

Distribution of coronal and root caries experience among persons aged 60+ in South Australia

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Abstract

This report provides epidemiological data describing caries experience among the population of non-institutionalized older adults in Adelaide and Mt Gambier. Subjects were selected in a stratified random sample of persons aged 60+ who were listed on the South Australian Electoral Database. Oral examinations were conducted by four calibrated dentists among 853 dentate persons aged 60 years and over. There was an average of 14.7 missing teeth, 8.3 filled teeth and 0.3 decayed teeth, and a further 0.2 teeth were present as retained roots. The mean number of missing teeth was higher ($p < 0.05$) in older compared with younger age groups, and in Mt Gambier compared with Adelaide. The mean DFS of 22.1 was significantly higher ($p < 0.05$) among younger persons, females and in Adelaide. Root surface caries affected an average of 3.1 surfaces, and was greater ($p < 0.05$) among persons aged 70-79 years, males and Adelaide residents. However, when root caries was expressed as an attack rate per 100 exposed surfaces, differences were statistically significant only among age groups. Analysis of specific teeth revealed that no more than 40 per cent of molars were retained, and between 30 and 58 per cent of retained molars had coronal fillings.

Key words: Dental caries, DMF index, dental health surveys, aged, epidemiology.

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Introduction

Oral epidemiological surveys provide descriptive data which are valuable to document the burden of illness and to monitor temporal changes in levels of disease within populations. Australia has an extensive time-series database describing caries experience of children which, since 1977, has demonstrated a

decline in DMFT to the 1992 mean of 1.2 among 12 year olds¹ – very near the Year 2000 health target of 1.0 DMFT for that age group.² Health targets for older adults have been expressed only in terms of the prevalence of edentulism, with findings from the 1987/88 National Oral Health Survey³ suggesting that Australia is well towards achieving the Year 2000 target of 40 per cent prevalence of edentulism among persons aged 65 years and over. However, Australian data describing dental caries experience among older adults are more limited, being reported in four surveys covering the period from 1984 to approximately 1989.

In the 1984 Brisbane Statistical Division Survey there was a mean of 16.6 missing teeth, 6.3 filled teeth and 1.1 decayed teeth among dentate persons aged 65+.⁴ In the subsequent year, a survey of adults in Melbourne was conducted and included caries experience data for people aged 55+.⁵ In 1987/88 the National Oral Health Survey of Australia found an average of 17.0 missing, 5.9 filled and 1.4 decayed teeth.³ Another Melbourne study was conducted around 1989 among residents of senior citizens' centres aged 60 years and over.⁶ Findings from these studies, albeit during a short period, suggest that there was no appreciable change in caries experience of dentate older adults.

Current projections suggest that the combined influences of an ageing population, reducing levels of tooth loss, and persistent levels of dental caries experience among older adults will create a growing pool of teeth which are at risk of caries, and an increase of approximately 50 per cent in the number of teeth requiring restoration among persons aged 65 years and over.⁷ This trend has been acknowledged recently by the National Health and Medical Research Council which noted that older adults remain susceptible to coronal and root caries and that the 'oldest-old' group (aged 80+) in Australia had extensive signs of accumulated oral disease.⁸

Additional features of dental caries experience among older adults need to be understood in order

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to adequately monitor oral health status and to plan for the provision of dental care. One feature concerns the severity of caries experience, as measured by the number of tooth surfaces (rather than the number of teeth) which are filled or decayed. For example, the US national survey of senior citizens found a mean of 7.6 decayed or filled teeth, but a mean of 20.4 decayed or filled surfaces among persons aged 65+.⁹ Root caries represents another dimension of caries experience which is particularly important among older adults because so many teeth have periodontal attachment loss and exposed root surfaces. However, previous Australian studies have not reported caries experience at the level of tooth surfaces, and only the National Oral Health Survey of Australia collected information about root caries experience, albeit at the tooth level.

