Geographic variation in preventable hospital admissions for dental conditions: an Australia-wide analysis

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Short running title: Preventable dental hospital admissions and remoteness

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Abstract

Objective: To describe the characteristics of hospital admissions for dental conditions, by Australian Statistical Geography Standard (ASGS) remoteness area for the five years 2010/11 to 2014/15.

Design: Retrospective analysis of preventable hospital admissions due to dental conditions.

Setting: National data set provided by the Australian Institute of Health and Welfare.

Participants: Every hospital admission for patients who were admitted for dental conditions over five financial years, from 2010/11 to 2014/15.

Main outcome measures: The number (and rate per 1,000 population) of hospital admissions due to dental conditions in each Australian Statistical Geography Standard (ASGS) remoteness area (major city, inner regional, outer regional, remote and very remote).

Results: There were 316,937 hospital admissions for dental conditions over the five-year period. The rate of potentially preventable dental hospital admissions ranged from an average of 2.5 per 1,000 population in major cities to 3.2 in inner regional areas, 3.1 in outer regional areas, and 4.1 per 1,000 in remote and very remote areas. The rate of admissions was highest among those aged 0-14 years living in remote (9.0-10.0 per 1,000) and very remote (9.8-12.5 per 1,000) areas. Dental caries was the most common reason for admissions.

What is already known on this subject?

- Potentially preventable hospital admissions include vaccine preventable conditions, acute conditions and chronic conditions.
- Dental conditions comprise approximately 21% of preventable hospital admissions within the acute conditions category.
- Research conducted in Western Australia reported higher incidence of preventable admissions due to dental conditions among people in rural and remote areas.

1 **Conclusions:** There is an urgent need to address the social determinants of oral health in

What does this study add?

- In Australia from 1 July 2010 to 31 June 2015 there were 316,937 potentially preventable hospital admissions for dental conditions.
- Dental caries was the most common reason for admission.
- Children aged 0-14 years have living in remote and very remote areas have approximately double the rate of preventable dental-related hospital admissions of children living in major cities.

2 children aged 0-14 years living in remote and very remote Australia. The delivery of mobile
3 primary dental care services needs to be expanded in remote and very remote areas to prevent
4 and treat dental caries.

5

6 **Key Words:** Preventable hospital admissions, dental conditions, oral health, remoteness area

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1 Introduction

2 In Australia in 2016–2017 there were 715,000 potentially preventable hospitalisations,
3 representing approximately 8.4% of all public hospital separations.¹ Potentially preventable
4 hospital admissions are defined as, ‘Hospitalisations thought to have been preventable if
5 timely and adequate non-hospital care had been provided, either to prevent the condition
6 occurring, or to prevent the hospitalisation for the condition.’¹

7 The number of potentially preventable hospital admissions gives an indication of health
8 system performance in terms of accessibility to and effectiveness of primary health care, as
9 well as providing information on socioeconomic and racial disparities in the equitable supply
10 of primary health.^{2,3}

11 Preventable hospital admissions comprise vaccine-preventable conditions (e.g. measles),
12 acute conditions (e.g. urinary tract infections) or chronic conditions (e.g. diabetes
13 complications). Hospital admissions due to acute conditions are defined as ‘conditions that
14 may not be preventable, but theoretically would not result in hospitalisation if adequate and
15 timely care (usually non-hospital) was received.’² Urinary tract infections comprise the largest
16 group (23%) of preventable hospital admissions due to acute conditions, while dental
17 conditions (21%) and cellulitis (21%) represent the equal second largest numbers of
18 preventable acute admissions.²

19 Research conducted in Western Australia has reported that the incidence of preventable
20 hospital admissions due to dental conditions is higher in rural and remote areas versus major
21 cities.^{4,5} However, nationwide results by geographical remoteness have not been reported in
22 detail, only a brief summary is reported on the AIHW website.⁶ This study aimed to
23 determine rates of preventable hospital admissions due to dental conditions by geographical
24 remoteness.

