Submission No. 007
(Dental Services)
Date: 14/03/2013

University of Tasmania
Private Bag 103, Hobart, Tasmania, Australia, 7001
Phone: 0419 597 756, 6226 7376
Email: leonard.crocombe@utas.edu.au
Web: www.utas.edu.au/ruralhealth/

UTAS
FACULTY OF HEALTH SCIENCE
Department of Rural Health

Submission to the
House of Representatives Standing Committee on Health and Ageing

Inquiry into adult dental services to identify priorities for Commonwealth funding

Dr Leonard Crocombe, A/Prof Tony Barnett, A/Prof Erica Bell, Dr Ha Hoang & Mrs Diana Godwin

On behalf of the University Department of Rural Health
at the University of Tasmania

March 2013

Executive summary

Point 1: Commonwealth funding towards improving access to dental care should include a requirement that where feasible, the water supplies are fluoridated.

Point 2: Excluding the mouth from health planning, including in health promotion, should cease and that further research into the oral health/general health links should be encouraged.

Point 3: Further research needs to be undertaken as a matter of urgency to find in-surgery preventive methods.

Point 4: A multidisciplinary team approach is needed to improve dental care to people with special needs, involving a range of primary health care providers.

Point 5: A rigorous evaluation policy using pre- and post-intervention baseline measures should be employed of the dental practitioner rural retention incentives.

Point 6: An analysis of what would be the best dental workforce for Australia, both in the number, and mix, of dental practitioners should be undertaken.

Point 7: A speciality in rural dentistry with extra training should be established.

Point 8: When the oral health therapist graduate year program commences, the use of dentist/oral health therapist teams in rural areas should be encouraged.

Point 9: Existing rural private dental practices to supply care to health care card holders and other people in the community with poor access to dental care

Introduction

The University Department of Rural Health (UDRH) at the University of Tasmania is a research-focused academic unit. By drawing on a wide range of skill sets and methodological expertise, staff engage in a vigorous and diverse program of high quality rural health research that position the department as locally relevant, nationally competitive and internationally recognised. It is uniquely positioned within an island state and has developed strong strategic alliances with local government, community organisations and the Tasmanian Government Department of Health and Human Services, to promote an evidence-based rural health agenda.

The authors of this submission are also researchers with the Research Centre of Excellence in Primary Oral Health Care (CRE). The CRE is a collaboration between the Universities of Tasmania; Adelaide; and Monash University. The CRE is part of the Australian Government funded Primary Health Care Research Evaluation and Development (PHCRED) Strategy to improve Australia's capacity to produce high quality primary health care research to establish an expanded pool of primary health care researchers, more research relevant to practice and policy, and in collaboration with other relevant organisations, well informed primary health care practice and policy. The views expressed in this submission are not necessarily those of the Research Centre of Excellence in Primary Oral Health Care.

This submission from the University Department of Rural Health at the University of Tasmania focuses on information that informs how the terms of reference influence oral health outcomes in rural and remote areas of Australia. The information presented is based on research evidence.

Thank you for the opportunity to submit to the House of Representatives Standing Committee on Health and Ageing. Should you wish to discuss any of the matters raised in this response, please contact Dr Crocombe: 0419 597 756, leonard.crocombe@utas.edu.au.

Comments against the Terms of Reference for the Inquiry

a) Demand for dental services across Australia and issues associated with waiting lists.

Oral Health is fundamental to overall health, wellbeing and quality of life. A healthy mouth enables people to eat, speak and socialise without pain, discomfort or embarrassment. The impact of oral disease on people's everyday lives is subtle and pervasive, influencing eating, sleep, work and social roles (National Advisory Committee on Oral Health, 2004).

Expenditure on dentistry in Australia was $7.7 billion in 2009-10 or 7.5% of total health funding (AIHW, 2012). However, many people do not have adequate access to dental care, including frail and older people (Chalmers et al. 2002), rural residents (Crocombe et al. 2010), Indigenous Australians (Slack-Smith et al. 2011), people with physical and intellectual disabilities (Pradhan et al. 2009a), and people of low socio-economic status (Sanders et al. 2006). Improving access to dental care is an option to improve oral health outcomes, albeit an expensive one. Some argue that a universal dental scheme would be beyond the financial capabilities of the Australian Government. Senator Walsh in his book *Confessions of a Failed Finance Minister* advised that:

> "dental treatment has the potential to be a bottomless fiscal pit which no Commonwealth Government should go near" (Walsh, 2005).

