Access, literacy and behavioural correlates of poor self-rated oral health amongst an Indigenous South Australian population

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Objective: To better understand the determinants of self-rated oral health within an Indigenous population by: 1, examining potential individual-level correlates of socio-demographic, health behaviours, dental care access and oral health literacy-related outcomes with self-rated oral health; and, 2, examining the relative contribution of these domains to self-rated oral health in multivariable modelling. *Methods:* We conducted nested logistic regression analyses on self-reported status of 'fair or poor' versus 'better' oral health using data from a convenience sample of rural dwelling Indigenous Australians (n=468). Data were collected on background characteristics, health behaviours, access to dental care, oral health literacy-related outcome variables and REALD 30, an oral health literacy scale. *Results:* Overall 37.0 % of the Indigenous adult population reported fair or poor oral health. In multivariable modelling, risk indicators for fair or poor self-rated oral health that persisted after adjusting for other covariates included being aged 38+ years (OR 2.9, 95%CI 1.9,4.6), holding a Government Health Concession card (OR 2.3, 95%CI 1.1,4.5), avoiding the dentist due to financial constraints (OR 2.3, 95%CI 1.4,3.6), not knowing how to make an emergency dental visit (OR 1.7, 95%CI 1.1,2.7) and poor understanding of the prevention of dental disease (OR 1.7, 95%CI 1.1,2.7). *Conclusions:* In this vulnerable population, risk indicators contributing to poor self-rated oral health included socio-demographic, dental care access and oral health literacy-related factors. Health behaviours were not significant.

Key words: *indigenous, self-rated oral health, risk indicator, rural, Australian, REALD*

Introduction

Aboriginal and Torres Strait Islander (hereafter known as 'Indigenous') people in Australia are a disadvantaged population (Thomson, 2003). Oral health disparities in this group reflect wider disparities in many social and health indicators (Harford *et al*., 2003). Indigenous Australians have, in general, poorer self-rated health and oral health than non-Indigenous populations (Roberts-Thomson *et al.*, 2008).

Global self-rated oral health has been found to be an adequate measure of people's perceived oral health (Kaplan and Baron Epel, 2003) and there is evidence to suggest that it could be a predictor of dental disease state and mortality amongst some populations (Benyamini *et al.,* 2004). Self-rated oral health has been used to successfully replace expensive clinical indicators in oral epidemiological surveys (Zaitsu *et al*., 2011). Self rated oral health is frequently used in national studies to measure oral health and has been reported to be a valid summary indicator of oral health in the absence of clinical examinations (Atchison and Dolan, 1990; Atchison *et al*., 1993; Matthias *et al*., 1995). Additionally, poor self-rated oral health provides an indication of dental needs (Atchison and Dolan, 1990; Matthias *et al*., 1995).

Despite increasing investment in health resources, there is still a shortage of Indigenous oral health data in Australia. This paper looks at access to health care, health literacy and behavioural determinants to explore the contribution of individual-level factors of poor self-rated oral health status within a rural Indigenous population. Other social measures which influence the biological process and health behaviours of Indigenous Australians need exploring to explain further disparities and associations with oral health within the Indigenous population. For this reason we did not explore clinical indicators, impact from disease or perceived treatment need. Findings from such work can help improve health services and their delivery and/or better access and tailoring of services to the needs of the population. Few studies in Indigenous populations have explored the relative contribution of oral health literacy and oral health literacy-related outcomes to self-rated oral health in an Indigenous population and in the presence of other known oral health determinants (Parker and Jamieson, 2010).

The objective of the research was to determine, within an already marginalised population with poor oral health outcomes, what the significant contributions to poor self-rated oral health and to examine the attenuation and contribution to variance of various theoretically driven blocks of variables. Hypothesised relationships to oral health under investigation in this study are participants' socio demographic characteristics, access to care, health behaviours and literacy. The aim to was to explore, within what is often conceptualised as a relatively homogenous population, the contribution of various theoretically distinct measures to poorer self-rated oral health and to explore whether literacy or access to dental services attenuated the negative effects of socio-economic determinants and oral health behaviour.

