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Associations with dental caries experience among a convenience sample of Aboriginal Australian adults

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ABSTRACT

Background: Few studies have examined dental caries experience in Aboriginal adults. The objectives of this study were to describe the dental caries experience of some Aboriginal Australian adults residing in the Northern Territory, and to determine associations with dental caries experience. Methods: A convenience sample of Aboriginal adults from Australia's Northern Territory was dentally examined. Self-reported oral health information was collected through a questionnaire. Results: Data were available for 312 participants. The percent of untreated decayed teeth (percent DT>0) was 77.9 (95% CI 73.0 to 82.1), the mean DT was 3.0 (95% CI 2.6 to 3.4), the prevalence of any caries experience (the percent DMFT>0) was 95.5 (95% CI 92.6 to 97.3) and the mean DMFT was 9.7 (95% CI 8.9 to 10.5). In multivariable analyses, unemployment and not brushing teeth the previous day were associated with the percent DT>0. Problem-based dental attendance was associated with both the mean DT and the percent DMFT>0. Older age, residing in the capital city, being non-incarcerated, last visiting a dentist < one year ago and problem-based dental attendance were associated with the mean DMFT. Conclusions: Dental caries experience among this convenience sample of Aboriginal Australian adults was very high. Most factors associated with dental caries were social determinants or dental service access-related.

Key words: Aboriginal Australians, caries experience, dental caries, dental attendance, social determinants

INTRODUCTION

Aboriginal Australians usually identify as being of Aboriginal or Torres Strait Islander descent, or both, and comprise 2.6 percent of the Australian population¹. The proportion of the Aboriginal population, relative to the non-Aboriginal population, is higher in

geographically remote areas. **Almost one-quarter of Aboriginal Australians (but only 2 percent of their non-Indigenous counterparts) reside in remote locations**¹. Australia's Northern Territory has the largest Aboriginal population in percentage terms for a state or territory, with 31.6 percent in 2011¹.

Aboriginal Australians experience poorer general and oral health than non-Aboriginal Australians². Aboriginal Australians suffer some of the worst social deprivations of any population subgroup, with impacts on many aspects of health³. A high proportion of Aboriginal Australians experience financial disadvantage, with further disadvantage being associated with ongoing dispossession of land, material deprivation and fragmented culture³. Many Aboriginal Australians live in poor housing conditions, participate in high levels of risk behaviour such as alcohol drinking or tobacco smoking, and face markedly adverse social and economic conditions in the workforce⁴.

Some studies from confined populations, which were conducted prior to the 1970s, suggested that the oral health of Aboriginal Australians was on par with, and in some instances better than, the general Australian population. It is important to note, however, that such findings cannot be generalised to the Aboriginal Australian population on the whole at that time⁵⁻⁷.

Aboriginal Australians have undergone rapid dietary changes since this time, with processed and convenience foods becoming more widespread, affordable and culturally acceptable.

Recent data from community stores in the Northern Territory indicate that the proportion of energy intake comprising of soft drinks and convenience foods at a community level is high⁸.

In addition to diet, Watt has ascertained that social determinants play a substantial role in the oral health inequalities persisting between vulnerable and less-vulnerable populations at a global level⁹.

There is limited information available on the oral health of Aboriginal Australian adults. This is largely due to the difficulties in conducting health research (such as oral health research projects including a clinical examination component) among hard-to-reach groups such as Aboriginal Australians. Techniques employed in traditional national-level surveys (such as telephone interviews and postal questionnaires) are logistically challenging among this group. Alternative methods such as face-to-face personal interviews, while costly, may be more successful.

The aim of this study was to describe the dental caries experience of a convenience sample of Aboriginal Australian adults residing in the Northern Territory, and to determine associations with dental caries experience.

