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Self-reported oral health, dental anxiety and use of services in Pacific tertiary students

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Abstract

Background and objectives: Pacific people suffer disproportionately from oral health disparities in New Zealand, and little is known about their oral health. This study aimed to investigate the self-reported oral health, dental anxiety and use of available services in a largely young Pacific sample.

Methods: A cross-sectional study of all Pacific adults enrolled at the University of Otago was conducted, using an online survey emailed to participants. Data was collected on socio-demographic characteristics, and the OHIP-14 set of questions were used to collect oral health impact information. The IDAF-4C was utilised to investigate dental anxiety, and questions on the use of services were also included.

Results: A total of 323 online questionnaires were completed. Undergraduate students made up almost 90% of the sample. Overall, almost half of the sample had experienced one or more OHIP-14 impacts 'fairly often' or 'very often'. The overall prevalence of dental anxiety was 18.0%, and females were more dentally anxious. Over two-thirds of the participants brushed twice a day. The youngest age group and non-CSC holders had visited dentists the most in the last two years. Almost two-thirds of the sample usually visit for a check-up. Mouthwash use was reported by almost a third of the sample.

Conclusion: This investigation resulted in valuable information which contributes to the scarce literature on the oral health of Pacific adults in New Zealand. The prevalence of dental anxiety is low, and favourable self-reported oral health and use of services was found.

Introduction

Oral health has improved over the years in New Zealand (NZ), but, despite this progress, Pacific people living in socioeconomically deprived areas suffer disproportionately from poorer oral health (Ministry of Health., 2010)

Pacific people make up 7.4% of NZ's total population, according to the 2013 Census. It is a fast-growing and youthful group that is projected to increase to 10.9% of the population by 2038 (Ministry for Pacific Peoples., 2016). In addition, approximately sixty percent of Pacific people are NZ-born, and close to sixty percent of Māori also identify as Pacific (Ministry for Pacific Peoples., 2016).

Historically, Pacific people's perception of their general health has been positive (Ministry for Pacific Peoples., 2016). In the annual update of the New Zealand Health

Survey 2019/2020, almost 80% of Pacific people self-reported their general health to be either excellent, very good, or good (Ministry of Health., 2020); this was also observed in the 2009 New Zealand Oral Health Survey (NZOHS), where only 37.5% reported having 'fair' or 'poor' oral health (Ministry of Health., 2010). However, their positive perception is not concordant with the health survey data (Ministry of Health., 2020, Ministry of Health., 2010).

Literature on the oral health of Pacific adults in NZ is limited. The most recent New Zealand Oral Health Survey (NZOHS) found that only 10% of Pacific adults were caries-free, while it was 22.7% for non-Pacific, and 70% of Pacific adults have been estimated to have untreated coronal decay (Ministry of Health., 2010). Furthermore, Pacific adults were also 2.3 times more likely to have deep periodontal pockets than non-Pacific people. Pacific adults also suffer the irreversible consequence of these oral health conditions, having the highest prevalence (66.1%) of 1+ missing teeth (Ministry of Health., 2010).

Data on dental anxiety and its impact on the use of dental services in NZ were collected in the 2009 New Zealand Oral Health Survey (NZOHS), using the Dental Anxiety Scale (DAS). The population prevalence of dental anxiety reported in the secondary analysis of this data was 13.3%, and it also illustrated the association between dental anxiety, episodic dental attendance, dental caries, and poorer Oral Health Related Quality of Life (OHRQoL) in NZ (Sukumaran et al., 2020). Furthermore, the newer IDAF-4C and the DAS were used in a Dunedin study, which found the prevalence of dental anxiety with those to be 13.0% and 18.6% respectively (Ibrahim., et al 2017). The mean scores for the IDAF-4C and DAS were higher in episodic visitors and those without a recent dental visit. The IDAF-4C has not yet been used to investigate dental anxiety in Pacific adults.

A self-report survey of Pacific adults in Christchurch reported over half of the participants had not attended a dentist in the previous two years, and three-quarters of the sample last visited because of dental pain (Petelo et al., 2004). Similar findings arose from Pacific adolescent studies, where they were less likely to have attended a general dentist in the previous year, and had poorer oral health than non-Pacific adolescents (Ministry of Health., 2010; Areai et al., 2011; Børsting et al., 2015).