25 Methods

26 Data on preventable hospital admissions for dental conditions were obtained from the
27 Australian Institute of Health and Welfare (AIHW) for a five financial-year-period (1 July to
28 31 June) from 2010/11 to 2014/15. As this data was de-identified and publicly available,
29 ethics committee approval was not sought for the research. The principal diagnosis for each
30 admission was determined by the treating clinician. Dental conditions comprise the principal

diagnosis categories of: dental caries, other diseases of hard tissues of teeth, diseases of the pulp and periapical tissues, gingivitis and periodontal diseases, other diseases of gingival and edentulous alveolar ridge, other disorders of teeth and supporting structures, other cysts of oral region, not elsewhere classified, or diseases of lip and oral mucosa.

The data set included sex, age group, remoteness area, length of stay in hospital (1, 2, 3, 4, 5+ days), same day flag (yes, no), and funding source (Private, Other). The treatment received was considered privately funded if it was funded by the individual or was covered by private health insurance. All non-private funding sources were defined as 'other'.

Remoteness areas are determined by the AIHW using the Australian Bureau of Statistics Australian Statistical Geography Standard (ASGS). The ASGS allocates areas to five main remoteness categories based on population characteristics and distance from population centres: RA1 major cities, RA2 inner regional, RA3 outer regional, RA4 remote, RA5 very remote. Two additional categories (migratory-offshore-shipping and no usual address) were not included in the dataset provided by AIHW.

The data were imported into Stata 15 for descriptive analyses.⁷ Crude rates per 1,000 and 95% confidence intervals were calculated by remoteness area, age and sex, for each of the five reference years (2010/11, 2011/12, 2012/13, 2013/14 and 2014/15), using Australian Bureau of Statistics Estimated Resident Population by Remoteness Areas for the years 2011, 2012, 2013, 2014 and 2015.⁸

The average rate of hospital admissions per 1,000 population was calculated for each diagnostic group: Dental caries, Other diseases of hard tissues of teeth, Diseases of pulp and periapical tissues, Gingivitis and periodontal diseases, Other disorders of gingiva and edentulous alveolar ridge, Other disorders of teeth and supporting structures, Cysts of oral region, not elsewhere classified, Stomatitis and related lesions, Other diseases of lip and oral mucosa. The mean rate was calculated using the mean number of admissions in each diagnostic category over the five-year period, with the mid-point year of 2013 used as the denominator Estimated Resident Population for each remoteness category.

Results

There were a total of 316,937 admissions to hospital for dental conditions during the five year period. For 1,711 admissions, there was no remoteness area data provided. Among the

1 remaining 315,226 admissions there were 205,779 (64.9%) from RA1 areas, 67,505 (21.3%)
2 from RA2 areas, 31,513 (9.9%) from RA3, 6,114 (1.9%) from RA4 and 4,315 (1.4%) from
3 RA5.

4 In each year, remote and very remote areas had the highest rate of dental admissions. The
5 confidence intervals for remote and very remote areas did not overlap with major cities, inner
6 regional or outer regional areas in any of the five years. In 2011 there were 4.1 dental
7 admissions per 1,000 population in remote areas and 3.9 in very remote areas. However, for
8 each subsequent year, the highest rate of dental admissions occurred within very remote
9 areas. Major cities had consistently lower rates of dental admissions, with an average of 2.5
10 preventable dental admissions per 1,000 population in each of the five years. Inner regional
11 areas had an average of 3.2 admissions per 1,000 population and outer regional areas had an
12 average of 3.1 per 1,000 population. Despite very remote areas having slightly higher rates of
13 preventable dental admissions than remote areas in each year except 2011, the average annual
14 rate was equivalent for remote areas (4.1 per 1,000 population) and very remote areas (4.1 per
15 1,000 population).

16 Females were more likely than males to be admitted for dental conditions in each year and
17 each remoteness area (Table 1). There was a trend of increasing preventable dental
18 admissions among those age 0-14 years, with increasing rurality (Table 2). The rate of
19 admissions among those aged 0-14 years living in major cities ranged from 5.0 per 1,000 to
20 5.2 per 1,000 in each of the five years, while the rate among the same age group living in
21 very remote areas ranged from 9.8 to 12.5 per 1,000. Conversely, for oldest group there was a
22 trend of decreasing preventable admissions with increasing rurality. For those aged 65 and
23 over living in major cities, the rate of admissions was 0.9 to 1.9 per 1,000 population. For the
24 same age group living in very remote areas the rate was 0.5 to 1.7 per 1,000. Among those
25 aged 15-24 years, the lowest rates were in major cities (1.8 to 3.9 per 1,000) and the highest
26 rates were in remote areas (2.5 to 5.2 per 1,000).