METHODS

Participants were recruited as part of the PerioCardio study, which was a randomised controlled trial (RCT) designed to assess vascular health and inflammation measures in Indigenous Australian adults living in the Northern Territory and to detect **whether** intensive periodontal treatment could improve these measures over one year¹⁰. Analyses for this paper **use** cross-sectional baseline data **from** participants who were screened for eligibility for the PerioCardio study. Participants described here include those who were both eligible and ineligible for participation in the RCT, based on their periodontal status. Eligibility criteria for screening included being Aboriginal or Torres Strait Islander (hereafter termed 'Aboriginal'), aged 18 years or over, and residing in one of two regional jurisdictions in Australia's Northern Territory or correctional centres in Alice Springs and Darwin. Data were collected between June 2010 and January 2012. The recruitment approach included liaising with Aboriginal community champions previously involved in our research projects,

engaging with key community stakeholder groups, encouraging word-of-mouth spread of knowledge about the study, advertisements in local newspapers and radio shows, and presentations made to local Aboriginal community groups. A snowballing technique was also employed, with participants asked to contact any Aboriginal friends, family and peers who may be interested in participating.

Ethical approval for the study was obtained from the Human Research Ethics Committee of the Northern Territory Department of Health and Menzies School of Health Research, the Central Australian Human Research Ethics Committee, Northern Territory Correctional Services Research Committee, University of Adelaide Human Research Ethics Committee, and the Aboriginal Health Council of South Australia.

Conceptual framework

Based on the literature, we defined seven domains of variables that we expected to be associated with dental caries experience; demographic, socio-economic, dental service utilisation, dental cost, self-rated health, dental health behaviours and psychological health. Data were collected via two means; clinical examinations for measures of dental caries experience and a self-report questionnaire for demographic, socio-economic, dental service utilisation, dental cost, self-rated health, dental health behaviours and psychological health-related factors.

Dependent variables

The dependent variables were dental caries prevalence [percent of decayed teeth (DT)>0 and percent of decayed, missing and filled teeth (DMFT)>0] and dental caries severity (mean DT and mean DMFT).

Procedure

Dental assessments replicated the methods used in Australia's second National Survey of Adult Oral Health 2004-06¹¹. Caries experience was recorded for each tooth as: decayed, recurrent caries (new decay around existing filling), filled unsatisfactorily (defective restorations without decay), filled and sound.

Criteria

Untreated dental decay was defined as 'cavitation of enamel or dentinal involvement or both being present' or 'visible caries that is contiguous with a restoration'.

Equipment and personnel

Disposable mirrors (Mirrorlite™ Defend, Hauppauge, USA) were used for dental examinations, which were conducted by two calibrated dental personnel; one dentist and one oral health therapist (dual therapist and hygienist). The intra-class correlations were 0.90 for D, 0.95 for M and 0.94 for F.

Independent variables

A total of 21 independent variables were included within the seven domains. The four demographic variables were age, sex, location (the capital city of Darwin or non-Darwin) and incarceration status. Non-Darwin location refers to participants residing in Katherine or Alice Springs (other urban centres within the Northern Territory). The four socio-economic variables were education (<12 years schooling, 12+ years schooling), annual income (<\$15,600, \$15,600+), employment status (employed, not employed) and household size (<5 people, 5+ people). The three dental service utilisation variables were last visited dentist (<1 year ago, 1+ years ago), usual reason for dental visit (check-up, problem) and perceived need to see dentist (yes, no). The two dental cost variables were avoiding dental care due to cost (yes, no) and difficulty paying a \$100 dental bill (none, hardly any, a little vs a lot). The two

self-rated health variables were self-rated general health (excellent or very good vs good, fair or poor) and self-rated oral health (excellent or very good vs good, fair or poor). The three dental behaviour variables were toothbrush ownership (yes, no), brushing teeth the previous day (yes, no) and toothpaste use (yes, no). The three psychological health variables were scared of dentist (little bit, fair bit or heaps vs no), psychological distress as measured by a modified Kessler-6 (K6) instrument for use among Aboriginal Australians and psychological distress as measured by a modified Patient Health Questionnaire-9 (PHQ-9) instrument for use among Aboriginal Australians^{12,13}. The sum of each scale was calculated to create mean scores, with each scale score then trichotomised into 'low', 'moderate' or 'high' groups.

