Deficits in Perceptions of Oral Health Relative to General Health in Populations

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Abstract

Objective: To compare perceptions of general health versus oral health within two populations. Methods: Secondary analysis of cross-sectional survey data obtained from representative samples of dentate adults in Australia and the United States, Australian data were collected in the 2002 National Dental Telephone Interview Survey and United States data were from the NHANES, 1988-1994. A stratified analysis compared self-ratings of general and oral health among groups classified by age, socioeconomic status and access to dental care. Results: In Australia, 43.6% rated their dental health 'very good' or 'excellent' whereas 58.6% rated their general health 'very good' or 'excellent' - a deficit of 15.0%. In the US, there was a comparable deficit of 24.2%. The deficit could be explained as a 'generation gap' where oral health ratings of the youngest cohort resembled the general health ratings of middle-aged adults in Australia and retirees in the US. An 'affluence gap' was evident where the oral health ratings of wealthier adults resembled the general health ratings of disadvantaged adults. Among Australians with private dental insurance who had visited a dentist in the past year the oral health deficit was negligible. Similar stratification in the US sample considerably attenuated the deficit. Conclusion: There is a deficit in perceived oral health compared with general health at all stages of adulthood and spanning the socioeconomic spectrum. The deficit was diminished among insured adults who had made a dental visit within the preceding year, suggesting that improved access to dental services may help redress the discrepancy.

Key Words: Access to dental care, self-rated health, age and income distributions, priority setting, population surveys

Introduction

The perceived health of populations is commonly assessed with a single global question such as, "How would you rate your health?" This question is distinguished from the comparative question that uses an explicit age or gender reference group. The single item specifically requires that respondents assimilate perceptions about their experience of all forms of disease and its potential impact on numerous dimensions of physical, mental or social well-being. Unlike batteries of questions where specific components of health-related quality of life are queried, the global question does not impose normative assumptions, for example that limitations in mobility necessarily diminish health. Global self-rated health allows individuals to take into account values and expectations that are not readily evaluated in clinical assessment. Investigation of the domains assessed by individuals in responding to the global self-rated health question reveals that current physical illness, functioning and health behaviour are the predominant factors influencing responses (1).

The single-item, global assessment of health has good test-retest reliability (2) and longitudinal studies show it to predict future morbidity (3) recovery from illness episodes (4) and mortality risk (5, 6, 7, 8) even after adjusting for covariates such as age, sex, physical health status and psychosocial characteristics (9). It is sensitive to socioeconomic conditions with more advantaged adults rating their health status more favourably (10, 11, 12). It is also associated with age. Cross-sectional data from adults aged 20 years and older from the United States, Canada and 15 European countries show that the proportion of adults with poor self-rated health increased with advancing age (13).

A global question about oral health perceptions has also been incorporated into population health surveys conducted in Australia (14) and the United States (15). As with the assessment of perceived general health, there is evidence that unfavourable global ratings of oral health are largely assessments of functional limitations (16, 17). In another US study conducted among adults in Michigan, both global self-rated general health and global self-rated oral health item were reported (18), although the two measures have not been compared at a population level among the same study participants at a single point in time. The authors could find no study that has investigated whether the burden of one outcome is perceived as greater, lesser or the same than the other outcome.

The objective of this study was to compare oral health against general health *within* countries; as opposed to contrasting levels of perceived health *between* countries. Specifically the study aimed to: (1) to compare the distributions of self-rated general and oral health perceptions in representative adult samples in two countries;

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(2) to examine age and socio-economic patterns associated with the distributions; and (3) to investigate whether private dental insurance and recent utilization of dental care accounts the observed deficit between ratings of general and oral health. Findings will contribute to a better understanding of the perceived morbidity attributable to oral health relative to general health and the possible mediating effect of dental care in these populations.