The cost of providing such a scheme has been estimated to be in the order of anywhere between $7 and $11 billion per annum (NHHRC, 2008).

With the recent large increase in dental practitioner training places, and the increase in the number of dentists coming from overseas, finding dental practitioners willing to practice in areas of dental need will become easier and easier. In the five years between 2006 and 2011 the number of dentists registered in Australia increased by 13.2%, while the total number of dental practitioners increased by 15.4% (AHPRA, 2012). However, the high cost of providing dental care suggests that reducing dental disease should be a public health priority.

Fluoridation of reticulated water supplies is the most effective, equitable and efficient measure of controlling dental disease (Slade et al. 2013). The US-based Centers for Disease Control and Prevention and the World Health Organisation placed water fluoridation in the top ten public health achievements of the 20th Century. The current fluoride guidelines (ARCPOH, 2006) recommend that water fluoridation should be expended to as many people as possible. This suggests that any Commonwealth funding towards improving access to dental care should include a requirement that where feasible, the water supplies are fluoridated.

The language of oral health policy documents in OECD countries is dominated by workforce and practitioner development concepts based on three causal explanations for unequal oral health based on socio economic causality, service model causality, and workforce causality (Bell and Crocombe, 2012). There was an absence of oral health policy documents, those that were available were dated, and that they had limitations in explaining poor oral health causes and providing solutions.

Currently oral health lacks a persuasive theory and evidence-base for understanding the socio-economic dimensions of unequal oral health. However, it is known that socio economic

factors are the primary determinants of unequal health outcomes. That is, good health and poor health are linked to the economic and social shapers of people's lives (Commission on the Social Determinants of Health, 2008; Rainham, 2007). Oral health research has yet to properly investigate and theorise how socioeconomic determinants of health could be working to shape oral health outcomes in ways that go beyond simple explanations of employment and income status. This is a big part of the challenge of addressing the socio economic determinants of unequal oral health. In researching the social determinants of oral health, oral health research will need to move beyond its current clinical paradigms to develop more policy-relevant solutions.

Other than fluoride exposure, the stated causes for poor oral health are the same as for poor health in general. This raises the question of whether these issues could be tackled as part of health promotion overall, not as a separate oral health promotion campaign. To promote oral health promotion as a separate message to general health promotion may only complicate the messages going to the public.

Perhaps not surprisingly as the mouth is part of the body, more and more links are being found between oral and general health. Examples include periodontal (gum) disease with low vitamin D serum levels (Grant & Boucher, 2010, Hujoel 2012), coronary heart risk (Hujoel et al. 2000) rheumatoid arthritis (Mercado et al. 2000), diabetes mellitus (Khader et al. 2006), premature births (Davenport et al. 1998) and respiratory infections (Scannapieco, 1999). In most cases, the evidence shows correlations without causality.

Further, pushing oral health messages may not work. One well known systematic review by Kay & Locker (1995) concluded that oral health education resulted in a small positive, but temporary effect on plaque accumulation and no discernible effect on caries increment. We do know that health promotion campaigns work in the area of early childhood caries (Hamilton et al. 2001, Plutzer and Spencer, 2007) and should be encouraged.

Despite advocacy over a long period for the common risk factor approach to the management of caries, the integration of oral health promotion into health promotion strategies, and emphasis on the importance of oral health to systemic well-being (Petersen 2008), there remains a disappointing focus on separate, dedicated, dental health education. It is not surprising that this approach has had limited impact (Pitts et al. 2011).

This suggests that the time of excluding the mouth from health planning, including in health promotion, should cease and that further research into the oral health/general health links should be encouraged.

b) The mix and coverage of dental services supported by state and territory governments, and the Australian Government.

Private dental practice has changed to reflect not just the greater retention of teeth, but also the increased use of services by adults. The pattern of practice has shifted towards fewer visits to the dentist per year, but more services provided per visit, so that there have been a stable annual number of services supplied per dentist (Brennan and Spencer, 2000). The mix of services per year by dentists has shifted from simple restorative, denture and extraction services to diagnostic, preventive, more complex restorative and root filling services. The use of minimal intervention dentistry that involves more conservative tooth

cavity preparation, and the comprehensive management of oral diseases, has the potential to prevent dental disease, reduce “the repeat restoration cycle” and improve oral health outcomes (Elderton 1990, Tyas et al. 2000).

