

# The distribution of dentists in Australia Socio-economic profile as an indicator of access to services

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**Objectives:** Analyse the dentist to population ratio relative to socio-economic profile to identify areas of workforce shortages and inform the policy direction of workforce recruitment strategies and public dental service planning. **Methods:** The suburb, state and postcode of dentists listed on the public access register of the Australian Health Practitioner Regulation Agency were geocoded by latitude and longitude and added to a map of Australia built on Australian Bureau of Statistics (ABS) Statistical Area 2 (SA2) census districts. Population data detailing the relative socio-economic disadvantage of each Statistical Area 1 (SA1) within each SA2 was superimposed on the map and used to calculate the number of dentists per 100 000 population relative to level of socio-economic disadvantage as defined by the ABS Socio-Economic Index for Areas, (SEIFA) Index of Relative Socio-economic Disadvantage (IRSD). The results were reported according to state and territory, and the Accessibility and Remoteness Index of Australia (ARIA+). **Results:** The dentist to population ratio was lower in areas of disadvantage within major cities. All regions outside major cities had population cohorts with dentist to population ratios below the 65 dentists per 100 000 benchmark, conservatively estimated to be the minimum required for reasonable access to services. **Conclusion:** There is an inequity in the distribution of dentists relative to the socio-economic profile and geographic location of the Australian population. Shortages of dentists persist across many IRSD deciles in regional and rural areas. Within major cities there are fewer dentists per capita in the lower socio-economic districts.

**Keywords:** Dentist, workforce, public, socio-economic

## Introduction

Health workforce planning is fraught with challenges because of the multitude of variables that must be considered in determining a sustainable workforce. Economic modelling takes into account factors that include workforce profiles, expected demand for services, disease trends, and population growth and is used to develop best estimates of future workforce needs (Chrisopoulos and Teusner, 2008). But economic modelling is imprecise due to the unpredictability of changing variables. There is a constant process of reassessment and adjustment. The dental workforce has transitioned through 2 significant planning stages in the past 15 years that illustrate the difficulty in maintaining an “appropriate level” of dentist numbers. A 2003 report published by the Australian Institute of Health and Welfare (AIHW) identified a shortage of qualified practitioners (Spencer *et al.*, 2003). The report estimated that, to meet demand for services, the dentist to population ratio should be raised from the existing level of 57 dentists per 100 000 to 65 dentists per 100 000. The report recommended increasing Australian graduate numbers by expanding the number of students enrolled in existing courses and opening new dental schools. The report also recommended recruiting overseas trained graduates to address the immediate shortfall. Consequently, the Australian government added dentists to the ‘Skilled Occupation List’ and planned new dental schools. The AIHW reviewed the progress of expanding dentist numbers in 2008 (Teusner *et al.*, 2008). Four new dental schools were under construction and migration from overseas had increased from approximately 60 dentists per year to 200. The 2005

report predicted a best estimate of 15000 dentists by the year 2020. The 15000 landmark was reached 6 years earlier than anticipated in 2014 (Dental Board of Australia, 2014). This triggered a reaction from professional groups concerned about an oversupply of dentists and limited job opportunities for Australian graduates (Australian Dental Association, 2017). The Australian government responded to industry pressure and removed dentists from the Skilled Occupation List (now renamed the Medium and Long Term Strategic Skills List). A dental qualification alone is no longer sufficient to grant eligibility for permanent migration to Australia. Dentists remain on the Temporary Skilled Shortage visa and can be employer-sponsored for short term migration, but this is a limited opportunity pathway. The change in visa eligibility criteria would seem to have had an immediate impact. In 2016, the number of registered dentists dropped for the first time in over 12 years, with 230 fewer dentists on the Australian Health Practitioner Regulation Agency (AHPRA) register than in 2015 (Dental Board of Australia, 2016).

Despite the concerns of an oversupply of dentists it is unclear whether this is substantiated, and whether shortages persist in particular demographic groups. Historically, the majority of dentists have provided services in major cities, and it has been harder to recruit personnel for regional and remote areas (Godwin *et al.*, 2016). Financial concerns, practice viability and lifestyle factors deter many practitioners from moving away from major centres (Godwin *et al.*, 2016). Within major cities dental practices are more numerous in the more prosperous areas (Kruger *et al.*, 2011)

and there is a disparity in the availability and affordability of services according to socio-economic status (Coles *et al.*, 2017; Jamieson, *et al.*, 2013). Many suburbs lack services completely (Tennant and Kruger, 2013).