Methods

Data collection. In Australia, a stratified random sample design was used to collect cross-sectional data in the 2002 National Dental Telephone Interview Survey (14) (NDTIS 2002) of community-dwelling Australian residents aged five years and over in all states and territories. NDTIS 2002 is the fifth in an ongoing series of telephone interviews designed to monitor access to dental care and use of dental services in Australia. Households were sampled from the most recent national listings of telephone numbers and addresses. So that unlisted numbers might be included, a random integer was substituted in each sampled number. The newly generated numbers were back-matched against residential listings, and an information letter was sent to the household address in advance of the telephone interview.

Trained interviewers collected data from a randomly selected household occupant in a computer-assisted telephone interview.

In the United States a stratified, multi-stage probability design was used to collect cross-sectional self-reported data in the third National Health and Nutrition Examination Survey (15) (NHANES III), conducted from 1988 through to 1994 of the civilian community dwelling population two months of age or over in the 50 states and the District of Columbia of the United States. NHANES III is the third of an ongoing series of periodic surveys designed to provide national estimates of the health and nutritional status. While NHANES 2001-02 data would have been pref-

erable as a contemporaneous survey, the authors did not use that dataset because of differences in the response categories used to query perceived general health and oral health that rendered them non-comparable. Specifically, the question about perceived general health elicited responses on a five-point scale, whereas the question about perception of oral health elicited responses on a four-point scale; omitting the "excellent" category. Household members were defined according to sex, age, and race or ethnicity characteristics and a subsample of individuals for interview was selected based on these characteristics to provide approximately self-weighting samples for each domain within geographic strata. Trained interviewers collected data in the homes of study participants using a face-to-face interview. In this study, analysis was limited to dentate subjects aged 18 years and over.

Self rated oral and general health status. In the Australian NDTIS 2002, self-rated oral health was assessed by asking, "How would you rate your dental health? Would you say that it is: excellent, very good, good, average, poor, very poor, don't know?" The general health question was "How would you rate your own general health? Would you say that it is: excellent, very good, good, average, poor, very poor, don't know?" For analysis, "poor" and "very poor" were collapsed. The wording of the equivalent questions in NHANES III was, "How would you describe the condition of your natural teeth: excellent, very good, good, fair or poor?" and "Would you say your health in general is excellent, very good, good, fair, or poor?"

Age and socioeconomic status. The surveys in both populations collected age in years. For analysis, this variable was collapsed to form four groups comprising 18-34 years, 35-44 years, 45-64 years and 65 years and over. Socioeconomic status was indexed in Australia using reported total pre-tax household income. Interviewees were asked to nominate their income level from a selection of nine categories that ranged from "Up to AU\$12,000" to "More than AU\$80,000." During analysis, categories were collapsed to form five groups of approximately equal population size (19.5%, 22.4%, 23.2%, 13.9%, 21.0% respectively). In the US, socioeconomic status was indexed with the poverty income ratio, which is a computed variable that adjusts family income for the size of the family. The distribution was divided into five groups for this analysis comprising 13%, 21%, 21%, 18% and 27% respectively.

Analysis of NHANES that included dental insurance was limited to phase two of the Survey because it was only phase in which that information was collected.

Analytic methods. Australian data were weighted to account for sampling probabilities that differed due to the sampling design and were further weighted by age and sex characteristics for each of the 13 sampling stratum as estimated by the Australian Bureau of Statistics so that estimates related closely to the national adult population. Similarly NHANES data were weighted using the variable labelled 'WTPFQX6' to account for the differential probabilities of selection and estimates were adjusted for non-coverage and non-response. Data were analysed in SUDAAN (19) to further adjust variance estimates allowing for clustering of subjects that occurred due to the multi-stage probability sampling design.

Statistical analysis began with a description of the distribution of selfrated oral and general health in the two populations. The two health indicators were cross-tabulated to show the percentage of adults with concordant ratings. The study computed a ratio of severe discordance, defined as paired ratings that differed by more than one category, to summarize the direction and magnitude of difference between perceived oral and general health among individuals. A stratified analysis of self-ratings by age group and socioeconomic status was conducted using simple frequencies for which 95% confidence intervals (95%CI) were computed. When comparing levels of perceived health, the authors interpreted percentages to be

statistically significant if there was no overlap of 95% confidence intervals. Finally, the sample was stratified by dental insurance status and time since last dental visit to investigate the possible effect on perceived oral health access to and utilisation of dental services.