Research has shown that frequently visiting a dentist has not reduced dental caries (tooth decay) experience (Sheiham 1977, Evans et al. 1993). The debate on appropriate dental visiting behaviour began back in 1977 when Sheiham found that though the most frequent dental attenders had the advantage over the less frequent attenders of having a higher number of functioning teeth, they also had the disadvantage of higher levels of dental disease experience. Later, regular attenders were found to have to be less likely to suffer acute symptoms and require emergency treatment (Sheiham et al. 1985, Todd and Lader 1991, Murray 1996). However, though the research suggests, that historically, in-surgery preventive health measures have not prevented dental disease, but that doesn’t mean it is a waste of time.

Pitts and colleagues (2011) suggest that the slow change to how dental caries is managed can be attributed in large measure to factors such as clinical and professional conservatism, economic incentives that reward surgical treatment more highly than preventive caries control, and the consistent failure of communication between the dental sub-groups, with poor communication by the research community and limited attempts at systematic implementation of research findings by clinicians working in health systems that promote the *status quo*.

Another and more plausible reason is simply that dental practitioners have not seen the evidence that preventive measures are cost effective. For example, Kallestal et al. (2003) in a systematic review found that the scarcity of well-conducted studies, as well as contradictory evidence in the reviewed articles, made it difficult to judge the health-economic effect of the studied caries-prevention measures which included fissure sealants, fluoride rinsing, fluoride tablets and lozenges, fluoride varnish, preventive programs and chlorhexidine.

This does not mean that we shouldn’t continue the trend towards using more in-surgery preventive health measures. However, we need to ensure that the measures used are evidence-based. So, let’s look at potential preventive measures to see what the evidence indicates.

The research evidence is of insufficient quality to reach any conclusions regarding the beneficial and adverse effects of routine scaling and polishing for periodontal health (Bierne et al. 2008).

There is clear evidence of a caries-inhibiting effect of fluoride gel (Marinho et al. 2009a). Additional forms of topical fluoride (mouthrinses, gels, or varnishes), whether used in the surgery or at home, can reduce tooth decay in children and adolescents more than fluoride toothpaste alone, but the extra benefit is not great (Marinho et al. 2009b). A review (Marinho et al, 2009c) suggested a substantial caries-inhibiting effect of fluoride varnish in both the permanent and the deciduous dentitions based largely on trials with no treatment controls. Given the relatively poor quality of most of the included studies and the wide confidence intervals around the estimates of effect, there remains a need for further trials. The Australian guidelines (ARCPOH, 2006) recommend that professionally applied fluoride

varnish should be used for people who have elevated risk of developing caries. It also recommends that high concentration fluoride gels and foams may be used for people aged 10 years or more who are at an elevated risk of developing caries in situations where other fluorides vehicles may be unavailable or impractical.

There is some evidence that one-to-one dietary interventions in the dental setting can change behaviour, although the evidence is greater for interventions aiming to change fruit/vegetable and alcohol consumption than for those aiming to change dietary sugar consumption (Harris et al. 2012).

Pit and fissure sealing of teeth is a recommended procedure to prevent caries of the occlusal surfaces of permanent molars. There was some evidence on the superiority of pit and fissure sealants over fluoride varnish application in the prevention of occlusal decays. However, current scarce data limit recommendations on whether to apply pit and fissure sealants or fluoride varnishes on occlusal surfaces (Hiri et al. 2010). According to Ahovuo-Saloranta and colleagues (2009), the effectiveness of sealants is obvious at high caries risk, but information on the benefits of sealing specific to different caries risks is lacking.

In Britain, a review (Nasser and Neild, 2010) concluded that behavioural intervention for smoking cessation involving oral health professionals was an effective method of reducing tobacco use in smokers and users of smokeless tobacco and preventing uptake in non-smokers. There was not enough evidence available to assess whether these interventions are cost-effective and the effectiveness of one intervention (or component of the intervention) over another was not clear.

The research results indicate that, other than in people with high dental caries risk, the evidence for successful use of dental surgery preventive oral health care is lacking. Further research needs to be undertaken as a matter of urgency.

Regular dental treatment has meant that the disease is tackled in its earlier stages resulting in better oral health outcomes by allowing people to receive dental care while the disease was at an early stage so that it could be treated before it caused problems. Although it is not the whole solution, improving access to dental care will improve oral health outcomes (Crocombe et al. 2013). In comparison to adults with favourable visiting patterns, adults with unfavourable visiting patterns are half as likely to receive preventive treatment and four times more likely to receive extractions (Ellershaw & Spencer, 2011). Both moderate to severe periodontal (gum) disease is also more likely in adults with unfavourable patterns compared to adults with favourable patterns (Spencer & Harford, 2008).

c) Availability and affordability of dental services for people with special dental health needs.