This study aimed to: (a) investigate the self-report oral health of Pacific adults and its impact on OHRQoL:

(b) examine the validity of the IDAF-4C in measuring dental anxiety and determining its association with sociodemographic characteristics; and (c) investigate Pacific adults' use of available dental services and oral health care.

Methods

All Pacific students enrolled at the University of Otago and who were >18 years of age were invited to participate. They were identified from the Pacific Island Centre's database of Pacific students. The research information sheet was distributed with the invitational email, and their decision to participate was noted as consent. Ethics approval was granted by the University of Otago Ethics Committee (reference number: D21/131), utilising the Pacific research protocols designed by the University of Otago. The study design was cross-sectional, employing a self-report online survey designed and distributed using REDCap (survey software).

The online survey included questions on the participants' socio-demographic characteristics, oral-health-related quality of life, dental anxiety, and use of services. The socio-demographic information items obtained were age, sex, ethnicity (Samoan, Tongan, Cook Islander, Fijian or other), community services card (CSC) status, enrolment status, source of income, and whether they were undergraduate or postgraduate students. Enrolment status was categorised as full-time or part-time, and the source of income was reported as Study-Link allowance, part-time work while studying, or private funds. Data on oral-health-related quality of life (OHRQoL) were collected using the 14-item short-form Oral Health Impact Profile (OHIP-14) (Slade., 1997). Moreover, questions on the frequency of dental visits, teeth brushing frequency, and mouthwash use were also included.

The IDAF-4C was used to measure dental anxiety and its association with sociodemographic characteristics (Armfield., 2010). The IDAF-4C was developed to improve on the limitations of the Dental Anxiety Scale (DAS) and the Modified Dental Anxiety Scale (MDAS), but is not yet widely used (Armfield, 2010; Ibrahim et al., 2017).

The data collected were extracted from REDCap and analysed using IBM SPSS version 27 (New York, USA), and Stata/IC version 17 (StataCorp, College Station, Texas 77845 USA) for multivariate analysis. Descriptive analysis was conducted, using cross-tabulations for categorical dependent variables and analysis of variance for continuous ones. Chi-square and ANOVA tests were utilised in bivariate and multivariate analysis to determine the statistical significance of the data, with the P value set at <0.05. A scatterplot (Figure 1) was produced in Stata, with the "jitter" option used to better demonstrate overlap between data points. Multivariate modelling was used to examine the associations between dental anxiety and OHRQoL.

Results

Overall, 323 of a total of 1,000 eligible students (32.3% response rate) completed the online survey over three weeks. The mean age of students was 21, with ages ranging from 18 to 63 years.

Table 1 summarises their socio-demographic characteristics by sex. Over two-thirds of the sample were female, and almost half identified as Samoans. The majority were 24 years of age or younger. The students were mostly in undergraduate studies and enrolled full-time. More than half did not hold a CSC and most used Study-Link for financial support.

Table 2 presents the mean OHIP-14 scores and prevalence of OHIP-14 impacts by socio-demographic characteristics. Overall, almost half of the sample had experienced one or more of OHIP-14 items 'fairly often' or 'very often'. Significant differences in mean OHIP-14 score were observed by sex, stage of study, and community services card status. There was also a gradient by age group, whereby the older group had the highest average OHIP-14 score. Well over half of the part-time students had one or more impacts on their OHRQoL.

The linear regression model for the OHIP-14 score is presented in Table 3. Those who were dentally anxious had higher OHIP-14 scores, on average, but there were no other statistically significant associations.

The mean IDAF-4C scores and prevalence of dental anxiety are presented by socio-demographic characteristics in Table 4, using a cut-off point of 3 for the standardised score on the IDAF-4C. The prevalence of dental anxiety was less than 20.0%, with various sociodemographic characteristics showing associations with dental anxiety.

The linear regression model for the IDAF-4C is presented in Table 5. Females had higher IDAF-4C scores, but no other statistically significant associations were found. Figure 1 illustrates a moderate correlation between the IDAF-4C and OHIP-14, with a Pearson correlation coefficient of 0.41.

