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Oral health of adults in the public dental sector

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Abbreviations

ABS	Australian Bureau of Statistics
ADPS	Adult Dental Programs Survey
AHMAC	Australian Health Ministers' Advisory Council
AIHW	Australian Institute of Health and Welfare
ARCPOH	Australian Research Centre for Population Oral Health
CPI	Community Periodontal Index
DSRU	Dental Statistics and Research Unit
GLM	General Linear Model
MIS	management information system
NHS	National Health Strategy
NIDR	US National Institute of Dental Research
OMR	optical mark read
WHO	World Health Organization

Symbols

%	percentage
n	number

Acknowledgments

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

The Adult Dental Programs Survey was collected 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.

Summary

This study shows that public dental patients have significantly worse oral health than the Australian population.

The higher prevalence of an inadequate dentition, and the increased presence of decayed teeth and periodontal pockets suggests that this low income group's disadvantage in oral health status is related to lower socioeconomic status and ability to access dental services.

Public dental patients: oral health of those attending for emergency care compared with those attending for general care

Public dental care patients who attend for emergency care typically attend for relief of pain, while general care patients have appointments after coming off a general care waiting list.

The results were mixed.

- A higher percentage of patients attending for emergency care had no natural teeth (8.1%) compared to general care patients (3.9%).
- Among patients with teeth, a higher proportion of those attending for general care had fewer than 21 teeth (38.6%) compared to those attending for emergency care (35.3%).
- Patients attending for emergency care were more likely to have decayed teeth (49.9% compared to 42.2% for general care) and had a higher average number of decayed teeth (average of 1.9 compared with 1.3).
- General care patients, however, had a higher average DMFT (number of decayed, missing and filled teeth) – 15.9 compared to 13.0 for emergency care patients.
- There was no difference between emergency and general care public dental patients in the prevalence of 6+ mm periodontal pockets; but general care patients had a higher prevalence of 4+ mm periodontal pockets (30.5% compared with 24.4%).

Public dental patients: oral health compared with Australian population

- Public dental patients were much more likely than the Australian population in general to have fewer than 21 teeth – 35.3% of public dental patients attending for emergency care, and 38.6% of those attending for general care, compared with 11.4% for the Australian population.
- The prevalence of dental decay was also higher for public dental patients – 49.9% of those attending for emergency care and 42.2% of those attending for general care, compared with 25.5% of the Australian population.
- Public dental patients were more likely to have periodontal pockets of 4+ mm – 24.4% of emergency care patients and 30.5% general care patients, compared with 19.8% for the Australian population.

1 Introduction

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).

Among people on low incomes, health cardholders are thought to be particularly at risk of lower levels of oral health (AIHW Dental Statistics and Research Unit 1993). Patients eligible for public dental care are primarily holders of government entitlement cards, for example age pensioners and the unemployed. Public patients have about twice the rate of extraction as patients in private general practice (Brennan et al. 1997).

1.1 Public dental services

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. The clinics, which are generally located in major regional centres and often associated with district hospitals or health centres, 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, for general dental care they 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 Information on adult public dental patients

The Adult Dental Programs Survey (ADPS) provides information on the oral health of patients attending for public dental care in Australia. The ADPS 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 ADPS has only been implemented as a national survey in 2001-02.

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 ADPS 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.

1.3 Structure and themes

The ADPS describes demographic and visit patterns and oral health status of patients within public dental programs. This report uses data available from South Australia for 2006 from Western Australia over the period 2004–05 to 2006–07 to put together a picture of the oral health status of public patients.

The structure of the report comprises the following: an outline of methods (Chapter 2), information on responses (Chapter 3) and findings on oral health status (Chapter 4). The major research theme deals with describing oral health while controlling for age. These results were further stratified by type of course of care and sex of patient.

2 Methods

The ADPS 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. It therefore may not necessarily be representative of that segment of the population eligible for public dental services who did not access public dental care during the survey period.

2.1 Data collection

Data were collected from a random sample of adult patients at the beginning of a course of public dental care. Initially the characteristics of sampled patients were recorded and then the examining dentist 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.

In Western Australia patients were sampled based on selected day of birth in order to meet their sample yield. Optical mark read (OMR) scan forms were used to collect data.

In South Australia a computer management information system (MIS) was used. Sampling was based on ongoing recording of each general care patient and sampling of one emergency care patient per day.

2.2 Rationale for sample size

In 2001–02 (Brennan & Spencer 2004) sample size estimates were based on measures of oral health status from the 1995–96 ADPS (Brennan & Spencer 1997). To achieve age-specific estimates of key outcome variables (e.g. caries experience by age) with a precision of 20% relative standard error or less, minimum target yields of 324 patients were set. Larger sample yields provide the ability to obtain precise age-specific estimates over a number of strata, such as type of course of care (i.e. emergency or general) or sex of patient.

2.3 Weighting

Data were weighted using the estimated number of persons aged 15 years or older from the 2006 Census (ABS 2007). Weighted data adjust the estimates to be representative of the number of adults for each participating state/territory.

2.4 Data items

Caries experience

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

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 either 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’.

3 Response

Data were available from a total of 1,255 patient courses of care from Western Australia, and from 7,364 patient courses of care from South Australia. Unweighted numbers of patient courses of care with valid values for course of care and age and sex of patient are presented in Table 1. This shows that the majority of recorded patient courses of care were for general care rather than emergency care. Data were collected for a slightly higher number of female compared to male patients for both emergency and general courses of care. The age distribution of patients differed by type of course of care. While the highest percentage of patients were observed in the 55–74 years age group for both emergency (33.7%) and general care (43.3%), the age distribution for emergency care comprised a higher percentage of 15–34-year-olds (22.8%) compared to general care (9.0%).

Table 1: Response by type of course of care and age and sex of patient

	Emergency care			General care		
	Male	Female	All	Male	Female	All
Age group	n	n	n	n	n	n
15–34 years	105	224	329	184	412	596
35–54 years	175	229	404	674	1,198	1,872
55–74 years	209	277	486	1,215	1,653	2,868
75+ years	121	104	225	628	659	1,287
All	610	834	1,444	2,701	3,922	6,623

It is possible that emergency courses of care may be under-enumerated in the sample due to time constraints involving emergency care. Hence, further analysis was stratified by type of course of care. All further data presented throughout this report are based on weighted data.