Pradhan et al. (2009b) has found that decay rates among adults with physical and intellectual disabilities were associated with age and with assistance with oral hygiene. In addition, many of these adults received irregular dental care, particularly those being cared for in the family home (Pradhan et al. 2009a). In institutions and community care settings the frequent changes of staff means that oral health care may be compromised. It is estimated that around 1 million Australians would be in the “special need” category for oral health (National Oral Health Plan 2004-2013). These people now encounter many barriers when trying to access either private or public dental care (Chalmers 1999). A multidisciplinary

team approach is needed, involving a range of primary health care providers (Chalmers 2003).

d) Availability and affordability of dental services for people living in metropolitan, regional, rural and remote locations.

Non–capital-city residents are more likely to suffer complete tooth loss, to have an inadequate dentition (less than 21 teeth), to wear dentures, to have missing teeth than capital-city residents (Roberts-Thomson & Do, 2007) and are more likely to avoid certain foods due to dental problems than capital–city-based people (Harford & Spencer, 2007). They also have a higher proportion of people with untreated coronal dental caries and a higher mean DMFT (Decayed, Missing and Filled Teeth). However, the presence of periodontal pocketing, clinical attachment loss and moderate or severe periodontitis does not differ between people 15 years of age or older residing inside or outside capital city areas (Roberts-Thomson & Do, 2007).

The following story highlights features of rural life and culture that affect oral health:

"….I had to travel to see a dentist. I reckon it was probably about 400 kms. About three-hour drive it was. I went to Mount Isa to the dentist. And I was living in a country town. That's probably about ten years ago. One time when I had to travel, I think a filling fell out –um, can't quite remember now. I remember having bad toothache and going to the dentist, and he wanted me to have root canal surgery. And I said, 'no, just pull it out.' Cheaper. And I would have had to keep going back for revisits. And I was, like, three hours away." (Sendziuk, 2007)

In the aged sector, people over 60 years of age from rural areas were more likely to be edentulous than those from urban areas (Adams et al. 2003) and geographical location was a major factor in the frequency of use of dental services and the reasons for dental visits (Adams et al. 2004).

Although the oral health of Australians improved over the 17 years between 1987–88 and 2004–06 (Slade and Sanders, 2007), there were similar improvements in oral health in capital city areas and the rest of Australia, resulting in the gap in oral health outcomes being as great in 2004/06 as it was in 1987/88 (Crocombe et al. 2010). This suggests that whatever is making rural oral health poorer than capital-city oral health is not being adequately managed nor satisfactorily explained.

A suggested reason for the poorer rural health has been poorer access to dental care, which may include patient perceptions of the impact of travel costs and the impact on family life (Curtis, 2007). Access is not a simple construct (Spencer, 2004). It includes notions of need, availability and comprehensiveness of dental services (Beck and Burt, 1984).

Beck and Burt (1984) defined dental care access as the:

> "opportunity for each individual to enter into the dental care system and to make use of dentists' services as the best way of preventing and controlling oral disease."

An imbalance in availability of general health services has been noted between urban and rural locations in Australia, with rural areas characterised by fewer facilities and a shortage of health personnel (Humphreys et al. 2002). There is an uneven distribution of dentists

towards larger centres (Teusner et al. 2007). Hence, it is not surprising that dentists from non-capital city areas supply more patient visits per year and are more likely to be busier than they would like to be than capital city dentists (Brennan and Spencer, 2007).

Research has indicated that that poorer access to dental care was not the sole reason why people outside capital cities have poor oral health (Crocombe et al. 2012). Water fluoridation is less common in rural areas than capital city areas[31], and hence could be a contributing factor in the differing levels of oral health. Later, as yet unpublished, research indicates that when a lifetime fluoride variable is added to the regression analysis, the difference in the dental caries experience between capital city and non-capital city residents disappears.

People from rural areas live in a different physical environment, are more likely to poorer, older, and less educated (ABS, 2012), and it could be a combination of these factors which is important to poorer oral health (Crocombe et al. 2010).

Another reason could be a differing attitude to health. People in rural areas commonly describe health as an absence of disease (Humphreys, 2002), and their money is spent on disease management rather than on primary care and health promotion (Coster and Gribben 1999). Previous research has shown that people not living in capital city areas were more likely than those living in capital cities to have a problem-orientated pattern of dental attendance, less likely to make an annual dental visit, and less likely to have a particular dentist that they usually visit (Coster and Gribben 1999).

