



Australian Government

**Australian Institute of
Health and Welfare**

*Better information and statistics
for better health and wellbeing*

DENTAL STATISTICS AND RESEARCH SERIES

Number 57

Dental attendance patterns and oral health status

AC Ellershaw

Research Officer

Australian Research Centre for Population Oral Health
The University of Adelaide

AJ Spencer

Professor of Social and Preventive Dentistry

Director, Australian Research Centre for Population Oral Health
The University of Adelaide

2011

Australian Institute of Health and Welfare
Canberra

Cat. no. DEN 208

The Australian Institute of Health and Welfare is Australia's national health and welfare statistics and information agency. The Institute's mission is *better information and statistics for better health and wellbeing.*

© Australian Institute of Health and Welfare 2011

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced without prior written permission from the Australian Institute of Health and Welfare. Requests and enquiries concerning reproduction and rights should be directed to the Head, Media and Communications Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601.

This publication is part of the Australian Institute of Health and Welfare's Dental statistics and research series. A complete list of the Institute's publications is available from the Institute's website <www.aihw.gov.au>.

ISSN 1321-0254

ISBN 978-1-74249-132-5

Suggested citation

Ellershaw AC & Spencer AJ 2011. Dental attendance patterns and oral health status. Dental statistics and research series no. 57. Cat. no. DEN 208. Canberra: AIHW.

Australian Institute of Health and Welfare

Board Chair

Hon. Peter Collins, AM, QC

Director

David Kalisch

Any enquiries about or comments on this publication should be directed to:

Communications, Media and Marketing Unit

Australian Institute of Health and Welfare

GPO Box 570

Canberra ACT 2601

Phone: (02) 6244 1032

Email: info@aihw.gov.au

Published by the Australian Institute of Health and Welfare

Printed by Union Offset Printers

**Please note that there is the potential for minor revisions of data in this report.
Please check the online version at <www.aihw.gov.au> for any amendments.**

Contents

- Acknowledgments v
- Abbreviations..... v
- Symbols..... v
- Summary vi
- 1 Introduction1**
 - 1.1 Report structure.....1
- 2 Methodology3**
 - 2.1 Survey design3
 - 2.2 Telephone interview survey3
 - 2.3 Oral examination.....4
 - 2.4 Sample size and participation rate5
 - 2.5 Weighting.....6
 - 2.6 Criteria for determining statistical significance6
 - 2.7 Methods used to derive population estimates.....7
- 3 Patterns of dental attendance8**
- 4 Sociodemographic characteristics10**
 - 4.1 Age and sex.....10
 - 4.2 Cardholder status and insurance status11
 - 4.3 Annual household income12
 - 4.4 Education level and work status13
 - 4.5 Residential region and country of birth.....14
 - 4.6 Socioeconomic status and dwelling ownership15
 - 4.7 Conclusions.....17
- 5 Self-reported health characteristics and behaviours18**
 - 5.1 Self-reported oral health status18
 - 5.2 Dental treatment received22
 - 5.3 Social impact of dental problems.....24
 - Dental appearance24
 - Avoiding certain food due to dental problems24
 - 5.4 Barriers to accessing dental care27
 - Financial barriers27
 - Dental fear.....28
 - 5.5 Conclusions.....29

| | | |
|----------|---|-----------|
| 6 | Clinical oral health status | 30 |
| 6.1 | Dental decay experience | 30 |
| | Dental decay experience (mean DMFT) | 30 |
| | Dental decay experience (mean DMFT) by pattern of dental attendance | 32 |
| | Prevalence of dental decay experience | 33 |
| | Prevalence of untreated decay and an inadequate dentition by pattern of dental attendance | 35 |
| 6.2 | Gum disease..... | 36 |
| | Prevalence of gingivitis..... | 36 |
| | Prevalence of gingival recession..... | 37 |
| | Prevalence of moderate or severe periodontitis | 37 |
| | Prevalence of deep periodontal pockets..... | 37 |
| | Prevalence of gum disease by pattern of dental attendance | 39 |
| 6.3 | Conclusions..... | 41 |
| | References..... | 42 |
| | List of tables | 43 |
| | List of figures | 44 |

Acknowledgments

The authors wish to acknowledge Gary Slade, Kaye Roberts-Thomson, Loc Do, Judy Stewart Anne Sanders, Gloria Mejia, Liana Luzzi and Carmen Koster for their significant contribution to the development and conduct of the 2004–06 National Survey of Adult Oral Health.

The authors would also like to acknowledge the team of ARCPOH interviewers and interviewer supervisor, Meredith Morgan, whose contributions were critical to the success of the survey.

The Acute Care Division of the Australian Government Department of Health and Ageing assisted with this research.

Abbreviations

| | |
|-----------------|---|
| ABS | Australian Bureau of Statistics |
| ARCPOH | Australian Research Centre for Population Oral Health |
| ASGC | Australian Standard Geographical Classification |
| CATI | computer assisted telephone interview |
| CI | confidence interval |
| EWP | Electronic White Pages |
| IRSAD | Index of Relative Social Advantage/Disadvantage |
| NDTIS | National Dental Telephone Interview Survey |
| NSAOH | National Survey of Adult Oral Health |
| <i>p</i> -value | probability value |
| SAS | Statistical Analysis Software |
| SEIFA | Socio-economic Indices for Areas |

Symbols

| | |
|---|----------|
| % | per cent |
|---|----------|

Summary

This publication explores the relationship between dental attendance patterns and oral health status. The findings are sourced from the 2004–2006 National Survey of Adult Oral Health (NSAOH). In this survey a random sample of Australian adults was interviewed by telephone to collect information on dental attendance patterns and self-reported oral health. An oral examination was then undertaken to collect information on tooth decay and gum disease.

In this report the dental attendance patterns of Australian adults have been categorised into three groups which represent contrasting attendance behaviour. These groups were formed through the concept of a 'favourable' to 'unfavourable' pattern of dental attendance where these descriptors reflect how closely the pattern of attendance reflects that recommended by the dental profession. The 'favourable' dental attendance group, which includes approximately 40% of Australian adults, have a usual dental care provider that they visit at least once a year for the purpose of a check-up. The 'unfavourable' dental attendance group, which includes nearly 30% of Australian adults, visit the dentist infrequently and usually for a dental problem. The remaining group, labelled 'intermediate', have a mixed pattern of dental attendance that cannot be categorised as either favourable or unfavourable.

Adults with an unfavourable pattern of dental attendance had significantly poorer oral health outcomes than those with favourable attendance. In particular, they were more likely to:

- rate their own oral health as either fair or poor
- have experienced toothache, sensitive teeth and bleeding gums in the previous year
- report being uncomfortable with their dental appearance
- report that they had avoided certain foods due to dental problems.

The type of dental treatment received varied significantly by pattern of dental attendance. Adults with an unfavourable pattern of dental attendance were 3.7 times more likely to have had a tooth extracted in the previous year and half as likely to have received a professional scale and clean treatment, than adults in the favourable attendance group.

Adults with an unfavourable pattern of dental attendance were also more likely to report barriers to accessing dental care than those with favourable attendance. In particular, they were 3 times more likely to report:

- delaying or avoiding dental care due to cost
- difficulty paying a \$100 dental bill
- being very afraid or distressed when making a dental visit.

The pattern of dental attendance that people displayed did not lead to variations in the average number of teeth with dental decay, although the nature of this decay experience and the way it was managed varied significantly. On average, adults with unfavourable attendance had more than 3 times the level of untreated decay and 1.6 times more teeth missing due to dental disease than those with favourable attendance. Conversely, those with favourable attendance had more restored teeth. These findings reflect the type of dental care received to treat dental disease. Those seeking regular dental check-ups were more likely to have dental disease treated promptly, which led to less untreated decay, fewer extractions and more teeth restored.

Gum disease was also more frequent among adults with an unfavourable pattern of dental attendance. Those with unfavourable attendance were 1.6 times more likely to have gingivitis, and 1.5 times more likely to have periodontitis, than those with favourable attendance.

The findings in this report clearly demonstrate the gap in oral health status between adults with favourable and unfavourable patterns of dental attendance. As the number of adults with unfavourable attendance is a sizeable proportion of the adult population, a significant challenge remains for the dental health system in Australia to close this gap.

1 Introduction

A person's usual attendance behaviour is frequently described by reference to individual characteristics of their dental visits including their usual frequency of visiting, their usual reason for making a dental visit and whether they have a usual dental care provider. These characteristics of dental attendance are interrelated, and recommendations about dental visiting tend to cluster them together. In this report the concept of a 'favourable' to 'unfavourable' pattern of dental attendance is explored, where these descriptors reflect how closely the pattern of attendance reflects that recommended by the dental profession.

A 'favourable' pattern of dental attendance was first described in *Australia's dental generations* (Slade et al. 2007a) and was defined as those who have a usual dental care provider that they visit at least once a year for the purpose of a dental check-up. Such a 'favourable' pattern of attendance was associated with more comprehensive dental care including an emphasis on preventive services and lower rates of tooth extraction. In contrast, those with an infrequent pattern of dental attendance that depended on perceiving a dental problem were described as having a 'less favourable' (Spencer et al. 2007:239) or 'unfavourable' attendance pattern (Spencer et al. 2007:xviii), and were less likely to receive comprehensive dental care.

The concept of a 'favourable' or 'unfavourable' dental attendance pattern was also presented to the National Health and Hospital Reform Commission (NHHRC) (Spencer and Harford 2008), was adopted by the NHHRC in its Interim Report (NHHRC 2008) and underpinned aspects of reform recommended (NHHRC 2009).

In this report the concept of a 'favourable' to 'unfavourable' pattern of dental attendance is explored through a detailed description of how this composite measure of dental attendance was constructed. The sociodemographic characteristics and dental behaviours of people with a 'favourable' to 'unfavourable' pattern of dental attendance is explored, and finally the relationship between pattern of dental attendance and self-reported and clinical oral health status is investigated to give more definition and understanding to this construct.

Data presented in this report represent Australians aged 18 years or older with natural teeth (dentate). The term 'adults' is used throughout the report and refers to this population group.

1.1 Report structure

The 2004–06 National Survey of Adult Oral Health provides a unique opportunity to further explore the relationship between patterns of dental attendance and oral health status. This survey collected a range of indicators relating to self-reported oral health status by telephone interview and collected clinical data on dental decay experience and gum disease by oral examination. A description of the survey design, collection methodology, level of participation and weighting methodology is presented in Chapter 2. Further details are provided in *Australia's dental generations* (Slade et al. 2007a).

Chapter 3 describes the survey questions used to derive a person's usual pattern of dental attendance.

Chapter 4 provides an insight into the sociodemographic characteristics of adults classified to each pattern of dental attendance. In particular, the characteristics of Australian adults

described as having a favourable and unfavourable pattern of dental attendance are compared.

After establishing the characteristics of people classified to each dental attendance pattern, Chapter 5 explores the relationship between pattern of dental attendance and a range of self-reported health indicators collected during the telephone interview. Topics addressed include oral health status, general health status, dental treatment received, the social impact of dental problems, barriers to accessing dental care and oral hygiene practices. Tables presented in this chapter compare the prevalence of a particular health characteristic or behaviour by pattern of dental attendance. Estimates of the overall population prevalence of a particular characteristic or behaviour are quoted in the text but are not provided in the tables. These estimates are very similar to those published in *Australia's dental generations* (Slade et al. 2007b) which reported on Australians aged 15 years or older.

The final chapter explores the relationship between pattern of dental attendance and a range of clinical oral health indicators collected during the oral epidemiological examination including dental decay experience and gum disease.

2 Methodology

The 2004–06 National Survey of Adult Oral Health (NSAOH) had two distinct phases. The first phase collected information on self-reported oral health status and access to dental care from a random sample of Australian adults by telephone interview. In the second phase, adults who participated in the telephone interview were asked to attend an oral epidemiological examination to measure clinical oral health status.

This chapter provides a description of the survey design and collection methodology implemented for the NSAOH; participation rates and sample sizes for each phase of the survey; a description of the weighting procedures used to derive population estimates; and the criteria used to determine whether changes in survey estimates over time were statistically significant.

2.1 Survey design

A three-stage sampling design was implemented for the NSAOH. The sampling frame used to select a random sample of adults from the Australian population was the Electronic White Pages (EWP). Duplicate records were removed from the sampling frame and EWP listings with mobile numbers but no corresponding landline number were excluded from the frame due to cost constraints. As the majority of households had a landline number listed, less than 1% of records were excluded for this reason.

Names and addresses listed on the EWP were stratified by state and region, where region was defined as metropolitan (capital city) or non-metropolitan (rest of state). The Australian Standard Geographical Classification (ASGC) for postcodes was used to stratify EWP listings to state and region. Within each stratum, EWP listings were sorted by postcode. Postcodes represented the geographic clustering in the design and were selected with probability proportional to size, where size was defined as the number of households listed in the EWP in each postcode.