Results

The participation rate for the NDTIS 2002 in Australia was 64.8%. In all 5,133 dentate adults completed an interview. In the US, 16,867 dentate persons aged 18 years or older (86.0%) completed the questionnaire. The racial composition of the US was: Non-Hispanic black (11.2%); Mexican-American (5.2%); Other (7.6%); and Non-Hispanic white (76.0%). As only 1.5 per cent of the Australian sample identified as of Aboriginal or Torres Strait Islander origin the study did not stratify by race. Less than half the Australian sample (46.4%) held private dental insurance and the proportion in the US with private dental insurance (45.5%) were almost identical.

Dentate adults in both populations rated their general health better than their oral health (Table 1). The comparative deficit in oral health status was more apparent in the US population than the Australian. In Australia, the absolute difference between the two health indicators for the very good or excellent categories was 15.5 percentage points, and in the US a wider discrepancy of 24.2 percentage points was observed for these same categories. A comparison of the average/fair or poor/very poor categories between the two health indicators revealed smaller absolute differences, but larger relative differences. In Australia, there was 1.8-fold difference in the proportions rating their general and oral health in these categories and in the United States a 2.5-fold difference was observed.

In Australia, 46.9% had concordant ratings of both oral and general health status depicted in the diagonal cells of Table 2. Discordance of at least two response categories was observed for 12.3% of Australians who perceived their oral health as worse

 Table 1

 Distribution of self rated oral health and general health in the dental adult

 Australian and United States populations

	Self-rated			Self rated				
	dental health			gen	general health			
Australia	<u>n</u>		95% CI_	<u>n</u>	_%_	95% CI		
Excellent	322	13.1	11.8 - 14.5	457	18.6	17.1 - 20.2		
Very good	748	30.5	28.6 - 32.3	993	40.5	38.6 - 42.4		
Good	849	34.6	32.7 - 36.5	632	25.8	24.0 - 27.5		
Average	387	15.8	14.3 - 17.2	308	12.5	11.2 - 13.8		
Poor or very poor	149	6.1	5.1 - 7.0	63	2.6	2.0 - 3.2		
	Self-rated condition			Self rated				
	of natural teeth			gen	general health			
United States	n	%	95% CI	n	%	95% CI		
Excellent	1,376	11.3	10.2 - 12.5	2,758	22.1	20.7 - 23.6		
Very good	2,344	18.5	17.4 - 19.6	4,156	31.9	30.5 - 33.4		
Good	5,506	35.9	34.3 -37.4	6,102	32.3	30.8 - 33.9		
Fair	4,798	22.2	20.8 - 23.6	3,149	11.2	10.2 - 12.3		
Poor	2,843	12.2	11.2 - 13.2	694	2.4	2.1 - 2.7		

Table 2

Percent of dentate adults in Australia and the United States with concordant ratings for both health indicators and percent of adults whose ratings differed by one category and percent of adults that differed by more than one category