The ideal dentist to population ratio is difficult to define. In 2003 the AIHW report concluded that 57.8 per 100 000 represented a shortage, and that a 25% increase in dentist numbers was necessary to meet rising demand for services (Spencer *et al.*, 2003). An ageing and more dentate population, an increase in the number of medically compromised patients in need of complex shared care, and the increasing popularity of complex dental cosmetic procedures, are all factors that will continue to drive up demand for services (Health Workforce Australia, 2014). A minimum ratio of 65 dentists per 100 000 is considered to be a conservative benchmark (Tennant *et al.*, 2017). By this estimate, Australia is still experiencing a shortage of dentists in the workforce.

Previous studies have analysed dental practice locations (Shiikha *et al.*, 2015), but practice numbers and location alone do not give a complete picture of availability of services. Although indicative of potential access to care this provides an incomplete picture of the number of available dentists in each area. Practices, both public and private, employ differing numbers of dentists and the accessibility of dental care is more closely linked to the availability of dentists than practice numbers. The Dental Board of Australia (DBA) releases quarterly statistics summarising dentist numbers categorised by state and age, and the AIHW report series summarises workforce distribution by regional area (AIHW, 2014). There are no published data analysing the distribution of dentists within each regional category.

This study is the first to provide a detailed report on the distribution of dentists in Australia with reference to the Australian Bureau of Statistics Index of Relative Socio-economic Disadvantage (IRSD).

## Methods

Data in this study were collected from open sources. No ethics approval was required.

*Dentist Data:* A de-identified list of dentists was compiled manually from the AHPRA public access database. The database is a complete record of all dentists who have met the minimum standard approved for registration and are eligible to practice dentistry in Australia. This includes all practicing dentists in both the private and public sectors. The address recorded on the register refers to the principal place of practice by suburb, state and postcode. Dentists with an overseas address and those with non-practicing or limited registration were excluded. The addresses were geocoded using Google maps API and imported into QGIS v3.4.0-Madeira licenced under the GNU Public Licence <http://www.gnu.org/licences>.

*Mapping Data:* The Australian land mass was mapped by Australian Statistical Geography Standard, Statistical Area Level 1 (SA1) and Statistical Area 2 (SA2) polygons. An SA2 is a “medium-sized general-purpose area”, built on an aggregate of smaller SA1 units. Each SA2 is designed to include a ‘functional area’ representing a commercial hub as a centre point for access to services. In regional Australia this may be a rural town and in metropolitan areas SA2s align with gazetted suburbs. SA2s are the appropriate statistical area for mapping suburb and postcodes locations because of the inclusion in each SA2 of a functional centre. QGIS

was used to analyse the mapping by outputting a count of dental practitioners per SA2. The data was then exported to Excel version 16.8 Ó Microsoft 2018 for further analysis.

*Population Data:* The study sought to identify the number of dentists according to socio economic indicators for areas. The Socio-Economic Index for Areas (SEIFA) is a group of four indices published by the Australian Bureau of Statistics (ABS) based on census data, that rank statistical areas by relative socio-economic advantage and disadvantage (Australian Bureau of Statistics, 2013). Each index aggregates information from selected subsets of variables chosen to reflect a particular aspect of socio-economic profile. The statistical areas are assigned a score and decile ranking. The Index of Relative Socio-economic Disadvantage (IRSD), is one of the four SEIFA indices, and captures indicators of socio-economic disadvantage including; household income below a defined threshold, levels of unemployment, lack of education, and housing criteria. An IRSD decile score of 1 denotes an area in the lowest 10% (most disadvantaged) for that particular index.