Based on the distribution of raw scores, we divided each scale into tertiles. The K6 trichotomised groups were: 0-2 (low), 3-7 (moderate) and 8+ (high) while the PHQ-9 trichotomised groups were: 0-4 (low), 5-9 (moderate) and 10+ (high).

Statistical power

It is noteworthy that the study was not designed at the inception to describe the dental caries experience or to ascertain factors associated with dental caries experience among the participants. However, post-hoc sample size calculations based on a power of 90% and alpha of 0.05 indicated that a sample size of 284 would be sufficient to yield statistically significant results even after adjusting for 10% non-response rate.

Data analytic approach

Univariate and bivariate **associations** of dental caries prevalence and severity were determined. Poisson regression analysis was used to derive adjusted estimates for the dependent variables in multivariable models for the prevalence outcomes, while linear regression was used when the dependent variables were continuous. Exposure variables were

classified into demographic, socio-economic, dental service utilisation, dental cost, self-perceived general and dental health, dental health behaviours and psychological health variables. Adjusted prevalence ratios were considered statistically significant when P values derived from the Wald statistic were ≤ 0.05 . The final regression models for dental caries prevalence and severity were constructed utilising backward stepwise regression (covariates removed one at a time according to P value size). Data were analysed using SAS version 9.3 (Cary, North Carolina, USA).

RESULTS

Data were collected over a period of 18 months and were available for 312 participants. The study sample was not representative of the Northern Territory Aboriginal population when comparing against population parameters derived from the 2011 Census (Table 1). A higher proportion of the study sample were aged 35 to 54 years, had completed Year 12 secondary school education, were buying their own house or were rent-free, were employed or had a weekly household income of \$1400 or greater than their population-level counterparts.

The prevalence of the individual components of the DMFT index was as follows: percent $D>0=77.9$ (95% CI 73.0-82.1); percent $M>0=67.3$ (95% CI 61.9-72.3) and percent $F>0=64.7$ (95% CI 59.3-69.8). The percent $DMFT>0$ was 95.5 (92.6-97.3). The mean number of decayed teeth was 3.0 (95% CI 2.6-3.4), mean number of missing teeth was 3.8 (95% CI 3.2-4.4) and mean number of filled teeth was 2.9 (95% CI 2.5-3.3). The cumulative measure of dental caries experience (mean DMFT) was 9.7 (95% CI 8.9-10.5). The age range of participants was 22 to 73 years, with a mean age of 39.6 years (sd=10.3 years). Around 56 percent of participants were male and approximately 58 percent resided in the Northern

Territory's capital city of Darwin (Table 2). Around one in three participants were incarcerated and over three-quarters had received less than 12 years education. Annual income of just over half the participants was less than \$15,600 and around 55 percent were unemployed. One in five participants resided in a household of five or more people. A higher proportion of those with untreated dental decay (percent DT>0) were unemployed, with mean DT levels also being higher among the unemployed. Mean DMFT levels were higher among those aged 39+ years, females, those residing in Darwin and those who were not incarcerated.

Almost three-quarters of participants had not visited a dentist in the previous 12 months (Table 3). Around 70 percent usually visited a dentist because of a problem, with approximately 80 percent having a perceived need to see a dentist. Just under half the participants reported avoiding dental care due to cost, with just under one-quarter reporting a lot of difficulty paying a \$100 dental bill. Around one-quarter of participants self-rated their general health as being 'excellent or very good', while approximately 10 percent self-rated their oral health as being 'excellent or very good'. A higher proportion of those with a perceived need to see a dentist and who perceived 'a lot' of difficulty paying a \$100 dental bill had untreated dental caries (percent DT>0). Participants who reported usually seeing a dentist because of a problem, with a perceived need to see a dentist and with reported difficulties paying a \$100 dental bill had higher mean levels of untreated decay. A greater proportion of those with problem-based dental attendance and perceived need to see a dentist had experience of decayed, missing or filled teeth (percent DMFT>0), while those who had last visited a dentist less than one year ago, who usually visited a dentist because of a problem, who reported a lot of difficulty paying a \$100 dental bill and who self-rated their general health as 'good, fair or poor' had higher mean levels of decayed, missing and filled teeth (mean DMFT).

