the provision of dental services in Australia. Australian Health Review 19:138–40.

Brennan DS, Spencer AJ & Slade GD 1997. Service provision among adult dental service patients: baseline data from the Commonwealth Dental Health Program. Australian and New Zealand Journal of Public Health 21:40–4.

Brennan DS & Spencer AJ 1999. Evaluation of service provision changes during a public-funded dental program. Australian and New Zealand Journal of Public Health 23:140–6.

Prospective Adult Dental Programs Survey 1995–96

Newsletters

AIHW Dental Statistics and Research Unit 1997. AIHW DSRU Newsletter. Vol VIII, No. 1, February 1997. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

Reports

AIHW DSRU: Brennan DS & Spencer AJ 1997. Prospective Adult Dental Programs Survey 1995–96. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Carter KD, Brennan DS & Stewart JF 1998. Adult access to dental care – migrants. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Brennan DS & Carter KD 1998. Adult access to dental care – Indigenous Australians. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Stewart JF, Carter KD & Brennan DS 1998. Adult access to dental care – rural and remote dwellers. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

Scientific articles

Brennan DS & Spencer AJ 1999. Variation in dental service provision among adult migrant public-funded patients. Australian and New Zealand Journal of Public Health 23:639–42.

Brennan DS, Spencer AJ & Slade GD 2000. Caries experience of public-funded dental patients in Australia 1995–96: type of care and geographic location. Australian Dental Journal 45:37–45.

Brennan DS, Spencer AJ & Slade GD 2001. Prevalence of periodontal conditions among public-funded dental patients in Australia. Australian Dental Journal 46:114–21.

Adult Dental Programs Survey 2001–02

Newsletters

AIHW Dental Statistics and Research Unit 2002. Caries experience of public dental patients. AIHW DSRU Research Report No. 10. November 2002. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW Dental Statistics and Research Unit 2002. Periodontal disease among public dental patients. AIHW DSRU Research Report No. 11. November 2002. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW Dental Statistics and Research Unit 2002. Oral health of public dental patients in rural areas. AIHW DSRU Research Report No. 12. November 2002. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW Dental Statistics and Research Unit 2002. Service patterns of public dental patients. AIHW DSRU Research Report No. 13. November 2002. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

Reports

AIHW DSRU: Brennan DS & Spencer AJ 2003. Adult Dental Programs Survey 2001–02. Adelaide: AIHW Dental Statistics and Research Unit, The University of Adelaide.

AIHW DSRU: Brennan DS & Spencer AJ 2004. Oral health trends among adult public dental patients. Dental Statistics and Research Series no. 30. Canberra: Australian Institute of Health and Welfare.