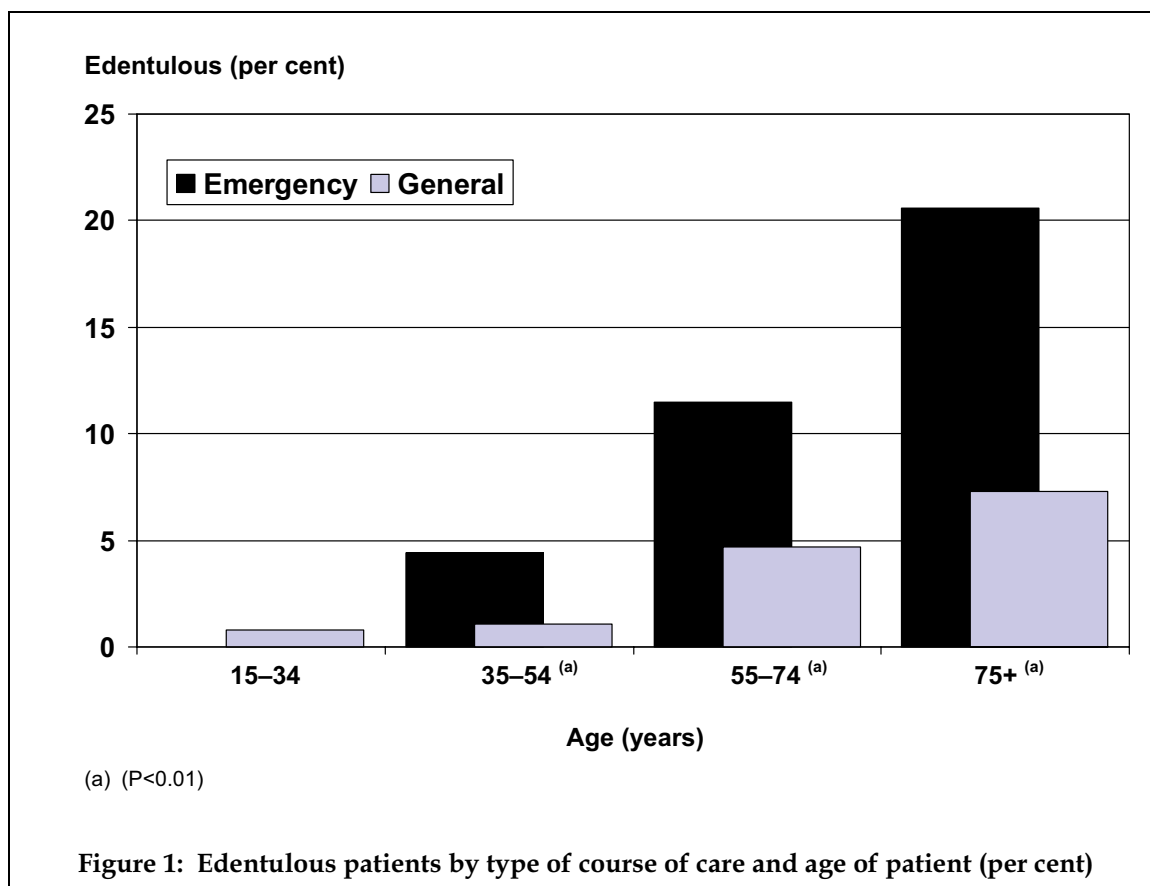
4 Oral health status of patients

In this chapter data are presented on oral health status by age, sex and type of course of care. The categories of data presented are edentulism, number of teeth, caries experience and periodontal disease.

4.1 Edentulism

Edentulism refers to whether patients have lost all their natural teeth. Even though most edentulous people wear dentures, they report poorer subjective health than dentate persons (Slade & Spencer 1994).

For both emergency and general patients there was a strong age-related pattern of higher levels of edentulism among successively older age groups of patients (Figure 1). However, within age groups there were higher percentages of edentulous patients for those attending for emergency care compared to general care among the age groups 35–54 years, 55–74 years and 75 years or older.



Edentulism is presented by the type of course of care and the age and sex of patient in Table 2. This shows that there were no significant differences between male and female patients within any of the age strata for those patients who attended for emergency care.

Patients attending for general care exhibited significant differences between males and females within some age strata, but these differences were not consistent. A higher percentage of male patients were edentulous compared to females within the 35–54 years age stratum. However, a higher percentage of female patients were edentulous compared to males within the 75 years and older age stratum.

Table 2: Edentulism by type of course of care and age and sex of patient

	Emergency care			General care		
	Male	Female	P	Male	Female	P
Age group	%	%		%	%	
15–34 years	0.0	0.0	ns	0.0	1.1	ns
35–54 years	5.1	4.0	ns	2.2	0.4	(a)
55–74 years	11.8	11.4	ns	5.0	4.4	ns
75+ years	16.5	24.9	ns	5.1	8.9	(b)
All	8.7	7.8	ns	4.1	3.7	ns

ns= not significant

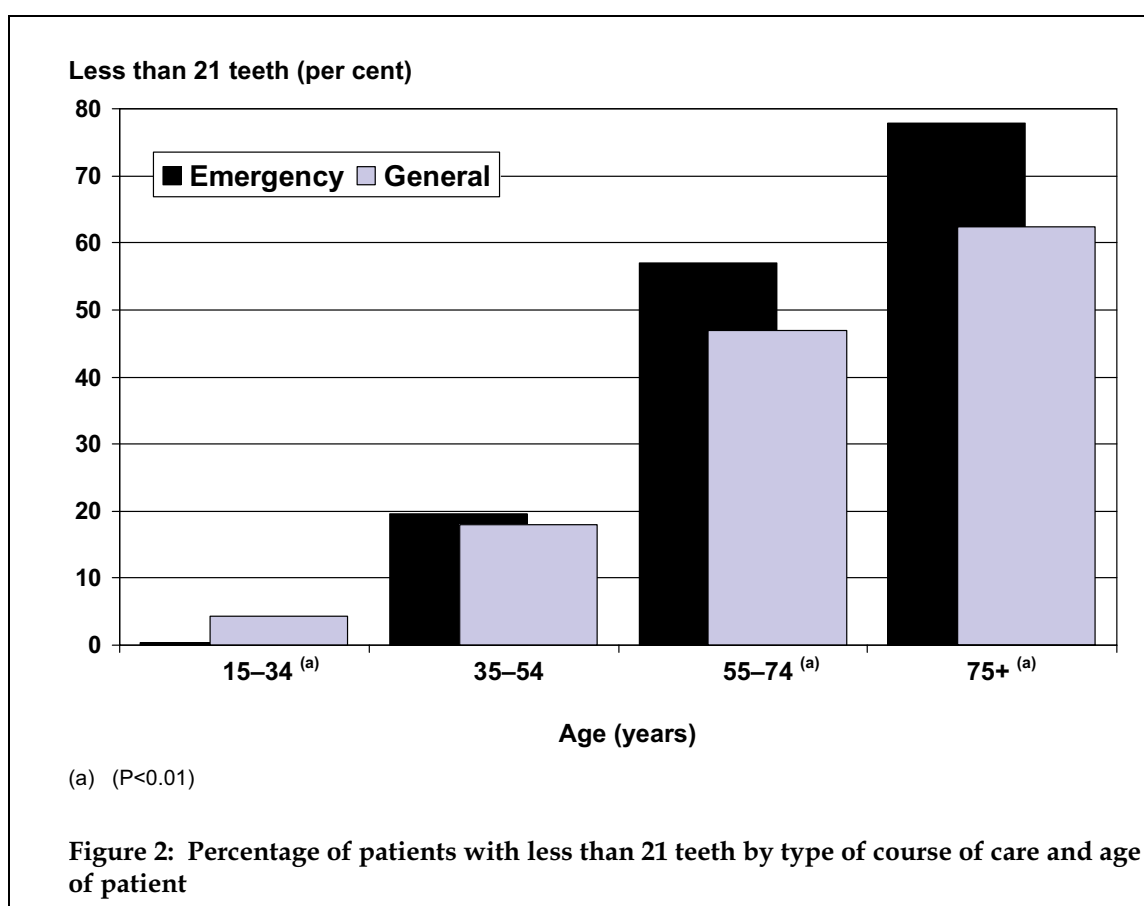
(a) ($P < 0.01$) χ^2 test

(b) ($P < 0.05$)

4.2 Number of teeth

Among dentate persons there is variation in the number of teeth present. As an indicator of an inadequate dentition, the number of persons with less than 21 teeth is presented in Figure 2. As reported for edentulism, the percentage of persons with less than 21 teeth increased across successively older age groups for both emergency and general care patients.