Over 90 percent of participants owned a toothbrush (Table 4), with approximately 87 percent reporting brushing the previous day. Around 96 percent reported using toothpaste. Over 70 percent were not afraid of the dentist. **The K6 mean score was 5.6 (95% CI 5.3-6.6) with a possible range of 0 to 29. The PHQ-9 mean score was 7.2 (95% CI 6.7-7.8) with a possible range of 0 to 26.**

Around one in three participants scored 'high' on the psychological distress variable as measured by the adapted K6 instrument, while 28 percent scored 'high' on the psychological distress variable as measured by the adapted PHQ-9 instrument. A higher proportion of those who did not own a toothbrush or who did not brush the previous day had untreated dental caries (percent DT>0). Non-ownership of a toothbrush was also associated with higher mean DT scores. Those with dental fear had higher mean DMFT scores.

Correlation analysis confirmed the existence of weak associations among items in a given group (Pearson's correlation coefficient range 0.08–0.46). The high prevalence of dental caries meant that odds ratios were poor indicators of relative frequency, so prevalence ratios were determined using Poisson regression modelling¹⁴. In multivariable modelling, independent variables that were significantly associated with untreated dental caries prevalence (percent DT>0) included unemployment and not brushing teeth the previous day (Table 5). Independent variables that were significantly associated with both mean levels of untreated dental caries (mean DT) and dental caries experience (percent DMFT>0) included problem-based dental attendance. Independent variables that were significantly associated with mean levels of decayed, missing and filled teeth (mean DMFT) in multivariable modeling included older age, residing in Darwin, being non-incarcerated, last visiting a dentist less than one year ago and problem-based dental attendance.

DISCUSSION

Our findings showed that the dental caries experience of a convenience sample of Aboriginal Australian adults was very high, with untreated dental caries comprising most of the cumulative dental caries experience. The prevalence of untreated dental caries in our study (percent DT>0) was three times that of national-level estimates reported in Australia's second National Survey of Adult Oral Health 2004-06 (NSAOH) (77.9 percent vs 25.5 percent), while mean levels of untreated dental decay in our study (mean DT) were almost four times greater than NSAOH estimates (3.0 vs 0.8)¹⁵. The majority of factors associated with the dental disease levels in our study were related to social determinants or dental service access.

It is important to highlight the study limitations. To allow greater ease in interpretation, many independent variables were dichotomised. **While** information may have been lost in this approach, an additional benefit was that any unmet parametric assumptions **about** the independent variables in multivariable modelling were avoided. The convenience nature of sampling and its lack of representativeness mean the findings are not generalizable to Aboriginal Australians in the Northern Territory, other Aboriginal groups in Australia or Aboriginal populations living elsewhere in the world. Due to this the associations within the dataset are of more value than reported frequencies of key variables. The study was cross-sectional, meaning cause-and-effect relationships could not be **determined**. It was also beyond the scope of the study to independently validate the self-reported explanatory variables. **It took longer than anticipated (18 months) to achieve our required sample size. This was due to many factors, including: delays with ethical approvals, staff absences, community events and inclement weather.** Strengths include a reasonably large sample size for such a hard-to-reach population, collation of both clinical and self-reported

information, and an opportunity for in-depth analyses of a multitude of factors associated with dental caries experience.