Oral health deficit ratio of discordance of 2+ categories 12.3:3.3 = 3.7



Oral health deficit ratio of discordance of 2+ categories 24.1:4.2 = 5.7

Concordant ratings for oral health and general heath

Discordant ratings of two or more categories

				- onited states
	18-34 years	35-44 years	45-64 years	65+ years
Australia	% 95% CI	% 95% CI	<u>% 95% CI</u>	<u>% 95% CI</u>
Australia Solf roted dontal boolth				
	140 104 100	11.0 0.4 10.5	110 110 110	
Excellent	14.8 12.4 - 17.2	11.0 8.4 - 13.7	14.3 11.8 - 16.8	9.0 5.7 - 12.3
very good	32.6 29.5 - 35.7	33.7 29.8 - 37.7	26.9 23.7 - 30.1	27.2 22.1 - 32.4
Good	33.6 30.4 - 36.7	34.0 30.1 - 38.0	33.5 30.1 - 36.9	41.6 35.9 - 47.2
Average	13.8 11.5 - 16.1	16.9 13.8 - 20.1	16.9 14.2 - 19.5	16.5 12.2 - 20.8
Poor or very poor	5.2 3.7 - 6.7	4.3 2.6 - 6.0	8.5 6.5 - 10.5	5.7 3.0 - 8.3
Ratio of discordance of 2+ categories Self-rated general health	11.3:3.3 = 3.4	12.8:3.7 = 3.5	12.8:3.4 = 4.0	9.3: 9.0 = 1.0
Excellent	19.9 17.3 - 22.6	19.1 15.8 - 22.4	19.3 16.5 - 22.1	12.0 8.2 - 15.7
Very good	45.6 42.3 - 48.9	41.7 37.6 - 45.9	37.1 33.6 - 40.5	31.8 26.4 - 37.1
Good	24.6 21.7 - 27.4	27.1 23.4 - 30.8	25.3 22.2 - 28.4	28.0 22.9 - 33.2
Average	8.7 6.8 - 10.6	10.4 7.8 - 12.9	15.3 12.7 - 17.8	21.0 16.3 - 25.8
Poor or very poor	1.2 0.5 - 1.9	1.7 0.6 - 2.8	3.0 1.8 - 4.2	7.2 4.2 - 10.1
United States				
Self rated condition of natural teet	h			
Excellent	15.0 12.5 - 17.9	12.2 10.6 - 13.9	8.9 7.6 - 10.4	7.5 6.4 - 8.9
Very good	21.9 19.4 - 24.6	19.8 17.9 - 21.9	15.9 13.8 - 18.2	134 119 - 150
Good	35.0 31.4 - 38.8	36.0 34.0 - 38.0	37.4 34.3 - 40.6	33 3 31 0 - 35 7
Fair	21.1 18.6 - 23.8	21.9 20.1-23.7	21.6 19.4 - 24.0	26.2 24.1 - 28.3
Poor	7.1 5.4 - 9.1	10.1 8.9-11.5	16.2 14.4 - 18.2	195 179 -213
Ratio of discordance of $2+$ categories	22.7:37=61	24 9.3 7=6.8	21 8.4 6-4 7	$23.75.8 \pm 4.1$
Self-rated general health	2201007-011	21.7.0.7 -0.0	21.0.4.0-4.7	25.7.5.0-4.1
Excellent	183 153-217	257 236-279	21 1 10 1 - 23 3	143 126 162
Very good	36.3 32.6 - 40.1	20.7 20.0 27.9 33.8 31.9 35.7	28.4 26.3 - 30.5	256 225 280
Good	360 322-399	30.3 28.1 - 32.6	20.4 20.5 - 50.5	23.0 23.3 - 26.0
Fair	91 77-108	90.78 - 102	12.0 11.0 -30.0	100 100 200
Poor			10.0 $11.2 - 10.1$	17.7 10.0 - 22.0
	0.0 0.2 0.0	1.4 0.7 - 1.7	π. 0 <i>3.</i> ∠ - <i>3.</i> 0	0.7 5.7 - 7.9

Table 3 Self-rated oral and general health status of dentate adults across age strata in Australia and in the United States

than their general health. Conversely, only 3.3% of Australians perceived their general health as worse than their oral health by at least two response categories. This corresponded with an oral health deficit ratio of 3.7 in Australia. Concordance was lower in the US where 31.9% nominated the same category for both indicators (Table 2). Conversely, discordance was more pronounced, with an oral health deficit ratio of 5.7 in the United States.

Perceptions of oral and general health were patterned by age (Table 3). Here the oral health deficit could be attributed to a "generation gap" between self-rated oral health and self-rated general health in both populations. In Australia the distribution of general health perception (from excellent to poor/very poor) of 45-64 year olds resembled the distribution for oral health perceptions of a generation younger (18-34 years old). In addition the distribution of general health perceptions for the 65+ age group resembled that of the younger generation (35-44 years old).