In short, the solution to the problem of poorer oral health of people living in rural areas compared to those living in metropolitan areas is more complicated than just improving access to dental care, though it is a factor.

Anecdotal evidence from rurally-based dentists in areas that have historically had difficulty attracting dentists, suggests that they are now receiving applications for jobs from dentists. They put this phenomenon down to the increased numbers of dentistry graduates and numbers of overseas-trained dentists coming to Australia. If true, the limitation in dental practitioner numbers as one reason for the poorer access to dental care in rural areas, may be abating. Research is needed to ascertain if this anecdotal evidence is correct.

Recently, tenders have just been called to manage and implement the Rural and Remote Infrastructure and Relocation Grants Support Scheme for Dentists (http://health.gov.au/internet/main/publishing.nsf/Content/work-st-driss). The measure aims to improve dental workforce distribution, and service delivery capacity in regional, rural and remote communities by providing relocation and infrastructure grants to encourage and support dentists to relocate to regional, rural and remote areas, and assist them to establish new practices or expand existing practices.

There is little research on the success or otherwise of such measures in the dental area, though research is currently being undertaken by the Centre for Research Excellence in Primary Oral Health Care. Though one cannot extrapolate the results from one area of health practice to another, research by the Centre of Research Excellence in Rural and Remote Health has given some insights into what may influence dentists to move, and possibly more importantly, stay in regional, rural and remote areas (Humphreys et al. 2007). Their research indicates that it is a combination of:

- professional factors such as the nature of the work, support, career pathway, remuneration, infrastructure, bureaucratic requirements, indemnity;
- social factors including family and personal characteristics;
- External factors involving the community and geographical location.

We can only but agree with the Centre of Research Excellence in Rural and Remote Health when they state that "the factors limiting the health and medical workforce supply are complex and vary according to the context in which they operate." We also agree with them in that "whatever retention incentive is adopted, a rigorous evaluation policy using pre- and post-intervention baseline measures should be employed from the outset (Centre of Research Excellence in Rural and Remote Health, 2011).

The Government has also created the Voluntary Dental Graduate Year Program which commenced this year. This program is of interest to people in rural areas because many of the new dentist graduates are being located in rural and remote areas. In the last Budget, the Government announced the expansion of the Voluntary Dental Graduate Year Program to cater for extra dental graduates and to include oral health therapists. The program is to be expanded, but the current program has only commenced this year and advertisements have just come out for tenders to do its evaluation. The program is to be expanded, but we don't know if it is success or not. We have a similar recommendation for this program as the Centre of Research Excellence in Rural and Remote Health had for retention incentives, i.e. whatever program is adopted, a rigorous evaluation policy using pre- and post-intervention baseline measures should be employed from the outset.

Unfortunately, we have not seen any analysis of what would be the best dental workforce for Australia, either in the number, or mix, of dental practitioners be they dental specialists, dentists, dental hygienists, dental therapists, oral health therapists, dental prosthetists or dental assistants. Nor have we seen a document that analyses a workable dental team concept. We certainly do not want to become involved in a debate about which dental practitioners should do various dental procedures, and on which patients such as age groups or public or private patients.

However, we would like to comment on four aspects of the relocation incentive and graduate programs as they influence rural areas:

- Established rural dental practices should not be adversely affected by the relocation incentive program. The concern is that an existing dental service with an experienced dentist may leave a rural area to be replaced by an inexperienced dentist who utilised the incentive funding, and then may find that practicising dentistry in a rural area was not what he/she wants.
- Dentists who practice in rural and remote areas have to undertake procedures that are usually undertaken by dental specialists in metropolitan areas. This suggests that we need the best dentists in rural areas and that a rural speciality with extra training should be established.
- When the oral health therapist graduate year program commences, the use of dentist/oral health therapist teams in rural areas should be encouraged.
- Steps should be taken to strengthen interprofessional primary care networks in rural and remote areas to better integrate oral health with broader health service provision.

e) The coordination of dental services between the two tiers of government and with privately funded dental services; and workforce issues relevant to the provision of dental services.

The coordination of dental services between the two tiers of government is outside the expertise of the University Department of Rural Health at the University of Tasmania.

However, we would like to make a comment about the coordination of dental services between of government and privately funded dental services in rural and remote areas. Less than 19% of dental costs are covered either by State or Commonwealth Governments (AIHW, 2012). Dentistry is largely supplied by the private sector (Balasubramanian and Teusner, 2011). This means that private dental practices have the greatest coverage of rural and remote areas in Australia.

