



Original article

Periodontal Health Knowledge Levels among Libyan Adult Patients Attending Public and Private Dental Clinics: A Comparative Study

Osama Ahmadi,¹ Aya BenAmer,² Honida Meftah,² Mabroka Eisawy²

¹ Department of Dental Public Health and Preventive Dentistry, Faculty of Dentistry, University of Benghazi, Libya

² Higher Institute of Medical Professions, National Commission of Technical Education, Benghazi, Libya

ABSTRACT:

Background: Periodontal diseases can result in premature tooth loss; However, early detection, adherence to oral hygiene practices, and regular prophylaxis can help prevent or minimize the severity of periodontal diseases. Additionally, increased awareness and knowledge about periodontal health can positively influence behaviors related to oral health.

Objectives: This study aimed to assess and compare the level of knowledge about periodontal oral health among patients attending public and private dental clinics and to investigate the relationship of their knowledge with Socio-demographic factors.

Methods: A cross-sectional study was conducted to assess periodontal health knowledge among Libyan adults. Researchers interviewed 180 adults aged 18 years and older face-to-face. The study focused on demographic factors such as age, gender, education level, occupation, and clinic type. Additionally, a chi-square test was used to explore differences in periodontal health knowledge between patients attending public and private dental clinics, considering age, gender, education, and occupation

Results: Socioeconomic status correlates with knowledge about periodontal signs, symptoms, etiology, and prevention. Females, those with higher education, and better economic status had significantly higher periodontal health knowledge. Knowledge increased with occupation level. The 41-60 age group and university-educated individuals demonstrated higher periodontal health knowledge. Females in public clinics were more aware of etiology than males. In private clinics, both genders showed an inverse association regarding the same question, with higher periodontal knowledge found among males.

Conclusion: The study showed differences in periodontal knowledge among patients attending different types of dental clinics, with variations based on age, gender, education, and occupation. Better socio-economic status is associated with better knowledge.

Key Words: *Periodontal health, knowledge, Awareness, Periodontal disease, Public dental clinic, Private dental clinic, Plaque control.*

Corresponding author:

Osama Ahmadi: Assistant lecturer in the Department of Dental Public Health and Preventive Dentistry, Faculty of Dentistry, University of Benghazi, Libya
Email: osama.ahmadi@uob.edu.ly

INTRODUCTION

Periodontal diseases affect people of all races and socioeconomic levels and age groups.^{1,2} Periodontal disorders are mainly caused by dental plaque and can eventually lead to tooth loss due to damaging supporting periodontal tissues. Adequate oral hygiene motivation

and regular prophylaxis can prevent or lessen the severity of periodontal diseases.³ Furthermore, increased periodontal health awareness and knowledge have been shown to positively impact periodontal health practices and behaviors. Likewise, as good periodontal outcomes are dependent on patient knowledge and attitude toward dentistry in general, and periodontal health in particular, it is imperative to understand the public's attitude and knowledge toward keeping a disease-free oral cavity.⁴ In short, people's periodontal health knowledge reflects their comprehension of its relevance, affecting their periodontal health management. Worldwide studies have been conducted

to assess diverse populations' knowledge and practice of periodontal health.⁵

Several research have linked university education, and higher socioeconomic status to better periodontal health knowledge.^{6, 7} Plaque-induced periodontal diseases are prevalent, even though they can be easily prevented and treated by removing microbial plaque.⁸ Untreated periodontitis leads to tooth loss in many patients who might lack an understanding of the causes and prevention of periodontal disease.

Libya's oral health care system includes both public and private dentists.⁹ In contrast to public dental clinics, private dental clinics provide all dental services. In Libya, little research was conducted to explore the knowledge and awareness of dental patients about periodontal health, and no studies compared periodontal knowledge levels between public and private clinic patients. Given the fact that more than half of the Libyan population needs attention to their oral health care,⁹⁻¹³ this study aimed to assess patients' knowledge of periodontal health in public and private dental clinics and to investigate the possible relationship between knowledge and socio-demographic characteristics.