In order to add to the existing information about oral health of older adults in Australia, this report aimed to provide epidemiological data describing caries experience among the population of non-institutionalized older adults in Adelaide and Mt Gambier.

Materials and methods

This report presents findings from data collected between July 1991 and March 1992 for the baseline phase of the South Australian Dental Longitudinal Study – an oral epidemiological study of people aged 60+ years in Adelaide and Mt Gambier.

Source of subjects

Subjects were selected at random from a stratified sample of persons listed on the Electoral Database maintained by the South Australian Electoral Commission – a compulsory register for Australian citizens aged 18 years or more. People aged 60+ years in the Adelaide Statistical Division were sampled from 18 strata defined by three age groups, two sexes and three locality categories. People aged 60+ years in the Mt Gambier city and district were sampled from six strata defined by three age groups and both sexes. The listed residential address of each sampled person was visited by an interviewer. Up to six visits were made to each address to locate sampled persons, and non-contacted addressees were revisited some two months later. When subjects were contacted, a fourth level of stratification was used to select all dentate people and, in Adelaide, a random sub-set of edentulous people. This was done to avoid over-sampling edentulous persons. An additional criterion was used at the time of contact to exclude any persons living in nursing homes or hospitals (but not hostels for the aged). After obtaining the consent of participants, the interviewer conducted a face-to-face interview containing 72 questions about demographic characteristics, dental health status, use of dental services, preventive

practices, residential history, socio-demographic characteristics and medical conditions.

The two cities were selected for this study in order to obtain subjects with a range of exposures to fluoridated water. The water supply in Adelaide was fluoridated in 1971, while Mt Gambier has never had a fluoridated water supply. During the interview, data were collected on individuals' residential histories and their use of public water, and those data were used to quantify levels of fluoride exposure which will be examined in a separate report. Consequently, for this report, findings for the two cities are presented simply for descriptive purposes.

Oral examinations

Interviewed people were invited to take part in an oral examination which followed the US National Institute of Dental Research protocol. Examinations were conducted by one of four calibrated dentists, all of whom underwent three days of prior training and standardization under the direction of Dr Ron Hunt who had experience with the use of the protocol in surveys of older adults conducted in Iowa and North Carolina. Mirrors and probes were used under standardized illumination to assess the status of teeth and periodontal tissues. Radiographs were not taken.

Dental caries experience was recorded for all teeth present in the mouth, including third molars. Examiners categorized teeth as present or missing, although the presumed reasons for tooth loss were not recorded. Teeth were coded separately as tooth roots if they were severely broken down, with more than three quarters of the natural or restored coronal structure missing (for example because of decay or fracture). Surfaces of tooth crowns were categorized by examiners as decayed, filled, or sound, and teeth with full crowns were coded separately. Five surfaces were coded for premolars and molars, while four surfaces were coded for incisors and canines. For each tooth, root caries experience was recorded separately by designating root surfaces which were decayed, filled or sound. To be registered as sound, the root surface had to be visible. Root surfaces in which there had been no recession of the gingival margin apical to the cemento-enamel junction were not recorded as sound but rather as unexposed. Four root surfaces were recorded in this way for each tooth.

Examiners used two sub-categorizations in the coding scheme for filled and decayed surfaces. Decayed surfaces were identified as 'recurrent' if the decay was contiguous with the margin of a filling, or simply as 'decayed' if there was primary caries on the surface. Restorations which had non-carious defects (such as fractures or marginal discrepancies) which were judged severe enough to warrant replacement of the restoration were coded as 'filled-unsatisfactory', while other restored surfaces were

coded simply as filled. For both coronal and root surface fillings, there was no attempt to ascertain the original reason for placement of the filling.