Despite the existence of oral health promotion and preventive strategies like the Northern Territory Oral health Plan, which aims to improve access to oral health care among Aboriginal Australians living in the Northern Territory, the predominance of untreated decay **in the** overall dental disease burden in our study **sample** is concerning. It perhaps indicates that oral health promotion and prevention strategies among this population are failing, together with a lack of available, accessible or appropriate dental health services. Most Aboriginal Australians adults in the Northern Territory are eligible for free public dental services, which provide basic and comprehensive dental care. Such services may be provided through the government public dental sector or through Aboriginal community-controlled health organisations. The waiting time for receipt of non-urgent dental care through the Northern Territory public dental sector varies. In the main urban centre, the waiting list is currently two to three years, with Aboriginal clients receiving no preferential care. After three 'Failed-To-Appear (FTA)' episodes, the client is placed at the end of the waiting list. In the smaller urban centre just outside Darwin that was involved in the study, clients are able to obtain appointments once they've come off the waiting list with no limit to FTAs. There is no waiting list in the smallest regional location (Katherine) involved in the study.

Unemployment, an important social determinant indicator, has been widely reported to be associated with adverse oral health in other groups; both at a population level¹⁶ and in smaller convenience samples among vulnerable populations¹⁷. Marmot and Bell¹⁸ argued that employment was an integral component to reducing disparities in oral health, with the key to employment lying in education. They describe the social gradient in educational performance

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leading to different experiences of employment in the labour market and in the types of jobs which people can expect to do. In Australia's Northern Territory, five percent of the population were unemployed in the 2011 Census, but that was 19 percent among Aboriginals¹. Marmot attests that unemployment levels among Australia's Aboriginal population are integral to the poor health experienced by this group (one of the "causes of the causes") and that closing the health inequality gap will only be achieved when action on the broader social determinants of health has occurred¹⁹.

Problem-based dental attendance has been associated with dental caries experience in other populations, especially with respect to untreated dental caries^{20,21}. Typically, those who prefer to wait until a dental problem arises (which is usually pain-related) present with higher levels of dental disease, and thus have a higher need for dental treatment, than their counterparts who attend for routine check-ups²². **Attending for dental care for a problem as opposed to a check-up has been well documented among the Aboriginal Australian population. For example, while 56 percent of Aboriginal adults in Australia's 2nd National Survey of Adult Oral Health were problem-based dental attenders the corresponding proportion of their non-Aboriginal counterparts was only 43 percent¹¹.** A limitation of the study was not exploring factors that may have contributed to problem-based dental attendance among our sample.

In conclusion, **while one should apply caution in interpreting our results given the limitations of the study we believe our findings highlight the unacceptably high levels of untreated dental caries experience among a population already disadvantaged on almost all health indicators².** We have conducted the largest oral health study that has collected both clinical and self-report information in a hard-to-reach adult Aboriginal

population in the Northern Territory. **While it warrants further studies beyond descriptive level among this population** we believe there is a need for the prevention of dental disease to be a focus at the community level, with more context-specific oral health promotion and education programs being implemented at a young age. It could be that before any sustainable gains are made in Aboriginal oral health, up-stream social determinant factors must be first addressed.

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Table 1: Socio-demographic characteristics of Aboriginal study participants compared to the Northern Territory Aboriginal Australians in the 2011 Australian Census

Variables	Categories	Aboriginal study participants % (95% CI)	NT Aboriginal 2011 Census % (95% CI)
Age	20-34 years	35.7 (30.1-41.2)*	46.2 (45.7-46.8)
	35-54 years	53.8 (48.0-59.7)*	39.8 (39.3-40.4)
	55+ years	10.5 (6.9-14.1)	14.0 (13.6-14.4)
Education	Completed Year 12	23.6 (18.6-28.6)*	8.5 (8.1-8.7)
Housing	Own	3.9 (1.6-6.2)	4.5 (4.1-4.9)
	Buying	23.0 (18.1-28.0)*	13.8 (13.2-14.5)
	Renting	48.2 (42.4-54.1)*	72.0 (71.1-72.8)
	Rent free	8.9 (5.5-12.2)*	1.0 (0.8-1.2)
Employment	Employed	53.3 (47.3-59.2)*	33.3 (32.8-33.8)
	Unemployed	6.2 (3.3-9.1)	5.6 (5.3-5.8)
	Not seeking work	40.5 (34.7-46.4)*	49.8 (49.3-50.4)
Weekly household income	\$0-349	8.6 (3.8-12.3)*	15.7 (15.1-16.4)
	\$350-799	21.6 (15.2-28.0)	24.2 (23.4-25.0)
	\$800-1399	30.9 (23.7-38.1)	23.7 (22.9-24.5)
	≥ \$1400	38.9 (31.3-46.5)*	19.5 (18.8-20.2)