*Analysis:* The number of dentists was counted at an SA2 level. Each SA2 is designed to represent a local community and includes a single “service centre”. The average population of an SA2 is 10000. This study examined access to services within each local community (SA2) calculated relative to the socio-economic measure of disadvantage (IRSD) of the community. Each SA2 is built of 25 Statistical Area 1 units (SA1). An SA1 represents the smallest census area for which ABS data is published and has an average population of 400 people but not necessarily a service hub. Within each SA2 the socio-economic profile and IRSD of the constituent SA1s varies significantly. Studying the dentist to population ratio relative to the aggregated IRSD of an SA2 is misleading because disadvantaged groups may be masked by pockets of advantage. The dentist to population ratio for each IRSD was calculated by apportioning the number of parent SA2 dentists relative to the population of the constituent SA1s. Since the IRSD of each SA1 is known this minimised the ecological fallacy created by aggregating the IRSD score for each SA1 within a parent SA2.

The results were further analysed according to remoteness area. The ABS define 5 categories of remoteness based on the Accessibility and Remoteness Index of Australia (ARIA+). ARIA+ measures accessibility to services relative to travel time. The five divisions of remoteness are: major cities, inner regional, outer regional, remote, and very remote.

## Results

In September 2017 a total of 16609 dentists were listed on the AHPRA public register. Of these, 560 registered overseas addresses and 357 had limited or non-practicing registration. The available dentist workforce numbered 15692. The dentist per 100 000 people ratio (DTPR), based on the available workforce, Australia-wide, had increased from 57.8 in 2003, to 63.3 in September 2017. The distribution of dentists by state or territory and ARIA+ was not uniform relative to the distribution of the population (Table 1). Approximately 81% of dentists practice within major cities, which are home to approximately 72% of Australian residents. Apart from the Australian Capital Territory and very remote areas of New South Wales (NSW), all other regional areas had proportionately fewer dentists than the corresponding proportion of the population.

The distribution by IRSD Australia-wide ranged from a DTPR of 58.1 in IRSD 1 (most disadvantaged) areas to 87.7 in IRSD 10 (least disadvantaged) areas (Figure 1), but there was significant variation between states and regions. Within major cities, Western Australia (WA) showed the greatest maldistribution of dentists, ranging from a DTPR of 57.2 in IRSD 2 areas to 128.1 in IRSD 10, and NSW the least, ranging between a DTPR of 63.6 for IRSD 1 and 87.7 for IRSD 10 (Table 1).

Regional areas had DTPRs indicative of a shortage of dentists across the majority of IRSD deciles with remoteness a significant determinant of service access (Table 1). In both inner and outer regional areas, Queensland had relatively higher DTPRs for the lowest 2 IRSD areas, suggestive of acceptable levels of access to dentists for the most disadvantaged groups in this state. For the same regional areas, all other states and territories had DTPRs for the most disadvantaged groups that inferred some deficit in availability and/or accessibility to services (IRSD 1 Range - 11.3 – 57.1). Inner regional Tasmania (range 31.8 – 86.7) and outer regional Northern Territory (range 11.3 – 104.9) had higher upper values of DTPRs. This is most probably explained by the location of the respective state and territory capital cities (Hobart and Darwin) within the corresponding regional areas. Remote and very remote regions are compromised by a widely distributed scarce population, and vast distances between urban centres. This is reflected in the paucity of dentists in these areas. That is, 0.55% of dentists had a registered principle practice addresses in remote areas and 0.13% in very remote areas, servicing 0.98% and 0.58% of the population respectively. The DTPR for Northern Territory remote areas returned a higher range than other states and territories (7.3 – 87.8). The results reflect the classification of Alice Springs (population 27800) as a remote area according to ARIA+ criteria, despite its status as a category C service centre, because of the vast travel distances to category A and B service centres. The DTPR across IRSDs in very remote areas were low (range 0 – 39.1[TAS IRSD1 excluded]). In terms of availability of dentists this was between 40 and 100% below the benchmark DTPR of 65. The high DTPR for IRSD 1 in very remote areas of Tasmania was due to 1 visiting dentist registering Watermark on Flinders Island (population 893) as the principle practice address. The Australian Capital Territory had a very high DTPR for IRSD 1 and IRSD 2, but these figures should be treated with caution because of the very small population numbers in these cohorts as a proportion of the total population (0.5% and 0.8%). Western Australia, the state with the highest dentist to population ratio for IRSD10 major city areas, also recorded shortages in lower socio-economic, and all regional areas.