Data on self-care and dental visiting by sociodemographic characteristics are summarised in Table 6. Females were better at brushing twice a day than males, and over two-thirds of the sample brushed twice a day. Higher proportions of the youngest age group and non-CSC holders had visited a dentist in the previous two years. Almost two-thirds of the participants usually visited for a check-up, and this was lower in the older age groups. Moreover, higher proportions of undergraduate students and non-CSC holders visited for check-ups. Mouthwash use was reported by almost a third of the sample, but only a quarter of CSC holders used it. There was an age gradient in mouthwash use, with it being more common in older groups.

Table 1. Overview of the sociodemographic characteristics of the sample (brackets contain row percentages unless otherwise indicated)

	Female		Male		All combined ^a	
Ethnic group						
Samoan	113	(72.4)	43	(27.6)	156	(48.3)
Tongan	30	(71.4)	12	(28.6)	42	(13.0)
Cook Islander	28	(82.4)	6	(17.6)	34	(10.5)
Fijian	31	(63.3)	18	(36.7)	49	(15.2)
Other	32	(76.2)	10	(23.8)	42	(13.0)
Age group						
Younger than 20	96	(70.6)	40	(29.4)	136	(42.1)
20 to 24	110	(75.3)	36	(24.7)	146	(45.2)
25 or older	28	(68.3)	13	(31.7)	41	(12.7)
Stage						
Undergraduate	207	(73.4)	75	(26.6)	282	(89.8)
Postgraduate	21	(65.6)	11	(34.4)	32	(10.2)
Enrolment status						
Full-time	218	(72.9)	81	(27.1)	299	(94.3)
Part-time	11	(61.1)	7	(38.9)	18	(5.7)
CSC holder						
No	130	(69.5)	57	(30.5)	187	(57.9)
Yes	104	(76.5)	32	(23.5)	136	(42.1)
Source of income						
Study link	142	(74.1)	57	(28.6)	199	(63.6)
Part-time work	45	(73.6)	16	(26.2)	61	(19.5)
Private funds	39	(73.6)	14	(26.4)	53	(16.9)
All combined	234	(72.4)	89	(27.6)	323	(100.0)

^a Column percentages**Table 2.** Mean OHIP-14 score and prevalence of OHIP-14 impacts by socio-demographic characteristics

	Mean OHIP-14 score (sd)		Prevalence: no. reporting 1+ impacts fairly/very often (%)	
Sex				
Female	12.9	(8.7) ^a	108	(46.2)
Male	12.8	(9.3)	46	(51.7)
Ethnic group				
Samoan	13.2	(9.3)	76	(48.7)
Tongan	13.3	(7.9)	20	(47.6)
Cook Islander	11.4	(8.2)	17	(50.0)
Fijian	11.5	(8.0)	21	(42.9)
Other	13.9	(9.6)	20	(47.6)
Age group				
Younger than 20	12.6	(8.6) ^a	63	(46.3)
20 to 24	12.9	(9.0)	73	(50.0)
25 or older	13.6	(9.3)	18	(43.9)
Stage				
Undergraduate	12.9	(8.9) ^a	136	(48.2)
Postgraduate	13.4	(9.3)	15	(46.9)
Enrolment status				
Full-time	12.5	(8.6)	141	(47.2)
Part-time	18.5	(12.6)	11	(61.1)
CSC holder				
No	12.9	(9.0) ^a	84	(44.9)
Yes	12.8	(8.7)	70	(51.5)
Source of income				
Study Link	12.7	(8.5)	97	(48.7)
Part-time work	14.5	(10.5)	31	(50.8)
Private funds	11.3	(8.6)	21	(39.6)
All combined	12.8	(8.9)	154	(47.7)

^aP<0.05

Table 3. Linear regression model for the OHIP-14 score

OHIP-14 total score	Coefficient (95% CI)	P-value
Age (continuous)	0.034 (-0.218, 0.286)	0.791
Female ^a	0.415 (-2.610, 1.779)	0.710
Ethnic group ^b		
Tongan	-0.425 (-3.534, 2.684)	0.788
Cook Islander	-2.787 (-6.095, 0.523)	0.099
Fijian	-2.377 (-5.218, 0.465)	0.101
Other	0.159 (-2.950, 3.269)	0.919
CSC ^c	-0.456 (-2.512, 1.609)	0.664
Income source ^d		
Part-time job	0.599 (-2.105, 3.304)	0.663
Private Funds	-1.860 (-4.687, 0.966)	0.196
Enrolment status ^e		
Part-time	4.207 (-0.633, 9.048)	0.088
Dentally fearful	6.816 (4.255, 9.376)	<0.001
Constant	12.024 (6.475, 17.573)	<0.001