Analysis

The components of DMFT were computed during the analysis. A tooth was designated as decayed if any coronal surface was decayed, regardless of the status of other coronal surfaces. If at least one coronal surface was filled, but there were no decayed surfaces, the tooth was designated as filled. The total number of missing teeth was summed, excluding teeth which were coded as retained roots. The components of DFS were computed by summing the number of decayed (D) and filled (F) surfaces, both for coronal surfaces and root surfaces. An attack rate was also computed, both for coronal and root surfaces, by dividing the sum of decayed and filled surfaces by the sum of decayed, filled and sound surfaces, and multiplying by 100. For each index, this gave a potential range from zero to 100 per cent. In the case of root surfaces, this attack rate was equivalent to Katz's Root Caries Index.¹⁰

Mean indices were computed for all persons in the sample, for those aged 65 years and over, and for sub-groups defined by three age groups, both sexes and the two cities. The reason for reporting DMFT indices and results for persons aged 65 years and over was to maintain comparability with previously published reports. Statistical evaluation of differences between groups was made using the non-parametric Kruskal-Wallis test. In addition to these means, the pooled data from all teeth were used to describe the percentage of teeth which were present, and the percentage of retained surfaces which were decayed or filled.

Examiner reliability

Inter-examiner reliability was assessed from thirty pairs of replicate examinations conducted among the four examiners using subjects in the study. Intra-class correlation coefficients were 0.99 for missing teeth, 0.91 for retained roots, 0.98 for the coronal DFS index and 0.70 for root DFS index, all indicating good or excellent reliability.

Weighting

In order to compute estimates which could be generalized to the Adelaide and Mt Gambier populations of non-institutionalized persons aged 60 years and over, data in this report (other than response rates) were weighted to account for the stratified sampling scheme. Weights for each of the 24 sampling strata were computed using the stratum-specific population size (obtained from the Electoral Database) as numerator and stratum-specific sample size as denominator. That figure was further divided by the quotient of the complete population size divided by the complete sample size

Table 1. Number of people sampled, interviewed and examined

No. of dentate and edentulous persons sampled	2751 (100.0)
Unable to contact	58 (2.1)
Deceased or declined due to illness	366 (13.3)
Refused interview	677 (24.6)
Participated in interview	1650 (60.0)
Dentate interviewed persons	1205 (100.0)
Dentate examined persons	853 (70.8)

Percentage in parenthesis.

in order to avoid inflating the total number of cases used for the analysis.

Ethical review

This research project was reviewed and approved by the Committee on the Ethics of Human Experimentation at the University of Adelaide. Informed, signed consent for the interview and examination was obtained from all participants.

Results

Participation in the study – unweighted data

Table 1 presents details of participation in the study. Some 2751 people were sampled, and 1650 (60%) of them took part in the face-to-face interview. Among the interviewed group, 1205 people were dentate, and 853 (70.8%) of them had a complete oral examination which included assessment of caries experience. The main reasons for non-participation in the interview could not always be elicited, although the most commonly mentioned reasons were disinterest or illness.

Table 2 presents characteristics of dentate interviewed people, comparing those who participated in the examination with those who did not. Examined people were younger by an average of one year, were more likely to have made a dental visit within the previous year (62.4 per cent of examined people compared with 54.6 per cent of non-examined

Table 2. Characteristics of examined and non-examined dentate persons who completed household interview

	Examined	Non-examined	p-value
Age (mean years)	70.8	71.7	0.05*
Female (%)	41.8	46.2	0.16
Australian born (%)	70.0	69.3	0.80
No. of medical conditions (mean)	1.8	1.8	0.83
Last dental visit <1 year (%)	62.4	54.6	0.01†
Last visit to public dental clinic (%)	20.4	18.7	0.48
Perceived need for dental care (%)	33.2	25.0	0.01†
Difficulty paying \$100 dental fee (%)	13.4	13.5	0.98
Age completed education (mean years)	15.0	14.9	0.42

*Student's *t* test.

†Chi-square test (1 df).