MATERIALS AND METHODS

Study design

This cross-sectional study was conducted in Benghazi from June 1 to August 30, 2020. The questionnaire was applied face-to-face by three well-trained interviewers. Two of them were hygienists and one was a dentist. The survey used structured questions. The questions were close-ended. A minimum sample size of 97 participants was considered appropriate for this cross-sectional investigation to estimate the proportion having appropriate knowledge at 0.05 precision. This number was doubled to compensate for the sample non-response. The participants were selected from patients who sought dental care at both public and private clinics using a convenience sampling approach from randomly selected clinics. The inclusion criteria encompassed all patients aged 18 years and older who attended both public and private dental clinics during the study period and consented to be interviewed. At the end of the questionnaire, respondents had the opportunity to add comments. The researcher distributed the surveys to patients in their wards, and the investigator collected and filled them for subsequent analysis. This cross-sectional study took place in Benghazi, Libya's second-largest city, at both public and private dental clinics, which collectively receive approximately ten new patients daily. The outcome variables were derived from self-reported questions related to periodontal health

knowledge, considering factors such as age, gender, education, and occupation

Study instrument

This study included twenty-four questions. Twelve of them investigated periodontal disease, including its origin, signs, symptoms, risk factors, health problems, and bleeding during brushing. Socioeconomic indicators considered were education level (high, low, or never educated) and occupational classification (professional, intermediate, manual, or never worked) based on the National Statistics Socio-economic Classification (NS-SEC 3).¹⁵ Other variables included age groups (18-40, 41-60, and over 60), gender, and types of dental clinics (private or public). A group of specialists reviewed the questionnaire for clarity, simplicity, relevance, and necessity. With input from five clinicians, the final instrument was refined, rectified, or removed. The second draft was then tested on 15 dental clinic patients.

Statistical analysis

Statistical Package for Social Sciences (SPSS 22) was used to compute the statistics. Descriptive statistics were conducted for all variables in the analysis. The knowledge of periodontal health was analyzed within socioeconomic status and patient profile. The Chi-Square test was performed to compare periodontal knowledge between patients from public and private dental clinics based on age, gender, education, and occupation. All statistical tests were performed at $P < 0.05$.

RESULTS

Data collection involved 180 patients, and their responses to the periodontal health knowledge questionnaire were tabulated and graphed.

Table 1: Demographic characteristics of the study participants (n=180).

Variables	Classification	N (%)
Gender	Male	69 (38.3)
	Female	111 (62.7)
Age	18-40 years	100 (55.6)
	41-60 years	67 (37.2)
	More than 60 years	13 (7.2)
Occupation	Unemployment	81 (45)
	Profession employment	22 (12.2)
	Intermediate employment	66 (36.7)
	Manual employment	11 (6.1)
Education degree	No Education	42 (23)
	Lower education	77 (43)
	Higher education	61 (34)
Dental clinic type	Public clinic	90 (50)
	Private clinic	90 (50)
	Total	180 (100)

The study analyzed flossing habits among participants. Dental floss was used twice daily by 2.3% of individuals, once daily by 14.4%, and not at all by 83.3% (**Figure 1**). In **Figure 2**, while brushing was the most common cleaning method, 61.1% of subjects brushed their teeth twice daily, 28.9% brushed once daily, and 10% did not use it.

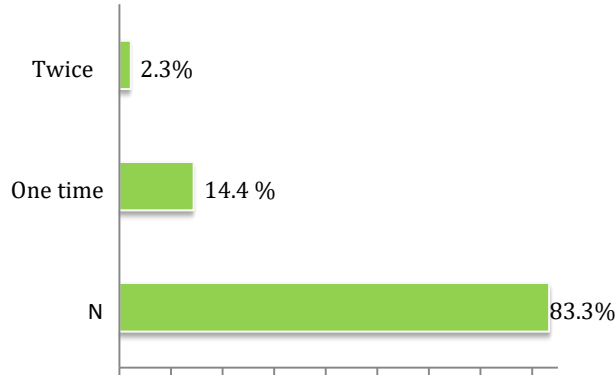


Figure 1: Distribution of use of dental floss

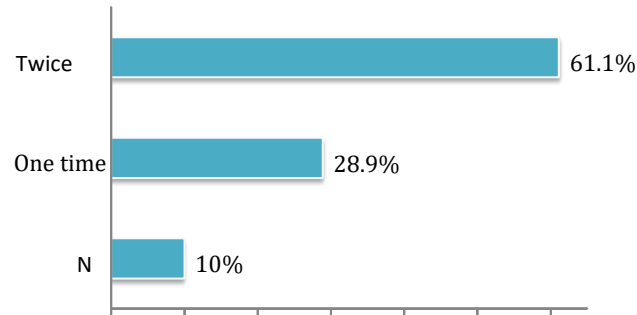


Figure 2: Distribution of use of toothbrush

In the study, a statistically significant difference between genders was observed. Females attending public clinics demonstrated greater awareness of issue 6: ‘Do you think that the initiating factor of periodontal disease is a dental calculus?’ (p=0.001) and question 5: ‘Do you think that the initiating factor of periodontal disease is a bacterial plaque?’ (p=0.014). However, no significant gender differences were detected in private clinics for the same questions. Male patients in private practice had better knowledge of the correct answer to question 4: ‘Do you think that dry mouth can cause bad breath?’ compared to female patients. On the other hand, female patients attending public practice were more aware of the same question than male patients. Additionally, the reasons for tooth loss significantly differed between male and female patients, particularly in cases of periodontal disease (as shown in **Table 2**)