In the second stage of sampling a systematic sample of EWP listings (households) was selected for each sampled postcode. Prior to selection, listings within a postcode were sorted by address and were selected to ensure 30 telephone interviews were completed for metropolitan postcodes and 40 telephone interviews were completed for non-metropolitan postcodes. The cluster size for non-metropolitan postcodes was larger so as to achieve greater efficiency in undertaking dental examinations outside capital cities. Based on previous survey experience it was expected that these cluster sizes would achieve approximately 17 examinations per metropolitan postcode and 21 examinations per non-metropolitan postcode.

The third stage of selection was implemented when telephone contact was made with the selected household. One adult was randomly selected per household using a computer algorithm that based selection on the birth dates of household residents.

2.2 Telephone interview survey

In order to obtain information about oral health and access to dental care, survey participants were interviewed by telephone. Interviewers read questions from a computer screen and recorded answers directly onto the computer. Interviews were conducted from a

dedicated computer-assisted telephone interview (CATI) suite at the University of Adelaide research offices using Windows-based WinCati software. Approximately 10 days prior to dialling a selected number, a primary approach letter was sent to each household explaining the purpose of the survey and encouraging participation. A toll-free telephone number was provided to allow those that received a primary approach letter to contact staff to discuss the survey. Each sampled telephone number was initially telephoned up to 6 times to establish contact, with calls scheduled at different times of the day and evening and different days of the week. The WinCati software made a record of each attempt. When no answer was obtained after six calls, the number was recorded as a non-contact for the purposes of calculating participation rates and not contacted again.

If telephone contact was made with a household, interviewers went through a standard procedure to identify if the household was in-scope of the survey. Telephone numbers that did not service residential dwellings were excluded from the survey, including business numbers, hospitals or nursing homes (where the telephone number was not connected to a private room), caravan parks, hotels and hostels.

The interviewer randomly selected a target person from each household, asking the householder to identify which resident in the household was due to have the next birthday and which resident had had the last birthday. The WinCati program then selected one of these residents with 50% probability. Where only one person was resident in a household, this person was selected as the target person.

Every effort was made to ensure that the interview was conducted with the target person if they were aged 15 years or older. However, in some circumstances another adult answered the questions in the form of a proxy interview.

Interviews were conducted by a panel of experienced telephone interviewers, each of whom was trained in survey methods and issues relating to the questionnaire. During interviewing hours a senior interviewer worked as a supervisor to assist interviewers and monitor their performance. Queries and concerns from survey participants that could not be answered satisfactorily by interviewers were referred to the supervisor.

The questionnaire used in the telephone interview survey has remained relatively unchanged to that used in previous surveys to enable comparisons of estimates over time. Most questions in the survey required participants to choose from a limited number of predetermined responses. Interviewers were asked to read each response category to enable participants to select the most appropriate answer. Open-ended questions were used to collect demographic information such as age, country of birth and language spoken at home. Skip sequences were built into the computer-assisted interviews so that questions flowed with limited intervention from the interviewer. The questions and interview procedures were pilot tested on a randomly selected sample of Adelaide households, and modifications were made where necessary prior to the commencement of data collection.

2.3 Oral examination

Information about clinical oral health status was collected during standardised dental examinations conducted by dentists trained in the survey protocol. Examinations were limited to people who reported having some or all of their own natural teeth at the time of the telephone interview. Appointments for examinations were made primarily at public dental clinics within or near the postcode in which people were sampled. Survey participants who attended the examination first completed a consent form and a questionnaire regarding their medical history. Examining dentists followed a standardised

protocol to record levels of tooth loss, dental decay experience, tooth wear and, for subjects with no medical contraindications to periodontal probing, signs of periodontal disease. During data collection, replicate examinations were conducted for approximately five study participants per examiner to evaluate the consistency of their findings when judged against the principal survey examiner. Two-day training and calibration sessions were held for each state and territory examination team at the University of Adelaide. There were 30 examiners who completed this training.

2.4 Sample size and participation rate

The number of dentate adults aged 18 years and over who participated in the telephone interview survey and the oral epidemiological examination is presented in Table 2.1. Sample sizes are provided by sex, age and state.

Table 2.1: Sample size for each phase of the NSAOH

| | Telephone interview survey | Oral epidemiological examination |
|--------------|----------------------------|----------------------------------|
| Sex | | |
| Male | 4,944 | 2,130 |
| Female | 7,448 | 3,234 |
| Age | | |
| 18–24 years | 894 | 291 |
| 25–34 years | 1,874 | 693 |
| 35–44 years | 2,712 | 1,087 |
| 45–54 years | 2,535 | 1,099 |
| 55–64 years | 2,223 | 1,151 |
| 65–74 years | 1,318 | 724 |
| 75+ years | 836 | 319 |
| State | | |
| NSW | 3,269 | 1,097 |
| Vic | 2,278 | 1,145 |
| Qld | 1,812 | 804 |
| SA | 1,124 | 604 |
| WA | 1,137 | 458 |
| Tas | 866 | 378 |
| NT | 901 | 376 |
| ACT | 1,005 | 502 |
| Total | 12,392 | 5,364 |

The participation rate for the telephone interview survey was calculated by dividing the number of participants by the number of in-scope telephone numbers contacted by interviewers. Telephone numbers that were unable to be contacted after six attempts were classified as ‘non-contacts’ and were defined as in-scope. Disconnected numbers and

business numbers were classified as out of scope. The participation rate for the telephone interview survey was 50.5%.

The participation rate for the oral epidemiological examination was calculated by dividing the number of people examined by the number who participated in the telephone interview survey who were eligible for an examination. The participation rate for the oral epidemiological examination was 43.7%.

2.5 Weighting

The purpose of sampling weights is to enable estimates to be generated that are representative of the underlying Australian population from which survey participants were selected. In this survey, postcodes, households and people were sampled with different probabilities of selection, and there were additional differences in the probability of participation.

In order to reflect these differences and to ensure that survey estimates were consistent with the age and sex distribution of the Australian population, it was necessary to create sampling weights for use during statistical analysis. The sample design used in the survey was a multi-stage design where the first stage selected postcodes, the second stage selected households within sampled postcodes, and the third stage selected one person aged 15 years or more in each sampled household.

A person's chance of selection in the survey was determined by the stratum and postcode from which their phone number was selected and the number of people aged 15 years or older usually resident in the selected household. Weights were calculated to reflect these probabilities of selection and to adjust for different participation rates across postcodes and among age and sex categories.

Separate weights were derived for the telephone interview survey and oral epidemiological examination. For the telephone interview survey, weights were adjusted to ensure survey estimates were consistent with the 2005 ABS Estimated Residential Population data at the state by metropolitan/non-metropolitan by 5-year age group by sex level. For the oral examination survey, which was restricted to dentate people, estimates of the dentate population were derived from the telephone interview survey and used as benchmarks to derive examination weights.

2.6 Criteria for determining statistical significance

As with any survey where data are collected from only some of the people in the population, values presented in this report are estimates of the true population values. These estimates have some degree of uncertainty, which is expressed in this report using 95% confidence intervals (95% CIs). The 95% CI signifies the likely lower and upper limits of the range of values within which the true population prevalence would fall. In this context 'likely' means that there is a 95% probability that the true population value lies between the lower and upper limits.

In this report 95% CIs were used as a guideline to identify differences between population subgroups that are statistically significant. When there was no overlap between the 95% CIs for two groups, the difference between the groups was deemed to be statistically significant. This criterion for judging statistical significance is more conservative than the alternative method of calculating *p*-values. In fact, when 95% CIs do not overlap, it means that a test of

statistical significance for the difference between the groups would yield a p -value of less than 0.05 (the conventional threshold used in many reports). A p -value of less than 0.05 indicates that the likelihood that a difference of the magnitude observed between the population subgroups would occur by chance is less than 5%.

2.7 Methods used to derive population estimates

Estimates of population means and population proportions were derived using the Statistical Analysis Software (SAS) callable SUDAAN procedure 'proc descript'. This procedure produces estimates and their corresponding 95% confidence intervals. The variances used to calculate these confidence intervals are derived using the implicit Taylor linearisation method which incorporates the complex sample design used in the 2004-2006 National Survey of Adult Oral Health.

To account for the different age and sex distributions within each pattern of dental attendance category, estimates of population proportions in Chapter 4, and estimates of population means in Chapter 6, are age and sex-standardised. Age and sex standardisation is a statistical procedure that aims to remove any effects of age and sex that might account for differences between two comparison groups. In this report the direct method of standardisation was used, with the reference population defined as the 2005 ABS Estimated Residential Population. The SAS callable SUDAAN procedure 'proc descript' was used to generate the age-sex standardised estimates of population means and proportions.

In Chapters 5 and 6 estimates of population proportions and their corresponding prevalence ratios are reported. These estimates have been age- and sex-adjusted to account for the different age and sex distributions within each pattern of dental attendance category. As 'proc descript' cannot produce estimates of population prevalence ratios and their corresponding 95% confidence intervals, the SAS callable SUDAAN procedure 'proc multilog' has been used to produce model adjusted prevalence estimates. This procedure is very similar to 'proc logistic' but is able to generate model-adjusted estimates of population proportions, and their corresponding prevalence ratios, for categorical variables with more than two categories.

To generate population estimates from the telephone interview and oral epidemiological examination using these SAS callable SUDAAN procedures, the stratification variables were specified as state and region, the primary sampling unit (cluster variable) was specified as postcode, the estimation method was specified as 'with replacement' and a separate weight variable was specified for each phase of the survey.

3 Patterns of dental attendance

To explore the relationship between patterns of dental attendance and oral health status a composite indicator was derived that summarised the characteristics of the respondent's usual dental attendance behaviour. This composite indicator, which was derived from questions asked in the telephone interview, categorised the dental attendance patterns of Australians into three contrasting groups, labelled 'favourable', 'intermediate' and 'unfavourable'.

Responses to the following questions were used to derive which category of dental attendance they were assigned to:

Q1. What is your usual reason for visiting a dental professional, for check-ups or when you have a dental problem?

- Check-ups*
- Dental problem*
- Don't know*

Q2. How often on average would you seek care from a dental professional?

- Two or more times a year*
- Once a year*
- Once in 2 years*
- Less often than that*
- Don't know*

Q3. Is there a dentist you usually go to for dental care?

- Yes*
- No*
- Don't know*

Table 3.1 lists all possible responses to these questions and the dental attendance category to which each combination was assigned. Of the 12,392 people interviewed, 138 could not be assigned a category due to responding 'Don't know' to one or more of these questions and hence were excluded from analysis.

Respondents were described as having a 'favourable' pattern of dental attendance if they have a usual dental care provider that they visit at least once a year for the purpose of a dental check-up. An 'unfavourable' pattern of dental attendance was assigned to respondents who visit the dentist infrequently (less than once every 2 years) for the purpose of a dental problem, and to respondents who usually visit a dentist once every 2 years for the purpose of a dental problem but do not have a usual dental care provider.

Respondents who were not classified to either a 'favourable' or 'unfavourable' pattern of dental attendance were classified to an 'intermediate' category to reflect their mixed pattern of dental attendance.

Table 3.1: Derivation of pattern of dental attendance

| Usual reason for dental visit | Usual frequency of dental visit | Usual dental care provider | Derived pattern of dental attendance | Sample size |
|-------------------------------|---------------------------------|----------------------------|--------------------------------------|---------------|
| Check-up | One or more per year | Yes | Favourable | 4,870 |
| Check-up | One or more per year | No | Intermediate | 322 |
| Check-up | Once every 2 years | Yes | Intermediate | 704 |
| Check-up | Once every 2 years | No | Intermediate | 176 |
| Check-up | Less frequently | Yes | Intermediate | 280 |
| Check-up | Less frequently | No | Intermediate | 333 |
| Problem | One or more per year | Yes | Intermediate | 1,023 |
| Problem | One or more per year | No | Intermediate | 225 |
| Problem | Once every 2 years | Yes | Intermediate | 825 |
| Problem | Once every 2 years | No | Unfavourable | 336 |
| Problem | Less frequently | Yes | Unfavourable | 1,197 |
| Problem | Less frequently | No | Unfavourable | 1,963 |
| Total | | | | 12,254 |

The number of dentate adults aged 18 years or older classified to each pattern of dental attendance is reported in Table 3.2. Of those interviewed, 40% were described as having a favourable pattern of dental attendance. At the other extreme, 29% were described as having unfavourable dental attendance behaviour. The remaining adults were classified to the intermediate attendance group reflecting a mixed pattern of dental attendance.

Table 3.2: Pattern of dental attendance

| Dental attendance pattern | Sample size | Sample % |
|---------------------------|---------------|--------------|
| Favourable | 4,870 | 39.7 |
| Intermediate | 3,888 | 31.7 |
| Unfavourable | 3,496 | 28.5 |
| Total | 12,254 | 100.0 |

4 Sociodemographic characteristics

In the previous chapter, surveyed adults were classified as having either a favourable, intermediate or unfavourable pattern of dental attendance based on their usual attendance behaviour. The purpose of this chapter is to explore the sociodemographic characteristics of adults with these different patterns of dental attendance. For example, are there particular characteristics associated with an unfavourable pattern of dental attendance?