Table 3. DMFT and retained roots

Group No.		No. of teeth (mean±sd)				
		Missing	Retained roots	Decayed	Filled	DMFT
All persons	853	14.7±7.6	0.2±0.8	0.3±0.6	8.3±6.1	23.3±5.1
Age 65+ years	640	15.3±7.0	0.1±0.6	0.2±0.5	8.2±5.7	23.7±4.4
Age group (years)						
60-69	431	14.0±8.7*	0.2±1.1	0.3±0.7	8.6±6.9*	22.8±6.0*
70-79	306	15.4±6.3	0.1±0.5	0.2±0.5	8.3±5.2	23.9±4.1
80+	116	17.9±5.2	0.3±0.6	0.3±0.5	6.1±4.1	24.3±3.1
Sex						
Male	497	15.0±7.2	0.3±1.0	0.3±0.7*	7.4±5.5*	22.8±5.4*
Female	356	14.4±8.0	0.1±0.4	0.2±0.5	9.2±6.6	23.8±4.5
City						
Mt Gambier	347	16.3±2.2*	0.2±0.3	0.3±0.2	7.3±1.9*	23.9±1.5
Adelaide	506	14.7±9.7	0.2±1.1	0.3±0.8	8.3±7.7	23.2±6.5

*p 0.05, Kruskal-Wallis test.

people), and were more likely to perceive a need for dental care (33.2 per cent compared with 25.0 per cent), and those differences were statistically significant (p=0.05). On a series of other characteristics presented in Table 2, differences between participants and non-participants were small and statistically non-significant.

Tooth loss and status of teeth – weighted data

Table 3 presents the mean number of teeth which were missing, decayed, filled or which were present only as retained roots. For the complete sample, there was an average of 14.7 missing teeth, and a further 0.2 retained roots. There were higher levels of tooth loss among people in older age groups and among Mt Gambier residents (p<0.05). For the complete sample, there was a mean of 0.3 decayed teeth and 8.3 filled teeth. Differences between men and women in the mean number of decayed teeth reached statistical significance, although the magnitude of the difference (mean=0.3 for men and 0.2 for women) was small. Filled teeth were more frequent among younger age groups, women and Adelaide residents (p<0.05). The overall mean DMFT of 23.3 differed among demographic groups by no more than 1.5 which was statistically significant only among age groups and the sexes. The relatively small

age differences in DMFT reflect the contrasting age-associated trends of increasing missing teeth and decreasing filled teeth.

Although not shown in Table 3, 9.8 per cent of people in the complete sample had one or more retained roots, 18.4 per cent had one or more decayed teeth and 91.0 per cent had one or more filled teeth. For people aged 65+ years, the corresponding percentages were 9.8, 17.5 and 92.2 per cent. Only 0.5 per cent of persons had no missing teeth and all of them were aged 65+ years.

Among teeth categorized as filled, 8.4 per cent were restored with full crowns, 2.2 per cent had unsatisfactory (non-carious) restorations, and the remainder had satisfactory restorations which were not full cast crowns. Among decayed teeth, 22.3 per cent of teeth had recurrent caries, and the remainder had primary caries. Among the retained roots, 50.8 per cent were carious, and the remainder were sound.

Distribution of coronal caries experience – weighted data

Table 4 displays the mean number of coronal surfaces with caries experience. The mean number of decayed surfaces (0.3) was equivalent to the mean

Table 4. Coronal DFS and components

Group	No. of surfaces (mean±sd)				% Coronal surfaces with DF
	Decayed	Filled	DFS		
All persons	0.3±0.9	21.8±18.7	22.1±18.6		26.5
Age 65+ years	0.3±0.8	21.5±17.2	21.8±17.2		27.0
Age group (years)					
60-69	0.4±1.1	22.8±21.6*	23.1±21.6*		26.6
70-79	0.3±0.8	21.6±15.8	21.9±15.7		27.4
80+	0.3±0.6	14.9±12.0	15.2±12.1		22.4
Sex					
Male	0.4±0.9*	19.1±16.3*	19.5±16.3*		24.4*
Female	0.2±0.9	24.6±21.2	24.8±21.1		28.7
City					
Mt Gambier	0.4±0.4*	17.8± 5.4*	18.2± 5.4*		23.1*
Adelaide	0.3±1.1	22.0±23.8	22.3±23.8		26.7

*p 0.05, Kruskal-Wallis test.