## Discussion

Analysing the dentist to population ratio by IRSD is a useful method of determining the distribution of dentists within regional areas of Australia relative to the socio-economic profile of areas. The analysis shows that the perceived oversupply of dentists is limited to certain demographics, and shortages remain both in lower socio-economic districts within major cities, and across many IRSDs in regional and remote areas.

The relative shortage of dentists in many lower IRSD deciles reflects the shortfall in the public funding of dental care. It is known that lower socio-economic groups carry the

burden of dental disease (Kruger and Tennant, 2016), but the current distribution of the workforce fails to provide for those who need care the most and can least afford to access it (Tennant and Kruger, 2014). A third of the Australian population do not seek regular dental care because of financial pressures (Bennett, 2009), while only 15% are managed by the public system (Tennant and Kruger, 2014). Lengthy waiting lists within the public system further compromise dental health (Dudko *et al.*, 2018), and this in turn has a negative impact on general health (Petersen, 2008). This is not a new problem and various publicly funded schemes have been implemented to extend public dental coverage, both in major cities and in rural and remote areas. The Voluntary Dental Graduate Year Programme; the Commonwealth Dental Health Program: the Allied Health and Dental Health Care Initiative: the Chronic Disease Dental Scheme; the Dental Relocation and Infrastructure Support Scheme; and the Networked Remote Area Dental Service delivered through the Centre for Remote and Rural Health in Western Australia (Dyson *et al.*, 2012) are all examples of publicly funded initiatives. All of the above have been short-lived. The relatively brief time frame within which each of these schemes was introduced and withdrawn is a testament to the failure of state and federal governments to develop a cohesive long term strategic approach to the management of dental healthcare and highlights a flaw in the federal system of governments with constant tension about which tier of government bears the responsibility for funding public dental services (Spencer *et al.*, 2003).

The failure to guarantee universal dental health coverage also raises health and human rights issues. The Australian government is a signatory to the United Nations Sustainable Development Goals, a blueprint for developing and implementing policies towards a sustainable future (Australian Government, 2018), and United Nations human rights treaties including the International Convention on Economic, Social and Cultural Rights (United Nations, 1976). A fundamental element of the sustainable development goals is a recognition of the importance of health for all. The 2018 voluntary report to the United Nations High-Level Political Forum on Sustainable development reaffirmed Australia's commitment towards universal health coverage (Australian Government, 2018). This principle supports the human rights-based approach of: 'available, accessible, affordable and quality' health care. The goals may be aspirational in nature and subject to caveats, but the principle of progressive realisation underpins the commitment. The World Health Organisation Global Oral Health Program has re-orientated its oral health care policy to emphasise the importance of oral health as integral and indivisible from general health (Petersen, 2008). As part of a promise to work towards universal health coverage, a more inclusive policy approach is needed to extend access to dental care.

There has been a shift within the dental profession towards increased specialisation and a focus on the more lucrative elements of dental care (Cohen *et al.*, 2017). The rising demand for cosmetic solutions and the promotion of expensive technology encourages dentists to pursue more profitable practice in wealthier suburbs. The corporatisation of dentistry has further fuelled this trend, and although some corporates have taken the initiative to establish practices in areas of shortages, the focus remains firmly on generating profit for stakeholders through the marketing of advanced dental solutions

**Table 1.** Dentist (per 100 000 people) by SEIFA Index of Relative Socio-economic Disadvantage decile (1 - most disadvantaged, 10 - least disadvantaged), and Regional (ARIA+) Areas by State or Territory