4.1 Age and sex

Overall, 39% of Australian adults had a favourable pattern of dental attendance, 32% had an intermediate attendance pattern, and 29% had an unfavourable attendance pattern. Table 4.1 reports the usual pattern of dental attendance among Australian adults by age and sex.

Table 4.1: Pattern of dental attendance, by age and sex (per cent)

| | | Pattern of dental attendance | | |
|------------------|---------------|------------------------------|--------------------|--------------------|
| | | Favourable | Intermediate | Unfavourable |
| Age group | | | | |
| 18–24 years | % | 40.4 | 33.6 | 26.0 |
| | 95% CI | (36.5,44.4) | (30.0,37.4) | (22.6,29.7) |
| 25–34 years | % | 28.5 | 38.9 | 32.6 |
| | 95% CI | (25.9,31.2) | (36.1,41.9) | (29.9,35.4) |
| 35–44 years | % | 36.4 | 32.1 | 31.4 |
| | 95% CI | (34.1,38.8) | (30.0,34.3) | (29.2,33.8) |
| 45–54 years | % | 42.9 | 31.1 | 25.9 |
| | 95% CI | (40.2,45.7) | (29.0,33.3) | (23.7,28.2) |
| 55–64 years | % | 46.0 | 29.3 | 24.7 |
| | 95% CI | (43.1,48.9) | (26.8,31.9) | (22.4,27.2) |
| 65–74 years | % | 44.5 | 27.4 | 28.1 |
| | 95% CI | (41.3,47.9) | (24.8,30.2) | (25.2,31.1) |
| 75+ years | % | 50.3 | 22.0 | 27.7 |
| | 95% CI | (46.0,54.5) | (18.8,25.7) | (23.7,32.0) |
| Sex | | | | |
| Male | % | 34.0 | 32.5 | 33.5 |
| | 95% CI | (32.1,35.9) | (30.8,34.3) | (31.8,35.2) |
| Female | % | 44.6 | 31.8 | 23.5 |
| | 95% CI | (42.9,46.4) | (30.4,33.3) | (22.2,25.0) |
| Total | % | 39.3 | 32.2 | 28.5 |
| | 95% CI | (37.9,40.8) | (31.1,33.3) | (27.3,29.8) |

Patterns of dental attendance varied significantly by age and sex. Adults aged 25–34 years (29%) and 35–44 years (36%) were less likely to report a favourable pattern of dental attendance than other age groups. Dental attendance behaviour also varied among males and females, with a higher proportion of females (45%) reporting a favourable attendance pattern than males (34%).

Due to the patterns of dental attendance behaviour by age and sex varying from the age and sex breakdown of the Australian population, the population estimates of dental attendance patterns for other sociodemographic characteristics have been age- and sex-standardised. The direct method of standardisation was implemented using the SAS callable SUDAAN procedure 'proc descript'.

4.2 Cardholder status and insurance status

Cardholders are defined as persons eligible for public dental care. A person was eligible for public care if they had either a Pensioner Concession Card or a Health Care Card at the time of survey. Non-cardholders referred to adults who were ineligible for public dental care. Table 4.2 compares the dental attendance patterns of Australian adults by cardholder status and dental insurance status.

Non-cardholders were almost twice as likely as cardholders to report a favourable pattern of dental attendance (45% compared with 23%). Conversely, cardholders were 1.8 times more likely than non-cardholders to report an unfavourable pattern of dental attendance (42% compared with 24%).

Australians can purchase dental insurance which covers all or part of the cost of visiting a private dentist. Adults with dental insurance (55%) were twice as likely to report a favourable pattern of dental attendance as uninsured adults (26%). Only 16% of insured adults reported an unfavourable attendance pattern compared with 40% of those without dental insurance.

Table 4.2: Pattern of dental attendance, by cardholder status and dental insurance status (per cent ^(a))

| | | Pattern of dental attendance | | |
|--------------------------|--------|------------------------------|--------------|--------------|
| | | Favourable | Intermediate | Unfavourable |
| Cardholder status | | | | |
| Cardholder | % | 22.9 | 35.0 | 42.0 |
| | 95% CI | (20.9,25.2) | (32.4,37.8) | (39.4,44.7) |
| Non-cardholder | % | 44.5 | 31.2 | 24.2 |
| | 95% CI | (43.0,46.1) | (29.9,32.5) | (23.0,25.5) |
| Insurance status | | | | |
| Uninsured | % | 25.8 | 34.4 | 39.9 |
| | 95% CI | (24.4,27.3) | (32.9,35.8) | (38.3,41.5) |
| Insured | % | 54.6 | 29.4 | 16.0 |
| | 95% CI | (52.8,56.4) | (27.8,31.0) | (14.7,17.4) |

(a) Age- and sex-standardised via direct standardisation method.

4.3 Annual household income

Household income was strongly associated with pattern of dental attendance, with the proportion of adults with a favourable attendance pattern increasing linearly with household income. Table 4.3 compares the dental attendance patterns of Australian adults by annual household income.

Over 50% of adults living in households with an annual income of \$80,000 or more reported a favourable attendance pattern compared with only 22% of adults in households earning less than \$20,000. There was a corresponding inverse relationship with the proportion of adults reporting an unfavourable pattern of attendance and household income.

Approximately 40% of adults living in households earning less than \$40,000 reported an unfavourable attendance pattern compared with approximately 20% for adults in households earning \$80,000 or more.

Table 4.3: Pattern of dental attendance, by annual household income (per cent ^(a))

| Annual household income | | Pattern of dental attendance | | |
|-------------------------|--------|------------------------------|--------------|--------------|
| | | Favourable | Intermediate | Unfavourable |
| Less than \$20,000 | % | 22.1 | 34.2 | 43.7 |
| | 95% CI | (19.1,25.5) | (30.3,38.3) | (39.7,47.8) |
| \$20,000–<\$40,000 | % | 28.9 | 34.6 | 36.5 |
| | 95% CI | (26.8,31.2) | (32.2,37.1) | (34.1,38.9) |
| \$40,000–<\$60,000 | % | 38.7 | 33.0 | 28.2 |
| | 95% CI | (36.1,41.4) | (30.6,35.6) | (25.5,31.1) |
| \$60,000–<\$80,000 | % | 43.5 | 31.5 | 25.0 |
| | 95% CI | (40.3,46.7) | (28.5,34.6) | (22.2,28.0) |
| \$80,000–<\$100,000 | % | 51.8 | 27.6 | 20.6 |
| | 95% CI | (48.5,55.1) | (24.6,30.8) | (18.0,23.5) |
| \$100,000 and over | % | 56.0 | 27.8 | 16.2 |
| | 95% CI | (53.0,59.0) | (25.2,30.5) | (13.9,18.9) |

(a) Age- and sex-standardised via direct standardisation method.

4.4 Education level and work status

Level of education was strongly associated with dental attendance behaviour. Among adults whose highest education level was Year 9 or less, only 16% reported a favourable pattern of attendance. In contrast, 40% of adults who had completed Year 12 and 50% of adults who had completed a university degree reported a favourable attendance pattern. This variation by educational attainment was also evident in the proportion of adults reporting unfavourable attendance behaviour. Those with lower levels of education were much more likely to report an unfavourable pattern of dental attendance than adults with high educational attainment. Table 4.4 compares the dental attendance patterns of Australian adults by highest level of education and work status.

Full-time and part-time workers had almost identical attendance profiles with 40% reporting a favourable pattern of dental attendance and 29% reporting an unfavourable dental attendance pattern. Unemployed adults were the most likely group to report an unfavourable pattern of dental attendance (38%).

Table 4.4: Pattern of dental attendance, by highest education level and work status (per cent ^(a))

| | | Pattern of dental attendance | | |
|--------------------------------|--------|------------------------------|--------------|--------------|
| | | Favourable | Intermediate | Unfavourable |
| Highest education level | | | | |
| Year 9 or less | % | 16.2 | 33.8 | 50.0 |
| | 95% CI | (13.1,19.9) | (27.9,40.4) | (44.0,56.0) |
| Year 10 or 11 | % | 29.2 | 32.8 | 37.9 |
| | 95% CI | (26.4,32.3) | (29.6,36.2) | (34.6,41.4) |
| Year 12 | % | 39.6 | 31.7 | 28.7 |
| | 95% CI | (36.6,42.8) | (28.7,34.8) | (25.7,31.9) |
| Certificate (1–2 yrs.) | % | 37.5 | 33.0 | 29.5 |
| | 95% CI | (34.4,40.7) | (29.9,36.2) | (26.4,32.8) |
| Trade/Apprenticeship | % | 33.4 | 35.1 | 31.5 |
| | 95% CI | (29.4,37.6) | (31.2,39.2) | (28.1,35.1) |
| Uni degree/diploma or higher | % | 49.8 | 32.2 | 18.0 |
| | 95% CI | (47.3,52.2) | (29.9,34.6) | (16.4,19.8) |
| Work status | | | | |
| Full-time | % | 40.3 | 31.0 | 28.7 |
| | 95% CI | (38.4,42.2) | (29.1,33.0) | (27.0,30.4) |
| Part-time | % | 40.0 | 31.5 | 28.5 |
| | 95% CI | (36.9,43.2) | (28.4,34.9) | (25.6,31.5) |
| Unemployed | % | 26.8 | 35.6 | 37.6 |
| | 95% CI | (22.1,32.1) | (30.4,41.2) | (33.1,42.3) |
| Home duties | % | 29.7 | 37.4 | 32.9 |
| | 95% CI | (23.9,36.4) | (28.0,47.8) | (23.9,43.2) |

(a) Age- and sex-standardised via direct standardisation method.

4.5 Residential region and country of birth

Region was defined and classified as capital city or rest of state and persons were assigned to these groups based on their postcode of residence in the 2001 Australian Standard Geographical Classification. Capital city was defined as the capital city statistical division. Rest of state was defined as all other statistical divisions within a state. Table 4.5 reports the dental attendance patterns of Australian adults by residential region and country of birth.

Adults living in capital cities were more likely to report a favourable pattern of dental attendance (44%) than those living elsewhere (31%). This variation was also reflected in the higher proportion of non-capital city residents reporting an unfavourable attendance pattern compared with capital city residents (35% compared with 25%).

Australian residents who were born overseas reported a very similar pattern of dental attendance as those born in Australia.

Table 4.5: Pattern of dental attendance, by residential region and country of birth (per cent ^(a))

| | | Pattern of dental attendance | | |
|---------------------------|--------|------------------------------|--------------|--------------|
| | | Favourable | Intermediate | Unfavourable |
| Residential region | | | | |
| Capital city | % | 43.5 | 31.5 | 24.9 |
| | 95% CI | (41.7,45.4) | (30.1,33.0) | (23.4,26.5) |
| Rest of state | % | 31.3 | 33.6 | 35.1 |
| | 95% CI | (29.2,33.5) | (31.7,35.5) | (33.1,37.3) |
| Country of birth | | | | |
| Australia | % | 39.1 | 32.0 | 28.9 |
| | 95% CI | (37.6,40.6) | (30.7,33.3) | (27.6,30.3) |
| Overseas | % | 40.2 | 32.5 | 27.3 |
| | 95% CI | (37.5,43.1) | (30.0,35.1) | (25.2,29.5) |

(a) Age- and sex-standardised via direct standardisation method.

4.6 Socioeconomic status and dwelling ownership

To explore whether patterns of dental attendance varied by areas of socioeconomic advantage and disadvantage, respondents were classified into groups using the ABS Socio-Economic Indexes for Areas (SEIFA). The index used for classification was the Index of Relative Social Advantage/Disadvantage (IRSAD) because it captured aspects of both advantage and disadvantage. This index score ranks areas from the most disadvantaged to the most advantaged. An area with a low index score has a relatively high proportion of disadvantaged residents and a relatively low proportion of advantaged residents. Table 4.6 reports the dental attendance patterns of Australian adults by the socioeconomic status (SES) of area of residence and dwelling ownership. For further information about the IRSAD see ABS Information Paper (ABS 2008).

Each person was assigned an index score based on their postcode of residence. Respondents were then allocated to an SES group based on their index score. Those living in the most disadvantaged postcodes were allocated to the lowest SEIFA quintile and those living in the most advantaged postcode were allocated to the highest SEIFA quintile.

Dental attendance patterns varied significantly between SEIFA quintiles. The proportion of adults reporting a favourable pattern of dental attendance increased with socioeconomic advantage. Only 29% of adults living in the most disadvantaged postcodes (lowest SEIFA quintile) reported a favourable attendance pattern. This was significantly lower than reports from residents in more advantaged postcodes. Nearly 53% of adults living in the most advantaged postcodes (highest SEIFA quintile) and 45% of those in the 4th SEIFA quintile reported a favourable pattern of dental attendance. Conversely, residents of the most disadvantaged postcodes were 2.4 times more likely to report an unfavourable pattern of attendance than those living in the most advantaged postcodes.