^a Reference category: Male

^b Self-reported Pacific ethnicity: reference category: Samoan

^c Community service card status

^d Source of income during study: reference category Study-Link

^e Enrolment status at university: reference category Full-time

Table 4. Mean IDAF-4C score and prevalence of dental fear, by socio-demographic characteristics

	Mean IDAF-4C score (sd)	Prevalence of dental anxiety (%)
Sex		
Female	16.0 (8.5) ^a	48 (20.5) ^a
Male	13.6 (6.6)	10 (11.2)
Ethnic group		
Samoan	15.3 (7.5) ^a	21 (13.5)
Tongan	15.1 (8.3)	8 (19.0)
Cook Islander	15.9 (9.1)	9 (26.5)
Fijian	15.2 (8.0)	10 (20.4)
Other	15.6 (9.2)	10 (23.8)
Age group		
Younger than 20	15.4 (8.0) ^a	25 (18.4)
20 to 24	14.9 (7.4)	23 (15.8)
25 or older	16.3 (10.4)	10 (24.4)
Stage		
Undergraduate	15.1 (7.9)	50 (17.7)
Postgraduate	17.0 (9.4)	7 (21.9)
Enrolment status		
Full-time	15.3 (7.9) ^a	52 (17.4)
Part-time	18.2 (10.3)	6 (33.3)
CSC holder		
No	15.0 (7.9) ^a	32 (17.1)
Yes	15.8 (8.2)	26 (19.1)
Source of income		
Study Link	15.0 (7.8) ^a	32 (16.1)
Part-time work	16.6 (9.7)	15 (24.6)
Private funds	15.0 (7.1)	10 (18.9)
All combined	15.3 (8.0)	58 (18.0)

^aP<0.05

Table 5. Linear regression model for the IDAF-4C score

IDAF-4C total score	Coefficient (95% CI)	P-value
Age (continuous)	-0.035(-0.259, 0.189)	0.757
Female ^a	2.286 (0.271, 4.302)	0.026
CSC ^b	0.887 (-1.012, 2.787)	0.359
Income source ^c		
Part-time work while studying	1.099 (-1.381, 3.579)	0.384
Private funds	0.034(-2.534, 2.604)	0.979
Enrolment status ^d		
Part-time	3.151 (-1.100, 7.402)	0.146
Constant	13.647 (8.737, 18.558)	0.000
N	313	313

^a Sex: reference category Males

^b Community services card status

^c Source of income during study: reference category Study-Link

^d Enrolment status at university: reference category Full-time

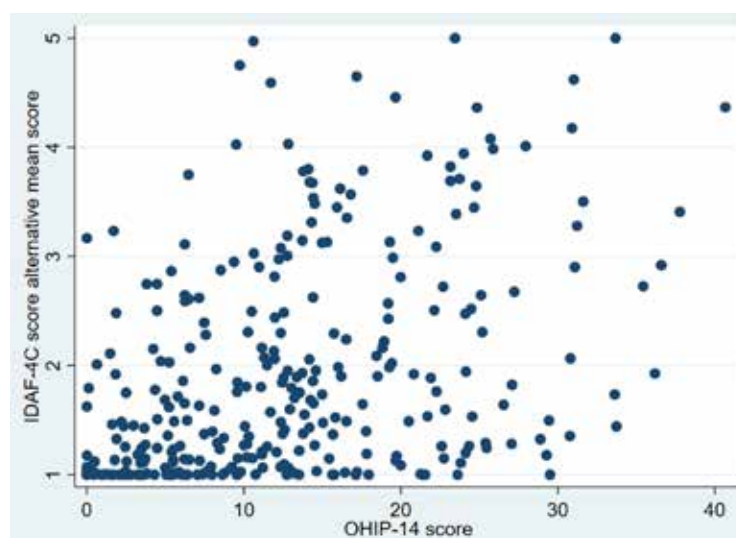
**Figure 1.** Scatter plot of the IDAF-4C and the OHIP-14 scale scores.