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Methods

Key community members were responsible for the recruitment of study participants using strategies which were largely opportunistic and included word of mouth, flyers and posters in the local community, radio interviews in the local radio station and personal visits to local Indigenous community centres, health clinics, resource centres and schools. Eligibility criteria were being Aboriginal or Torres Strait Islander aged 17 years or older living in the study region which was a regional centre about 230km north of South Australia's capital city, Adelaide. Participants received a $20 supermarket voucher as recompense for their time and contribution to the research.

Ethical approval was granted by the Aboriginal Health Council of South Australia and the Human Research Ethics Committee of the University of Adelaide and all participants gave written informed consent before participating. Calculations of sample size were performed using PC-SIZE software (GE Dallal, 1990, v3) and based on the 2008 oral health literacy survey. A minimum of 310 was the sample needed to detect a 7.5% difference in the proportion of problem-based dental attenders, a 25% difference in the proportion of those who believe teeth should be brushed none or once daily and a 30% in the proportion of those who believe cordial is good for teeth, don't own a toothbrush or own a toothbrush but didn't brush the previous day at the significance criterion of 0.05 and a power of 0.80.

Questionnaire items were based on those used in Australia's 2004-06 National Survey of Adult Oral Health (Slade et al., 2007) and piloted on a selection of Indigenous adults with changes were made accordingly to increase usability. The questionnaire took approximately 15 minutes to complete with items administered by the researchers except for the REALD-30 oral health literacy instrument (Lee et al., 2007) which participants self-completed.

The dependent variable was self-rated oral health status. This was a single global item worded "Would you rate your oral health as…" with responses on a five-point scale with responses ranging from 1, 'excellent', to 5, 'poor'. Responses were dichotomised as the reference level 'good' including excellent, very good or good or 'poor' including fair and poor following common practice (Sabbah et al., 2009; Borrell et al., 2002).

Independent variables included socio-demographic information of age (dichotomised into <38 years and 38+ years), gender, employment status, possession of a government means-tested health care card, highest educational attainment and household size. Behavioural factors included use of alcohol, use of tobacco and toothbrush ownership, while dental care access variables included car ownership, avoiding dentist because of cost, difficulty paying a $100 dental bill, knowledge of how to make an emergency dental visit and living outside of the regional centre. Oral health literacy-related variables included understanding the number of times it is recommended to brush teeth each day (responses measured from none, once per day, twice or more than twice a day), understanding reasons for tooth decay (dichotomous yes/no response) and REALD-30; a word-recognition, validated oral health literacy tool (Lee et al., 2007). The REALD-30, series of oral health related words, was asked by a health worker and categorised as yes/no depending on the ability of participant to pronounce each item.

Bivariate distributions of self-rated oral health were generated. Exposure variables were classified into socio-demographic, health behaviour, access to care and oral health literacy domains. Any variable that was significant at the 0.2 level in bivariate analyses was included in a multivariable logistic regression model to determine indicators of self-rated oral health. Data were analysed using SPSS v19.

Results

Completed questionnaires were received from 468 participants with an average age of 38 years and of whom 64% were female. The prevalence of participants rating their oral health dichotomised as fair or 'poor' was 37% (Table 1).

In regards to socio-demographic factors, a higher prevalence of those aged 38 years or more, males and those owning a health care card rated their oral health as fair or poor. Behavioural factors that were significantly associated with poor self-rated oral health included tobacco smoking and non-ownership of a toothbrush. A higher proportion of those who avoided dental care because of cost, could not afford a $100 dental bill or who did not know how to make an emergency dental visit had poor self-rated oral health. Oral health literacy-related factors associated with poor self-rated oral health included not knowing the recommended number of times to brush teeth per day and not understanding the reasons for dental disease.

On the REALD-30 scale (range 0-30) the mean score was 15.0 overall and 15.3 (sd 0.58) rating themselves with poor oral health (p=0.52).