Adults who owned their dwelling outright were 1.8 times more likely to report a favourable pattern of dental attendance than those living in rental accommodation (44% compared with 24%). Among adults who were purchasing their dwelling, 40% reported a favourable attendance pattern. Unfavourable attendance behaviour was far more common among adults living in rental accommodation (41%).

Table 4.6: Pattern of dental attendance, by SES group and dwelling ownership (per cent ^(a))

| | | Pattern of dental attendance | | |
|---------------------------|--------|------------------------------|--------------|--------------|
| | | Favourable | Intermediate | Unfavourable |
| SES group | | | | |
| Lowest | % | 29.2 | 32.1 | 38.6 |
| | 95% CI | (26.8,31.9) | (29.8,34.5) | (36.1,41.3) |
| Second | % | 32.5 | 33.9 | 33.6 |
| | 95% CI | (30.1,35.1) | (31.6,36.3) | (31.0,36.3) |
| Third | % | 37.4 | 32.2 | 30.4 |
| | 95% CI | (34.6,40.3) | (29.7,34.7) | (28.3,32.7) |
| Fourth | % | 45.4 | 31.4 | 23.2 |
| | 95% CI | (42.5,48.4) | (29.0,33.9) | (20.9,25.5) |
| Highest | % | 52.8 | 31.1 | 16.1 |
| | 95% CI | (49.8,55.7) | (28.4,33.9) | (14.2,18.2) |
| Dwelling ownership | | | | |
| Fully owned | % | 44.0 | 31.3 | 24.7 |
| | 95% CI | (41.8,46.2) | (29.4,33.4) | (22.8,26.7) |
| Being purchased | % | 39.6 | 32.6 | 27.8 |
| | 95% C | (36.7,42.6) | (30.2,34.9) | (25.1,30.7) |
| Rented | % | 24.2 | 34.5 | 41.3 |
| | 95% CI | (21.8,26.8) | (31.8,37.2) | (38.6,44.1) |

(a) Age- and sex-standardised via direct standardisation method.

4.7 Conclusions

There was significant variation in the sociodemographic characteristics of adults by pattern of dental attendance. In particular, a favourable pattern of dental attendance was more frequent among adults who were:

- female
- aged 55 years or older
- insured
- ineligible for public dental care
- living in households earning \$80,000 or more annually
- university graduates
- working either full time or part time
- residents of capital cities
- living in area of socioeconomic advantage
- purchasing or owning their home outright.

Conversely, an unfavourable pattern of dental attendance was more frequent among adults who were:

- male
- aged 25–44 years old
- uninsured
- eligible for public dental care
- living in households earning less than \$40,000 annually
- educated to Year 11 or lower
- unemployed
- living in areas of socioeconomic disadvantage
- renting accommodation.

5 Self-reported health characteristics and behaviours

In the previous chapter, the sociodemographic characteristics of adults reporting a favourable, intermediate and unfavourable pattern of dental attendance were compared. The telephone interview survey also collected a range of indicators relating to self-reported oral and general health status, dental treatment received in the previous year, oral hygiene behaviours, the social impact of dental problems and potential barriers to accessing dental care. The purpose of this chapter is to explore the relationship between these indicators and usual pattern of dental attendance. Of particular interest are comparisons between the oral health status of adults with favourable and unfavourable attendance patterns.

Tables presented in this chapter include estimates of population proportion and prevalence ratios derived from these values. Prevalence ratios have been provided to facilitate comparison between dental attendance groups. The reference group used for these comparisons was defined as the 'favourable' dental attendance group. To remove the effect of contrasting age and sex distributions within each dental attendance group, population estimates of prevalence have been age- and sex-adjusted. The SAS callable SUDAAN procedure 'proc multilog' was used to generate estimates of population proportion, their corresponding prevalence ratios and 95% CIs.

5.1 Self-reported oral health status

In the telephone interview a range of questions were asked relating to both general and oral health status. General health status was assessed with the question:

Q. How would you rate your general health? Would you say that it is:

Excellent
Very good
Good
Fair
Poor
Don't know

Respondents were then asked to rate their oral health using the same categories of response. In Table 5.1 responses have been categorised into two groups, those reporting either 'Excellent', 'Very good' or 'Good' and those reporting either 'Fair' or 'Poor'. Adults who responded 'Don't know' were excluded from analysis (three respondents for general health question and 12 respondents for dental health question).

Overall, 90% of Australian adults rated their general health as either excellent, very good or good. In comparison, 83% reported the same rating for their oral health and 17% rated their oral health as poor or average.

Dental attendance behaviour had little influence on self-reported general health rating. Among adults described as having a favourable pattern of dental attendance, 93% rated their general health as either excellent, very good or good. This compared with 89% for those with an intermediate pattern of dental attendance, and 87% for the unfavourable attendance group.

Dental attendance behaviour was strongly associated with self-reported oral health status. Among adults with a favourable pattern of dental attendance, 93% rated their dental health as excellent, very good or good, significantly higher than the unfavourable attendance group (71%). Conversely, adults with an unfavourable attendance pattern were 4 times more likely to rate their dental health as either fair or poor than those with a favourable attendance pattern.

Table 5.1: Self-reported health characteristics by pattern of dental attendance (per cent ^(a))

| Health characteristics | Pattern of dental attendance | | | |
|--|------------------------------|--------------|--------------|-------------|
| | Favourable | Intermediate | Unfavourable | |
| General health status | | | | |
| Excellent/Very good/Good | % | 93.1 | 89.4 | 86.8 |
| | 95% CI | (92.3,94.0) | (88.1,90.7) | (85.4,88.1) |
| Fair/Poor | % | 6.9 | 10.6 | 13.3 |
| | 95% CI | (6.0,7.7) | (9.3,11.9) | (11.9,14.6) |
| Dental health status | | | | |
| Excellent/Very good/Good | % | 93.2 | 81.1 | 70.8 |
| | 95% CI | (92.4,94.1) | (79.6,82.7) | (68.6,72.9) |
| Fair/Poor | % | 6.8 | 18.9 | 29.2 |
| | 95% CI | (5.9,7.6) | (17.3,20.4) | (27.1,31.4) |
| Experienced toothache in previous 12 months | | | | |
| Very often/Often/Sometimes | % | 8.6 | 19.5 | 19.2 |
| | 95% CI | (7.5,9.6) | (17.7,21.3) | (17.5,20.8) |
| Hardly ever/Never | % | 91.4 | 80.5 | 80.8 |
| | 95% CI | (90.4,92.5) | (78.7,82.3) | (79.2,82.5) |
| Experienced sensitive teeth in previous 12 months | | | | |
| Very often/Often/Sometimes | % | 24.6 | 34.6 | 34.0 |
| | 95% CI | (22.9,26.3) | (32.7,36.6) | (32.0,36.1) |
| Hardly ever/Never | % | 75.4 | 65.4 | 66.0 |
| | 95% CI | (73.7,77.1) | (63.4,67.3) | (63.9,68.0) |
| Experienced bleeding gums in previous 12 months | | | | |
| | % | 26.0 | 32.1 | 32.6 |
| | 95% CI | (24.3,27.7) | (30.2,34.0) | (30.7,34.6) |
| Self-reported gum disease | | | | |
| | % | 7.2 | 11.6 | 12.3 |
| | 95% CI | (6.3,8.1) | (10.3,12.9) | (10.9,13.8) |
| Smoking status | | | | |
| Current or previous smoker | % | 38.7 | 47.4 | 55.0 |
| | 95% CI | (36.8,40.7) | (45.5,49.3) | (52.8,57.2) |
| Never smoked | % | 61.3 | 52.6 | 45.0 |
| | 95% CI | (59.3,63.2) | (50.7,54.5) | (42.8,47.2) |

(a) Age- and sex-adjusted via logit model.

Respondents were asked to report on whether they had experienced toothache, sensitive teeth or bleeding gums within the previous 12 months, and to report on their smoking history. Estimates of the proportion of Australian adults reporting these conditions are presented in Table 5.1.

Toothache

Among Australian adults, 15% reported they had experienced toothache either sometimes, often or very often in the previous 12 months. Dental attendance behaviour was moderately associated with frequency of toothache experience. Only 9% of adults with a favourable pattern of dental attendance reported they had experienced toothache either sometimes, often or very often in the previous 12 months. In comparison, adults with an intermediate pattern of dental attendance and those in the unfavourable attendance group were twice as likely to report this (19%).

Sensitive teeth

In the previous 12 months, 30% of Australian adults reported they had experienced sensitive teeth either sometimes, often or very often. One in four (25%) adults with a favourable pattern of dental attendance reported this condition either sometimes, often or very often in the previous 12 months. Adults with an intermediate or unfavourable pattern of dental attendance were more likely to report experiencing sensitive teeth than those with favourable attendance (34%).

Bleeding gums

Thirty per cent of Australian adults reported that their gums had bled during the previous 12 months and 10% thought they had gum disease. There were small variations in the prevalence of these conditions by pattern of dental attendance. Approximately one in four (26%) adults in the favourable attendance group reported their gums had bled in the previous 12 months. Adults with an intermediate (32%) or unfavourable (33%) pattern of dental attendance were 1.4 times more likely to report this condition than those with favourable attendance. Similarly, adults in the intermediate and unfavourable attendance groups were more likely to report they had gum disease than those with a favourable attendance pattern (12% compared with 7%).

Smoking status

Among Australian adults, 46% reported they were either a current or previous smoker. Adults with an unfavourable dental attendance pattern were 1.4 times more likely to report this than those in the favourable attendance group (55% compared with 39%). Among those in the intermediate attendance group, 47% reported they were either a current or previous smoker.

Table 5.2 presents prevalence ratios which compare the proportion of adults reporting a particular health characteristic by pattern of dental attendance. These ratios were derived from the values reported in Table 5.1. The favourable attendance group was used as the reference group for comparison.

Table 5.2: Self-reported health characteristics by pattern of dental attendance (prevalence ratios ^(a))

| Health characteristics | | Pattern of dental attendance | |
|--|--------|------------------------------|-----------------------------|
| | | Unfavourable vs. favourable | Intermediate vs. favourable |
| General health status fair or poor | Ratio | 1.9 | 1.5 |
| | 95% CI | 1.6,2.3 | 1.3,1.8 |
| Dental health status fair or poor | Ratio | 4.3 | 2.8 |
| | 95% CI | 3.7,5.0 | 2.4,3.2 |
| Experienced toothache in previous 12 months very often, often or sometimes | Ratio | 2.2 | 2.3 |
| | 95% CI | 1.9,2.6 | 2.0,2.6 |
| Experienced sensitive teeth in previous 12 months very often, often or sometimes | Ratio | 1.4 | 1.4 |
| | 95% CI | 1.3,1.5 | 1.3,1.5 |
| Experienced bleeding gums in previous 12 months | Ratio | 1.4 | 1.4 |
| | 95% CI | 1.3,1.5 | 1.3,1.5 |
| Self-reported gum disease | Ratio | 1.7 | 1.6 |
| | 95% CI | 1.4,2.1 | 1.4,1.9 |
| Current or previous smoker | Ratio | 1.4 | 1.2 |
| | 95% CI | 1.3,1.5 | 1.2,1.3 |

(a) Age- and sex-adjusted via logit model.

5.2 Dental treatment received

The benefits of regular dental check-ups are well documented (Thomson et al. 2010). Not only do patients benefit from ongoing advice about oral hygiene, dentists are able to manage and treat dental disease promptly and with a focus on preventive dental care. Respondents who had visited the dentist in the previous 12 months were asked what type of dental treatment they had received. In the telephone interview survey 7,660 respondents had visited a dentist in the previous 12 months. Of these, 4,461 were classified as having a favourable pattern of dental attendance, 2,249 were classified to the intermediate attendance group and 950 were classified as having an unfavourable pattern of dental attendance.

The type of treatment received was strongly associated with usual pattern of dental attendance. Adults with a favourable attendance pattern were more likely to have received a preventive treatment, and less likely to have received an extraction or restorative treatment, than those with unfavourable attendance.

Table 5.3 compares the type of dental treatment received for each pattern of dental attendance. Of the Australian adults who had visited a dentist in the previous 12 months, 15% reported they had received an extraction, 43% had received a filling and 71% had received a scale and clean treatment.

Less than one in 10 adults (9%) with a favourable pattern of dental attendance received an extraction in the previous 12 months compared with one in three (33%) in the unfavourable attendance group. Prevalence among adults with an intermediate pattern of dental attendance was halfway between these groups with nearly one in five (19%) reporting they had received an extraction.

Adults with favourable attendance were also less likely to have received a filling in the previous 12 months than those in the unfavourable attendance group (38% compared with 46%). Prevalence of this restorative treatment was highest among those with an intermediate pattern of dental attendance (52%).