The "generation gap" phenomenon was also observed in the US, although there, the distribution of oral health of 18-34 year olds most closely corresponded to the distribution of general health in the oldest age category of 65+ years.

An oral health deficit was also manifest as an "affluence gap" apparent in a comparison of the distributions by socioeconomic status between self-ratings of general and oral health status. In Australia (Table 4) the distribution of self-rated *oral* health of adults with household income in the fourth group (\$60,000 to \$80,000) most closely resembled that of *general* health of adults in the first (poorest) group of household income (up to \$20,000). And the distribution of *oral* health among adults in the most advantaged group (\$80,000+) most closely resembled the distribution of *general* health in the second household income group (\$20,000 to \$40,000). The same pattern was observed in the US (Table 4) where the *oral* health distribution of adults in the most advantaged fourth and fifth income groups resembled the *general* health distribution of adults in the least advantaged first and second income groups respectively.

When the Australian population was stratified by private dental insurance status and time since last dental visit, discrepancies in perceptions of general and oral health diminished (Table 5). Specifically, the distribution of perceived *oral* health among the stratum of dentally insured adults in Australia who had visited a dentist within the last 12 months resembled the distribution of self-rated *general* health for all adults. Furthermore, the percentages of people with average or

Table 4 Self-rated oral and general health status of dentate adults across socioeconomic groupings in Australia and the United States

Australia *	Up	to \$20,000	\$	20-40,000	\$	40-60,000	\$	60-80,000	\$	80,000+
	$\hat{\%}$	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Self-rated dental health										
Excellent	9.9	7.0 - 12.6	10.9	8.2 - 13.7	13.8	10.8 - 16.8	12.4	8.7 - 16.1	16.5	13.1 - 19.8
Very good	21.2	17.4 - 25.1	29.7	25.6 - 33.7	33.7	29.6 - 37.8	34.4	29.0 - 39.6	35.0	30.7 - 39.4
Good	35.4	31.0 - 40.0	35.4	31.1 - 39.6	32.4	28.4 - 36.6	36.4	30.9 - 41.7	33.8	29.5 - 38.1
Average	21.3	17.4 - 25.1	16.5	13.2 - 19.7	15.6	12.4 - 18.7	13.6	9.9 - 17.6	12.5	9.5 - 15.6
Poor or very poor	12.2	9.1 - 15.2	7.5	5.2 - 9.9	4.5	2.7 - 6.3	3.2	1.3 - 5.3	2.1	0.8 - 3.5
Ratio of discordance of 2+ categories	15.4	: 7.0 = 2.2	12.	1: 3.8 = 3.2	13.	.9: 3.3 = 4.2	10.	.2: 2.3 = 4.4	12.2	: 3.5 = 3.5
Self-rated general health										
Excellent	12.5	9.4 - 15.7	15.7	12.4 - 18.9	20.1	16.6 - 23.5	18.6	14.3 – 23.0	26.8	22.8 - 30.9
Very good	31.6	27.1 - 35.9	38.2	33.9 - 42.5	44.5	40.3 - 48.9	48.5	42.8 - 54.0	42.4	37.9 - 46.9
Good	28.4	24.2 - 32.7	28.9	24.9 - 32.9	26.1	22.3 - 29.9	21.2	16.7 - 25.8	22.6	18.7 - 26.3
Average	20.8	16.9 - 24.6	14.4	11.3 - 17.5	8.1	5.7 - 10.4	11.5	7.9 - 15.0	7.1	4.8 - 9.5
Poor or very poor	6.7	4.4 - 9.1	2.8	1.4 - 4.3	1.2	0.2 - 2.1	0.2	-0.3 - 1.0	1.1	0.1 - 2.0
United States +		<1		1-<2		2-<3		3-<4		4+
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Self rated condition of natural tee	eth							<u></u>		
Excellent	7.1	5.2 - 9.7	7.5	5.7 - 9.6	9.3	7.6 - 11.2	12.0	10.1 - 14.1	18.1	15.7 - 20.7
Very good	11.3	9.5 - 13.5	11.7	9.8 - 13.9	18.8	16.8 - 21.0	22.6	20.0 - 25.4	24.0	22.1 - 26.0
Good	29.2	26.5 - 32.1	34.5	31.8 - 37.4	38.2	35.8 - 40.8	38.7	35.4 - 42.1	35.6	32.6 - 38.8
Fair	31.2	28.5 - 34.1	28.5	25.8 - 31.5	22.1	19.5 - 25.0	18.2	15.4 - 21.3	15.4	13.4 -17.6
Poor	21.2	18.4 - 24.2	17.8	16.1 - 19.6	11.5	9.9 - 13.4	8.5	7.0 - 10.4	6.9	5.5 - 8.7
Ratio of discordance of 2+ categories	16	.0:6.1=2.6	27	.0:3.8=7.2	23	3.9:3.4=7.0	24	4.4:3.8=6.4	24.	9:4.4=5.7
Self-rated general health										
Excellent	13.2	11.1 - 15.7	15.4	12.9 - 18.2	19.8	17.0 - 22.9	22.7	20.3 - 25.3	33.2	30.9 - 35.6
Very good	20.0	17.5 - 22.7	29.1	26.3 - 32.2	32.8	30.4 - 35.3	36.9	33.2 - 40.6	37.1	35.1 - 39.3
Good	36.3	32.4 - 40.4	37.0	34.3 - 39.8	35.7	32.4 - 39.1	32.4	29.7 - 35.2	23.8	21.8 - 25.9
Fair	23.6	21.4 - 25.9	15.0	13.0 - 17.2	10.4	8.5 - 12.6	7.0	5.7 - 8.6	4.9	3.8 - 6.3
Poor	6.9	5.2 - 9.2	3.5	2.8 - 4.4	1.3	1.0 - 1.8	1.1	0.7 - 1.6	1.0	0.5 - 1.6