Table 2 presents the estimates from the nested multivariable regression analyses. Model 1 reports only socio-demographic characteristics. Participants aged 38 years or more were 2.6 times as likely to report poor oral health as their younger counterparts, while health care card owners were 2.4 times as likely to report poor oral health as those not owning a card. In Model 2 (adjusting for socio-demographic factors), the same socio-demographic characteristics associated with reportedly poor oral health were still significant in the presence of health behaviours although the magnitude slightly increased for age and decreased for health care card status. No health behaviours were significant in this model. Access to care variables were added in Model 3. The socio-demographic estimates were similar to Model 2, with the odds for age increasing slightly and the odds for health care card status being attenuated. Two of the four 'access to care' variables were significant; avoiding the dentist due to cost and not knowing how to make an emergency dental visit.

Oral health literacy-related outcome variables were added in Model 4. Their inclusion strengthened older age and health care card ownership as predictors of 'poor' self-rated oral health. Access to care effects were attenuated but remained significant. Those reporting not understanding the reason for tooth decay had almost double the odds of reporting poor self-rated oral health.

Table 1. Self-rated oral health by socio-demographic, behavioural, access and oral health literacy factors

	%	n	Fair or poor self-rated oral health, % (95%CI)	p
Whole sample	100.0	468	37.0	
Socio-demographic				
Age				
37 years or younger	50.0	234	26.9 (21.6, 33.0)	**<0.01**
38 years or older	50.0	234	47.0 (40.7, 53.4)	
Gender				
Male	35.7	83	42.5 (35.2, 50.2)	**0.04**
Female	64.3	385	33.9 (28.7, 51.5)	
Income source				
Employed	30.8	144	33.3 (26.1, 41.4)	0.16
Welfare	69.2	324	38.6 (33.4, 44.0)	
Healthcare card				
Yes	75.6	353	40.2 (35.2, 45.4)	**<0.01**
No	24.4	114	26.3 (19.0, 35.2)	
Highest qualification				
Trade, TAFE / University	17.7	83	37.3 (27.6, 48.2)	0.51
Primary / High school	82.3	385	36.9 (32.2, 41.8)	
Household size				
4 or fewer	61.5	288	38.5 (29.0, 43.3)	0.20
5 or more	38.5	180	34.4 (27.8, 41.7)	
Behavioural				
Ever use alcohol				
Yes	82.9	388	38.4 (33.7, 43.4)	0.09
No	17.1	80	30.0 (21.0, 40.9)	
Ever used tobacco				
Yes	75.4	353	39.1 (34.1, 44.3)	0.05
No	24.6	115	30.4 (22.7, 39.5)	
Own a toothbrush				
Yes	84.6	396	34.3 (29.8, 39.2)	**<0.01**
No	15.4	72	51.4 (39.9, 62.7)	
Access				
Car ownership				
Yes	41.0	192	34.4 (28.0, 41.4)	0.19
No	59.0	276	38.8 (33.2, 44.7)	
Avoid dentist due to cost				
Yes	52.1	244	47.5 (41.3, 53.8)	**<0.01**
No	47.9	224	25.4 (20.2, 31.6)	
Paying $100 dental bill would be				
Not difficult	17.1	80	40.5 (35.7, 45.4)	**<0.01**
Difficult	82.9	388	20.0 (12.6, 30.2)	
Know how to make emergency appointment				
Yes	70.5	330	31.2 (26.4, 36.4)	**<0.01**
No	29.5	138	50.7 (42.4, 59.0)	
Location				
Regional centre	91.5	428	38.1 (33.6, 42.8)	0.06
Other	8.5	40	25.0 (14.0, 40.6)	
Oral health literacy				
Number of times to brush?				
Twice or more	83.3	390	35.1 (30.5, 40.0)	**0.04**
none, once, not sure/don't know	16.7	78	46.2 (35.4, 57.3)	
Understand reasons for oral disease				
Yes	70.7	331	32.9 (28.1, 38.2)	**<0.01**
No	29.3	137	46.7 (38.5, 55.1)	
Think oral disease preventable				
Yes	71.4	334	35.0 (30.1, 40.3)	0.10
No	28.6	134	41.8 (33.7, 50.3)	

Table 2. Nested regression model of indicators for 'poor' self-rated oral health in an Indigenous population