Table 5.3: Treatment received during previous 12 months by pattern of dental attendance (per cent ^(a))

| Treatment received | | Dental attendance pattern | | |
|---|--------|---------------------------|--------------|--------------|
| | | Favourable | Intermediate | Unfavourable |
| Received an extraction | % | 8.9 | 19.4 | 32.8 |
| | 95% CI | (7.8,10.0) | (17.3,21.4) | (29.0,36.6) |
| Received a filling | % | 38.3 | 51.7 | 45.8 |
| | 95% CI | (36.4,40.1) | (49.0,54.4) | (41.7,49.9) |
| Received a professional clean and polish and/or scaling | % | 84.3 | 59.2 | 41.0 |
| | 95% CI | (82.8,85.7) | (65.5,61.9) | (37.2,44.7) |

(a) Age- and sex-adjusted via logit model.

Over 84% of adults with a favourable attendance pattern had their teeth scaled and cleaned during the previous year. In comparison, 59% of adults in the intermediate attendance group and 41% in the unfavourable attendance group received this preventive treatment. The treatment mix associated with each pattern of dental attendance is provided in Figure 5.1.

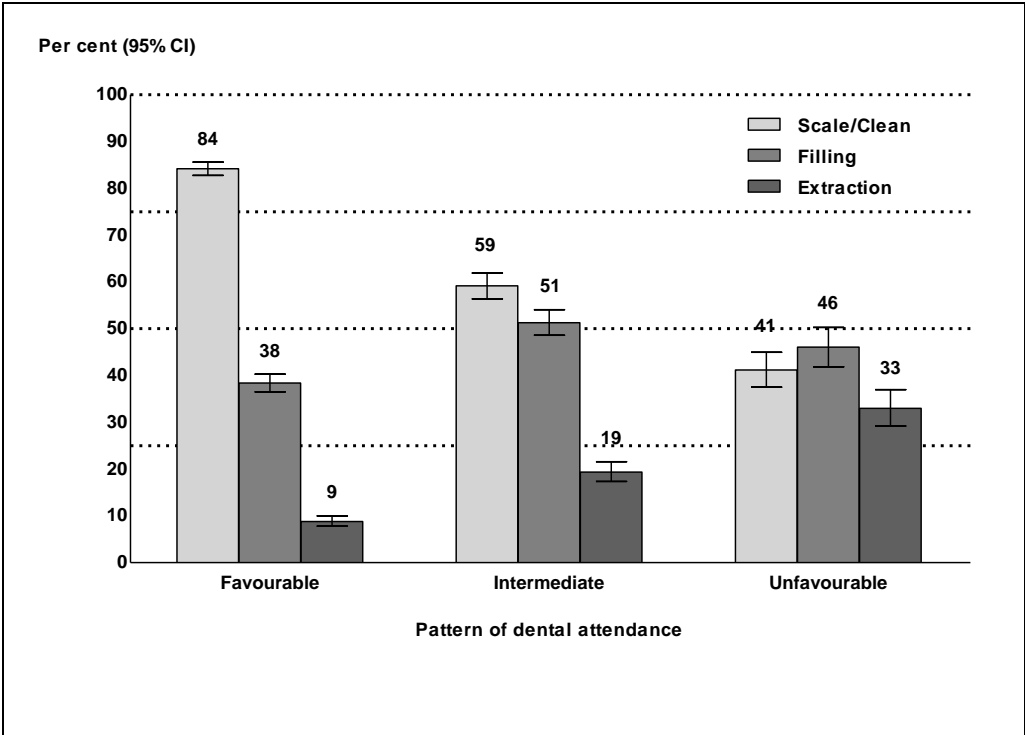


Figure 5.1: Treatment mix associated with pattern of dental attendance

Prevalence ratios comparing the proportion of adults receiving a particular dental treatment by pattern of dental attendance are reported in Table 5.4. These ratios were derived from values reported in Table 5.3. The favourable attendance group has been used as the reference group for comparison.

Table 5.4: Dental treatment received by dental attendance pattern (prevalence ratios ^(a))

| Treatment received | Dental attendance pattern | | |
|---|-----------------------------|-----------------------------|-----------|
| | Unfavourable vs. favourable | Intermediate vs. favourable | |
| Received an extraction | Ratio | 3.7 | 2.2 |
| | 95% CI | (3.1,4.4) | (1.9,2.6) |
| Received a filling | Ratio | 1.2 | 1.4 |
| | 95% CI | (1.1,1.3) | (1.3,1.5) |
| Received a professional clean and polish and/or scaling | Ratio | 0.5 | 0.7 |
| | 95% CI | (0.4,0.5) | (0.7,0.7) |

(a) Age- and sex-adjusted via logit model.

For adults who had made a dental visit in the previous 12 months, those with an unfavourable pattern of dental attendance were nearly four times as likely to have received an extraction, and half as likely to have received a scale and clean treatment, as adults with a favourable attendance pattern.

5.3 Social impact of dental problems

In the telephone interview respondents were asked a number of questions about the impact of dental problems on their everyday life.

Dental appearance

Dental appearance can have a major impact on a person's self-esteem. People with a poor perception of their dental appearance can have low self-esteem and, as a consequence, limit their level of social interaction (Bedos et al. 2009). To assess how respondents felt about their dental appearance the survey asked:

Q. How often have you felt uncomfortable about the appearance of your teeth, mouth or dentures during the last 12 months?

Very often

Often

Sometimes

Hardly ever

Never

Don't know

Table 5.5 responses have been combined into two groups: those reporting either 'Very often', 'Often' or 'Sometimes', and those reporting either 'Hardly ever' or 'Never'. Adults who responded 'Don't know' were excluded from the analysis (four respondents).

Among Australian adults 25% reported they had felt uncomfortable about their dental appearance either sometimes, often or very often during the previous 12 months. The extent of this problem varied significantly by pattern of dental attendance. Adults with an unfavourable pattern of dental attendance (35%) were twice as likely to report this problem as those in the favourable attendance group (16%). Among adults with an intermediate pattern of dental attendance, 28% reported being uncomfortable about their dental appearance.

Avoiding certain food due to dental problems

Avoiding food due to dental problems is an implication of poor oral health and can affect a person's quality of life. Limiting the types of food eaten due to problems with chewing can affect both enjoyment of food and the ability to maintain a healthy diet. In the survey respondents were asked:

Q. How often have you had to avoid eating some foods because of problems with your teeth, mouth or dentures during the last 12 months?

Very often

Often

Sometimes

Hardly ever
Never
Don't know

In Table 5.5 responses have been combined into two groups: those reporting either 'Very often', 'Often' or 'Sometimes' and those reporting either 'Hardly ever' or 'Never'. Adults who responded 'Don't know' were excluded from the analysis (three respondents).

Among Australian adults, 16% reported they had avoided eating certain foods due to problems with their teeth either sometimes, often or very often during the previous 12 months. Adults in the unfavourable (22%) and intermediate (20%) attendance groups were equally likely to report this, and twice as likely as those in the favourable attendance group (10%).

Table 5.5: Social impact of dental problems by pattern of dental attendance (per cent ^(a))

| Social impact | Pattern of dental attendance | | | |
|--|------------------------------|-------------|--------------|--------------|
| | | Favourable | Intermediate | Unfavourable |
| Uncomfortable with dental appearance | | | | |
| Very often/Often/Sometimes | % | 16.3 | 27.6 | 34.8 |
| | 95% CI | (15.0,17.6) | (25.8,29.4) | (32.7,36.8) |
| Hardly ever/Never | % | 83.7 | 72.4 | 65.2 |
| | 95% CI | (82.4,85.0) | (70.6,74.2) | (63.2,67.3) |
| Avoided certain foods in last 12 months | | | | |
| Very often/Often/Sometimes | % | 9.8 | 20.1 | 22.0 |
| | 95% CI | (8.7,10.8) | (18.4,21.8) | (20.1,23.8) |
| Hardly ever/Never | % | 90.2 | 79.9 | 78.0 |
| | 95% CI | (89.2,91.3) | (78.2,81.6) | (76.2,79.9) |

(a) Age- and sex-adjusted via logit model.

Prevalence ratios comparing the proportion of adults reporting a particular social impact by pattern of dental attendance are provided in Table 5.6. These ratios were derived from the values reported in Table 5.5. The favourable attendance group was used as the reference group for comparison.

Table 5.6: Social impact of dental problems by pattern of dental attendance (prevalence ratios ^(a))

| Social impact | Pattern of dental attendance | | |
|--|------------------------------|-----------------------------|-----------------------------|
| | | Unfavourable vs. favourable | Intermediate vs. favourable |
| Uncomfortable with dental appearance | | | |
| Very often/Often/Sometimes | Ratio | 2.1 | 1.7 |
| | 95% CI | (1.9,2.4) | (1.5,1.9) |
| Avoided certain foods in last 12 months | | | |
| Very often/Often/Sometimes | Ratio | 2.3 | 2.1 |
| | 95% CI | (2.0,2.6) | (1.8,2.3) |

(a) Age- and sex-adjusted via logit model.

Oral hygiene

Oral self-care practices include regular brushing and flossing of one's teeth and using a range of other dental cleaning aids, such as fluoride mouth-rinses, toothpicks, interdental cleaners and disclosing solutions. Self-care practices are understood to play an important role in oral health maintenance, predominantly by reducing food build-up on and between teeth, minimising plaque at the gum level and raising the fluoride content in saliva (if fluoridated toothpastes are used) (Jamieson et al. 2007).

In the survey respondents were asked how often during the last seven days they had used dental floss, tape or an inter-dental brush to clean between their teeth, other than just to remove food particles and how often during the last seven days had they used a mouthwash or any dental rinse product. Respondents were asked to specify the number of times they had used each product. Table 5.7 presents the proportion of adults who reported using these products at least once in the previous seven days.

Among Australian adults, 48% reported they had flossed between their teeth at least once in the previous week and 39% had used a mouthwash or dental rinse during this period.

Flossing frequency varied significantly by pattern of dental attendance. Over six in ten (61%) adults with favourable attendance reported they had flossed in the previous week compared with 48% of adults with an intermediate pattern of attendance and 33% of adults with unfavourable attendance.

In comparison, the proportion of adults who had used a mouthwash or dental rinse product in the previous week varied slightly by pattern of dental attendance. Just over four in ten (42%) adults with favourable attendance reported using this product in the previous week compared with 39% of adults with an intermediate pattern of attendance and 36% of adults with unfavourable attendance.

Table 5.7: Prevalence of oral hygiene behaviours, by pattern of dental attendance (per cent ^(a))

| Oral health behaviour | | Pattern of dental attendance | | |
|---|--------|------------------------------|--------------|--------------|
| | | Favourable | Intermediate | Unfavourable |
| Flossed in previous week | % | 60.9 | 47.5 | 32.9 |
| | 95% CI | (59.1,62.8) | (45.5,49.6) | (30.6,35.1) |
| Used mouthwash or dental rinse in previous week | % | 41.5 | 38.7 | 35.9 |
| | 95% CI | (39.6,43.4) | (36.7,40.6) | (33.8,37.9) |

(a) Age- and sex-adjusted via logit model.

Prevalence ratios which compare the proportion of adults using each oral hygiene product by pattern of dental attendance are reported in Table 5.8. These ratios were derived from the values reported in Table 5.7. The favourable attendance group was used as the reference group for comparison.

Table 5.8: Oral hygiene behaviours, by pattern of dental attendance (prevalence ratios ^(a))

| Oral health behaviour | | Pattern of dental attendance | |
|---|--------|------------------------------|-----------------------------|
| | | Unfavourable vs. favourable | Intermediate vs. favourable |
| Flossed in previous week | Ratio | 0.54 | 0.78 |
| | 95% CI | (0.50,0.58) | (0.74,0.82) |
| Used mouthwash or dental rinse in previous week | Ratio | 0.86 | 0.93 |
| | 95% CI | (0.80,0.93) | (0.87,0.99) |

(a) Age- and sex-adjusted via logit model.

5.4 Barriers to accessing dental care

They can be many reasons why Australians do not access regular dental care. In the survey respondents were asked about potential barriers to accessing dental care, including financial barriers, and whether they experienced fear when visiting a dentist.

Financial barriers

Financial barriers can influence how regularly adults seek dental care and, consequently, the type of treatment they receive. To assess whether cost was a barrier to accessing dental care respondents were asked if they had avoided or delayed dental care due to cost.

Nearly one-third (32%) of Australian adults reported they had avoided or delayed visiting the dentist in the previous 12 months due to cost. The proportion of adults reporting cost as a barrier to accessing dental care varied significantly among dental attendance groups (Table 5.9). Those with an unfavourable dental attendance pattern were 3 times as likely to report avoiding or delaying dental care due to cost as those in the favourable attendance group (48% compared with 15%). Adults with an intermediate pattern of dental attendance also reported this more frequently than the favourable attendance group (39% compared with 15%).

Difficulty in paying for dental care was also assessed by asking respondents at most times of the year, how much difficulty they would have paying a \$100 dental bill. Among Australian adults, 17% reported they would have a lot of difficulty and this proportion varied significantly among dental attendance groups (Table 5.9). Those with an unfavourable pattern of attendance were 3 times more likely to report this than adults in the favourable attendance group (28% compared with 9%). Adults with an intermediate pattern of dental attendance also reported this more frequently than the favourable attendance group (17% compared with 9%).