Variation by type of course of care was observed within three of the age strata. For the youngest age stratum of patients, aged 15–34 years, a higher percentage of those attending for general care had less than 21 teeth compared to emergency care patients. However, the percentage of 15–34-year-olds with less than 21 teeth was low for both emergency and general care patients. In the three older age groups this pattern was reversed, with higher percentages of emergency care patients having less than 21 teeth compared to patients attending for general care. However, these differences were only statistically significant in the 55–74 years and 75 years and older age strata.



The percentage of patients with less than 21 teeth is presented by the type of course of care and the age and sex of patient in Table 3. For emergency care patients differences between males and females were observed in two of the age strata, but the direction of the effects were not consistent. A higher percentage of male patients had less than 21 teeth compared to females in the 55–74 years age stratum. However, among patients aged 75 years or older a higher percentage of female patients had less than 21 teeth compared to males.

Among general care patients a similar pattern was observed to that found for emergency care patients. A higher percentage of males compared to females had fewer than 21 teeth in the 35–54 years and 55–74 years age strata. However, among general care patients aged 75 years or older a higher percentage of females had less than 21 teeth compared to males.

Table 3: Patients with less than 21 teeth by type of course of care and age and sex of patient (per cent)

	Emergency care			General care		
	Male	Female	P	Male	Female	P
Age group	%	%		%	%	
15–34 years	0.4	0.4	ns	1.8	5.4	ns
35–54 years	22.7	17.8	ns	20.8	16.5	(b)
55–74 years	62.4	52.6	(b)	50.6	44.0	(a)
75+ years	70.9	86.2	(b)	55.7	68.7	(a)
All	40.5	31.9	(a)	42.0	36.1	(a)

ns=not significant

(a) ($P < 0.01$) χ^2 test

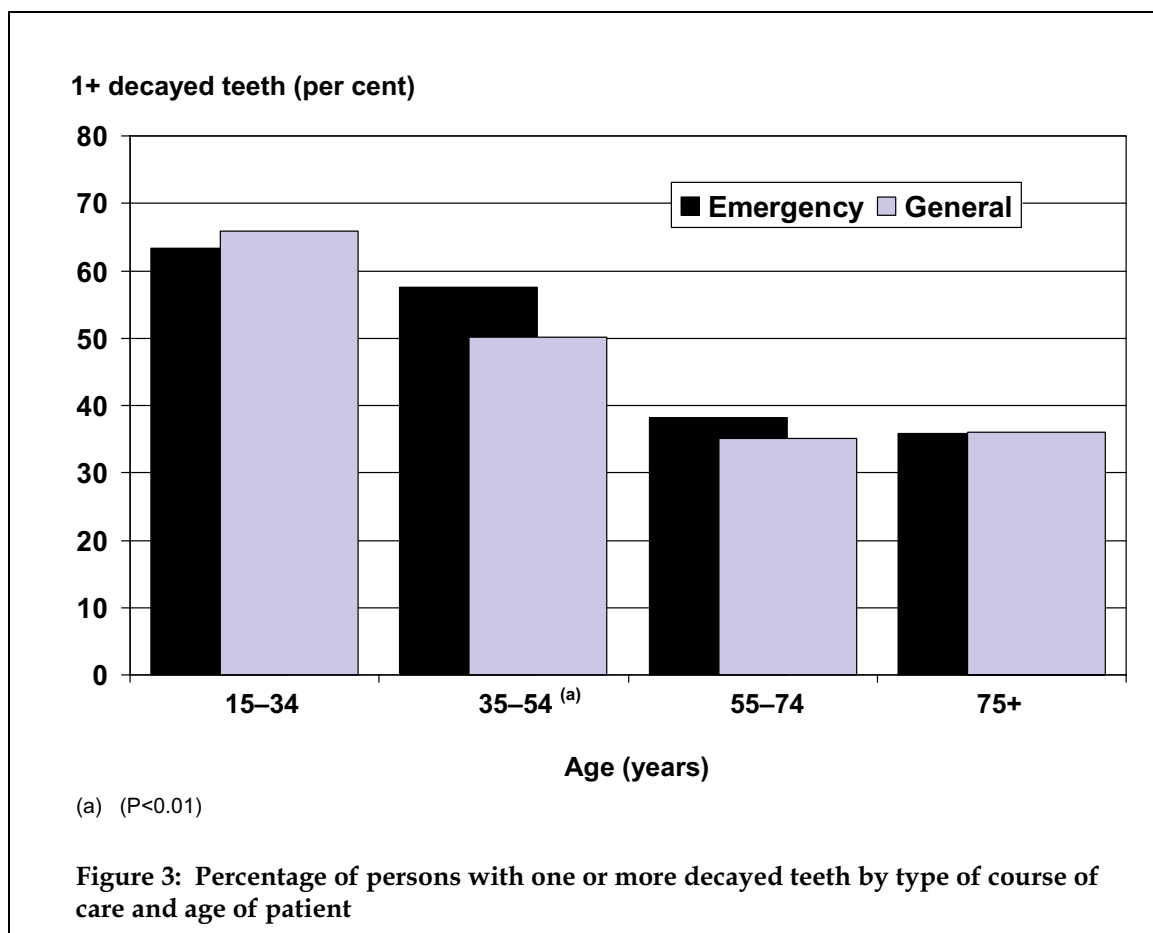
(b) ($P < 0.05$)

4.3 Caries experience

Prevalence of decay

The percentage of persons with one or more decayed teeth is presented by age of patient and type of course of care in Figure 3. For both emergency and general care patients there was a trend for a higher percentage of younger patients to have decayed teeth compared to older patients.

The only statistically significant difference between emergency and general care patients was observed for patients aged 35–54 years, where a higher percentage of emergency care patients had one or more decayed teeth compared to general care patients.



The percentage of patients with one or more decayed teeth is presented by the type of course of care and the age and sex of patient in Table 4. For emergency care patients there were no differences between males and females in the prevalence of decay in any age strata.

For general care patients a higher percentage of males had one or more decayed teeth compared to females, but this was only statistically significant among those aged 55–74 years.

Table 4: Patients with 1+ decayed teeth by type of course of care and age and sex of patient (per cent)

	Emergency care			General care		
	Male	Female	P	Male	Female	P
Age group	%	%		%	%	
15–34 years	63.1	62.9	ns	67.3	65.2	ns
35–54 years	59.3	56.8	ns	53.4	48.6	ns
55–74 years	40.6	36.5	ns	39.4	32.1	(a)
75+ years	35.7	36.5	ns	38.6	33.4	ns
All	49.3	50.5	ns	44.4	40.7	(a)