Table 6. Self-care and dental visiting by sociodemographic characteristics (%)

	Usually visits for a check-up	Visited in the last two years	Brushing twice a day	Mouthwash use
Sex				
Female	144 (61.5)	154 (65.8)	176 (75.2) ^a	76 (32.5)
Male	60 (67.4)	58 (65.2)	51 (57.3)	27 (30.3)
Ethnic group				
Samoan	97 (62.2)	101 (64.7)	106 (67.9) ^a	41 (26.3)
Tongan	25 (59.5)	23 (54.8)	23 (54.8)	15 (35.7)
Cook Islander	24 (70.6)	24 (70.6)	27 (79.4)	12 (35.7)
Fijian	32 (65.3)	37 (75.5)	42 (85.7)	17 (34.7)
Other	26 (61.9)	27 (64.3)	29 (69.0)	18 (42.9)
Age group				
Younger than 20	108 (79.4) ^a	114 (83.8) ^a	99 (71.8)	34 (25.0) ^a
20 to 24	81 (55.5)	74 (50.7)	97 (66.4)	51 (34.9)
25 or older	15 (36.6)	24 (58.5)	31 (75.6)	18 (43.9)
Stage				
Undergraduate	185 (65.6) ^a	188 (66.7)	199 (70.6)	89 (31.6)
Postgraduate	13 (40.6)	18 (56.3)	23 (71.9)	11 (34.4)
Enrolment status				
Full-time	192 (64.2)	198 (66.2)	211 (70.6)	98 (32.8)
Part-time	9 (50.0)	10 (55.6)	11 (61.1)	3 (16.7)
CSC holder				
No	127 (67.9) ^a	132 (70.6) ^a	131 (70.1)	69 (36.9) ^a
Yes	77 (56.6)	80 (58.8)	96 (70.6)	34 (25.0)
Source of income				
Study-link	131 (65.8)	135 (67.8)	137 (68.8)	58 (29.1)
Part-time work	35 (57.4)	35 (57.4)	47 (77.0)	20 (32.8)
Private funds	33 (62.3)	37 (69.8)	36 (67.9)	23 (43.4)
All combined	204 (63.2)	212 (65.6)	227 (70.5)	103 (31.9)

^a P<0.05

Discussion

This investigation of the self-reported oral health, dental anxiety, and use of services in a Pacific adult sample found that almost half of the participants reported 1+ OHRQoL impacts fairly/very often, with males and the 25+ age group also having higher mean OHIP-14 scores. The prevalence of dental anxiety was 18.0%, and females were more dentally anxious. Moreover, dentally anxious participants had higher OHIP-14 scores. Dental visits in the last two years were more common for younger participants, and routine dental visiting was more common among the undergraduates and the younger age group. Moreover, more than two-thirds of the sample brushed twice a day, and only about one-third used mouthwash regularly.

Before discussing the findings, it is important to consider the study's limitations and strengths. Although the investigation was inexpensive and time-efficient, its cross-sectional nature means that it cannot examine behaviours over time, and so it was not possible to determine a cause-and-effect relationship (Mann., 2003). We did not attempt to measure aspects of personality, an important influence on self-reported health, but whether

the failure to do so is of any practical importance is unclear, since a recent investigation with a Dunedin adult sample found that adjusting for personality was of only marginal benefit interpreting such associations (Thomson et al, 2019). Additionally, the sample represented a relatively young group of Pacific adults, who are well educated and likely have better understanding of oral health care overall; this may have produced more favourable responses that would otherwise be expected. The findings may have differed if the study was to be conducted with a more formally-drawn representative sample.

Considering the sample's likely representativeness, all Pacific students enrolled at the University of Otago over the age of 18 years were invited to participate, and the ethnicity breakdown is very similar to that of NZ's population (Ministry for Pacific Peoples., 2016), perhaps enhancing the likelihood that the findings are generalisable. Moreover, the ethnic make-up of the Pacific students who took part is comparable to that of Pacific students enrolled at the University of Auckland, NZ's largest tertiary education provider, and the one



with the largest number of Pacific students (University of Auckland, 2020). Ideally, the current investigation would have been conducted across all NZ tertiary institutions, but the administrative hurdles would have considerably delayed data collection.