27 The most common diagnosis was dental caries, with an average overall rate of 1.4 admissions
28 per 1,000 population per year over the five-year period (Table 3). Figure 1 shows the rate of
29 admissions due to caries per 1,000 population in each year and by remoteness area. For each
30 year, the rate of admissions due to caries in very remote areas was almost double or double
31 (for 2013-2014) the rate found in major cities. The rate of caries in remote areas was also
32 almost double the rate in major cities.

The proportion of persons with private health insurance was inversely associated with rurality. Among those living in major cities, 143,629 (69.8%) had private health insurance, whereas 41,584 (61.6%) in inner regional areas, 15,737 (49.9%) in outer regional areas, 2,014 (32.9%) in remote areas and 607 (14.1%) in very remote areas had private health insurance.

Discussion

This is the first study in Australia to report on nationwide preventable hospitalisation admissions due to dental conditions. The rate of oral-health related hospital admissions was higher in remote and very remote areas of Australia than in major cities, inner regional and outer regional areas. These findings demonstrate disparities in social determinants and inequities in access to primary dental care in rural and remote areas of Australia as compared to the major cities. This is line with previous research in Australia where the prevalence of oral-health related hospital admissions increased with increasing remoteness and with characteristics that were associated with remoteness such as Indigenous identity, low access to care and being uninsured.⁹⁻¹³

In this study, dental caries was reported as the most common reason for oral health-related preventable hospital admissions. Despite, a significant decline in dental caries in the last few decades, it remains Australia's most prevalent oral health problem. It was also found that the rate of dental caries related hospital admissions increased with remoteness. This is in line with previous studies, where dental caries was reported as a main cause for preventable hospital admissions.^{4,5}

The National Survey in Adult Oral health (NSAOH) 2004-2006 reported that the prevalence of dental caries in people living outside of major cities was higher than those living in major cities (32.8% versus 21.5%).¹⁴ Similar trends were observed in National Child Oral Health Survey (NCOHS) 2012-2014, where the percentage of children with untreated decayed teeth was reported to be higher in outer regional areas (29.9%) and remote/very remote areas (37.8%) as compared to major cities (25.7%).¹⁵ Social determinants of health such as low education, low income, poor diet, smoking, alcohol consumption, poor dental visiting behaviour, inadequate oral hygiene practices and not having health insurance, are attributes that are commonly associated with geographic remoteness and dental caries.¹⁶⁻¹⁹ The consequences of oral health risk behaviours are compounded by the absence of water fluoridation and remoteness.²⁰ These factors contribute to the development of oral health

1 conditions that may result in avoidable hospital admissions. Children aged 0-14 years living
2 in remote and very remote areas had approximately double the rate of preventable hospital
3 admissions for dental conditions, compared to children living in major cities. This emphasises
4 the importance of health services working in collaboration with remote and very remote
5 communities to deliver comprehensive preventative programs to address modifiable oral
6 health risk factors among young children.

7 In this study the disorders of the teeth and supporting structures were estimated to be higher
8 in people residing in major cities as compared to remote and very remote areas. These
9 disorders comprise of exfoliation of teeth due to systemic causes, loss of teeth due to
10 accident, extraction or local periodontal disease, atrophy of edentulous alveolar ridge or
11 retained dental root. No previous studies have reported this finding, but this finding matches
12 with other attributes of geographic remoteness index, where non-Indigenous people and
13 people aged 60 years and older experience disorders of the teeth and supporting structures
14 more than their counterparts.⁵

15 The proportion of persons with private health insurance was inversely associated with
16 rurality. This indicates that costs of accessing private dental care would be higher for people
17 in rural and remote areas than for those people in urban areas. Previous research using the
18 Australian National Survey of Adult Oral Health found that people who have private health
19 insurance have a 56% higher probability of visiting a dentist.²¹ The lower levels of private
20 health insurance among rural and remote people in our study are likely to contribute to
21 delayed dentist visits (due to affordability concerns). This may lead to minor dental
22 conditions becoming acutely painful, resulting in preventable hospital admissions.