ns=not significant

(a) ($P < 0.01$) χ^2 test

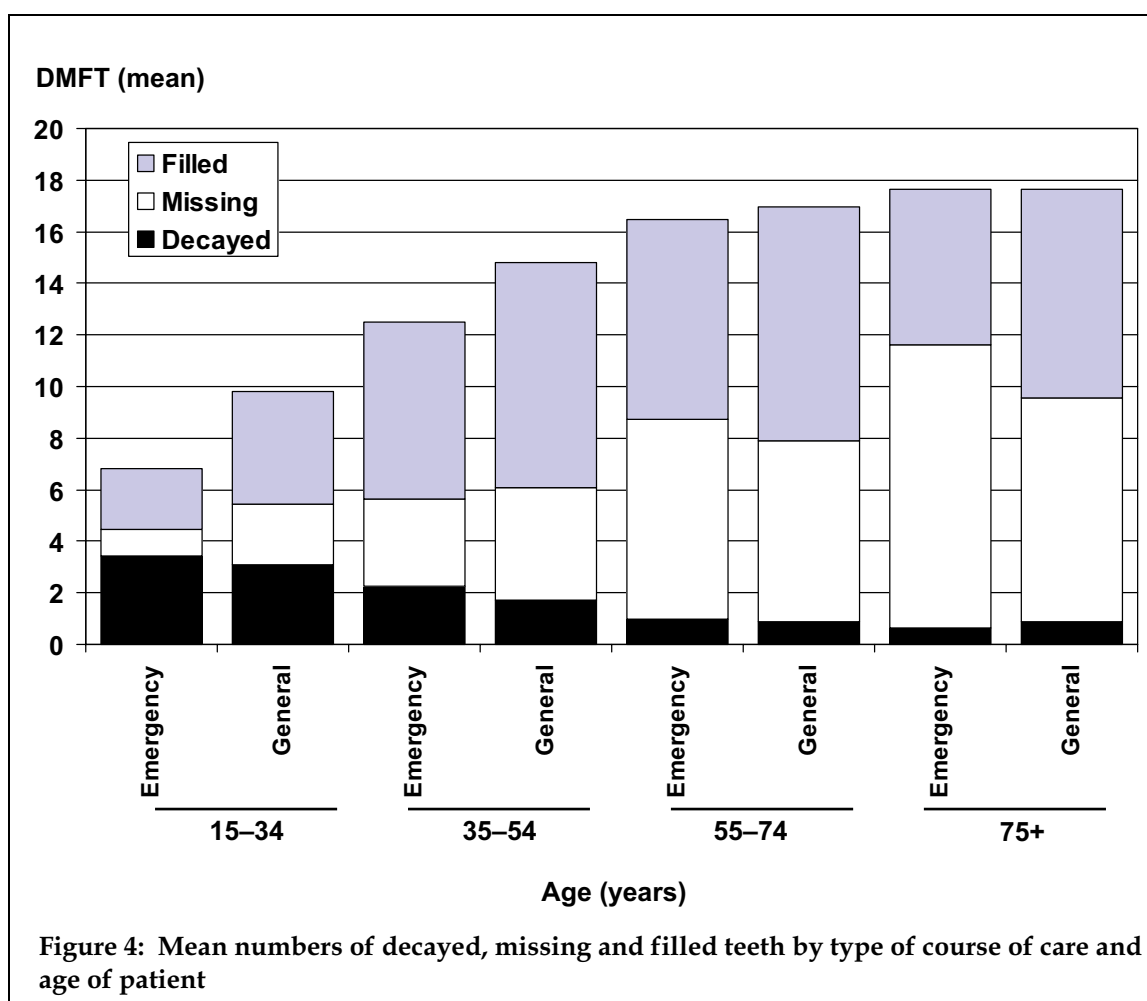
Mean caries experience

Mean numbers of decayed, missing and filled teeth (DMFT) are presented in Figure 4 by age and type of course of care. In general, the mean number of decayed teeth was higher among younger compared to older patients for both emergency and general care. Emergency care patients aged 35–54 years had significantly higher numbers of decayed teeth compared to general care patients, while general care patients aged 75 years or older had significantly higher numbers of decayed teeth compared to emergency care patients.

General care patients aged 15–34 years and 35–54 years had significantly higher numbers of missing teeth compared to emergency care patients, but the opposite was observed for patients aged 54–74 years and 75 years or older.

General care patients had higher mean numbers of filled teeth compared to emergency care patients in all age groups.

While overall DMFT was higher for general compared to emergency care patients, this was only statistically significant in the 15–34 years and 35–54 years age strata.



The mean number of decayed teeth is presented by the type of course of care and the age and sex of patients in Table 5. For emergency care patients the only significant difference observed was the higher mean number of decayed teeth for males compared to females in the 15–34 years age stratum.

For general care patients males had higher mean numbers of decayed teeth compared to females in the 35–54 years, 55–74 years and 75 years or older age strata.

Table 5: Mean number of decayed teeth by type of course of care and age and sex of patient (per cent)

	Emergency care			General care		
	Male	Female	P	Male	Female	P
Age group	Mean (SE)	Mean (SE)		Mean (SE)	Mean (SE)	
15–34 years	4.5 (0.5)	3.0 (0.2)	(a)	3.3 (0.3)	3.0 (0.2)	ns
35–54 years	2.6 (0.3)	2.0 (0.2)	ns	2.1 (0.1)	1.5 (0.1)	(a)
55–74 years	1.1 (0.2)	0.9 (0.1)	ns	1.1 (0.1)	0.8 (0.0)	(a)
75+ years	0.6 (0.1)	0.6 (0.1)	ns	1.1 (0.1)	0.7 (0.1)	(a)
All	2.1 (0.2)	1.8 (0.1)	ns	1.5 (0.1)	1.2 (0.0)	(a)

ns=not significant

(a) (P<0.01) GLM

The mean number of missing teeth is presented by the type of course of care and the age and sex of patient in Table 6. For emergency care patients there were no statistically significant differences observed between males and females in any of the age strata.

For general care patients the only statistically significant difference observed was the higher number of missing teeth for females compared to males in the 75 years or older age stratum.

Table 6: Mean number of missing teeth by type of course of care and age and sex of patient (per cent)

	Emergency care			General care		
	Male	Female	P	Male	Female	P
Age group	Mean (SE)	Mean (SE)		Mean (SE)	Mean (SE)	
15–34 years	1.0 (0.2)	1.0 (0.1)	ns	2.1 (0.2)	2.5 (0.2)	ns
35–54 years	4.1 (0.5)	2.9 (0.4)	ns	4.7 (0.2)	4.2 (0.2)	ns
55–74 years	6.9 (0.6)	8.4 (0.5)	ns	7.3 (0.2)	6.7 (0.2)	ns
75+ years	9.7 (1.0)	12.2 (1.2)	ns	7.8 (0.4)	9.4 (0.4)	(a)
All	5.4 (0.3)	4.9 (0.3)	ns	6.4 (0.2)	6.0 (0.1)	(b)

ns=not significant

(a) (P<0.01) GLM

(b) (P<0.05)

The mean number of filled teeth is presented by the type of course of care and the age and sex of patient in Table 7. For emergency care patients the only statistically significant difference observed was the higher mean number of filled teeth for females compared to males in the 55–74 years age stratum.

For general care patients females tended to have a higher mean number of filled teeth compared to males, and these differences were statistically significant for the 35–54 years and 55–74 years age strata.

Table 7: Mean number of filled teeth by type of course of care and age and sex of patient (per cent)

	Emergency care			General care		
	Male	Female	P	Male	Female	P
Age group	Mean (SE)	Mean (SE)		Mean (SE)	Mean (SE)	
15–34 years	2.1 (0.3)	2.4 (0.2)	ns	4.3 (0.3)	4.4 (0.2)	ns
35–54 years	7.0 (0.5)	6.8 (0.4)	ns	8.2 (0.2)	9.0 (0.2)	(a)
55–74 years	6.3 (0.4)	8.9 (0.4)	(a)	8.2 (0.2)	9.8 (0.1)	(a)
75+ years	5.5 (0.5)	6.6 (0.7)	ns	7.8 (0.2)	8.3 (0.2)	ns
All	5.6 (0.2)	6.1 (0.2)	ns	7.9 (0.1)	8.8 (0.1)	(a)

ns=not significant

(a) (P<0.01) GLM

The mean number of DMFT is presented by the type of course of care and the age and sex of patient in Table 8. For emergency care patients there were no consistent differences observed, with males having a higher DMFT in the 35–54 years age stratum but females having a higher DMFT in the 55–74 years and 75 years or older age strata.