* Socioeconomic groups defined according to total household income

+ Socioeconomic groups defined according to poverty income ratio groupings

poor/very poor self-rated general health and oral health did not differ significantly within the stratum of Australians who were dentally insured and who had made a dental visit within the last 12 months. Similar adjustment in the US considerably reduced the gap between self-rated oral and general health but did not eliminate the deficit (Table 5).

Discussion

The authors identified a substantial discrepancy between ways that the general population perceive their oral health and their general health status. This discrepancy presented as an oral health deficit showing that, in the public's perception, greater morbidity was attributed to oral health than general health. The oral health deficit was evident at all stages of adult life and it spanned the socioeconomic spectrum. The deficit was likened to a generation gap, as the perception of oral health of Australians in early adulthood resembled the perception of general health of adults some 30 years senior to them while adults in early midlife had perceived oral health status like the perceived general health of adults in retirement. The generation gap in the US was wider so that the youngest adults perceived their oral health in ways expressed by retirees about their general health. The authors also likened the deficit to an affluence gap illustrating how the oral health perception of the top two income groups resembled the general health perception of the lowest two income groups in both Australia and the US.

The extent to which the oral health deficit might be attributed to a distinction between general and oral health as suggested by Atchison and colleagues (20) and how much might reflect differences in the organization, financing and delivery of general health and oral health care is not clear. The authors found that in Australia the oral health deficit was substantially smaller among adults with private dental insurance who had last visited a dentist in the past 12 months. These adults rated their oral health better than their non-insured counterparts who last visited a dentist less recently. Importantly their self-rated general and oral health differed minimally indicating that stratification did not simply identify a group that was healthier in all respects.