Dental practice involves the use of expensive dental equipment. Costs are high with the average profit margin (inclusive of the practice owners income) being 16.8% in 2010 (Barnard and Shao, 2012). This means a town needs to be a certain size before a full-time dental practice becomes viable. If a practice is located in a marginally sized town, the introduction of a part-time government funded dental service adults may be enough to make a full-time practice unviable. If that occurs, the town may lose a full-time dental practice that could cater to all its citizens, to be replaced by a part-time clinic that supplies care to only some of its citizens.

The solution is to use existing rural private dental practices to supply care to health care card holders and other people in the community with poor access to dental care. This can be done either via a voucher scheme or by a modification of the Department of Veteran Affairs dental services scheme for returned veterans.

References

Adams C, Slack-Smith L, Larson A, O'Grady M. Dental visits in older Western Australians: A comparison of urban, rural and remote residents. Australian Journal of Rural Health. 2004; 12(4): 143-149.

Adams C, Slack-Smith L, Larson A, O'Grady M. Edentulism and associated factors in people 60 years and over from urban, rural and remote Western Australia. Australian Dental Journal. 2003; 48(1): 10-14

Ahovuo-Saloranta A, Hiri A, Nordblad A, Makela M, Worthington HV. Pit and fissure sealants for preventing dental decay in the permanent teeth of children and adolescents. Cochrane Oral health Group, 2009.

Australian Bureau of Statistics (ABS). 2011 Census of Population and Housing, 2012. http://www.abs.gov.au/census. Accessed 7 March 2013.

Australian Institute for Health and Welfare (AIHW), Health Expenditure Australia 2009-10. Canberra. 2012.

Australian Research Centre for Population Oral Health (ARCPOH). The use of fluorides in Australia: guidelines. Australian Dental Journal, 2006; 51(2): 196-199.

Balasubramanian M, Teusner DN 2011. Dentists, specialists and allied practitioners in Australia: Dental Labour Force Collection, 2006. Dental statistics and research series no. 53. Cat. no. DEN 202. Canberra: AIHW.

Barnard PD, Shao JH. Australian Dental Practice Survey 2010 – Report and Tables. Australian Dental Association Inc. PO Box 520 St Leonards NSW Australia 1590, February 2012.

Beck JD, Burt BA. Access to dental care: Summary and recommendations. Journal of Public Health Dentistry 1984;44:39-42.

Beirne PV, Worthington HV, Clarkson JE. Routine scale and polish for periodontal disease in adults. Cochrane Oral health Group. 2008.

Bell E, Crocombe LA. Oral health policy; What does it do for rural and remote communities? Presentation at the SARRAH Conference, Launceston, Tasmania. 2012.

Brennan DS, Spencer AJ. Trends in private dental service provision by geographic location. Australian Journal of Rural Health 2007;15:189-95.

Brennan DS, Spencer AJ. Trends in service provision among Australian private general dental practitioners over a 20-year period. International Dental Journal, 2000; 56(4): 215-223.

Centre of Research Excellence in Rural and Remote Health. Submission to the Parliament of Australia Senate Enquiry into the factors affecting the supply of health services and medical professionals in rural areas. December 2011.

Chalmers JM, Carter KD, Spencer AJ. Caries incidence and increments in community-living older adults with and without dementia. Gerodontology. 2002 Dec;19(2):80-94.

Chalmers JM. Oral diseases in older adults. In: Chalmers JM et al. Aging and Dental Health. AIHW Dental Statistics and Research Series No. 19 Adelaide: The University of Adelaide. 1999.

Chalmers JM. Oral health promotion for our ageing population. Australian Dental Journal, 2003; 48:2–9.

Commission on the Social Determinants of Health, 2008. Final Report: Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health. Geneva. Available at

Coster G, Gribben B. Primary care models for delivering population-based health outcome. Wellington, New Zealand: National Health Committee, 1999.

Crocombe LA, Brennan DS, Slade GD and Do L. Is self interdental cleaning associated with dental plaque levels, dental calculus, gingivitis and periodontal disease? Journal of Periodontal Research, 2012; 47:188–97.

Crocombe LA, Mahoney GD, Spencer AJ, Waller M. Will improving access to dental care improve oral health-related quality of life? Australian Dental Journal. 2013, In press.

Crocombe LA, Stewart JF, Barnard PD, Slade GD, Roberts-Thomson KD, Spencer AJ. Relative oral health outcome trends between people inside and outside capital city areas of Australia. Australian Dental Journal 2010;55: 280-284.