Dental fear

Respondents were asked whether fear of visiting a dentist was a potential barrier to accessing regular dental care and 58% reported they had no fear of visiting the dentist. Nearly one-third (32%) reported being a little or moderately afraid or distressed and 10% said they were very or extremely afraid or distressed when making a dental visit.

Prevalence of 'dental fear' varied significantly among dental attendance groups (Table 5.9). Adults with an unfavourable pattern of dental attendance were 3.4 times more likely to report being either very or extremely afraid of visiting a dentist than those in the favourable attendance group (18% compared with 5%). Those with an intermediate pattern of dental attendance also reported this more frequently than the favourable attendance group (10% compared with 5%).

Table 5.9: Barriers to accessing dental care by pattern of dental attendance (per cent ^(a))

| Barriers | Pattern of dental attendance | | | |
|--|------------------------------|--------------|--------------|-------------|
| | Favourable | Intermediate | Unfavourable | |
| Financial barriers | | | | |
| Avoided/delayed dental visit in last 12 months due to cost | % | 14.9 | 38.5 | 47.7 |
| | 95% CI | (13.6,16.1) | (36.4,40.5) | (45.6,49.8) |
| A lot of difficulty paying a \$100 dental bill | % | 8.8 | 16.8 | 28.2 |
| | 95% CI | (7.8,9.9) | (15.3,18.3) | (26.2,30.1) |
| Fear of dental visit | | | | |
| Not afraid or distressed at all | % | 64.6 | 56.5 | 48.4 |
| | 95% CI | (62.8,66.5) | (54.5,58.5) | (46.2,50.6) |
| A little/moderately afraid or distressed | % | 30.1 | 33.0 | 33.4 |
| | 95% CI | (28.2,31.9) | (31.1,34.9) | (31.4,35.4) |
| Very/extremely afraid or distressed | % | 5.3 | 10.4 | 18.2 |
| | 95% CI | (4.5,6.1) | (9.3,11.6) | (16.5,19.9) |

(a) Age- and sex-adjusted via logit model.

Prevalence ratios which compare the proportion of adults reporting barriers to accessing dental care by pattern of dental attendance are reported in Table 5.10. These ratios were derived from the values reported in Table 5.9. The favourable attendance group was used as the reference group for comparison.

Table 5.10: Barriers to accessing dental care, by pattern of dental attendance (prevalence ratios ^(a))

| Barriers | | Pattern of dental attendance | |
|--|--------|------------------------------|-----------------------------|
| | | Unfavourable vs. favourable | Intermediate vs. favourable |
| Financial barriers | | | |
| Avoided/delayed dental visit in last 12 months due to cost | Ratio | 3.2 | 2.6 |
| | 95% CI | (2.9,3.5) | (2.4,2.9) |
| A lot of difficult paying a \$100 dental bill | Ratio | 3.2 | 1.9 |
| | 95% CI | (2.8,3.7) | (1.6,2.2) |
| Fear of dental visit | | | |
| Very/extremely afraid or distressed | Ratio | 3.4 | 2.0 |
| | 95% CI | (2.9,4.1) | (1.6,2.4) |

(a) Age- and sex-adjusted via logit model.

5.5 Conclusions

Adults with an unfavourable pattern of dental attendance had significantly poorer oral health outcomes than those with favourable attendance. In particular, they were more likely to have:

- rated their oral health as either fair or poor
- experienced toothache, sensitive teeth or bleeding gums in the previous year
- reported that they have gum disease
- been uncomfortable with their dental appearance
- avoided certain foods due to dental problems.

The type of dental treatment received varied significantly by pattern of dental attendance. Adults with an unfavourable pattern of dental attendance were 3.7 times more likely to have had a tooth extracted in the previous year, and half as likely to have received a professional scale and clean treatment as those with favourable attendance.

Adults with an unfavourable pattern of dental attendance were also more likely to report barriers to accessing dental care than those with favourable attendance. In particular they were 3 times more likely to have:

- avoided or delayed dental care due to cost
- reported a lot of difficulty paying a \$100 dental bill
- reported being very afraid or distressed when making a dental visit.

6 Clinical oral health status

A sample of respondents who participated in the telephone interview was asked to undertake an oral epidemiological examination. Examining dentists followed a standardised procedure to record levels of tooth loss, dental decay experience and signs of gum disease. Across Australia, 5,364 adults aged 18 years or older with one or more natural teeth (dentate) participated in the dental examination.

The purpose of this chapter is to investigate the relationship between clinical oral health status and usual pattern of dental attendance. Table 6.1 summarises the number of examined adults classified to each pattern of dental attendance. Incomplete information prevented 61 adults from being assigned a category.

Among examined adults, 39% (2,064) were classified as having a favourable pattern of dental attendance and 29% (1,541) were classified to the unfavourable attendance group.

Table 6.1: Pattern of dental attendance for examined adults

| Pattern of dental attendance | Sample size | Sample % |
|------------------------------|--------------|--------------|
| Favourable | 2,064 | 38.9 |
| Intermediate | 1,698 | 32.0 |
| Unfavourable | 1,541 | 29.1 |
| Total | 5,303 | 100.0 |

6.1 Dental decay experience

The number of decayed, missing and filled teeth (DMFT) reflects a person's lifetime experience of dental caries and its management. Once a cavity occurs in a tooth it can remain untreated, be restored with a filling or, in some circumstances, the tooth can be removed. A measure of a person's decay experience is referred to as DMFT where:

D = number of teeth with untreated decay

M = number of teeth missing due to pathology

F = number of filled teeth

T = total number of teeth affected by decay experience (D+M+F)

In the examination, all missing teeth in adults aged 45 years or older were counted as missing, as it was assumed that missing teeth had been extracted due to dental disease. For people aged less than 45 years, the count included only teeth where the examiner judged that dental decay or gum disease was the most likely reason for the extraction. This was to ensure that teeth extracted for orthodontic reasons were excluded from the missing count. Further details are provided in *Australia's dental generations* (Slade et al. 2007a).

Dental decay experience (mean DMFT)

Table 6.2 reports the mean DMFT score of Australian adults by age group and sex. On average, Australian adults had less than one tooth with an untreated cavity, nearly five teeth missing due to dental decay and eight teeth restored by a filling. Dental decay experience

varied significantly by age. Younger adults were more likely to have untreated decay but had fewer missing and filled teeth. Across older age groups the number of teeth missing due to dental caries increased significantly.

Males and females had a similar pattern of decay experience with males having an average of 12.9 teeth affected by dental decay compared with 14.1 for females.

Table 6.2: Mean number of decayed, missing, filled teeth per person, by age and sex

| | | Mean decayed teeth | Mean missing teeth | Mean filled teeth | Mean DMFT |
|------------------|---------------|-----------------------|-----------------------|----------------------|---------------------|
| Age group | | | | | |
| 18–24 years | % | 0.7 | 0.7 | 2.3 | 3.7 |
| | 95% CI | (0.4, 1.0) | (0.4, 1.0) | (1.6, 3.0) | (2.7, 4.7) |
| 25–34 years | % | 0.8 | 1.0 | 4.2 | 5.9 |
| | 95% CI | (0.6, 1.0) | (0.8, 1.2) | (3.7, 4.7) | (5.4, 6.5) |
| 35–44 years | % | 0.7 | 2.1 | 7.8 | 10.7 |
| | 95% CI | (0.5, 0.9) | (1.8, 2.4) | (7.4, 8.3) | (10.1, 11.2) |
| 45–54 years | % | 0.6 | 5.9 | 12.0 | 18.5 |
| | 95% CI | (0.4, 0.7) | (5.5, 6.3) | (11.5, 12.5) | (18.0, 19.0) |
| 55–64 years | % | 0.4 | 9.2 | 12.1 | 21.7 |
| | 95% CI | (0.4, 0.5) | (8.5, 9.8) | (11.6, 12.7) | (21.3, 22.1) |
| 65–74 years | % | 0.4 | 12.0 | 10.9 | 23.3 |
| | 95% CI | (0.3, 0.6) | (11.2, 12.7) | (10.3, 11.4) | (22.8, 23.7) |
| 75+ years | % | 0.4 | 14.1 | 9.8 | 24.3 |
| | 95% CI | (0.3, 0.6) | (13.1, 15.1) | (8.8, 10.8) | (23.6, 25.0) |
| Sex | | | | | |
| Male | % | 0.7 | 4.7 | 7.5 | 12.9 |
| | 95% CI | (0.6, 0.8) | (4.3, 5.0) | (7.1, 8.0) | (12.3, 13.6) |
| Female | % | 0.5 | 4.9 | 8.6 | 14.1 |
| | 95% CI | (0.4, 0.6) | (4.6, 5.3) | (8.3, 9.0) | (13.6, 14.6) |
| Total | % | 0.6 | 4.8 | 8.1 | 13.5 |
| | 95% CI | (0.5, 0.7) | (4.6, 5.1) | (7.8, 8.4) | (13.1, 13.9) |

Table 6.2 illustrates the significant variation in mean DMFT by age and small variation by sex. To remove any effects of age and sex that might account for differences in oral health indicators among dental attendance groups, population estimates in Table 6.3 have been age- and sex-standardised. The direct method of standardisation was implemented using the SAS callable SUDAAN procedure 'proc descript'.

Dental decay experience (mean DMFT) by pattern of dental attendance

Dental decay experience did not vary by pattern of dental attendance with all groups having an average of between 13.3 and 13.8 teeth affected by dental caries (Table 6.3). However, the nature of this decay experience and the way it had been managed varied significantly.

Adults with a favourable pattern of dental attendance had fewer teeth with untreated decay (0.3 compared with 1.1) and fewer teeth missing due to dental caries (3.9 compared with 6.1) than adults in the unfavourable attendance group. Conversely, adults with a favourable attendance pattern had an average of 9.3 teeth restored with a filling compared with 6.1 teeth in the unfavourable attendance group.

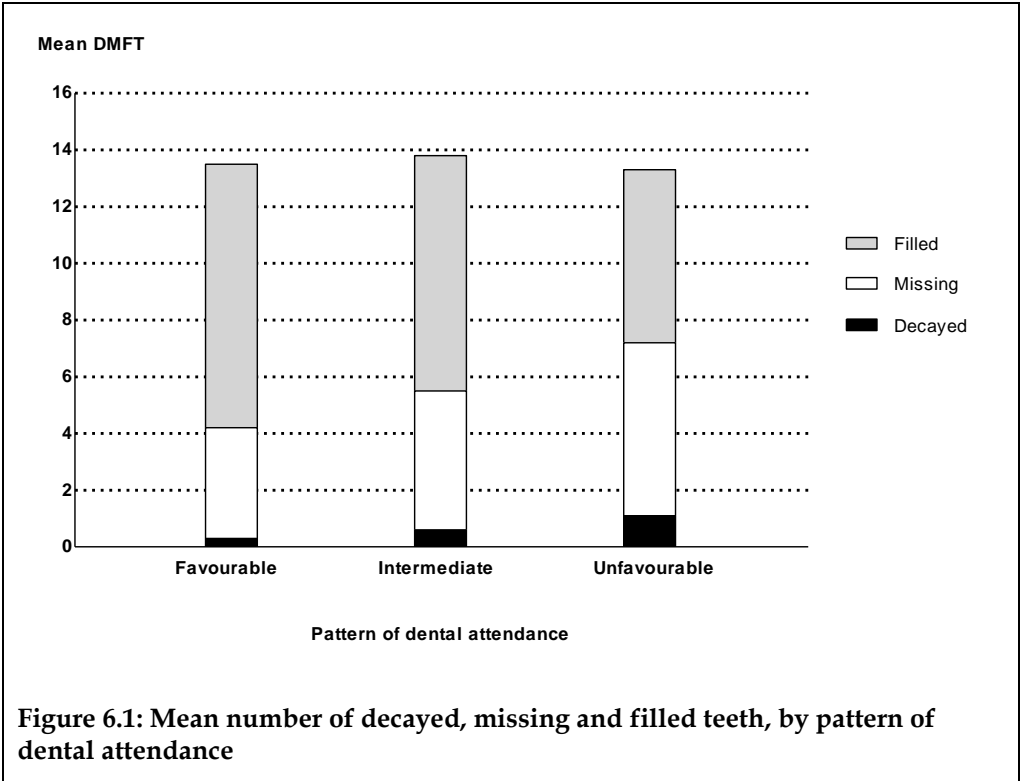
These findings reflect the type of dental care provided to manage dental decay. Those seeking regular care were more likely to have dental decay treated in a timely manner which lead to less untreated decay, fewer extractions and more teeth restored through fillings.

Table 6.3: Mean number of decayed, missing, filled teeth per person ^(a) by pattern of dental attendance

| Decay experience | | Pattern of dental attendance | | |
|--------------------|---------------|------------------------------|--------------------|--------------------|
| | | Favourable | Intermediate | Unfavourable |
| Mean decayed teeth | Mean | 0.3 | 0.6 | 1.1 |
| | 95% CI | (0.2,0.4) | (0.5,0.7) | (0.9,1.2) |
| Mean missing teeth | Mean | 3.9 | 4.9 | 6.1 |
| | 95% CI | (3.7,4.2) | (4.6,5.2) | (5.8,6.4) |
| Mean filled teeth | Mean | 9.3 | 8.3 | 6.1 |
| | 95% CI | (9.0,9.7) | (8.0,8.6) | (5.8,6.5) |
| Mean DMFT | Mean | 13.6 | 13.8 | 13.3 |
| | 95% CI | (13.2,14.0) | (13.5,14.1) | (12.9,13.8) |

(a) Age- and sex-standardised via direct standardisation method.