The study did not specifically examine gender and racial differences in either country but the authors draw attention to earlier analysis of NHANES III data conducted by Gift and colleagues (21). They found that among dentate adults who had consulted a dentist within the past 12 months, African-Americans and Mexican-Americans had a significantly poorer perception of their overall dentition than had white non-Mexican Americans even after statistical adjustment for age, gender, socioeconomic circumstances, dental insurance and perceived general health. However, among those whose last dental consultation was less recent, the poorer perception of oral health of African-Americans and Mexican-Americans in the age and gender-adjusted regression model was no longer apparent after further adjustment for socioeconomic circumstances, dental insurance and perceived general health. Findings suggested that recent dental care may confer a greater advantage for white Americans in terms of their perceived oral health, but further information about the types of dental services obtained is needed to interpret these findings. This same study found no gender differences in perceived oral health irrespective of the time since last dental consultation.

The variation in the wording of the global self-rated questions between countries and also between health indicators imposes some limitation of comparative analyses and interpretation. In Australia the global questions offered six response categories while only five were offered in the NHANES survey. The category of "fair" in Australia and "average" in the US might also be interpreted differently. Bias might also be introduced through the NHANES indicator 'condition of natural teeth' compared with the NDTIS 2002 indicator of "dental health." Consequently analysis centred on intra-national comparisons of oral and general health rather than comparisons between nations for each global indicator.

A major strength of this study is that the sample is representative of the adult populations in two countries. To the best of the authors' knowledge, only one study (17) has compared ratings of oral and general health. However, the findings of that study were

Table 5Distribution of self rated oral health and general health in the dental adultAustralian and United States populations stratified for private dentalinsurance and time since last dental visit

	Total p	opulation	No d	ental ins.	Has dental ins.		
	(as in Table 1)		Last d	lental visit	Last dental visit		
			1+ y	/ear ago	<1 year ago		
	%	95% CI	%	95% CI	%	95% CI	
Australia							
Self-rated dental health							
Excellent	13.1	11.8 - 14.5	9.0	6.8 - 11.1	17.7	15.0 - 20.3	
Very good	30.5	28.6 - 32.3	23.9	20.7 - 27.2	35.0	31.6 - 38.3	
Good	34.6	32.7 - 36.5	35.7	32.1 - 39.4	32.9	29.6 - 36.1	
Average	15.8	14.3 - 17.2	20.7	17.6 - 23.8	11.7	9.5 - 13.9	
Poor or very poor	6.1	5.1 - 7.0	10.7	8.3 - 13.0	2.8	1.7 - 4.0	
Self rated general heath							
Excellent	18.6	17.1 - 20.2	14.2	11.5 - 16.9	22.7	19.8 - 25.6	
Very good	40.5	38.6 - 42.4	38.6	34.8 - 42.3	41.9	38.4 - 45.3	
Good	25.8	24.0 - 27.5	29.4	25.9 - 32.9	22.9	20.0 - 25.8	
Average	12.5	11.2 - 13.8	14.3	11.6 - 17	11.1	8.9 - 13.3	
Poor or very poor	2.6	2.0 - 3.2	3.6	2.2 - 5.0	1.5	0.6 - 2.3	
United States							
Self rated condition of r	atural t	eeth					
Excellent	11.3	10.2 - 12.5	7.0	5.4-9.1	16.3	13.2 - 19.9	
Very good	18.5	17.4 - 19.6	14.6	12.3-17.3	24.7	21.4 - 28.3	
Good	35.9	34.3 -37.4	35.3	31.9-38.9	38.5	35.4 - 41.8	
Fair	22.2	20.8 - 23.6	26.9	23.9-30.3	14.3	11.6 - 17.4	
Poor	12.2	11.2 - 13.2	16.1	13.5-19.2	6.3	4.7 - 8.3	
Self rated general heath							
Excellent	22.1	20.7 - 23.6	19.1	16.1-22.6	25.8	22.0 - 30.1	
Very good	31.9	30.5 - 33.4	25.7	22.6-29.0	38.8	35.5 - 42.2	
Good	32.3	30.8 - 33.9	35.8	31.8-39.9	28.4	25.0 - 32.1	
Fair	11.2	10.2 - 12.3	15.5	12.9-18.5	6.0	4.7 - 7.5	
Poor	2.4	2.1 - 2.7	3.9	2.9-5.2	1.0	0.6 - 1.7	

not generalizable. Compared with national norms, study participants (aged 65+ years) had higher levels of education and income and one quarter the prevalence of edentulism. Furthermore, 82% reported having had a dental check up in the preceding year compared with 35% of their peers in a national study.