Curtis B, Evans RW, Sbaraini A, Schwarz E. Geographic location and indirect costs as a barrier to dental treatment: A patient's perspective. Australian Dental Journal 2007;52(4):271-275.

Davenport ES, Williams CE, Sterne JA, Sivapathasandaram V, Fearne JM and Curtis MA. The East London Study of Maternal Chronic Periodontal Disease and Preterm Low Birth Weight Infants: study design and prelevance data. Ann Periodontol 1998; 3(1):214-21.

Elderton RJ. Clinical studies concerning re-restoration of teeth. Advances in Dental Research, 1990; 4(1): 4-9.

Ellershaw AC, Spencer AJ. Dental attendance patterns and oral health status, AIHW Dental Statistics and Research Series No. 57, 2011.

Evans RW, Lo ECM, Darvell BW. Determinants of variation in dental caries experience in primary teeth of Hong Kong children aged 6-8 years. Community Dentistry and Oral Epidemiology, 1993; 21(1): 1-3.

Grant WB, Boucher BJ. Are Hill's criteria for causality satisfied vor Vitamin D and periodontal disease? Dermato-Endocrinology, 2010; 2(1): 30-36.

Hamilton FA, Davis KE, Blinkhorn AS. 2001. An oral health promotion programme for nursing caries. International Journal of Paediatric Dentistry, 1999; 9(3): 195–200,

Harford J, Spencer AJ. Oral health perceptions. Australia's dental generations: The National Survey of Adult Oral Health 2004-06. G. Slade, A. Spencer and K. Roberts-Thompson. Canberra, Australian Institute of Health and Welfare. 2007:173-195.

Harris R, Gamboa A, Dailey Y, Ashcroft A. One-to-one dietary interventions undertaken in a dental setting to change dietary behaviour. Cochrane Oral health Group. http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD006540.pub2/abstract. Accessed 10 December 2012.

Hiri A, Ahovuo-Slaoranta A, Nordblad A, Makela M. Pit and fissure sealants versus fluoride varnishes for preventing dental decay in children and adolescents, 2010. http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003067.pub3/abstract. Accessed 10 December 2012.

Hujoel PP, Drangsholt M, Spiekerman C, DeRouen TA. Periodontal disease and coronary heart disease risk. Journal of the American Medical Association, 2000; 284(11): 1406-1410.

Hujoel PP. Vitamin D and dental caries in controlled clinical trials: systematic review and meta-analysis. Nutrition Reviews. DOI: 10.1111/j.1753-4887.2012.00544.x. http://onlinelibrary.wiley.com/doi/10.1111/j.1753-4887.2012.00544.x/abstract. Accessed 22 December 2012.

Humphreys J, Jones M, Jones JA, Mara PR. Workforce retention in rural and remote Australia: determining the factors that influence length of practice. Medical Journal of Australia 2002;176:472-476.

Humphreys J, Wakerman J, Wells R, Jones J, Entwistle P, Harvey P. Improving primary health care workforce retention in small rural and remote communities – How important is ongoing education and training, Canberra, Australian Primary Health Care Research, 2007 Institute. http://www.anu.edu.au/aphcri/Domain/Workforce/humphreys_1_final.pdf.

Kallestal C, Norlund A, Soder B, Nordenram G, Dalhlgren H et al. Economic evaluation of dental caries prevention: a systematic review. Acta Odondol Scand 2003; 61: 341-346.

Kay EJ, Locker D. Is dental health education effective? A systematic review of the evidence. Community Dentistry and Oral Epidemiology, 24(4): 231-235.

Khader YS, Dauod AS, El-Qaderi SS, Alkafajei A, Batayha WQ. Periodontal status of diabetics compared with nondiabetics: a meta-analysis. Journal of Diabetes and its Complications, 2006; 20: 59-68.

Marinho VCC, Higgins JPT, Logan S, Sheiham A. Fluoride gels for preventing dental caries in children and adolescents. Cochrane Oral health Group, 2009a.

http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD002280/abstract. Accessed 20 December 2012.

Marinho VCC, Higgins JPT, Logan S, Sheiham A. Fluoride varnishes for preventing dental caries in children and adolescents. Cochrane Oral health Group, 2009c. http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD002279/abstract. Accessed 20 December 2012.

Marinho VCC, Higgins JPT, Sheiham A, Logan S. Combinations of topical fluoride (toothpastes, mouthrinses, gels, varnishes) versus single topical fluoride for preventing dental caries in children and adolescents. Cochrane Oral health Group, 2009b. http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD002781.pub2/abstract. Accessed 20 December 2012.