The composition of dental decay experience by pattern of dental attendance is illustrated in Figure 6.1.



Prevalence of dental decay experience

Table 6.4 reports the proportion of Australian adults with untreated decay and the proportion with an inadequate dentition, which was defined as having fewer than 21 teeth. This definition was used in *Australia's dental generations* (Roberts-Thomson & Do 2007) and the UK adult dental health survey (Kelly et al. 2000).

Adults aged less than 45 years were more likely to have untreated decay than older adults. The presence of untreated decay was most prevalent in the 35-44 year age group (30%).

The proportion of adults with an inadequate dentition rose significantly with age. Only 3% of adults aged less than 45 years had fewer than 21 teeth compared with 43% aged 65-74 years and 56% aged 75 years or older.

Untreated decay was more frequent among males (29%) than females (23%), but there was no difference in the proportion of males and females with an inadequate dentition.

Table 6.4: Prevalence of dental decay experience, by age and sex

| | | Per cent with untreated decay | Per cent with fewer than 21 teeth |
|------------------|---------------|--|--|
| Age group | | | |
| 18–24 years | % | 25.7 | 0.1 |
| | 95% CI | (19.3,33.4) | (0.0,0.6) |
| 25–34 years | % | 27.2 | 0.2 |
| | 95% CI | (22.4,32.6) | (0.1,0.9) |
| 35–44 years | % | 29.7 | 2.8 |
| | 95% CI | (26.1,33.6) | (1.6,4.8) |
| 45–54 years | % | 24.3 | 10.2 |
| | 95% CI | (21.1,27.8) | (7.8,13.3) |
| 55–64 years | % | 23.2 | 25.4 |
| | 95% CI | (20.0,26.7) | (21.7,29.5) |
| 65–74 years | % | 21.6 | 43.1 |
| | 95% CI | (18.0,25.7) | (38.2,48.1) |
| 75+ years | % | 22.0 | 55.8 |
| | 95% CI | (17.4,27.4) | (49.3,62.2) |
| Sex | | | |
| Male | % | 28.6 | 12.5 |
| | 95% CI | (25.8,31.5) | (11.1,14.0) |
| Female | % | 22.7 | 12.6 |
| | 95% CI | (20.5,25.1) | (11.1,14.2) |
| Total | % | 25.7 | 12.5 |
| | 95% CI | (23.9,27.6) | (11.4,13.7) |

Table 6.4 shows the significant variation in the prevalence of fewer than 21 teeth by age and in the prevalence of untreated decay by sex. To remove any effects of age and sex that might account for differences in oral health status among dental attendance groups, population estimates in Table 6.5 and Table 6.6 have been age- and sex-adjusted. To be able to produce age- and sex-adjusted estimates of proportions and corresponding prevalence ratios the SAS callable SUDAAN procedure 'proc multilog' was used.

Prevalence of untreated decay and an inadequate dentition by pattern of dental attendance

The prevalence of untreated decay among Australian adults varied significantly by dental attendance pattern. Adults with an unfavourable pattern of dental attendance were 2.7 times more likely to have untreated decay than those with favourable attendance (38% compared with 14%). Similarly, those with unfavourable attendance were 2.5 times more likely than the favourable attendance group to have an inadequate dentition (20% compared with 8%).

Adults with an intermediate pattern of dental attendance were also more likely than those with favourable attendance to have untreated decay (27% compared with 14%) and fewer than 21 teeth (13% compared with 8%).

Table 6.5: Prevalence ^(a) of dental decay experience, by pattern of dental attendance

| Decay experience | | Pattern of dental attendance | | |
|---------------------|--------|------------------------------|--------------|--------------|
| | | Favourable | Intermediate | Unfavourable |
| Untreated decay | % | 14.1 | 27.0 | 38.4 |
| | 95% CI | (11.5,16.7) | (23.8,30.3) | (34.7,42.1) |
| Fewer than 21 teeth | % | 7.9 | 12.8 | 20.0 |
| | 95% CI | (6.6,9.2) | (10.7,14.8) | (17.8,22.3) |

(a) Age- and sex-adjusted via logit model.

Prevalence ratios which compare the proportion of adults with untreated decay, and the proportion with an inadequate dentition, by pattern of dental attendance, are provided in Table 6.6. These ratios were derived from the values reported in Table 6.5. The favourable attendance group was used as the reference group for comparison.

Table 6.6: Dental decay experience, by pattern of dental attendance (prevalence ratios ^(a))

| Decay experience | | Pattern of dental attendance | |
|---------------------|--------|------------------------------|-----------------------------|
| | | Unfavourable vs. favourable | Intermediate vs. favourable |
| Untreated decay | Ratio | 2.7 | 1.9 |
| | 95% CI | (2.2,3.4) | (1.6,2.4) |
| Fewer than 21 teeth | Ratio | 2.5 | 1.6 |
| | 95% CI | (2.1,3.1) | (1.3,2.0) |

(a) Age- and sex-adjusted via logit model.

6.2 Gum disease

Those examined were also assessed for gum diseases such as gingivitis and periodontitis. Gum disease affects many people at some time during their life (Slade et al. 2007b). Gingivitis (inflammation of the gums) is early gum disease and occurs when dental plaque builds up on teeth, particularly where the gum joins the tooth. The signs of gingivitis are bleeding, redness and swelling of the gum. Gingival recession is the condition where the gum tissue surrounding the teeth is lost, exposing the roots of the teeth. Periodontitis is an advanced gum disease. The periodontal ligament – the part of the gum that joins the tooth to surrounding bone – is weakened and destroyed. Bacteria cause an inflammatory reaction in the tissues surrounding the tooth below the gum margin. As the disease progresses and bone is lost, spaces begin to form between the tooth and the gum which are called ‘periodontal pockets’. Signs of periodontitis include receding gums and the presence of these periodontal pockets. The two common causes of receding gums are improper tooth brushing and gingivitis/periodontitis. Further details are provided in *Australia’s dental generations* (Slade et al. 2007b).

Regular brushing of teeth and gums using correct cleaning techniques help prevent plaque build-up, which is a primary cause of gum disease. Frequent dental visiting ensures advice on oral hygiene and early intervention. Early intervention can help prevent the early stages of gum disease progressing to the more severe forms of gum disease, which can result in tooth loss.

Prevalence of gingivitis

In the dental examination gingivitis was assessed on six index teeth. The gingival index was used to measure the extent of gingivitis. One in five (20%) Australian adults had gingivitis (Table 6.7). There were only small and non-significant differences in the proportion of adults with gingivitis across age groups. Prevalence was lowest in younger adults aged 18–24 years (18%) and highest among those aged 75 years or older (24%). Males were more likely to have gingivitis (23%) than females (17%).

Prevalence of gingival recession

In the dental examination, gingival recession was measured using a periodontal probe at three sites on each tooth. The proportion of adults with one or more tooth surfaces with gingival recession of 2 millimetres (mm) or more is provided in Table 6.7.

The prevalence of gingival recession of 2 mm or more among Australian adults was 56%. The likelihood of this condition varied significantly by age. Prevalence was lowest among young adults aged 18–24 years (15%) and increased sharply for older adults. Over one in two adults aged 35–44 years had gingival recession of 2 mm or more and nine in ten adults aged 65 years or older had this condition. There was no difference in prevalence among males and females.

Prevalence of moderate or severe periodontitis

In the dental examination, moderate periodontitis was defined as the presence of either two sites between adjacent teeth where the gums had lost attachment to the tooth by 4 mm or more, or at least two such sites that have pockets of 5 mm or more. Severe periodontitis was defined as the presence of at least two sites between adjacent teeth where the gums had lost attachment to the tooth by 6 mm or more, and at least one pocket of 5 mm or more depth. This was consistent with the case definition of periodontitis developed jointly by the US Centres for Disease Control and Prevention (CDC) and the American Academy of Periodontology (AAP).

Among Australian adults, approximately 22% had moderate periodontitis and less than 3% had severe periodontitis. The presence of this gum disease was strongly associated with age (Table 6.7). Only 3% of adults aged 18–24 years had moderate/severe periodontitis compared with 19% of those aged 35–44 years and 41% of those aged 55–64 years. By 75 years of age over six in ten adults had this condition. Males were more likely to have moderate or severe periodontitis than females (28% compared with 20%).

Prevalence of deep periodontal pockets

Deep periodontal pockets were defined as 4 mm or more. The depth of the pocket was measured using a periodontal probe at three sites on each tooth. The proportion of adults who had at least one site with a periodontal pocket of 4 mm or more is reported in Table 6.7. Approximately one in five (21%) Australian adults had periodontal pockets of 4 mm or more. Prevalence of this condition increased with age. Just over one in ten adults aged 18–24 years had 4+ mm periodontal pocketing compared with one in four adults aged 45–64 years. Prevalence also varied by sex, with 24% of males having deep periodontal pockets compared with 18% of females.

Table 6.7: Prevalence of gum disease by age and sex (per cent)

| | | Gingivitis | 2+ mm gingival recession | Moderate/severe periodontitis | 4+ mm periodontal pocket depth |
|------------------|---------------|--------------------|---------------------------------|--------------------------------------|---------------------------------------|
| Age group | | | | | |
| 18–24 years | % | 17.6 | 14.6 | 2.8 | 10.6 |
| | 95% CI | (12.5,24.1) | (9.8,21.3) | (1.2,6.7) | (6.2,17.4) |
| 25–34 years | % | 20.2 | 29.4 | 11.9 | 17.8 |
| | 95% CI | (15.8,25.4) | (24.7,34.6) | (8.7,16.1) | (13.7,22.7) |
| 35–44 years | % | 19.3 | 54.3 | 18.5 | 22.6 |
| | 95% CI | (15.9,23.3) | (50.2,58.3) | (15.4,22.0) | (19.2,26.3) |
| 45–54 years | % | 19.3 | 76.6 | 31.4 | 25.5 |
| | 95% CI | (16.2,23.0) | (72.9,79.9) | (27.5,35.5) | (21.6,29.8) |
| 55–64 years | % | 20.9 | 83.6 | 40.9 | 25.4 |
| | 95% CI | (17.6,24.7) | (80.2,86.5) | (36.8,45.1) | (22.0,29.0) |
| 65–74 years | % | 21.3 | 89.9 | 48.9 | 20.6 |
| | 95% CI | (17.4,25.8) | (85.9,92.8) | (44.0,53.7) | (16.9,24.8) |
| 75+ years | % | 24.2 | 95.2 | 60.8 | 26.0 |
| | 95% CI | (17.5,32.4) | (89.5,97.9) | (52.6,68.5) | (18.6,35.1) |
| Sex | | | | | |
| Male | % | 22.6 | 56.8 | 28.1 | 23.9 |
| | 95% CI | (19.8,25.6) | (52.9,60.7) | (25.3,31.1) | (20.8,27.1) |
| Female | % | 17.0 | 54.7 | 20.2 | 17.6 |
| | 95% CI | (14.9,19.2) | (51.8,57.5) | (18.3,22.2) | (15.8,19.6) |
| Total | % | 19.8 | 55.8 | 24.2 | 20.8 |
| | 95% CI | (18.0,21.8) | (53.2,58.3) | (22.5,26.0) | (18.8,22.9) |

Table 6.7 illustrates the significant variation in the prevalence of gum disease by age and sex. To remove any effects of age and sex that might account for differences in oral health indicators among dental attendance groups, population estimates in Table 6.8 and Table 6.9 have been age- and sex-adjusted. To be able to produce age- and sex-adjusted estimates of proportions and corresponding prevalence ratios the SAS callable SUDAAN procedure 'proc multilog' was used.

Prevalence of gum disease by pattern of dental attendance

The proportion of adults with gingivitis varied significantly by pattern of dental attendance (Table 6.8). Those with an unfavourable attendance pattern were 1.6 times more likely to be diagnosed with gingivitis than adults in the favourable attendance group (24% compared with 15%). Prevalence of gingivitis among adults with an intermediate pattern of attendance was slightly lower than the unfavourable attendance group (21%).

The presence of gingival recession of 2 mm or more was not associated with pattern of dental attendance (Table 6.8). Approximately 55% of adults with a favourable pattern of attendance had this condition compared with 57% in the intermediate and 56% in the unfavourable attendance groups.

The proportion of adults with moderate or severe periodontitis varied significantly by pattern of dental attendance (Table 6.8). Those with an unfavourable attendance pattern were 1.5 times more likely to be diagnosed with this condition than adults in the favourable attendance group (29% compared with 19%). Prevalence for adults with an intermediate pattern of attendance was similar to the unfavourable attendance group (27%).