*Non-overlapping 95% CIs for Aboriginal study participants and NT Aboriginal 2011 census

Table 2. Total counts, caries prevalence and severity by demographic and socio-economic factors

	Total (%)	Percent DT>0 (95% CI)	Mean DT (95% CI)	Percent DMFT>0 (95% CI)	Mean DMFT (95% CI)
Total	312	77.9 (73.0-82.1)	3.0 (2.6-3.4)	95.5 (92.6-97.3)	9.7 (8.9-10.5)
<i>Demographic</i>					
Age					
<39 years	175 (50.3)	81.1(75.3-87.0)	3.1 (2.6-3.7)	93.7 (90.1-97.3)	7.1 (6.1-8.0)*
39+ years	137 (49.7)	73.7 (66.3-81.1)	2.9 (2.3-3.4)	97.8 (95.3-100.0)	13.1 (11.8-14.4)
Sex					
Male	174 (55.8)	80.5 (74.5-86.4)	3.1 (2.6-3.6)	94.3 (90.8-97.7)	8.2 (7.2-9.2)*
Female	138 (44.2)	74.6 (67.3-81.9)	2.9 (2.3-3.5)	97.1 (94.3-99.9)	11.7 (10.3-13.0)
Location					
Darwin	180 (57.8)	75.6 (69.2-81.9)	3.1 (2.6-3.6)	95.0 (91.8-98.2)	11.6 (10.4-12.8)*
Non-Darwin	132 (42.2)	81.1 (74.3-87.8)	2.9 (2.4-3.4)	96.2 (92.9-99.5)	7.1 (6.1-8.1)
Incarceration status					
Incarcerated	104 (33.4)	82.7 (75.4-90.0)	3.0 (2.4-3.6)	97.1 (93.9-100.0)	7.6 (6.4-8.8)*
Non-incarcerated	208 (66.6)	75.5 (69.6-81.4)	3.0 (2.6-3.5)	94.7 (91.7-97.8)	10.8 (9.7-11.9)
<i>Socio-economic</i>					
Education					
<12 years	221 (76.4)	76.9 (71.3-82.5)	2.8 (2.4-3.2)	96.8 (94.5-99.2)	9.9 (8.9-10.9)
12+ years	68 (23.6)	76.5 (66.3-86.6)	3.0 (2.2-3.9)	89.7 (82.4-97.0)	9.3 (7.4-11.3)
Annual income					
<\$15,600	86 (52.1)	77.9 (69.0-86.8)	3.4 (2.7-4.2)	97.7 (94.5-100.0)	10.6 (9.0-12.3)
≥\$15,600	79 (47.9)	77.2 (67.9-86.6)	2.9 (2.2-3.6)	94.9 (90.1-99.8)	11.5 (9.7-13.4)

Employment status					
Employed	110 (45.0)	64.5 (55.5-73.5)*	2.3 (1.7-2.8)*	91.8 (86.7-100.0)	10.6 (9.0-12.2)
Not employed	134 (55.0)	85.8 (79.8-91.8)*	3.5 (2.9-4.1)*	97.0 (94.1-99.9)	9.5 (8.3-10.7)
Household size					
≥5 people	66 (21.1)	75.8 (65.3-86.2)	3.1 (2.3-3.8)	97.0 (92.8-100.0)	9.3 (7.5-11.1)
<5 people	246 (78.9)	78.5 (73.3-83.6)	3.0 (2.6-3.4)	95.1 (92.4-97.8)	9.8 (8.9-10.8)

*P<0.05

Table 3. Total counts, caries prevalence and severity by dental service utilisation, dental cost factors and self-perceived general and dental health factors