23 The limitations of this study included the following: firstly, there is the issue of varying time
24 periods – financial year for admissions and calendar year for ABS population estimates data.
25 To avoid underestimating rates, upper calendar year populations were used to calculate the
26 annual admissions rates. However, this may have led to slight underestimates of the true rate.
27 Secondly, the AIHW data did not include information on Aboriginal or Torres Strait Islander
28 status. The absence of this data meant that we could not accurately identify the groups most
29 at risk of preventable oral health-related hospital admissions across each remoteness area.

Conclusion

Dental caries was the leading cause of preventable hospital admissions due to dental conditions in remote and very remote areas of Australia. Addressing social determinants of oral health in children aged 0-14 years, using the WHO framework three recommended areas of action on implementing preventive strategies to address the “cause of the cause”, could be helpful in reducing the burden of oral health disease among children in remote and very remote communities of Australia. Additionally, there is a need to expand the delivery of mobile primary dental care services to increase the provision of preventative oral health care and treat dental caries before the condition results in hospitalisation.

References

1. Australia Institute of Health and Welfare. Australia's health 2018. Selected potentially preventable hospitalisations. <https://www.aihw.gov.au/reports/australias-health/australias-health-2018/contents/indicators-of-australias-health/selected-potentially-preventable-hospitalisations>.
2. Australia Institute of Health and Welfare. Admitted patient care 2016-2017: Australian hospital statistics. Health Services Series Number 84. Cat. No. HSE 201. Canberra: Australian Government, Australian Institute of Health and Welfare, 2018, page 98.
3. Schumacher JR, Hall AG, Davis TC, Arnold CL, Bennett RD, Wolf MS, et al. Potentially preventable use of emergency services: the role of low health literacy. Medical care. 2013;51:654.
4. Kruger E, Dyson K, Tennant M. Hospitalization of Western Australian children for oral health related conditions: a 5–8 year follow-up. Australian dental journal. 2006;51:231-6.
5. Kruger E, Tennant M. Potentially preventable hospital separations related to oral health: a 10-year analysis. Australian dental journal. 2015;60:205-11.
6. Australia Institute of Health and Welfare. Oral health and dental care in Australia 2015. Web report, last updated 28 January 2016. Canberra: Australian Government, Australian Institute of Health and Welfare. <https://www.aihw.gov.au/reports/dental-oral-health/oral-health-and-dental-care-in-australia-2015/contents/hospital-visits>

7. Stata Corp. Stata 15. College Station, Texas, Stata Corp LLC.
8. Australian Bureau of Statistics. 3218.0 - Regional Population Growth, Australia, 2016-17. Population Estimates by Remoteness Area (ASGS 2016), 2007 to 2017 – Revised. <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3218.02016-17?OpenDocument>
9. Crocombe L, Stewart J, Barnard P, Slade G, Roberts-Thomson K, Spencer A. Relative oral health outcome trends between people inside and outside capital city areas of Australia. Australian dental journal. 2010;55:280-4.
10. Crocombe L, Stewart J, Brennan D, Slade G, Spencer A. Is poor access to dental care why people outside capital cities have poor oral health? Australian dental journal. 2012;57:477-85.
11. Slack-Smith L, Colvin L, Leonard H, Kilpatrick N, Bower C, Brearley Messer L. Factors associated with dental admissions for children aged under 5 years in Western Australia. Archives of disease in childhood. 2009;94:517-23.
12. Slack-Smith LM, Read AW, Colvin LJ, Leonard H, Kilpatrick N, McAullay D, et al. Total population investigation of dental hospitalizations in Indigenous children under five years in Western Australia using linked data. Australian dental journal. 2011;56:358-64.
13. Alsharif AT, Kruger E, Tennant M. Dental hospitalization trends in Western Australian children under the age of 15 years: a decade of population-based study. International journal of paediatric dentistry. 2014;25:35-42.
14. Slade GD, Spencer AJ, Roberts-Thomson KF. Australia's dental generations: The national survey of adult oral health. Canberra: Australian Institute of Health and Welfare (Dental Statistics and Research Series No. 34): Cat. no. DEN 165; 2007. Contract No.: 2007.
15. DH Ha KR-T, P Arrow, KG Peres, LG Do. The National Child Oral Health Survey, Chapter 5: Children's oral health status in Australia, 2012–14. Adelaide, Australia: Australian Research Centre for Population Oral Health; 2012-14.
16. Crocombe L, Stewart J, Barnard P, Slade G, Roberts-Thomson K, Spencer A. Relative oral health outcome trends between people inside and outside capital city areas of Australia. Australian dental journal. 2010;55:280-4.
17. Whyman RA, Mahoney EK, Morrison D, Stanley J. Potentially preventable admissions to New Zealand public hospitals for dental care: a 20-year review. Community Dentistry and Oral Epidemiology. 2014;42:234-44.