For general care patients females had a higher DMFT than males in the 55–74 years and 75 years or older age strata.

Table 8: Mean number of DMF teeth by type of course of care and age and sex of patient (per cent)

	Emergency care			General care		
	Male	Female	P	Male	Female	P
Age group	Mean (SE)	Mean (SE)		Mean (SE)	Mean (SE)	
15–34 years	7.6 (0.6)	6.3 (0.4)	ns	9.6 (0.5)	9.8 (0.3)	ns
35–54 years	13.6 (0.6)	11.7 (0.5)	(b)	15.0 (0.3)	14.7 (0.2)	ns
55–74 years	14.3 (0.6)	18.2 (0.5)	(a)	16.5 (0.2)	17.3 (0.2)	(a)
75+ years	16.1 (1.0)	19.4 (1.2)	(b)	16.8 (0.3)	18.4 (0.3)	(a)
All	13.1 (0.4)	12.9 (0.3)	ns	15.8 (0.2)	16.0 (0.1)	ns

ns=not significant

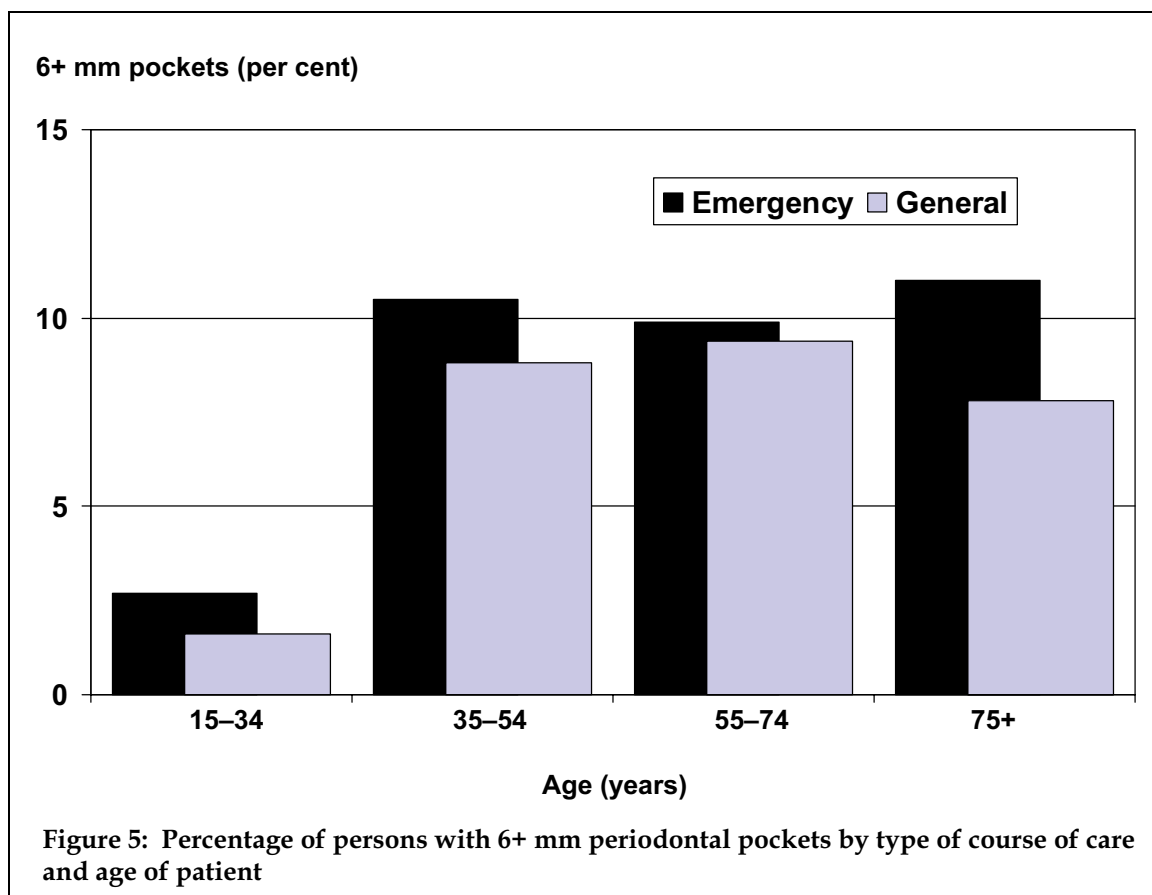
(a) (P<0.01) GLM

(b) (P<0.05)

4.4 Periodontal disease

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 pocket(s).

The percentage of persons with periodontal pockets of 6+ mm is presented by age of patient and type of course of care in Figure 5. For both emergency and general care patients the percentage with 6+ mm pockets was lower in the 15–34 years age stratum compared to older patients. While the percentage with 6+ mm pockets was higher for emergency compared to general patients in all age strata, none of the differences was statistically significant.



The percentage of patients with 6+ mm pockets is presented by the type of course of care and the age and sex of patients in Table 9. For emergency care patients the only statistically significant difference was the higher percentage with 6+ mm pockets for female compared to male patients aged 75 years or older.

For general care patients there were no statistically significant differences in the prevalence of 6+ mm pockets between males and females in any of the age strata.

Table 9: Patients with 6+ mm pockets by type of course of care and age and sex of patient (per cent)

	Emergency care			General care		
	Male	Female	P	Male	Female	P
Age group	%	%		%	%	
15–34 years	1.7	3.2	ns	1.1	1.8	ns
35–54 years	13.6	8.3	ns	9.9	8.2	ns
55–74 years	11.6	8.7	ns	10.6	8.5	ns
75+ years	6.4	17.4	(a)	7.7	8.0	ns
All	9.7	7.5	ns	9.2	7.7	(a)

ns=not significant

(a) ($P < 0.05$), χ^2 test

4.5 Comparison with population oral health status

Adult public dental patients comprise a low income group, and only include those who have accessed public dental care. Comparison with population-based studies provides a benchmark with which to compare oral health status. In this section some comparisons are made between public dental patients and the general population using data from the National Survey of Adult Oral Health 2004–06 (Slade et al. 2007).

Comparisons were evaluated by inspection of whether there was overlap within the 95% confidence intervals of the estimates for public dental patients and the Australian population estimates.

The selected key indicators of edentulism – persons with less than 21 teeth, persons with one or more decayed teeth, persons with one or more filled teeth and the presence of 4+ mm periodontal pockets – are used.

Edentulism

The percentage of edentulous persons is presented by age for public dental patients and Australian population estimates in Table 10. Overall, public dental patients attending for emergency care had a higher percentage who were edentulous compared to the Australian population, although the lower bound of the confidence interval for public patients coincided with the upper bound of the confidence interval for the population. Public dental patients attending for general care had a lower percentage who were edentulous compared to the Australian population. Some of these differences may be accounted for by differences in age distributions, as they do not occur consistently across age strata.

An important interpretational issue is that the percentage of edentulous public dental patients probably reflects the availability of denture services rather than the underlying distribution of edentulism among persons eligible for public dental care.