	Total (%)	Percent DT>0 (95% CI)	Mean DT (95% CI)	Percent DMFT>0 (95% CI)	Mean DMFT (95% CI)
<i>Dental service utilisation</i>					
Last visited dentist					
<1 year ago	72 (26.8)	72.2 (61.8-82.6)	2.4 (1.6-3.2)	100.0	12.3 (10.4-14.1)*
1+ year ago	197 (73.2)	77.7 (71.8-83.5)	3.0 (2.5-3.4)	93.4 (89.9-96.9)	9.2 (8.1-10.2)
Usual reason visit dentist					
Check-up	78 (28.9)	69.2 (58.9-79.5)	1.8 (1.3-2.4)*	87.2 (79.7-94.6)*	6.7 (5.1-8.2)*
Problem	192 (71.1)	79.2 (73.4-84.9)	3.2 (2.7-3.7)	98.4 (96.7-100.0)	11.3 (10.2-12.4)
Perceived need see dentist					
Yes	232 (80.6)	80.6 (75.5-85.7)*	3.2 (2.7-3.6)*	96.6 (94.2-98.9)*	9.9 (8.9-10.9)
No	56 (19.4)	62.5 (49.7-75.3)	1.6 (1.1-2.1)	89.3 (81.1-97.4)	8.8 (6.7-10.9)
<i>Dental cost</i>					
Avoid dental care due to cost					
Yes	130 (46.5)	76.2 (68.8-83.5)	2.9 (2.3-3.5)	97.7 (95.1-100.0)	10.6 (9.2-11.9)
No	150 (53.5)	76.7 (69.9-83.5)	2.7 (2.2-3.2)	93.3 (89.3-97.3)	9.1 (7.8-10.3)
Difficulty paying \$100 dental bill					
None/hardly any/ a little	214 (76.1)	72.4 (66.4-78.5)*	2.5 (2.1-2.9)*	93.9 (90.7-97.1)	8.8 (7.9-9.8)*
A lot	67 (23.9)	89.5 (82.2-96.9)	3.8 (2.9-4.7)	100.0	12.4 (10.5-14.3)
<i>Self-perceived general and dental health</i>					
Self-rated general health					
Excellent or very good	71 (24.6)	77.5 (67.7-87.2)	3.0 (2.2-3.9)	94.4 (89.0-99.8)	7.5 (6.0-8.9)*
Good/fair/poor	218 (75.4)	76.6 (71.0-82.3)	2.8 (2.4-3.2)	95.4 (92.6-98.2)	10.5 (9.4-11.5)

Self-rated oral health					
Excellent or very good	30 (10.3)	73.3 (57.4-89.3)	2.4 (1.1-3.7)	90.0 (79.2-100.0)	8.3 (5.7-10.9)
Good/fair/poor	248 (89.7)	77.2 (72.1-82.4)	2.9 (2.5-3.3)	95.8 (93.3-98.2)	9.9 (9.0-10.9)

*P<0.05

Table 4. Total counts, caries prevalence and severity by dental health behaviours and psychological health.