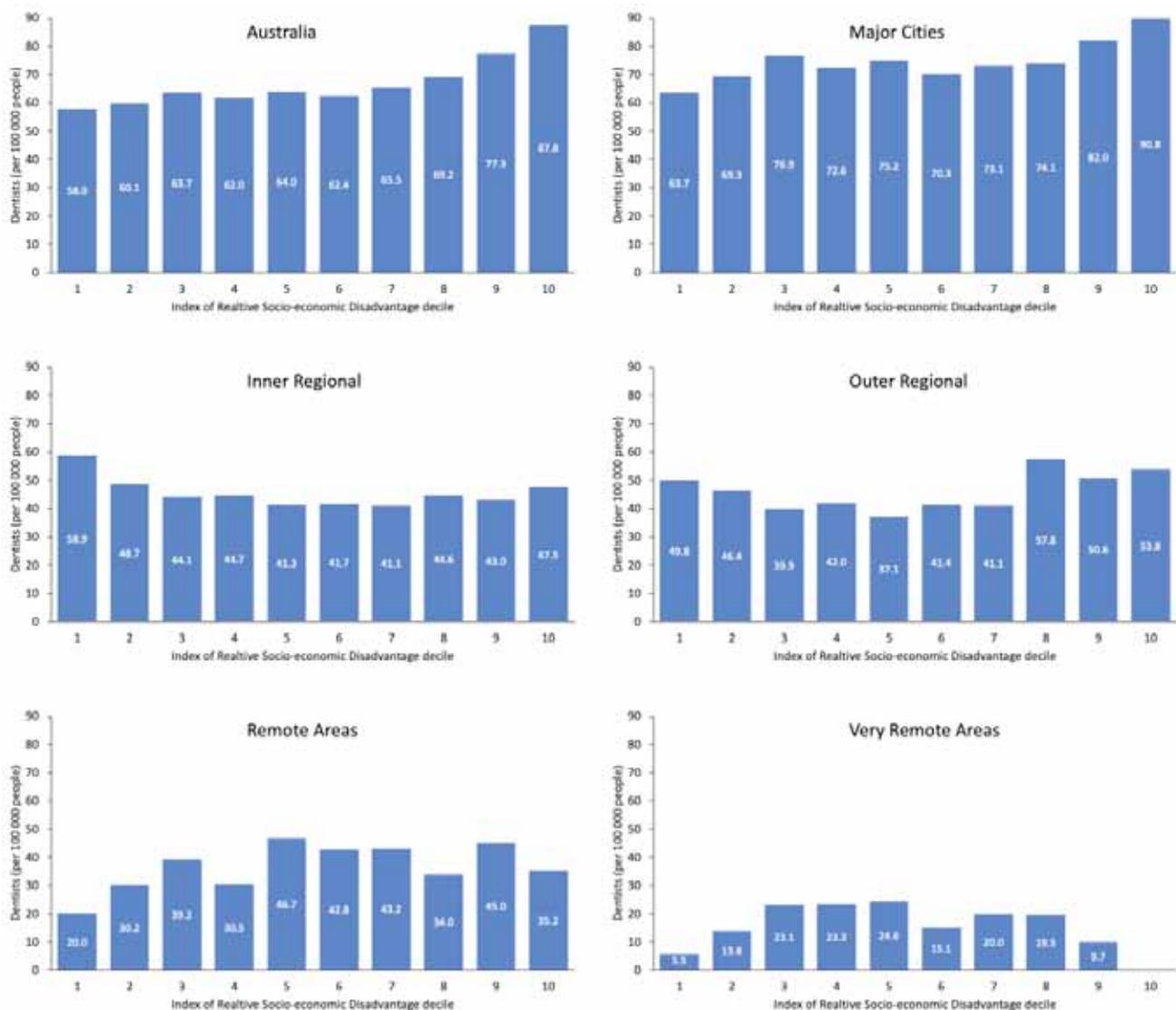
State or Territory* and Regional (ARIA+) Area	SEIFA Index of Relative Socio-economic Disadvantage Decile										Dentists		Population**
	1	2	3	4	5	6	7	8	9	10	n	% of total	% of total pop
<i>Major Cities of Australia</i>													
ACT	111.3	133.5	53.7	39.7	63.7	65.5	73.0	63.0	83.4	90.0	290	1.85	1.65
NSW	63.6	73.3	72.3	75.3	79.1	71.6	75.3	73.2	79.3	87.7	4344	27.68	24.41
NT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
QLD	70.9	76.1	89.9	74.5	78.2	81.7	78.3	74.6	80.4	82.6	2395	15.26	13.04
SA	53.3	65.8	73.5	92.3	94.8	75.6	84.8	79.4	86.2	79.2	987	6.29	5.36
TAS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
VIC	65.5	64.3	84.3	66.7	67.8	60.1	66.3	70.5	78.9	87.3	3271	20.85	19.63
WA	58.8	57.2	57.9	61.4	65.3	69.4	69.5	84.1	96.7	128.1	1506	9.60	8.19
<i>Inner Regional Australia</i>													
ACT	z	z	z	z	z	0.0	z	z	0.0	43.5	11	0.07	0.02
NSW	57.1	49.2	46.9	46.8	45.6	48.5	43.3	49.8	40.7	41.1	659	4.20	5.98
NT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
QLD	82.7	52.6	43.7	40.1	37.9	40.2	36.9	45.1	45.4	62.5	463	2.95	3.82
SA	33.0	30.1	27.0	21.7	29.5	25.6	24.6	13.9	40.4	101.7	57	0.36	0.80
TAS	31.8	66.1	54.8	72.1	60.2	61.1	86.7	49.0	51.2	39.2	205	1.31	1.54
VIC	52.3	42.5	40.7	41.4	34.6	32.7	33.2	41.4	41.1	43.8	455	2.90	4.87
WA	38.1	37.7	44.3	54.8	46.8	38.9	41.9	47.0	45.4	77.1	106	0.68	1.01
<i>Outer Regional Australia</i>													
ACT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NSW	37.8	33.9	30.8	32.8	31.0	32.0	33.1	22.8	36.6	19.6	114	0.73	1.53