Table 10: Edentulous persons by age for public dental patients and population estimates (per cent)

	Emergency patients		General patients		Australian population	
	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)
Age group						
15–34 years	0.0	(—)	0.8	(0.0, 1.6)	0.0	(0.0, 0.1)
35–54 years	4.4	(2.7, 6.2)	1.1	(0.6, 1.5)	1.7	(1.3, 2.2)
55–74 years	11.5	(9.1, 13.9)	4.7	(3.9, 5.4)	13.9	(12.7, 15.2)
75+ years	20.6	(15.5, 25.6)	7.3	(5.8, 8.7)	35.7	(32.6, 38.9)
All	8.1	(6.9, 9.3)	3.9	(3.4, 4.3)	6.4	(6.0, 6.9)

Number of teeth

The percentage of persons with less than 21 teeth is presented by age for public dental patients and Australian population estimates in Table 11. Overall, the percentage of persons with less than 21 teeth was higher for both emergency and general care public dental patients compared to the Australian population.

This trend was observed in all age groups over 34 years of age, and also for public dental patients aged 15–34 years attending for general care.

Table 11: Persons with less than 21 teeth by age for public dental patients and population estimates (per cent)

	Emergency patients		General patients		Australian population	
	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)
Age group						
15–34 years	0.4	(0.0, 1.0)	4.3	(2.5, 6.1)	0.4	(0.2, 0.6)
35–54 years	19.6	(16.2, 23.1)	18.0	(16.2, 19.8)	6.8	(6.0, 7.8)
55–74 years	57.0	(53.0, 61.0)	46.9	(45.1, 48.7)	28.6	(26.6, 30.7)
75+ years	77.9	(72.1, 83.7)	62.4	(59.6, 65.2)	55.1	(51.0, 59.2)
All	35.3	(33.1, 37.6)	38.6	(37.4, 39.8)	11.4	(10.7, 12.1)

Number of decayed teeth

The percentage of persons with one or more decayed teeth is presented by age for public dental patients and Australian population estimates in Table 12. Overall, the percentage of persons with one or more decayed teeth was higher for both emergency and general care public dental patients compared to the Australian population.

This trend was observed consistently between public dental patients and the Australian population in all age strata.

Table 12: Persons with one or more decayed teeth by age for public dental patients and population estimates (per cent)

	Emergency patients		General patients		Australian population	
	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)
Age group						
15–34 years	63.3	(58.5, 68.1)	65.9	(61.7, 70.2)	25.5	(22.4, 29.5)
35–54 years	57.5	(53.2, 61.8)	50.2	(47.9, 52.6)	27.1	(24.6, 29.8)
55–74 years	38.1	(34.2, 42.0)	35.2	(33.5, 37.0)	22.6	(20.1, 25.4)
75+ years	35.8	(29.1, 42.5)	36.0	(33.3, 38.8)	22.0	(17.0, 27.4)
All	49.9	(47.5, 52.3)	42.2	(41.0, 43.5)	25.5	(23.7, 27.3)

Number of filled teeth

The percentage of persons with one or more filled teeth is presented by age for public dental patients and Australian population estimates in Table 13. Overall, the percentage of persons with one or more filled teeth was lower for public dental patients attending for emergency care compared to the Australian population. In contrast, the percentage of persons with one or more filled teeth was higher for public dental patients attending for general care compared to the Australian population.

The trend for a lower percentage of public emergency care patients to have one or more fillings compared to the Australian population was observed in the 35–54 years and 55–74 years age strata. The trend for a higher percentage of public general care patients to have one or more fillings compared to the Australian population was observed in the 15–34 years age stratum.

Table 13: Persons with one or more filled teeth by age for public dental patients and population estimates (per cent)

	Emergency patients		General patients		Australian population	
	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)
Age group						
15–34 years	63.4	(58.6, 68.2)	83.7	(80.4, 87.0)	65.4	(61.2, 69.4)
35–54 years	80.2	(76.8, 83.7)	94.4	(93.4, 95.5)	94.8	(93.1, 96.0)
55–74 years	83.4	(80.4, 86.5)	95.5	(94.7, 96.3)	96.2	(94.6, 97.3)
75+ years	83.7	(78.5, 88.8)	93.1	(91.7, 94.6)	89.5	(84.8, 92.9)
All	77.3	(75.3, 79.3)	93.9	(93.3, 94.5)	83.9	(81.9, 85.6)

Periodontal disease

The percentage of persons with 4+ mm periodontal pockets is presented by age for public dental patients and Australian population estimates in Table 14. The less severe cut-off point of 4+ mm rather than 6+ mm is used here for comparability with published estimates of the Australian population (Slade et al. 2007). Overall, a higher percentage of public dental patients in both the emergency care and general care groups had 4+ mm pockets compared to the Australian population.

The overall trend between public dental patients and the Australian population was not observed consistently across age strata. For public dental patients attending for emergency care a lower percentage had 4+ mm pockets compared to the Australian population in the 15–34 years age stratum, but a higher percentage had 4+ mm pockets in the 55–74 years age stratum. For public dental patients attending for general care a higher overall percentage with 4+ mm pockets compared to the Australian population was only observed in the 35–54 years and 55–74 years age strata.

Table 14: Patients with 4+ mm periodontal pockets by age for public dental patients and population estimates (per cent)

	Emergency patients		General patients		Australian population	
	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)
Age group						
15–34 years	7.2	(4.6, 9.8)	13.2	(10.2, 16.3)	13.1	(10.2, 16.7)
35–54 years	29.6	(25.5, 33.7)	29.7	(27.6, 31.9)	23.9	(21.2, 26.9)
55–74 years	30.9	(27.1, 34.7)	32.3	(30.5, 34.0)	23.7	(21.1, 26.7)
75+ years	26.0	(19.3, 32.8)	34.4	(31.6, 37.2)	26.0	(18.6, 35.1)
All	24.4	(22.3, 26.5)	30.5	(29.3, 31.6)	19.8	(17.9, 21.8)

5 Discussion

This chapter looks first at limitations and interpretational issues associated with the use of monitoring surveys. The main oral health findings are then discussed and conclusions are presented.

5.1 Interpretational issues

This section looks at issues associated with the monitoring survey approach adopted in the Adult Dental Programs Survey, and the study population from which the sample was drawn.

Monitoring survey approach

This study reports the results of surveys of the oral health of patients receiving public-funded dental care during the period 2004–07. 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). The authors 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. They concluded that the collection of data by general practitioners was feasible, and had construct and internal validity. However, they cautioned 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 cardholders, which represent a low income group, such as the unemployed and age pensioners. 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 and it is likely they would have more untreated disease. Another consideration is that these findings are restricted not only to health cardholders, but to those health cardholders who are eligible for care and have obtained such care.

Another consideration in the comparisons made between the findings for patients attending for public-funded dental care and the population data for Australia was the difference in geographic scope of the two studies. The findings on public dental patients were drawn from two states, Western Australia and South Australia, while the population data were from all Australian states and territories. However, when the population data were restricted to the same two states as the data for public dental patients a similar pattern of differences was observed (see Appendix B for details).

5.2 Oral health findings

This section outlines the oral health findings from the 2004–07 Adult Dental Programs Survey in terms of edentulism, inadequate dentition, 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, the availability and accessibility of care, and prevailing dental treatment philosophies (Weintraub & Burt 1985). Among the oral health factors associated with extraction, caries has been reported as the most common reason (Ainamo et al. 1984). While diagnosis of periodontal disease has also been accepted as a major cause of tooth loss among adults (Weintraub & Burt 1985), a history of previous tooth loss has been associated with further extractions (Eklund & Burt 1994; Holst et al. 1992), caries remains the major cause of tooth loss due to the higher prevalence of this condition (Brennan et al. 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 older decreasing from 66.6% in 1979 (ABS 1979) to 40.0% in 1994 (Carter et al. 1994) and 33.4% in 1999 (Carter et al. 2001).