Table 2: Responses to periodontal health knowledge questions among different sex groups based on clinic type

Sr.	Questions	Clinic	Gender	Response				p-value
				Yes		No		
				N	%	N	%	
1.	Is there any relation between periodontal health and general health?	Public	Female	27	45.8%	32	54.2%	0.216
			Male	10	32.3%	21	67.7%	
		Private	Female	41	78.8%	11	21.2%	
			Male	25	65.8%	13	34.2%	
2.	Is there any relation between periodontal disease and diabetes?	Public	Female	24	40.7%	35	59.3%	0.908
			Male	13	41.9%	18	58.1%	
		Private	Female	33	63.5%	19	36.5%	
			Male	25	65.8%	13	34.2%	
3.	Is there any relation between periodontal disease and heart disease?	Public	Female	18	30.5%	41	59.5%	0.137
			Male	5	24.2%	26	75.6%	
		Private	Female	18	34.6%	34	65.4%	
			Male	17	44.7%	21	55.3%	
4.	Do you think that dry mouth can cause bad breath?	Public	Female	34	57.6%	25	42.4%	0.046
			Male	11	35.5%	20	64.5%	
		Private	Female	34	65.4%	18	34.6%	
			Male	32	84.2%	6	15.8%	
5.	Do you think that the initiating factor of periodontal disease is a bacterial plaque?	Public	Female	36	61%	23	39%	0.014
			Male	8	25.8%	23	74.2%	
		Private	Female	43	82.7%	9	17.3%	
			Male	31	81.6%	7	14.4%	
6.	Do you think that the initiating factor of periodontal disease is a dental calculus?	Public	Female	36	61%	23	39%	0.001
			Male	8	25.8%	23	74.2%	
		Private	Female	43	82.7%	9	17.3%	
			Male	31	81.6%	7	18.4%	
7.	Do you think that the most indicating sign of periodontal disease is gingival bleeding?	Public	Female	38	64.4%	21	35.6%	0.079
			Male	14	45.2%	17	54.8%	
		Private	Female	46	88.5%	6	11.5%	
			Male	30	78.9%	8	21.1%	
8.	Do you think that use of toothbrush and dental floss can prevent periodontal disease?	Public	Female	29	49.2%	30	50.8%	0.608
			Male	17	54.8%	14	45.2%	
		Private	Female	39	75%	13	25%	
			Male	32	84.2%	6	15.8%	
9.	Do you think that a mouthwash from the pharmacy can play an important role in reducing periodontal disease?	Public	Female	26	44.1%	33	55.9%	0.331
			Male	17	54.8%	14	45.2%	
		Private	Female	45	86.5%	7	13.5%	
			Male	34	89.5%	4	10.5%	
10.	Do you think that regular visits to the dentist at least every six months can reduce periodontal disease?	Public	Female	40	67.8%	19	32.2%	0.008
			Male	12	38.7%	19	61.3%	
		Private	Female	48	92.3%	4	7.7%	
			Male	36	94.7%	2	5.3%	
11.	Do you think that the main causes of tooth lose are periodontal diseases?	Public	Female	34	57.6%	25	42.4%	0.046
			Male	11	35.5%	20	64.5%	
		Private	Female	46	88.5%	6	11.5%	
			Male	31	81.6%	7	18.4%	
12.	Do you think that the initiating symptom of periodontal disease is pain?	Public	Female	40	67.8%	19	32.2%	0.037
			Male	14	45.2%	17	54.8%	
		Private	Female	82.7	82.7%	17.3	17.3%	
			Male	30	78.9%	8	21.1%	

p-value<0.05=Significant

Table 3 compares participants' ages and knowledge levels among clinics. Those aged 41-60 at a private clinic replied yes to question 3 more than those aged 18-40 and over 60. In the public clinic, persons aged 41-60 years old replied yes to question 3 more than those of other ages (p -value=0.04). Patients with greater education in the private sector were substantially more likely to answer questions about risk factors and plaque control than patients with lower education or illiteracy.

Table 3 also shows that intermediate personnel in both clinics were more conscious of answering multiple questions. In other words, they replied yes to questions 7, 9 and 10, while the public answered properly to question 4. This finding shows that most intermediate employees are aware of the signs and symptoms of periodontal disease. The 2-test findings show that the differences found in both clinics by occupation level are statistically significant (p -value 0.05).