Murray JJ. Attendance patterns and oral health. British Dental Journal, 1996;181:339–342.

Nasser M, Neild H. Evidence summary: is smoking cessation an effective and cost-effective service to be introduced in NHS dentistry? British Dental Journal, 2010(4): 169-177.

National Advisory Committee on Oral Health. Healthy mouths, healthy lives: Australia's National Oral Health Plan 2004-2014. Adelaide, Government of South Australia on behalf of the Australia's Health Minister's Conference, 2004.

National Advisory Committee on Oral Health. Healthy mouths, healthy lives: Australia's National Oral Health Plan 2004-2014. Adelaide, Government of South Australia on behalf of the Australia's Health Minister's Conference, 2004.

National Health and Hospital Reform Commission (NHHRC). Costing a Social Insurance Scheme for Dental Care. 2008. PriceWaterhouseCoopers.

Petersen PE. World Health Organization global policy for improvement of oral health – World Health Assembly 2007. International Dental Journal, 2008; 58: 115-121.

Pitts N, Amaechi B, Niederman R, Acevedo A-M, Vianna R, Ganss C, Ismail A, Honkala E. Global Oral Health Inequalities: Dental Caries Task Group—Research Agenda. Advances in Dental Research. 2011; 23(2): 211–220.

Plutzer K, Spencer AJ, 2008 Efficacy of an oral health promotion intervention in the prevention of early childhood caries. Community Dentistry and Oral Epidemiology, 2008; 36(4): 335-346.

Pradhan A, Slade GD, Spencer AJ. Access to dental care among adults with physical and intellectual disabilities: residence factors. Aust Dent J. 2009a Sep;54(3):204-11.

Pradhan A, Slade GD, Spencer AJ. Factors influencing caries experience among adults with physical and intellectual disabilities. Community Dent Oral Epidemiol. 2009b Apr;37(2):143-54.

Rainham D. Do Differences in Health Make a Difference? A Review for Health Policymakers. Health Policy 2007; 84(2-3), 123-132.

Roberts-Thomson K, Do L. 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. Canberra, Australia's Institute of Health and Welfare, 2007;Ch5:81-142.

Scannapieco FA. Role of oral bacteria in respiratory infection. Journal of Periodontology 1999; 70(7):793-802.

Sendziuk P. Historical context of Australia's oral health. In: Slade GD, Spencer AJ, Roberts-Thomson KF, eds. Australia's dental generations. The National Survey of Adult Oral Health 2004–06. Canberra, Australia's Institute of Health and Welfare, 2007;Ch4:54-80.

Sheiham A. Is there a scientific basis for six-monthly dental examinations. Lancet 1977; 27: 288–293.

Sheiham AJ, Maizels AM, Cushing J, Holmes J. Dental attendance and dental status. Community Dentistry and Oral Epidemiology 1985; 13: 304–309.

Slade GD, Sanders AE, Do L, Roberts-Thomson K, Spencer AJ. Effects of fluoridated drinking water on dental caries in Australian adults. Journal of Dental Research., 2013; 1-7.

Slade GD, Sanders AE. Trends in oral health1987-2006. In: Slade GD, Spencer AJ, Roberts-Thomson KF, eds. Australia's dental generations. The National Survey of Adult Oral Health 2004–06. Canberra, Australian Institute for Health and Welfare, 2007;Ch8:196-235.

Spencer AJ. Narrowing the inequality gap in oral health and dental care in Australia. Australian health Policy Unit. University of Sydney. Commissioned Paper Series. 2004.

Spencer, AJ, Harford J. Improving Oral Health and Dental Care for Australians. Prepared for the National Health and Hospitals Reform Commission (NHHRC), 2008.

Spencer, AJ. Narrowing the inequality gap in oral health and dental care in Australia. Sydney. Australian Health Policy Institute, 2004.

Teusner DN, Chrisopoulos S, Brennan DS. Geographic distribution of the Australian dental labour force, 2003. AIHW Cat. no. DEN 168. Dental Statistics and Research Series No. 37. Canberra: Australian Institute of Health and Welfare, 2007.

Todd JE, Lader D. Adult Dental Health. London: HMSO, 1991.

Tyas MJ, Anusavice KJ, Frencken JE, Mount GJ. Minimal intervention dentistry – a review. FDI Commission Project 1097. International Dental Journal, 2000; 50: 1-12.

Walsh P. Confessions of a Failed Finance Minister. Random House Australia (Milsons Point, NSW and New York). 1995.