- 1 18. Crocombe L, Stewart J, Brennan D, Slade G, Spencer A. Is poor access to dental
2 care why people outside capital cities have poor oral health? Australian dental
3 journal. 2012;57:477-85.
- 4 19. Slack-Smith L, Colvin L, Leonard H, Kilpatrick N, Bower C, Brearley Messer L.
5 Factors associated with dental admissions for children aged under 5 years in
6 Western Australia. Archives of disease in childhood. 2009;94:517-23.
- 7 20. Jin L, Lamster I, Greenspan J, Pitts N, Scully C, Warnakulasuriya S. Global
8 burden of oral diseases: emerging concepts, management and interplay with
9 systemic health. Oral diseases. 2016;22:609-19.
- 10 21. Srivastava P, Chen G, Harris A. Oral health, dental insurance and dental service
11 use in Australia. Health economics. 2017 Jan;26(1):35-53.

Table 1 Number and rate per 1,000 population of dental-related hospital admissions by year, remoteness area and sex

Sex	2010-2011	rate per 1,000 (95% CI)	2011-2012	rate per 1,000 (95% CI)	2012- 2013	rate per 1,000 (95% CI)	2013-2014	rate per 1,000 (95% CI)	2014-2015	rate per 1,000 (95% CI)
RA 1 Major Cities										
Male	18549	2.43 (2.39, 2.46)	19732	2.49 (2.46, 2.53)	20041	2.48 (2.45, 2.51)	20296	2.47 (2.43, 2.50)	20546	2.46 (2.43, 2.50)
Female	19990	2.56 (2.53, 2.60)	21014	2.61 (2.57, 2.64)	21692	2.63 (2.60, 2.67)	21623	2.58 (2.54, 2.61)	22295	2.62 (2.58, 2.65)
RA2 Inner Regional										
Male	6626	3.09 (3.01, 3.16)	6870	3.32 (3.24, 3.40)	6477	3.09 (3.01, 3.17)	6345	2.99 (2.92, 3.07)	6476	3.03 (2.95, 3.11)
Female	6877	3.16 (3.09, 3.24)	7094	3.39 (3.31, 3.47)	6800	3.21 (3.13, 3.29)	6929	3.23 (3.16, 3.31)	7011	3.24 (3.16, 3.32)
RA3 Outer Regional										
Male	3190	3.10 (3.00, 3.21)	3135	3.02 (2.92, 3.13)	3100	2.96 (2.85, 3.06)	3010	2.85 (2.75, 2.95)	3043	2.88 (2.78, 2.98)
Female	3253	3.25 (3.14, 3.37)	3311	3.28 (3.17, 3.39)	3158	3.10 (2.99, 3.21)	3163	3.08 (2.97, 3.19)	3150	3.06 (2.95, 3.16)
RA4 Remote										
Male	656	3.70 (3.42, 4.00)	619	3.63 (3.35, 3.93)	640	3.69 (3.41, 3.99)	566	3.25 (2.98, 3.52)	581	3.35 (3.09, 3.64)