Generally, similar findings in Australian and the US appear sufficient to reject the possibility that the oral health deficit in Australia was an artifact of data collection methods arising from the fact that interviewees knew that they were participating in a dental survey. In contrast, questions about oral health in NHANES represented only a small subset of the full interview that inquired about all aspects of health and nutrition.

These cross-sectional studies do not permit causal inference about the

contribution of access to dental care to perceived oral health, nor can they confirm the direction of the relationship. However, the finding that deficits between oral and general health were minimized among people who reported favorable access to dental care raises the question of whether the deficit might be remedied by improving access to and affordability of dental care. Previous longitudinal research has shown that dental care visits and services are positively associated with improvements in perceived oral health (21) and oral health-related quality of life (22). However, the published research on the topic is mostly confined to studies of the elderly and children and is sparse in relation to population oral health.

Aside from illustrating theoretical distinctions in perceptions of health, these results are relevant to health

policies that are based on summary measures of population health. Unlike summary measures of population health that compare different health conditions according to their burden of illness such as disability-adjusted life years (DALY), single-item, global questions of health perception allow respondents to consider positive aspects of health as well as negative consequences. Moreover, unlike DALYs they do not rely on normative assessments such as the value of gaining a year of healthy life now as compared with 20 years hence, or the relative value of years lost through death years lived with poor health (23).

Population groups are likely to assign different values to various dimensions of health. Finally, DALY estimates obscure information critical to efficient targeting of resources about how the burden is distributed across groups defined by age, racial or socioeconomic characteristics. This limitation arises because the methodology for DALYs uses disease-related probabilities of disability developed for demographic subgroups, but not for socio-economic subgroups. Internationally, the reduction of population levels of disparity is increasingly seen as an important goal as expressed for example within the US Healthy People 2010 initiative (24.) Currently, dental care in Australia remains the least subsidized area of health care that relies heavily on adults to voluntarily purchase dental insurance or to cover costs from out-of-pocket expenditure. Approximately one third of the AU\$2 billion annual expenditure on dental care in Australia was covered by private dental insurance in the 1990's (25) and this contribution has remained fairly stable. Meanstested publicly funded care is provided to low-income Australian adults who contribute a co-payment, but this scheme is described as a "torn and tattered safety net" (26) characterized by a harsh rationing of resources and poorer quality outcomes. By contrast, the US offers universal access to general health care through Medicare – the federal government insurance scheme - that is financed by general taxation plus a compulsory Medicare levy. Individuals are encouraged to purchased additional private insurance.

In 1987, the period immediately preceding the NHANES, private insurers paid approximately one third of the US\$30 billion annual expenditure on dental care in the United States (27). Following the survey period in 1996, the contribution of private insurers towards dental care had increased to 43% (28).

Unlike the universal care system in Australia, the system in the US is based on employment-related health insurance scheme that covers around 60 per cent of the population. The federal Medicare scheme provides health care, but not dental care for the elderly and those with disabilities (approximately13%). The US Medicaid system, funded jointly by federal, state and local government, provides reimbursement for health care to low-income families, including dental care for children. However, the majority of the population is required to purchase (or contribute to) individually financed health insurance coverage. The US spent 13.9% of its gross national product on health care in 2001 compared with 8.5% spent by Australia in 2000, which is consistent with most of the nations in the Organisation for Economic Co-operation and Development.

The findings from this study suggest that it would be useful to model the economic costs and benefits of increased coverage to publicly subsidized dental care for adults in both countries. As observed in the case of chiropody services in the UK (29), there may be potential for effective increases in oral health within the populations studied here, at least to redress the discrepancy in perceived general and oral health.

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