	Model 1 OR (95%CI) n= 467	Model 2 OR (95%CI) n=467	Model 3 OR (95%CI) n=467	Model 4 OR (95%CI) n=467
Socio-demographic factors				
38+ years (ref <38 years)	**2.64 (1.7,3.9)***	**2.71 (1.7,4.0)***	**2.87 (1.8,4.4)***	**2.94 (1.9,4.6)***
Male	1.40 (0.9,2.1)	1.36 (0.9,2.0)	1.16 (0.7,1.8)	1.20 (0.7,1.8)
Welfare (ref employed)	1.12 (0.6,1.9)	1.09 (0.6,1.9)	1.14 (0.6,2.1)	1.21 (0.6,2.3)
Have health care card (ref no)	**2.36 (1.2,4.4)**	**2.29 (1.2,4.3)**	**2.27 (1.1,4.4)**	**2.30 (1.1,4.5) **
Household size (ref <6)	1.22 (0.7,1.9)	1.22 (0.7,1.9)	1.26 (0.7,2.0)	1.28 (0.7,2.0)
Health behaviours				
Use alcohol (ref No/never)		1.52 (0.8,2.9)	1.66 (0.8,3.2)	1.88 (0.9,3.7)
Use tobacco (ref No/never)		1.32 (0.7,2.2)	1.27 (0.7,2.2)	1.35 (0.7,2.4)
Don't own toothbrush (ref 'Do own')		1.71 (0.9,2.9)	1.49 (0.8,2.6)	1.39 (0.7,2.5)
Access to care				
Do not own a car (ref 'do own')			1.23 (0.7,2.0)	1.12 (0.6,1.8)
Avoid dentist due to cost (ref No)			**2.33 (1.4,3.6)***	**2.30 (1.4,3.6)***
Difficulty paying $100 bill (ref No)			1.82 (0.9,3.5)	1.77 (0.9,3.4)
Not know how to make emergency visit			**1.86 (1.1,2.9)**	**1.69 (1.1,2.7)***
Location other than regional centre			1.79 (0.7,4.0)	0.52 (0.2,1.1)
Oral health literacy				
Number of times should brush <2				1.10 (0.5,1.8)
Not understand reasons for tooth decay				**1.85 (1.1,3.3)***
Think oral disease can't be prevented				1.05 (0.6,1.7)
Nagelkerke R^2	0.09	0.11	0.21	0.23

* p<0.05,   ** p<0.01,   *** p<0.001

Discussion

This study aimed to determine those characteristics which were independently associated with poor self-rated oral health in a convenience sample of rural dwelling Indigenous adults and to address potential confounding which may lead to an overestimate of the effects of some individual level effects on self-rated oral health. We also sought to examine how multiple individual level barriers might contribute to the risk of poor self-rated oral health in Indigenous adults. Associations with poor self-rated oral health included socio-demographic factors such as age and health care card status, and access factors such as avoiding dentist due to cost and not knowing how to make an emergency visit. Measures associated with oral health literacy outcomes, assessed by knowledge of what causes dental decay, were shown to be independently associated with poor self-rated oral health.

As this was a convenience sample, some caution in generalising from the results must be exercised. Further exploration of the role of access, literacy and behaviour in a fully randomised indigenous population would be prudent. Additionally, the lack of correlation between REALD-30 and self-rated oral health among this vulnerable population was somewhat counter-intuitive. Two reasons are suggested. Firstly, REALD-30 may not encapsulate oral health literacy in a functional sense; that is, it may not adequately reflect the dimensions of oral health literacy that would be expected to correlate with global oral health perceptions such as self-rated oral health. Or, secondly, the frames of reference for self-rated oral health in this population may differ from those of general population groups. In Models 2-4 socioeconomic conditions remained significant after adjusting for health behaviours. Apart from potential residual confounding, there may be some other important health behaviours which were not included in this study

The findings showed a persistent social inequality in poor self-rated oral health, with ownership of a means-tested health care card a risk indicator for poor self-rated oral health across all models despite adjusting for other covariates. None of the hypothesised individual health behaviours increased the odds of reporting fair or poor oral health, whereas two of our five 'access to care' indicators (avoiding dental care due to cost and not knowing how to access emergency dental services) and one of the oral health literacy-related outcomes (not knowing what causes tooth decay) increased the odds of fair or poor self-rated oral health. The finding that there are differences in self rated oral health for those reporting *not* knowing how to access emergency dental services suggests structurally-based barriers, such as appropriate and well publicised services, to accessing dental care that are above and beyond the traditionally reported transport related barriers in accessing services. Whilst improving socio-economic conditions is generally outside the realm of the dental community, improving access to dental care and oral health literacy-related factors is achievable. It is in these areas that future attention-both research and policy- may perhaps be best focussed.