<i>Female</i>	584	3.72 (3.42, 4.03)	621	4.18 (3.86, 4.52)	621	4.15 (3.83, 4.49)	617	4.12 (3.80, 4.46)	609	4.11 (3.79, 4.45)
RA5 Very Remote										
<i>Male</i>	378	3.55 (3.20, 3.92)	415	3.64 (3.30, 4.01)	462	4.02 (3.66, 4.40)	395	3.43 (3.10, 3.79)	435	3.79 (3.44, 4.16)
<i>Female</i>	437	5.04 (4.58, 5.53)	456	4.95 (4.51, 5.42)	430	4.69 (4.26, 5.15)	440	4.85 (4.41, 5.32)	467	5.21 (4.75, 5.70)

Note: 1,711 admissions with no remoteness area data provided excluded from this table

Table 2 Number and rate per 1,000 population of dental-related hospital admissions by year, remoteness area and age group

Age group	2010-11	rate per 1,000 (95% CI)	2011-12	rate per 1,000 (95% CI)	2012-13	rate per 1,000 (95% CI)	2013-14	rate per 1,000 (95% CI)	2014-15	rate per 1,000 (95% CI)
RA 1 Major Cities										
<i>0-14 years</i>	14605	5.15 (5.07, 5.23)	15310	5.19 (5.11, 5.27)	15293	5.06 (4.98, 5.14)	15476	5.03 (4.96, 5.11)	16655	5.40 (5.32, 5.48)
<i>15-24 years</i>	3935	1.79 (1.73, 1.85)	4334	1.94 (1.88, 2.00)	4835	3.89 (3.78, 4.00)	4479	1.96 (1.91, 2.02)	4106	1.81 (1.76, 1.87)
<i>25-44 years</i>	6914	1.49 (1.45, 1.52)	7081	1.47 (1.44, 1.51)	7528	1.53 (1.49, 1.56)	7135	1.42 (1.14, 1.46)	7084	1.41 (1.38, 1.45)
<i>45-64 years</i>	8543	2.27 (2.22, 2.32)	8887	2.32 (2.27, 2.36)	8648	2.22 (2.18, 2.27)	9137	2.31 (2.26, 2.36)	9084	2.27 (2.22, 2.31)
<i>≥65 years</i>	4542	2.25	5134	1.05	5430	1.08	5692	1.10	5912	1.11

		(2.19, 2.32)		(1.02, 1.08)		(1.05, 1.11)		(1.07, 1.13)		(1.08, 1.14)
RA2 Inner Regional										
0-14 years	5426	6.38 (6.22, 6.56)	5676	6.98 (6.80, 7.16)	5237	6.40 (6.23, 6.57)	5032	6.12 (5.95, 6.29)	5167	6.17 (6.01, 6.34)
15-24 years	1356	2.46 (2.34, 2.60)	1365	2.60 (2.47, 2.74)	1255	5.14 (4.86, 5.43)	1327	2.51 (2.38, 2.65)	1201	2.24 (2.12, 2.38)
25-44 years	2535	2.45 (2.36, 2.55)	2521	2.56 (2.46, 2.66)	2407	2.43 (2.33, 2.53)	2417	2.43 (2.33, 2.53)	2369	2.32 (2.22, 2.42)
45-64 years	2863	2.44 (2.35, 2.53)	2872	2.55 (2.46, 2.65)	2822	2.49 (2.40, 2.58)	2918	2.55 (2.46, 2.64)	2968	2.57 (2.48, 2.67)
≥65 years	1323	1.87 (1.77, 1.97)	1530	0.96 (0.91, 1.00)	1556	0.94 (0.89, 0.99)	1580	0.92 (0.87, 0.96)	1782	1.00 (0.96, 1.05)
RA3 Outer Regional										
0-14 years	2619	6.41 (6.17, 6.66)	2519	6.12 (5.88, 6.36)	2510	6.08 (5.84, 6.32)	2374	5.75 (5.53, 5.99)	2305	5.39 (5.18, 5.62)
15-24 years	554	2.23 (2.05, 2.42)	566	2.25 (2.07, 2.44)	566	4.80 (4.41, 5.21)	532	2.11 (1.93, 2.30)	506	1.92 (1.76, 2.10)
25-44 years	1325	2.60 (2.47, 2.75)	1361	2.66 (2.52, 2.81)	1259	2.45 (2.32, 2.59)	1251	2.44 (2.31, 2.58)	1263	2.38 (2.25, 2.51)
45-64 years	1386	2.49 (2.36, 2.62)	1355	2.45 (2.32, 2.58)	1318	2.36 (2.22, 2.49)	1296	2.30 (2.18, 2.43)	1446	2.56 (2.43, 2.70)
≥65 years	559	1.84 (1.69, 2.00)	645	0.92 (0.85, 0.99)	605	0.83 (0.77, 0.90)	720	0.95 (0.89, 1.03)	673	0.86 (0.80, 0.93)