A notable strength of the study was using the validated OHIP-14 scale to obtain information on OHRQoL. Another strength was the use of a better, more theoretically-based dental anxiety scale (the IDAF-4C) than has been used in previous such studies, and that scale was found to be valid for use with Pacific people in New Zealand.

The prevalence of OHIP-14 impacts in this study was higher than the 23.5% reported from the 2009 New Zealand Oral Health Survey (NZOHS) for Pacific people (Ministry of Health., 2010). The reason for this difference is unknown, although it is possible that the superior oral health awareness of the current study's young, tertiary-educated sample may have contributed.

Overall, the prevalence of dental anxiety was 18.0%, with females being more dentally anxious. Comparable data from a study of adults in Dunedin utilising the IDAF-4C also showed that females were more dentally anxious than males (at 18.9% and 5.5% respectively), with the overall prevalence of dental anxiety being 13.0% (Ibrahim et al., 2017). The confidence intervals for the two studies' prevalence estimates for dental anxiety (18.0 [13.8, 22.2], and 13.0 [9.0, 17.1] respectively) overlap, suggesting no statistically significant difference in estimates. Despite the difference in the sociodemographic characteristics of these samples, the IDAF-4C produced similar findings and associations. Furthermore, dental anxiety was investigated using the Dental Anxiety Scale (DAS) in the 2009 New Zealand Oral Health Survey, and secondary analysis of those data showed that it was more prevalent among females, and that Pacific adults were less anxious than non-Pacific adults (Sukumaran et al, 2020). Comparing the prevalence and antecedents of dental anxiety between Pacific and non-Pacific adults using the IDAF-4C in further research would be useful and informative.

Almost two-thirds of the sample reported usually visiting for a check-up and had visited a dentist in the previous two years. However, most had been recently eligible for the Adolescent Oral Health Services (AOHS) scheme, receiving free dental care, and this will have affected those rates. By contrast, the 25+ age group—who now have to privately fund their dental care—showed a much lower rate of dental visiting. The prevalence of Pacific adults who usually visit for a dental check-up was 22.0% in the 2009 New Zealand Oral Health Survey (NZOHS), which was lower than that for non-Pacific adults. (Ministry of Health., 2010).

The cost of dental care and access to private dental services in NZ has been reported to contribute to the poor dental attendance by Pacific adults (Petelo et al., 2004). Episodic visiting patterns were described in a

cross-sectional study of Pacific adults in Christchurch, which highlights a lack of priority for dental care (Petelo et al., 2004). Moreover, the current study found that participants who held a CSC were more likely to not visit a dental professional regularly. The prevalence of having avoided dental care in the previous 12 months due to cost was highest in Pacific adults, according to the 2009 New Zealand Oral Health Survey (Ministry of Health., 2010). In addition, the accessibility of private dental practices is a challenge for Pacific communities, since such practices in NZ are mostly situated in areas of high socioeconomic status (Kruger et al., 2012). Pacific people mostly reside in deprived areas, where fewer private dental practices are available (Ministry for Pacific People., 2016).

The proportion of participants brushing twice daily (70.5%) in the current study was close to that reported from the Christchurch study and the 2009 NZOHS, with estimates of 75.2% and 62.0% respectively for twice-daily brushing (Petelo et al., 2004; Ministry of Health., 2010). The reason for the limited use of mouthwash is unknown but is likely due to the extra associated costs, a lack of awareness, or perhaps well-justified scepticism about its efficacy. Furthermore, there was a gradient in mouthwash use across the age groups, the older adults having higher usage. Mouthwash use was not reported in the 2009 New Zealand Oral Health Survey, and Pacific peoples' mouthwash use has not been investigated previously.

The findings of this study will be valuable for researchers investigating the oral health of Pacific people, creating meaningful discussions and establishing directions for future research. Pacific people suffer the highest prevalence of dental diseases in NZ, and understanding their oral health practices and dental anxiety levels will contribute to improving the accessibility of dental care for them. The lower use of services in the older age groups presents a familiar multi-factorial challenge for the dental profession and the Government. Additionally, our findings contribute to growing evidence on the validity of the IDAF-4C in dental anxiety research.

Conclusion

This study has provided further insight into the oral health of a largely young Pacific sample. Impacts of oral health problems are experienced by almost half of the participants, and the prevalence of dental anxiety was low. Over half reported having good oral health care practices and use of services.

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