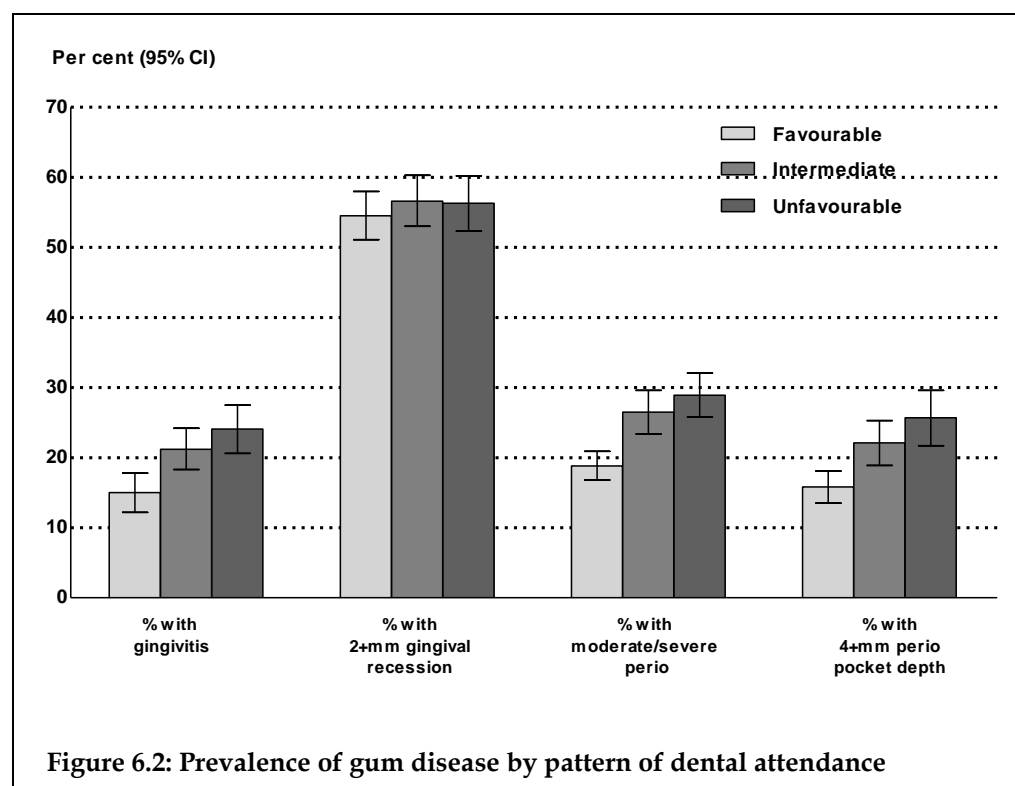
The presence of 4+ mm periodontal pocketing varied significantly by pattern of dental attendance (Table 6.8). Those with an unfavourable pattern of attendance were 1.6 times more likely to have deep periodontal pockets than adults in the favourable attendance group (26% compared with 16%). Prevalence of this condition for adults with an intermediate pattern of dental attendance was 22%.

Table 6.8: Prevalence ^(a) of gum disease, by pattern of dental attendance

| Gum disease | | Pattern of dental attendance | | |
|--|--------|------------------------------|--------------|--------------|
| | | Favourable | Intermediate | Unfavourable |
| Per cent with gingivitis | % | 15.0 | 21.2 | 24.1 |
| | 95% CI | (12.2,17.8) | (18.3,24.2) | (20.6,27.5) |
| Per cent with 2+mm gingival recession | % | 54.5 | 56.6 | 56.3 |
| | 95% CI | (51.1,58.0) | (53.0,60.3) | (52.3,60.2) |
| Per cent with moderate/severe periodontitis | % | 18.8 | 26.5 | 28.9 |
| | 95% CI | (16.8,20.9) | (23.4,29.6) | (25.8,32.1) |
| Per cent with 4+ mm periodontal pocket depth | % | 15.8 | 22.1 | 25.7 |
| | 95% CI | (13.5,18.1) | (18.9,25.3) | (21.7,29.6) |

(a) Age- and sex-adjusted via logit model.

Figure 6.2 illustrates the prevalence of gum disease by pattern of dental attendance.



Prevalence ratios that compare the proportion of adults experiencing gum disease by pattern of dental attendance are provided in Table 6.9. These ratios were derived from the values reported in Table 6.8. The favourable attendance group was used as the reference group for comparison.

Table 6.9: Gum disease by pattern of dental attendance (prevalence ratios ^(a))

| Gum disease | | Pattern of dental attendance | |
|--|--------|------------------------------|-----------------------------|
| | | Unfavourable vs. favourable | Intermediate vs. favourable |
| Per cent with gingivitis | Ratio | 1.6 | 1.4 |
| | 95% CI | (1.3,2.0) | (1.1,1.8) |
| Per cent with 2+ mm gingival recession | Ratio | 1.0 | 1.0 |
| | 95% CI | (0.9,1.1) | (0.9,1.1) |
| Per cent with moderate/severe periodontitis | Ratio | 1.5 | 1.4 |
| | 95% CI | (1.3,1.8) | (1.2,1.6) |
| Per cent with 4+ mm periodontal pocket depth | Ratio | 1.6 | 1.4 |
| | 95% CI | (1.3,2.0) | (1.2,1.7) |

(a) Age- and sex-adjusted via logit model.

6.3 Conclusions

The average number of teeth affected by dental decay experience did not vary by pattern of dental attendance. However, the nature of this decay experience and the way it was managed varied significantly. Adults with an unfavourable pattern of dental attendance had more teeth with untreated decay (1.1 compared with 0.3 teeth), and more teeth missing due to dental disease (6.1 compared with 3.9 teeth), than those with favourable attendance. Conversely, those with favourable attendance had a higher number of teeth restored than those with unfavourable attendance (9.3 compared with 6.1 teeth). These findings reflect the type of dental care received to treat dental decay. Those seeking regular dental check-ups were more likely to have dental decay treated promptly, which led to less untreated decay, fewer extractions and more teeth restored with fillings.

Adults with an unfavourable attendance pattern were 2.5 times more likely to have an inadequate dentition than those with favourable attendance (20% compared with 8%). An inadequate dentition was also more frequent among adults with an intermediate pattern of dental attendance (13%).

Gum disease was more frequent among adults with an unfavourable pattern of dental attendance. In particular, those with unfavourable attendance were 1.6 times more likely to have gingivitis, and 1.5 times more likely to have periodontitis, than adults with favourable attendance. The presence of periodontal pockets of 4 mm or more was also more prevalent among those with unfavourable attendance.

Adults with an intermediate pattern of dental attendance also had higher levels of gum disease than those with favourable attendance. However, prevalence of gingivitis and periodontitis in this intermediate attendance group was lower than that reported for adults with unfavourable attendance.

References

- Australian Bureau of Statistics (ABS) 2008. Information Paper: Census of Population and Housing – Socio-Economic Indexes for Areas, Australia, 2006. Catalogue No. 2039.0. Canberra: Commonwealth of Australia.
- Bedos C, Levine A and Brodeur J-M 2009. How people on social assistance perceive, experience, and improve oral health. *Journal of Dental Research* 88(7): 653–7.
- Jamieson LM, Armfield JM & Roberts-Thomson KF 2007. Oral health of Aboriginal and Torres Strait Islander children. Cat. no. DEN 167. Canberra: Australian Institute of Health and Welfare (Dental Statistics and Research Series No. 35).
- Kelly M, Steele J, Nuttal N, Bradnock G, Morris J, Nunn J, Pine C, Pitts N, Treasure E & White D 2000. Adult Dental Health Survey: Oral health in the United Kingdom in 1998. London: The Stationery Office.
- NHHRC (National Health and Hospitals Reform Commission) 2008. A Healthier Future For All Australians – Interim Report December 2008. Commonwealth of Australia 2009. Available online at: <<http://www.health.gov.au/internet/nhhrc/publishing.nsf/Content/home-1>>.
- NHHRC 2009. A Healthier Future For All Australians – Final Report of the National Health and Hospitals Reform Commission – June 2009. Commonwealth of Australia 2009. Available online at: <<http://www.health.gov.au/internet/nhhrc/publishing.nsf/Content/home-1>>.
- Roberts-Thomson KF & Do L 2007. Oral health status. In: Slade, GD, Spencer AJ & Roberts-Thomson KF (eds). *Australia's dental generations: the National Survey of Adult Oral Health 2004–06*. Cat. no. DEN 165. Canberra: Australian Institute of Health and Welfare (Dental Statistics and Research Series no. 34), 81–142.
- Slade GD, Roberts-Thomson KF & Ellershaw A 2007a. Survey aims and methods. In: Slade GD, Spencer AJ & Roberts-Thomson KF (eds). *Australia's dental generations: the National Survey of Adult Oral Health 2004–06*. Cat. no. DEN 165. Canberra: Australian Institute of Health and Welfare (Dental Statistics and Research Series no. 34), 11–36.
- Slade GD, Spencer AJ & Roberts-Thomson KF (eds) 2007b. *Australia's dental generations: the National Survey of Adult Oral Health 2004–06*. Cat. no. DEN 165. Canberra: Australian Institute of Health and Welfare (Dental Statistics and Research Series no. 34).
- Spencer AJ & Harford JE 2008. Improving oral health and dental care for Australians. Prepared for the National Health and Hospitals Reform Commission. Available online at: <<http://www.health.gov.au/internet/nhhrc/publishing.nsf/Content/discussion-n-papers>>.
- Spencer AJ, Sendziuk P, Slade GD & Harford J 2007. Interpretation of findings. In: Slade, GD, Spencer AJ & Roberts-Thomson KF (eds). *Australia's dental generations: the National Survey of Adult Oral Health 2004–06*. Cat. no. DEN 165. Canberra: Australian Institute of Health and Welfare (Dental Statistics and Research Series no. 34), 236–47.
- Thomson WM, Williams SM, Broadbent JM, Poulton R & Locker D 2010. Long-term dental visiting patterns and adult oral health. *Journal of Dental Research* 89(3):307–11.

List of tables

| | | |
|-------------|--|----|
| Table 2.1: | Sample size for each phase of the NSAOH | 5 |
| Table 3.1: | Derivation of pattern of dental attendance | 9 |
| Table 3.2: | Pattern of dental attendance..... | 9 |
| Table 4.1: | Pattern of dental attendance, by age and sex (per cent) | 10 |
| Table 4.2: | Pattern of dental attendance, by cardholder status and dental insurance status (per cent) | 11 |
| Table 4.3: | Pattern of dental attendance, by annual household income (per cent) | 12 |
| Table 4.4: | Pattern of dental attendance, by highest education level and work status (per cent) | 13 |
| Table 4.5: | Pattern of dental attendance, by residential region and country of birth (per cent)..... | 14 |
| Table 4.6: | Pattern of dental attendance, by SES group and dwelling ownership (per cent) | 16 |
| Table 5.1: | Self-reported health characteristics by pattern of dental attendance (per cent) | 19 |
| Table 5.2: | Self-reported health characteristics by pattern of dental attendance (prevalence ratios) | 21 |
| Table 5.3: | Treatment received during previous 12 months by pattern of dental attendance (per cent) | 22 |
| Table 5.4: | Dental treatment received by dental attendance pattern (prevalence ratios)..... | 23 |
| Table 5.5: | Social impact of dental problems by pattern of dental attendance (per cent) | 25 |
| Table 5.6: | Social impact of dental problems by pattern of dental attendance (prevalence ratios) | 25 |
| Table 5.7: | Prevalence of oral hygiene behaviours, by pattern of dental attendance (per cent)..... | 26 |
| Table 5.8: | Oral hygiene behaviours, by pattern of dental attendance (prevalence ratios) | 27 |
| Table 5.9: | Barriers to accessing dental care by pattern of dental attendance (per cent)..... | 28 |
| Table 5.10: | Barriers to accessing dental care, by pattern of dental attendance (prevalence ratios) | 29 |
| Table 6.1: | Pattern of dental attendance for examined adults..... | 30 |
| Table 6.2: | Mean number of decayed, missing, filled teeth per person, by age and sex | 31 |
| Table 6.3: | Mean number of decayed, missing, filled teeth per person by pattern of dental attendance | 32 |
| Table 6.4: | Prevalence of dental decay experience, by age and sex..... | 34 |
| Table 6.5: | Prevalence of dental decay experience, by pattern of dental attendance..... | 35 |
| Table 6.6: | Dental decay experience, by pattern of dental attendance (prevalence ratios) | 35 |
| Table 6.7: | Prevalence of gum disease by age and sex (per cent) | 38 |

Table 6.8: Prevalence of gum disease, by pattern of dental attendance39

Table 6.9: Gum disease by pattern of dental attendance (prevalence ratios)40

List of figures

Figure 5.1: Treatment mix associated with pattern of dental attendance23

Figure 6.1: Mean number of decayed, missing and filled teeth, by pattern of dental attendance33

Figure 6.2: Prevalence of gum disease by pattern of dental attendance40