RA4 Remote										
0-14 years	678	9.32 (8.63, 10.05)	682	10.04 (9.31, 10.82)	700	10.31 (9.56, 11.09)	603	8.96 (8.27, 9.71)	645	9.97 (9.21, 10.76)
15-24 years	106	2.54 (2.08, 3.07)	122	3.12 (2.59, 3.73)	106	5.16 (4.22, 6.23)	113	2.94 (2.43, 3.54)	98	2.64 (2.14, 3.22)
25-44 years	217	2.20 (1.91, 2.51)	220	2.31 (2.01, 2.63)	220	2.26 (1.97, 2.58)	248	2.54 (2.23, 2.88)	206	2.24 (1.94, 2.56)
45-64 years	173	2.00 (1.71, 2.31)	163	1.98 (1.69, 2.31)	176	2.12 (1.81, 2.45)	166	1.98 (1.69, 2.31)	167	2.00 (1.71, 2.32)
≥65 years	66	1.91 (1.48, 2.43)	53	0.73 (0.55, 0.95)	59	0.78 (0.59, 1.01)	53	0.67 (0.50, 0.88)	74	0.90 (0.71, 1.13)
RA5 Very remote										
0-14 years	518	11.30 (10.35, 12.31)	539	11.25 (10.32, 12.23)	589	12.45 (11.47, 13.49)	527	11.36 (10.41, 12.36)	541	9.76 (8.95, 10.61)
15-24 years	64	2.27 (1.75, 2.90)	74	2.58 (2.03, 3.24)	71	4.40 (3.44, 5.55)	65	2.42 (1.87, 3.09)	63	1.96 (1.51, 2.51)
25-44 years	123	1.93 (1.60, 2.30)	144	2.10 (1.77, 2.47)	136	1.96 (1.64, 2.32)	151	2.16 (1.83, 2.54)	168	2.10 (1.79, 2.44)
45-64 years	89	2.05 (1.65, 2.52)	95	2.03 (1.65, 2.48)	79	1.68 (1.33, 2.09)	78	1.65 (1.31, 2.06)	111	2.30 (1.89, 2.77)
≥65 years	21	1.73 (1.07, 2.64)	19	0.66 (0.40, 0.10)	17	0.57 (0.33, 0.91)	14	0.45 (0.24, 0.75)	19	0.57 (0.34, 0.88)

Note: 1,711 admissions with no remoteness area data provided excluded from this table

Table 3 Number of admissions by diagnosis and average annual rate for the five-year period

Diagnosis	% (n)	Average Annual Rate per 1,000 Population (95% CI)
Dental caries	52.6 (166,587)	1.44 (1.42, 1.46)
Other disorders of teeth and supporting structures	18.5 (58,671)	0.51 (0.50, 0.52)
Diseases of pulp and periapical tissues	14.0 (44,327)	0.38 (0.38, 0.39)
Other diseases of lip and oral mucosa	3.9 (12,433)	0.11 (0.10, 0.11)
Gingivitis and periodontal diseases	3.6 (11,253)	0.10 (0.48, 0.50)
Stomatitis and related lesions	3.4 (10,866)	0.09 (0.09, 0.10)
Other diseases of hard tissues of teeth	1.2 (3,705)	0.03 (0.03, 0.03)
Other disorders of gingiva and edentulous alveolar ridge	0.7 (2,359)	0.02 (0.02, 0.02)
Cysts of oral region, not elsewhere classified	0.4 (1,327)	0.01 (0.01, 0.01)
Not recorded	1.7 (5,409)	-

Figure 1 Rate per 1,000 population for admission due to dental caries, by year and remoteness area

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