NT	11.3	29.2	16.5	57.7	21.0	44.0	44.9	104.9	79.7	48.2	78	0.50	0.57
QLD	74.2	63.7	52.8	57.7	47.1	60.2	52.7	66.4	47.9	74.6	397	2.53	2.86
SA	46.5	43.8	31.7	35.7	36.4	34.3	34.3	39.6	55.4	34.1	68	0.43	0.82
TAS	31.2	32.7	28.2	10.9	10.2	12.4	13.7	18.1	z	0.0	30	0.19	0.61
VIC	39.4	39.6	29.5	29.2	38.1	27.9	36.5	27.9	22.4	20.0	74	0.47	0.90
WA	52.9	47.5	46.6	43.8	44.5	37.3	32.2	21.4	20.4	27.6	75	0.48	0.81
<i>Remote Australia</i>													
ACT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NSW	12.6	29.8	32.0	14.9	31.3	15.7	29.8	29.6	z	z	6	0.04	0.06
NT	7.3	27.0	47.1	31.1	73.1	65.8	87.8	11.3	41.0	13.1	16	0.10	0.20
QLD	15.0	21.5	38.6	35.0	32.9	33.7	43.4	37.2	44.9	49.1	13	0.08	0.17
SA	52.7	42.0	37.4	26.4	39.8	26.3	34.3	58.7	40.5	z	18	0.11	0.17
TAS	0.0	0.0	0.0	0.0	z	z	z	z	z	z	0.0	0.00	0.02
VIC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
WA	36.7	35.8	41.5	34.8	43.9	41.3	28.8	36.1	46.7	48.4	36	0.23	0.36
<i>Very Remote Australia</i>													
ACT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NSW	25.0	25.0	25.0	25.0	25.0	z	0.0	z	z	z	1	0.01	0.02
NT	0.0	0.0	0.0	15.9	0.0	0.0	32.4	28.1	12.7	0.0	2	0.01	0.18
QLD	6.8	17.9	23.3	24.5	18.6	10.3	14.2	4.3	7.0	z	6	0.04	0.19
SA	5.5	0.0	33.2	24.1	z	39.1	z	z	z	z	1	0.01	0.03
TAS	112.0	z	0.0	33.4	51.7	z	z	z	z	z	1	0.01	0.01
VIC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
WA	13.5	12.1	26.1	12.1	24.5	13.6	26.5	21.4	11.0	0.0	7	0.04	0.15
Grand Total	58.0	60.1	63.7	62.1	64.0	62.4	65.5	69.2	77.3	87.8	15692	100.00	100.0