Table 5. Root DFS and components

Group	No. of surfaces (mean±sd)			% Root surfaces with DF
	Decayed	Filled	DFS	
All persons	0.4±1.2	2.7±3.5	3.1±3.6	11.9
Age 65+ years	0.4±1.0	3.1±3.5	3.5±3.5	12.8
Age group (years)				
60-69	0.4±1.3*	2.4±3.7	2.8±3.9*	11.4*
70-79	0.5±1.0	3.2±3.4	3.7±3.4	13.1
80+	0.7±1.1	2.6±2.7	3.2±2.8	11.6
Sex				
Male	0.6±1.3*	2.8±3.4	3.4±3.5*	12.6
Female	0.3±0.9	2.6±3.6	2.8±3.7	11.2
City				
Mt Gambier	0.5±0.5	2.2±0.9*	2.8±1.0*	11.7
Adelaide	0.4±1.5	2.7±4.4	3.1±4.6	11.9

*p 0.05, Kruskal-Wallis test.

number of decayed teeth (Table 3). There were statistically significant differences in the mean number of decayed surfaces between the sexes and between the two cities, although sub-group differences did not exceed 0.2 surfaces (Table 4). For the complete sample, there was an average of 21.8 filled surfaces – some 2.6 times the mean of 8.3 filled teeth observed in Table 3. Although not shown in the tables, only 20.4 per cent of restored molars and premolars had single surface restorations, and 7.0 per cent had 5 surface restorations, excluding full crowns. For incisors and canines, 48.2 per cent of restored teeth had a single surface restoration, while 7.3 per cent had 4 surface restorations, excluding full crowns.

The mean number of filled surfaces was significantly greater among younger age groups, among females and in Adelaide, with differences as large as 7.9 surfaces among the three age groups (Table 4). There was an average of 22.1 decayed or filled surfaces, and there were statistically significant differences among all three demographic sub-groups. When the level of coronal caries experience was expressed as an attack rate, differences among age groups became smaller (26.5 per cent of surfaces among 60-69 year olds compared with 22.4 per cent among those 80 years and older) and they were not statistically significant. However, significant differences in coronal caries attack rates persisted between the sexes and between the cities (p<0.05).

Distribution of root caries experience – weighted data

The mean of 0.4 decayed root surfaces (Table 5) was greater than the mean of 0.3 decayed coronal surfaces observed in Table 4. Decayed root surfaces were more frequent in the oldest age group and among males (Table 5, p<0.05). The mean of 2.7 filled root surfaces (Table 5) was substantially smaller than the corresponding mean of 21.8 filled coronal surfaces (Table 4). The mean number of filled root surfaces was higher in Adelaide than Mt Gambier (p<0.05). The mean root DFS index was 3.1 for the complete sample, and differed significantly among age, sex and

city groups. However, when root caries experience was compared among sub-groups using the measure of attack rate, differences were apparent only among the age groups, where people aged 70-79 years had the highest attack rate. The root caries attack rate for the complete sample (11.9 per cent) was substantially less than the coronal caries attack rate for all persons (26.5% – Table 4). However this two-fold difference in attack rates between coronal and root surfaces was smaller than the seven-fold difference between mean DFS indices for the two categories of surfaces (coronal DFS=22.1 compared with root DFS=3.1).