The results from this study found that a higher percentage of public dental patients attending for emergency care were edentulous compared to those attending for general care. Compared to the Australian population in 2004–06, the percentage of edentulism was lower for public dental patients, particularly in the older age group. However, this probably reflects the availability of denture services in the public sector rather than the underlying prevalence of edentulism among those eligible for public dental care. Looking at the number of teeth present among dentate persons should provide a better comparison of tooth loss between public dental patients and the Australian population.

Inadequate dentition

The loss of all teeth is considered a fundamental indicator of dental impairment. While dentate persons retain some teeth, they vary in the number of teeth that are present. The UK adult dental health survey and the Australian National Survey of Adult Oral Health have used a threshold of 21 teeth as an indicator of an adequate dentition (Kelly et al. 2000; Slade et al. 2007).

The percentage of public dental patients with an inadequate dentition showed inconsistent effects by age between emergency and general care patients. The slightly higher overall prevalence of an inadequate dentition for general compared to emergency care patients probably reflects the older age distribution of public general care patients rather than any systematic difference by type of care. However, public dental patients aged over 34 years attending for emergency care or general care both showed consistently higher prevalence of an inadequate dentition compared to the Australian population. This finding is consistent with previous reports that have shown higher extraction rates for public dental patients compared to patients in the private sector (Brennan et al. 1997).

Caries experience

Dental caries is caused by acid-producing bacteria that live in the mouth. The effect of caries can progress from demineralisation of the tooth or root (leading to cavities) to pain, infection of the tooth pulp, abscess formation 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), U.K. (Hull et al. 1997), Norway (Klock & Haugejorden 1991) and Australia (Brennan et al. 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, but still not the major, reason for extraction among older adults, for example those over 40 years (Ong et al. 1996) or 50 years (Hull et al. 1997) of age.

For public dental patients the overall mean number of decayed teeth was higher for those attending for emergency compared to general care. Consistent with this finding, a higher overall percentage of public dental patients attending for emergency care had decayed teeth compared to general patients. However, a much larger difference occurred in the higher percentage of public dental patients with one or more decayed teeth attending for both emergency and general care compared to the Australian population in all age strata. While this could reflect the likely expectation that patients attending for dental care will have more symptoms than the population at large, the numbers of decayed teeth among public dental patients were still higher than previously reported for private dental patients (Brennan & Spencer 2002). When coupled with the higher extraction rates among public dental patients, this is likely to result in greater oral health disadvantage.

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 2003). These periodontal pockets can lead to advanced destruction of tooth support resulting in tooth mobility, formation of gum abscesses and tooth loss.

Overall, a higher percentage of public dental patients in both the emergency care and general care groups had 4+ mm periodontal pockets compared to the Australian population, mainly reflected in the 55–74 years age group.

5.3 Conclusions

Among public dental patients, those attending for emergency care tended to have higher levels of decayed teeth compared to those who attended for general care. However, regardless of type of public dental care there were notable differences between public dental patients and the estimates for the Australian population.

Some of these differences may reflect the effect of comparing patient-based estimates to population-based estimates; patients may be expected to be attending because of dental problems and this may be reflected in worse oral health status for patient-based estimates.

However, the higher prevalence of an inadequate dentition and the increased presence of decayed teeth and periodontal pockets, among public dental patients compared to the Australian population suggests that this low income group suffers from a disadvantage in oral health status that is related to their lower socioeconomic status and ability to access dental services.

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Appendix A: Data tables

This section provides data tables for the oral health status variables presented in the figures.

Table A1: Edentulous patients by type of course of care and age – all patients (per cent)

	Emergency care	General care	P-value
Age group	%	%	
15–34 years	0.0	0.8	ns
35–54 years	4.4	1.1	(a)
55–74 years	11.5	4.7	(a)
75+ years	20.6	7.3	(a)
All	8.1	3.9	(a)

ns=not significant
(a) ($P<0.01$) χ^2 test

Table A2: Patients with less than 21 teeth by type of course of care and age – dentate patients (per cent)

	Emergency care	General care	P-value
Age group	%	%	
15–34 years	0.4	4.3	(a)
35–54 years	19.6	18.0	ns
55–74 years	57.0	46.9	(a)
75+ years	77.9	62.4	(a)
All	35.3	38.6	(b)

ns=not significant
(a) ($P<0.01$) χ^2 test
(b) ($P<0.05$)

Table A3: Patients with 1+ decayed teeth by type of course of care and age – dentate patients (per cent)

	Emergency care	General care	P-value
Age group	%	%	
15–34 years	63.3	65.9	ns
35–54 years	57.5	50.2	(a)
55–74 years	38.1	35.2	ns
75+ years	35.8	36.0	ns
All	49.9	42.2	(a)

ns=not significant
(a) ($P<0.01$) χ^2 test

Table A4: Mean number of decayed teeth by type of course of care and age – dentate patients

Age group	Emergency care		General care		P-value
	Mean	SE	Mean	SE	
15–34 years	3.4	0.2	3.1	0.2	ns
35–54 years	2.2	0.2	1.7	0.1	(a)
55–74 years	1.0	0.1	0.9	0.0	ns
75+ years	0.6	0.1	0.9	0.1	(b)
All	1.9	0.1	1.3	0.0	(a)

ns=not significant

(a) (P<0.01) GLM

(b) (P<0.05)

Table A5: Mean number of missing teeth by type of course of care and age – dentate patients

Age group	Emergency care		General care		P-value
	Mean	SE	Mean	SE	
15–34 years	1.0	0.1	2.3	0.2	(a)
35–54 years	3.4	0.3	4.4	0.1	(a)
55–74 years	7.8	0.4	7.0	0.2	(b)
75+ years	11.0	0.8	8.7	0.3	(a)
All	5.2	0.2	6.2	0.1	(a)

(a) (P<0.01) GLM

(b) (P<0.05)

Table A6: Mean number of filled teeth by type of course of care and age – dentate patients

Age group	Emergency care		General care		P-value
	Mean	SE	Mean	SE	
15–34 years	2.4	0.2	4.4	0.2	(a)
35–54 years	6.9	0.3	8.7	0.1	(a)
55–74 years	7.7	0.3	9.1	0.1	(a)
75+ years	6.0	0.4	8.1	0.2	(a)
All	5.9	0.2	8.4	0.1	(a)

(a) (P<0.01) GLM

Table A7: Mean number of DMF teeth by type of course of care and age – dentate patients

Age group	Emergency care		General care		P-value
	Mean	SE	Mean	SE	
15–34 years	6.8	0.3	9.8	0.3	(a)
35–54 years	12.5	0.4	14.8	0.2	(a)
55–74 years	16.5	0.4	17.0	0.1	ns
75+ years	17.6	0.8	17.7	0.2	ns
All	13.0	0.2	15.9	0.1	(a)

ns=not significant

(a) (P<0.01) GLM

Table A8: Patients with 6+ mm pockets by type of course of care and age – dentate patients (per cent)

Age group	Emergency care		General care		P-value
	%		%		
15–34 years	2.7		1.6		ns
35–54 years	10.5		8.8		ns
55–74 years	9.9		9.4		ns
75+ years	11.0		7.8		ns
All	8.3		8.3		ns

ns=not significant χ^2 test

Appendix B: Key findings: Western Australia and South Australia

This section presents key comparisons between public-funded dental patients and the Australian population confined to the same two states, Western Australia and South Australia.