This examination of multiple individual level factors and their contribution to poorer self-rated oral health is important in determining best practice and effective health service policy and programs serving Indigenous populations in Australia. The results add to the growing body of evidence of the independent role of oral health literacy in contributing to poorer health outcomes.

Conclusions

Health behaviours did not predict poor self-rated oral health amongst this Indigenous population. Structural barriers surrounding issues of access to dental care persisted, however literacy did not significantly attenuate some of the negative effects of socio-demographic or access to care factors. There is a clear need for better articulated oral health promotion messages, including those related to access to dental care for this vulnerable population.

References

Atchison, K.A. and Dolan T.A. (1990): Development of the geriatric oral health assessment index. *Journal of Dental Education* **54**, 680–687.

Atchison, K.A., Matthias, R.E., Dolan, T.A., Lubben, J.E., De Jong, F., Schweitzer, S.O. and Mayer-Oakes S.A. (1993): Comparison of oral health ratings by dentists and dentate elders. *Journal of Public Health Dentistry*, **53**, 223–230.

Benyamini, Y., Leventhal, H., Leventhal, E. (2004): Self-rated oral health as an independent predictor of self-rated general health, self-esteem and life satisfaction. *Social Science & Medicine* **59**, 1109–1116.

Borrell, L.N., Burt, B.A., Gillespie, B.W., Lynch, J. and Neighbors, H. (2002): Periodontitis in the United States: beyond black and white. *Journal of Public Health Dentistry* **62**, 92–101.

Harford, J., Spencer, J. and Roberts-Thomson, K. (2003): Oral health. In: *The health of indigenous Australians*. ed. Thomson, N., Melbourne: Oxford University Press, pp 313-338.

Kaplan, G and Baron Epel, O. (2003): What lies behind the subjective evaluation of health status? *Social Science & Medicine* **56**, 1669–1676.

Lee, J.Y., Rozier, G., Lee, S., Bender, D. and Ruiz R.E. (2007): Development of a word recognition instrument to test health literacy in dentistry: The REALD-30 – A brief Communication. *Journal of Public Health Dentistry* **67**, 94–98.

Matthias, R.E., Atchison, K.A., Lubben, J.E., De Jong F. and Schweitzer S.O. (1995): Factors affecting self-ratings of oral health. *Journal of Public Health Dentistry*, **55**, 197–204.

Parker, E.J. and Jamieson, L.M. (2010): Associations between Indigenous Australian oral health literacy and self-reported oral health outcomes. *BMC Oral Health*, **10**, 3.

Roberts-Thomson, K., Spencer, A.J. and Jamieson, L.M. (2008): Oral health of Aboriginal and Torres Strait Islander Australians *Medical Journal of Australia* **188**, 592-593.

Sabbah, W., Tsakos, G., Sheiham, A. and Watt, R.G. (2009): The role of health-related behaviours in the socioeconomic disparities in oral health. *Social Science & Medicine,* **68**, 298–303.

Slade, G.D., Spencer, A.J. and Roberts-Thomson, K.F. (2007): *Australia's Dental Generations; The National Survey of Adult Oral Health 2004–2006.* Canberra: AIHW.

Thomson, N. (2003): The need for indigenous health information. In: *The health of indigenous Australians*. Ed. Thomson, N. Melbourne: Oxford University Press, pp1–24.

Zaitsu, T., Ueno, M., Shinada, K., Ohara, S., Wright, F.A. and Kawaguchi Y. (2011): Association of clinical oral health status with self-rated oral health and GOHAI in Japanese adults. *Community Dental Health* **28**, 297-300.