Tooth-specific patterns of caries experience – weighted data

Table 6 presents data from specific tooth categories, describing the percentage of teeth which were present and the percentage of retained surfaces which were filled or decayed, both for coronal and root surfaces. Approximately 90 per cent of mandibular incisors and canines were present, while only 21 per cent of maxillary first molars and 22 per

Table 6. Percentage of surfaces with caries experience among specific teeth

Tooth	Teeth (%)		Coronal surfaces (%)		Root surfaces (%)	
	Present		Filled	Decayed	Filled	Decayed
Maxilla						
1	54		33	0.3	12	4
2	49		31	0.6	13	2
3	57		26	0.5	18	3
4	36		44	0.9	17	3
5	32		46	0.8	12	2
6	21		54	0.3	10	1
7	38		43	0.9	7	1
8	26		30	0.9	4	3
Mandible						
1	89		5	0.3	3	1
2	91		5	0.2	4	1
3	94		8	0.5	9	3
4	76		21	0.5	15	2
5	51		35	0.5	13	3
6	22		58	1.1	18	3
7	40		45	0.8	11	3
8	25		34	0.8	9	3

cent of mandibular first molars were present. Seven of the 16 tooth categories in Table 6 had a greater than 50 per cent probability of being retained within this sample of older adults. All of the molars had a probability of 40 per cent or less of being retained. Furthermore, between 30 and 58 per cent of retained molar surfaces were filled. In contrast, fewer than 10 per cent of retained surfaces in mandibular incisors and canines were filled. Much smaller percentages of retained coronal surfaces were decayed.

Between 3 per cent and 18 per cent of retained, exposed root surfaces were filled, and the tooth-specific pattern was different from the pattern for coronal caries experience (Table 6). In the maxilla, exposed root surfaces of canines had the greatest likelihood of being filled (18 per cent) while in the mandible it was the first molar. Between 1 and 4 per cent of exposed root surfaces had decay.

Discussion

In this study of dentate people aged 60 years and over living independently in Adelaide and Mt Gambier, there was extensive caries experience, with an average DMFT of 23.3 teeth per person, and an average coronal DFS of 22.1 surfaces per person. Although less extensive, there were additional retained roots and root surfaces which were decayed or filled. Caries experience varied among tooth categories. More than 60 per cent of molars were missing and between 30 and 58 per cent of the coronal surfaces of molars had fillings. Four-fifths of molars and premolar teeth had fillings affecting two or more surfaces. In contrast, mandibular incisors and canines had the lowest experience of caries. This intra-oral pattern confirms historically observed differences in caries susceptibility among tooth categories.^{5,11} Consequently, this population of dentate older adults can be characterized as one with numerous missing teeth and with many multi-surface fillings in their remaining teeth.

A factor which affects the interpretation of these results is the protocol for coding missing and filled teeth. Examiners did not attempt to ascertain the underlying cause of missing teeth, and therefore the DMFT index must include some teeth which were extracted because of periodontal disease, trauma, or for other reasons. This is a limitation of the index which is particularly relevant for elderly populations.¹² The assumption that teeth are missing because of caries is one which is made in the World Health Organization's protocol¹³ used in previous Australian studies. The protocol used in the current study also did not seek to ascertain the reasons for placement of restorations, and therefore the coronal and root DFS indices must include some surfaces which were filled because of trauma, abrasion, and other non-caries related reasons. This differs from the WHO

protocol, which asks examiners to determine the reasons for placement of restoration. However, during examiner training and calibration sessions, the authors were unable to obtain satisfactory agreement among examiners concerning such decisions, and subjects usually could not recall the original reasons for specific restorations. Consequently, in order to maintain acceptable inter-examiner reliability, the current protocol of including all restored surfaces in the DFS index was adopted, although it is acknowledged that this must inflate the index.