\* ACT- Australian Capital Territory, NSW - New South Wales, NT - Northern Territory, QLD - Queensland, SA - South Australia, TAS - Tasmania, VIC - Victoria, WA - Western Australia

n/a - no corresponding regional area within state or territory

z - zero population

\*\*Population - 2016 Australian Bureau of Statistics Census data



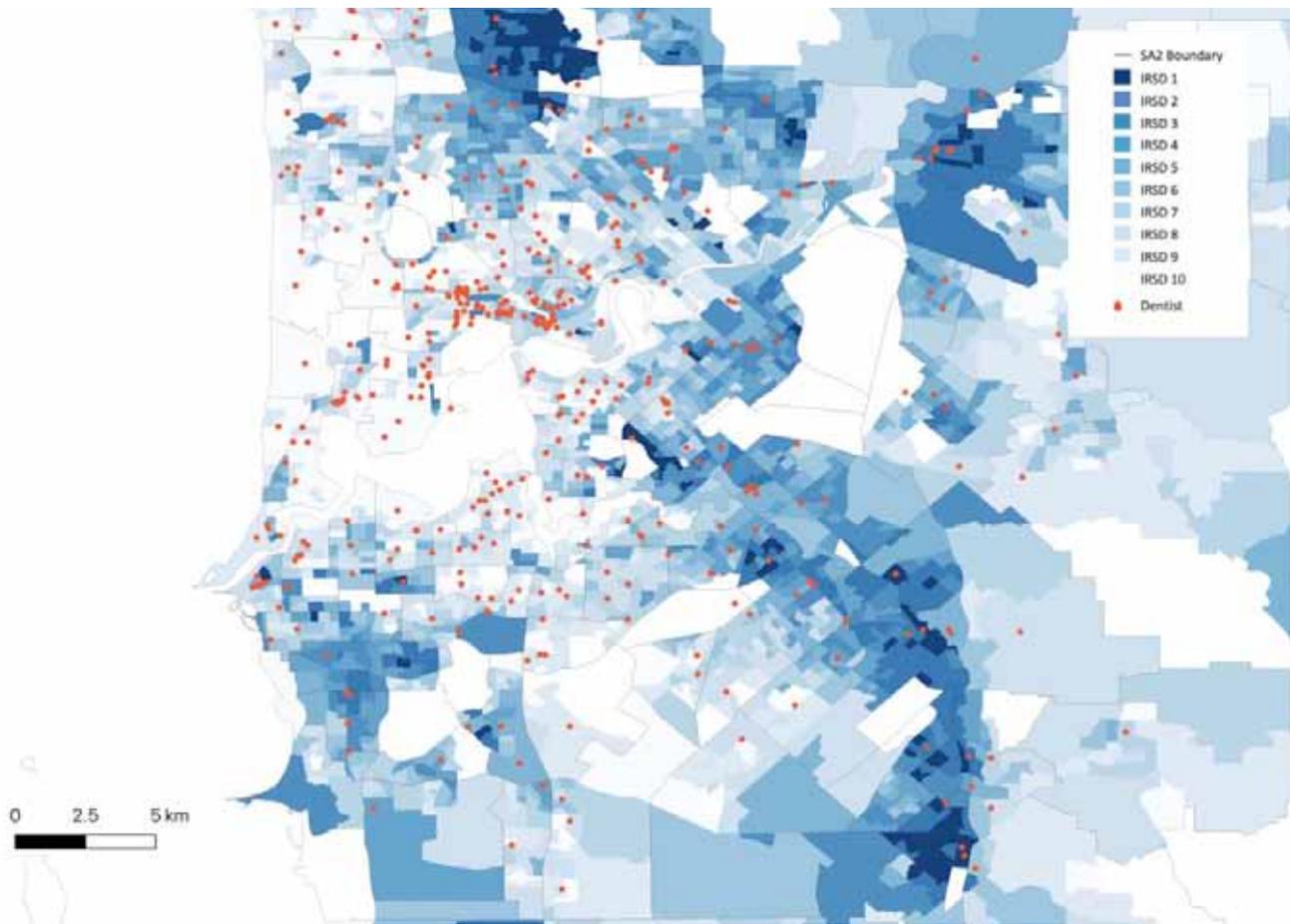
**Figure 1.** Dentists (per 100 000 people) by Australian Bureau of Statistics SEIFA Index of Relative Socio-economic Disadvantage (IRSD 1 most disadvantaged – IRSD 10 least disadvantaged) by Australia, Major Cities, Inner Regional, Outer Regional, Remote and Very Remote (ARIA+) Areas

(Holden, 2018). There is comment in the literature that this is a direct result of the overtraining of dentists (Cohen *et al.*, 2017). The influence of industry in the sponsorship of dental education may have redirected the focus of dentist training away from the basic management of oral disease towards more highly technical alternatives (Cohen *et al.*, 2017). If this is the case and dentists no longer see themselves as the providers of basic care – the treatment and prevention of dental caries and periodontal disease – alternative workforce solutions must be pursued.