	Total (%)	Percent DT>0 (95% CI)	Mean DT (95% CI)	Percent DMFT>0 (95% CI)	Mean DMFT (95% CI)
<i>Dental health behaviours</i>					
Own toothbrush					
Yes	264 (91.3)	75.0 (69.7-80.3)*	2.7 (2.3-3.1)*	94.7 (92.0-97.4)	9.6 (8.7-10.5)
No	24 (8.7)	96.0 (88.3-100.0)	4.2 (2.9-5.4)	100.0	11.7 (7.9-15.5)
Brush previous day					
Yes	232 (86.9)	72.8 (67.1-78.6)*	2.6 (2.2-3.0)	94.4 (91.4-97.4)	9.6 (8.6-10.6)
No	35 (13.1)	91.4 (82.1-100.0)	3.6 (2.4-4.9)	97.1 (91.6-100.0)	9.9 (7.5-12.2)
Use toothpaste					
Yes	234 (95.5)	73.1 (67.4-78.8)	2.6 (2.2-3.0)	94.4 (91.5-97.4)	9.5 (8.5-10.5)
No	11 (4.5)	81.8 (58.9-100.0)	2.4 (1.0-3.7)	100.0	13.1 (7.4-18.8)
<i>Psychological health</i>					
Scared of dentist					
Little bit, fair bit, heaps	84 (29.2)	72.6 (63.0-82.2)	3.1 (2.3-4.0)	96.4 (92.4-100.0)	11.4 (9.7-13.1)*
No	204 (70.8)	78.9 (73.3-84.6)	2.8 (2.3-3.2)	94.6 (91.5-97.7)	9.0 (8.0-10.1)
<i>Psychological distress (K6)</i>					
Low (0-2)	86 (33.8)	78.1 (69.8-86.4)	2.8 (2.0-3.6)	94.8 (90.3-99.3)	9.8 (7.9-11.7)
Moderate (3-7)	91 (32.0)	80.2 (72.0-88.5)	2.6 (1.8-3.4)	96.7 (93.0-100.0)	9.3 (7.4-11.3)
High (8+)	97 (34.2)	71.1 (62.1-80.2)	3.1 (2.3-3.9)	93.8 (89.0-98.6)	10.1 (8.2-12.0)
<i>Psychological distress (PHQ-9)</i>					
Low (0-4)	91 (32.0)	82.4 (74.5-90.3)	2.5 (1.6-3.3)	97.8 (94.8-100.0)	9.9 (8.0-11.9)
Moderate (5-9)	115 (40.5)	72.2 (63.9-80.4)	2.7 (2.0-3.5)	92.2 (87.2-97.1)	9.5 (7.8-11.2)
High (≥10)	78 (27.5)	75.6 (66.1-85.2)	3.4 (2.6-4.3)	96.2 (91.9-100.0)	10.0 (7.9-12.1)

*P<0.05

Table 5. Multivariable models of caries prevalence and severity

	^a Percent DT>0 (PR,95% CI)	^b Mean DT (B, 95% CI)	^a Percent DMFT>0 (PR, 95% CI)	^b Mean DMFT (B, 95% CI)
Age				
39+ years	-	-	-	0.32 (0.24-0.39)*
<39 years (ref)	-	-	-	
Sex				
Female	-	-	-	0.67 (-1.19-2.54)
Male (ref)	-	-	-	
Location				
Darwin	-	-	-	3.76 (1.06-6.47)*
Non-Darwin (ref)	-	-	-	
Incarceration status				
Non-incarcerated	-	-	-	3.34 (0.38-6.30)*
Incarcerated (ref)	-	-	-	
Employment status				
Not employed	1.23 (1.03-1.46)*	0.47 (-0.02-0.96)	-	-
Employed (ref)	1.00		-	
Last visited dentist				
<1 year ago	-	-	-	2.75 (1.03-4.48)*
1+ year ago (ref)	-	-	-	
Usual reason visit dentist				
Problem	-	1.16 (0.16-2.15)*	1.12 (1.03-1.22)*	2.81 (1.12-4.49)*
Check-up (ref)	-		1.00	
Perceived need see dentist				
Yes	1.24 (0.96-1.60)	0.64 (-0.41-1.70)	1.07 (0.97-1.17)	
No (ref)	1.00		1.00	
Difficulty paying \$100 dental bill				
A lot	1.13 (0.98-1.32)	0.09 (-0.30-0.47)	-	0.45 (-0.19-1.09)
None, hardly any, a little	1.00			
Self-rated general health				
Good, fair, poor	-	-	-	0.86 (-0.03-1.74)
Excellent, very good (ref)	-	-	-	
Own toothbrush				
No	1.09 (0.89-1.32)	1.06 (0.84-2.97)	-	-
Yes (ref)	-		-	

Brush previous day				
No	1.19 (1.04-1.36)*	-	-	-
Yes (ref)	1.00		-	
Scared of dentist				
Little bit, fair bit, heaps	-	-	-	0.47 (-0.38-1.32)
No (ref)	-		-	

*P <0.05 ^a Poisson regression ^b Multiple linear regression