Number of teeth

The percentage of persons with less than 21 teeth is presented by age for public dental patients and Australian population estimates for Western Australia and South Australia in Table B1. Overall, the percentage of persons with less than 21 teeth was higher for both emergency and general care public dental patients compared to the population data. This trend was observed in all age groups over 34 years of age, and also for public dental patients aged 15–34 years attending for general care.

Table B1: Persons with less than 21 teeth by age for public dental patients and population estimates (per cent)

	Emergency patients		General patients		Australian population ^(a)	
	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)
Age group						
15–34 years	0.4	(0.0, 1.0)	4.3	(2.5, 6.1)	0.2	(0.0, 1.3)
35–54 years	19.6	(16.2, 23.1)	18.0	(16.2, 19.8)	5.4	(3.4, 8.6)
55–74 years	57.0	(53.0, 61.0)	46.9	(45.1, 48.7)	30.4	(25.7, 35.6)
75+ years	77.9	(72.1, 83.7)	62.4	(59.6, 65.2)	49.2	(35.7, 62.8)
All	35.3	(33.1, 37.6)	38.6	(37.4, 39.8)	10.9	(9.0, 13.2)

(a) Data for population estimates is restricted to Western Australia and South Australia

Number of decayed teeth

The percentage of persons with one or more decayed teeth is presented by age for public dental patients and Australian population estimates for Western Australia and South Australia in Table B2. Overall, the percentage of persons with one or more decayed teeth was higher for both emergency and general care public dental patients compared to the population data. This trend was observed consistently for all age strata.

Table B2: Persons with one or more decayed teeth by age for public dental patients and population estimates (per cent)

Age group	Emergency patients		General patients		Australian population ^(a)	
	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)
15–34 years	63.3	(58.5, 68.1)	65.9	(61.7, 70.2)	18.7	(13.7, 25.1)
35–54 years	57.5	(53.2, 61.8)	50.2	(47.9, 52.6)	28.8	(23.3, 35.0)
55–74 years	38.1	(34.2, 42.0)	35.2	(33.5, 37.0)	15.6	(11.8, 20.4)
75+ years	35.8	(29.1, 42.5)	36.0	(33.3, 38.8)	28.2	(18.4, 40.7)
All	49.9	(47.5, 52.3)	42.2	(41.0, 43.5)	22.4	(18.9, 26.3)

(a) Data for population estimates is restricted to Western Australia and South Australia

Number of filled teeth

The percentage of persons with one or more filled teeth is presented by age for public dental patients and Australian population estimates for Western Australia and South Australia in Table B3. Overall, the percentage of persons with one or more filled teeth was lower for public dental patients attending for emergency care compared to the population data. In contrast, the percentage of persons with one or more filled teeth was higher for public dental patients attending for general care compared to the population data. The trend for a lower percentage of public emergency care patients to have one or more fillings compared to the population data was observed in the 35–54 years and 55–74 years age strata. The trend for a higher percentage of public general care patients to have one or more fillings compared to the population data was observed in the 15–34 years age stratum.

Table B3: Persons with one or more filled teeth by age for public dental patients and population estimates (per cent)

Age group	Emergency patients		General patients		Australian population ^(a)	
	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)
15–34 years	63.4	(58.6, 68.2)	83.7	(80.4, 87.0)	64.2	(55.8, 71.8)
35–54 years	80.2	(76.8, 83.7)	94.4	(93.4, 95.5)	95.6	(91.9, 97.6)
55–74 years	83.4	(80.4, 86.5)	95.5	(94.7, 96.3)	97.3	(94.4, 98.7)
75+ years	83.7	(78.5, 88.8)	93.1	(91.7, 94.6)	89.6	(76.6, 95.8)
All	77.3	(75.3, 79.3)	93.9	(93.3, 94.5)	84.2	(79.9, 87.7)

(a) Data for population estimates is restricted to Western Australia and South Australia

Periodontal disease

The percentage of persons with 4+ mm periodontal pockets is presented by age for public dental patients and Australian population estimates for Western Australia and South Australia in Table B4. Overall, a higher percentage of public dental patients in both the emergency and general care groups had 4+ mm pockets compared to the population data. For public dental patients attending for emergency care a higher percentage had 4+ mm pockets compared to the population data in the 55–74 years age stratum. For public dental patients attending for general care the higher overall percentage with 4+ mm pockets compared to the population data was only observed in the 55–74 years and 75 years or older age strata.

Table B4: Patients with 4+ mm periodontal pockets by age for public dental patients and population estimates (per cent)

	Emergency patients		General patients		Australian population ^(a)	
	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)
Age group						
15–34 years	7.2	(4.6, 9.8)	13.2	(10.2, 16.3)	12.8	(8.3, 19.3)
35–54 years	29.6	(25.5, 33.7)	29.7	(27.6, 31.9)	20.4	(15.8, 25.9)
55–74 years	30.9	(27.1, 34.7)	32.3	(30.5, 34.0)	19.7	(14.5, 26.1)
75+ years	26.0	(19.3, 32.8)	34.4	(31.6, 37.2)	19.6	(11.8, 30.9)
All	24.4	(22.3, 26.5)	30.5	(29.3, 31.6)	17.2	(14.4, 20.5)

(a) Data for population estimates is restricted to Western Australia and South Australia

Appendix C: Publications from the Adult Dental Programs Survey

Adult Dental Programs Survey 1992–93

Newsletters

AIHW DSRU (Australian Institute of Health and Welfare, Dental Statistics and Research Unit) 1993. AIHW DSRU Newsletter. Vol IV, No. 1, May 1993. Adelaide: AIHW DSRU, The University of Adelaide.

Reports

AIHW DSRU (Australian Institute of Health and Welfare, Dental Statistics and Research Unit) 1993. A research database on dental care in Australia. AIHW DSRU, The University of Adelaide.

AIHW DSRU (Australian Institute of Health and Welfare, Dental Statistics and Research Unit) 1993. Dental care for adults in Australia. Proceedings of a workshop. Adelaide: AIHW DSRU, The University of Adelaide.

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

Newsletters

AIHW DSRU (Australian Institute of Health and Welfare, Dental Statistics and Research Unit) 1995. CDHP Research Report 1. March 1995. Adelaide: AIHW DSRU, The University of Adelaide.

AIHW DSRU (Australian Institute of Health and Welfare, Dental Statistics and Research Unit) 1995. CDHP Research Report 2. August 1995. Adelaide: AIHW DSRU, The University of Adelaide.

Reports

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.

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

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.

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

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.

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

Scientific articles

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 1996. Provision of public 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 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 DSRU (Australian Institute of Health and Welfare, Dental Statistics and Research Unit) 1997. AIHW DSRU Newsletter. Vol VIII, No. 1, February 1997. Adelaide: AIHW DSRU, The University of Adelaide.

Reports

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

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

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

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

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

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

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

AIHW DSRU (Australian Institute of Health and Welfare, Dental Statistics and Research Unit) 2006. Emergency care among adult public dental patients in Australia. Research Report No. 27, March 2006. Adelaide: AIHW DSRU, The University of Adelaide.

Reports

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

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.

Scientific articles

Brennan DS & Spencer AJ 2004. Changes in caries experience among public dental patients between 1995/96 and 2001/02. *Australian and New Zealand Journal of Public Health* 28:542-8.

Brennan DS, Roberts-Thomson KF & Spencer AJ 2007. Oral health of Indigenous adult public dental patients in Australia. *Australian Dental Journal* 52:322-8.

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