Another factor influencing the interpretation of these findings concerns the potential for bias which could be introduced if participants were not representative of the sampled population. It was found that examined people were older, more likely to have made a recent dental visit, and more likely to perceive a need for dental care compared with non-examined people. This may have influenced the observed level of untreated decay, which was lower in this study (mean DT=0.2) compared with means that ranged from 1.1 to 1.4 in previous Australian studies.³⁻⁶ However, another factor could be related to the protocol in this study which coded retained roots separately, unlike other protocols which usually regard retained roots as decayed. In addition, untreated carious lesions which extended onto both a root and coronal surface were designated as root surface lesions if more than half of the lesion occurred on the root. Consequently, if all retained roots were recoded as decayed, and if half of the decayed lesions on root surfaces were coded as coronal, then the mean number of decayed teeth would be approximately 0.7 – much closer to the values observed in previous studies.

Despite differences in the mean number of decayed teeth, the main impression gained from a comparison with previous Australian studies is the similarity in mean DMFT: 23.7 for people aged 65+ in this study which is within the range from 22.1 for people aged 55+ in Melbourne, 1985,⁵ to 25.0 for people aged 60+ at senior citizens centres in Melbourne, 1989.⁶ This static picture is in contrast to observed reductions in edentulism among older adults: in the 1984 Brisbane survey,⁴ 59.7 per cent of persons aged 65+ years were edentulous, compared with 41.1 per cent of Adelaide residents aged 65+ in this sample.¹⁴ The consistency in DMFT also contrasts with findings from school-age children, where the national estimate for 12-year-old DMFT halved from a mean of 2.4 in 1984 to 1.2 in 1992.¹

For older adults, it appears likely that larger temporal changes will emerge among the missing and filled components of caries experience, rather than the aggregate DMFT index. For example, in this South Australian sample, the ratio of missing to filled teeth was 2.9 for people aged 80+ compared with 1.6 for people aged 60-69 (Table 3). Furthermore, surface-level measurements are likely to reveal

larger age differences than the coarser measure of teeth. For example, people aged 60-69 years had 41 per cent more filled teeth than people aged 80+ years (Table 3), whereas they had 52 per cent more filled surfaces (Table 4).

The only other Australian study to have reported root caries experience was the National Oral Health Survey of Australia, which found a mean of 0.8 teeth with decayed or filled root surface(s) per dentate person aged 65+ years – apparently substantially less than the figure of 3.5 surfaces per person aged 65+ in this study. The level of root caries experience observed here is very similar to the mean of 3.2 surfaces per person observed in the US national survey of seniors.⁹

Root surfaces had substantially lower mean DFS levels compared with coronal DFS, although when attack rates are compared, the rate for root caries was approximately one-third of the rate for coronal surfaces. Nonetheless, the attack rate of 11.9 per cent for root surfaces represents an important hazard because many of the root surfaces would have been exposed probably for no more than a few decades, compared with coronal surfaces which would have been exposed for nearly a lifetime. Furthermore, the number of surfaces with untreated decay was slightly greater for roots (mean=0.4) compared with tooth crowns (mean=0.3). This highlights the importance of preventive measures directed towards both the prevention of periodontal attachment loss in younger ages, and the prevention of root surface caries in older ages. As well, there is a need for additional clinical research to evaluate the most appropriate stage for restorative intervention in the progress of root caries.

Conclusions

In this study of Adelaide and Mt Gambier residents, the mean of 23.7 DMFT per person aged 65+ years was very similar to mean DMFT values observed in other Australian surveys of older adults conducted during the previous eight year period. This study also found an average of 3.5 decayed or filled root surfaces, a figure which appears substantially higher than the one previous Australian study which reported root caries experience, but a figure which is similar to findings from the national survey of seniors in the United States. Variations in mean DMFT levels among demographic groups in this study were not dramatic, although there were clear differences in the components of the DFS indices. In particular, men had fewer filled coronal surfaces but more decayed coronal surfaces than women, and men had higher mean DFS values for root surfaces. The findings from analyses of tooth surfaces demonstrated a heavy restorative burden for older adults in this study: one-half of incisors and canines and four-

fifths of premolars and molars had caries experience on two or more surfaces. When coupled with the very high rates of tooth loss for molar teeth, this provides an indication of a heavy legacy of dental caries experience among these older adults.

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