One option to facilitate the extension of dental service coverage would be to expand the scope of practice of allied dental practitioners (oral health therapists, dental therapists and dental hygienists). This was a consideration behind the enactment of the Health Practitioner Regulation National Law\*, as enacted in each state and territory of Australia. A review of the health workforce not limited to dentistry concluded that barriers to expanded scope of practice were driven primarily by protectionist attitudes as opposed to demonstrated declines to quality of service (Productivity Commission, 2005). The purpose of the National Law extended beyond the historical notions of public protection to a more proactive involvement

in maintaining a “sustainable and flexible workforce”. In dentistry there is evidence that many of the tasks traditionally performed by dentists can be delegated to allied dental health professionals without a decrease in standard of care (Wanyonyi *et al.*, 2015). The recent announcement by the DBA that it would no longer define scope of practice for all registrant divisions of dental practitioner, aligns with current health policy to remove unnecessarily restrictive barriers to cost effective service provision. The DBA has also announced that allied dental health practitioners will no longer be subject to the requirement for supervision by a dentist paving the way for independent practice (DBA, 2018). This is unlikely to improve access to care since the policy fails to account for the costs of maintaining a dental practice in a private setting (Brocklehurst and Tickle, 2011). It is unclear whether allied health practitioners will consequently be able to provide more affordable services. It is also unlikely that given the opportunity for more profitable private practice, allied health practitioners will elect to seek employment within the public sector. The removal of supervised practice may be an opportunity lost for public dental services to harness the potential of expanded scope of practice allied health practitioners.

\* The National Law as applies in each State or Territory; Health Practitioner Regulation National Law Act 2010 (ACT); Health Practitioner Regulation National Law 2010 (NSW); Health Practitioner Regulation (National Uniform Legislation) Act (NT); Health Practitioner Regulation National Law Act 2010 (SA); Health Practitioner National Law Act 2010 (Tas); Health Practitioner Regulation National Law Act 2009 (Vic); Health Practitioner Regulation National Law Act 2010 (WA); Health Practitioner Regulation National Law Act 2009 (Qld) (National Law).



**Figure 2:** Perth metropolitan area showing Australian Bureau of Statistics Statistical area 1 (SA1 - shaded areas) by SEIFA Index of Relative Socio-economic disadvantage (IRSD1 – most disadvantaged, IRSD 10 – least disadvantaged), Statistical area 2 (SA2- boundary lines) and dentist location by principal place of practice.

A possible limitation of this study is that it does not factor for average hours worked. This may have a bearing on the full-time equivalent number of dentists in each area. A decline in the average capacity to supply dental visits has been reported (Chrisopoulos and Teusner, 2008), thought to be in part due to the increasing feminisation of the profession with women more likely to work part time. But this trend is not documented in the most recent dental practice survey published by the Australian Dental Association (Australian Dental Association, 2014), or the most recent AIHW report (AIHW, 2014). Respondents worked an *average* of 37 hours per week, marginally less than full time equivalent benchmark of 37.5 hours per week used in workforce analysis studies (Teusner *et al.*, 2007). For the purposes of this study it was consequently assumed that the number of practicing dentists was close to full time equivalent numbers.

### Conclusion

Socio-economic profile and geographical remoteness are factors influencing the availability of, and accessibility to dental care. Although more socio-economically disadvantaged populations are known to experience the burden of basic dental disease, there are fewer dentists per 100 000 people practicing in areas of greater disadvantage compared to less disadvantaged areas. All regional areas outside major cities continue to experience shortages in dentist numbers when measured against a conservative

benchmark of 65 dentists per 100 000 people needed to maintain reasonable access to services. The results support the contention that Australian dental workforce policy has yet to find solutions to address the unmet need of those living in disadvantaged areas and rural and remote Australia. This study will help inform policy makers in formulating strategies to facilitate a more equitable workforce distribution, and improve recruitment and retention strategies in areas of need. A failure to address workforce shortages may put Australia in conflict with its commitment to progressive realisation of the highest attainable standard of health and the Sustainable Development Goals.

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