Table 3: Distribution of significance responses to periodontal health knowledge questions within occupation groups, age groups and education groups based on clinic type

Questions	Variables	Clinics	Classification	Response				p-value
				Yes		No		
				N	%	N	%	
Q4. Do you think that dry mouth can cause bad breath?	Occupation groups	Public	Unemployment	21	45.7%	25	54.3%	0.013
			Professional	4	57.1%	3	42.9%	
			Intermediate	20	66.7%	10	33.3%	
			Manual	0	50%	7	50%	
		Private	Unemployment	26	74.3%	9	25.7%	
			Professional	13	86.7%	2	13.3%	
			Intermediate	23	63.9%	13	36.1%	
		Manual	4	100%	0	0%		
Q7. Do you think that the most indicating sign of periodontal disease is gingival bleeding?	Occupation groups	Public	Unemployment	27	58.7%	19	41.3%	0.006
			Professional	3	42.9%	4	57.1%	
			Intermediate	19	63.3%	11	36.7%	
			Manual	3	42.9%	4	57.1%	
		Private	Unemployment	30	85.7%	5	14.3%	
			Professional	12	80%	3	20%	
			Intermediate	33	9.7%	3	8.3%	
		Manual	1	25%	3	75%		
Q10. Do you think that regular visits to the dentist at least every 6 months can reduce periodontal disease?	Occupation groups	Public	Unemployment	26	56.5%	20	43.5%	0.003
			Professional	3	42.9%	4	57.1%	
			Intermediate	21	70%	9	30%	
			Manual	2	28.6	5	71.4	
		Private	Unemployment	32	91.4%	3	8.6%	
			Professional	15	100%	0	0%	
			Intermediate	35	97.2%	1	2.8%	
		Manual	2	50%	2	50%		
Q3. Is there any relation between periodontal disease and heart disease?	Age groups	Public	18-40 years	9	22%	32	78%	0.007
			41-60 years	12	29.3%	29	70.7%	
			More than 60	2	25%	6	75%	
		Private	18-40 years	16	27.1%	43	72.9%	
			41-60 years	16	61.5%	10	38.5%	
		More than 60	3	60%	2	40%		
Q10. Do you think that regular visits to the dentist at least every 6 months can reduce periodontal disease?	Age groups	Public	18-40 years	23	56.1%	18	43.9%	0.001
			41-60 years	29	70.7%	12	29.3%	
			More than 60	0	0%	8	100%	
		Private	18-40 years	55	93.2%	4	6.8%	
			41-60 years	24	92.3%	2	7.7%	
			More than 60	5	100%	0	0%	
			No Education	1	11.1%	8	88.9%	

Q2. Is there any relation between periodontal disease and diabetes?	Education groups	Public	Low education	19	42.2%	26	57.8%	0.008
			High education	17	47.2%	19	52.8%	
		Private	No Education	0	0%	3	100%	
			Low education	17	53.1%	15	46.9%	
			High education	41	74.5%	14	25.5%	
Q9. Do you think that a mouthwash from the pharmacy can play an important role in reducing periodontal disease?	Education groups	Public	No Education	5	55.6%	4	44.4%	0.022
			Low education	20	44.4%	25	55.6%	
			High education	18	50%	18	50%	
		Private	No Education	3	100%	0	0%	
			Low education	24	75%	25	7.7%	
			High education	52	94.5%	3	5.5%	

p-value<0.05=Significant

DISCUSSION

To the best of our knowledge, no previous studies have examined the level of knowledge of gingival and periodontal diseases among patients of both public and private dental clinics. This study presents the first comparison of patient's knowledge in this regard. The findings of this research reveal differences in periodontal knowledge among patients attending different types of dental clinics, with variations based on age, gender, education, and occupation. While most individuals recognized the importance of using a toothbrush to prevent periodontal disease, more than two-thirds of the participants were unaware that dental floss also plays a crucial role in preventing such diseases. This result highlights the need to improve knowledge about dental floss and promote its usage. Our hypothesis suggests that patients attending private dental clinics possess greater knowledge about periodontal health compared to those attending public dental clinics, likely due to the higher socioeconomic status (SES) of private patients. Interestingly, both higher and lower educated patients attending private clinics demonstrated better knowledge about periodontal health, which supports our hypothesis. However, it's worth noting that despite this knowledge, only 2% of individuals reported using dental floss. This finding contrasts with the high rate of dental floss usage (44%) reported in developed countries such as Canada.¹⁶ This may be attributed to the educational programs implemented in Canada, which our society lacks. Thus, public education and motivation are urgently required to adopt this effective oral healthcare strategy. Previous research has shown that poor income, ethnicity, and education play a role in periodontal disease development.¹⁷ We are unaware of any research on the importance of periodontal health knowledge. Our study had a flaw: there is no international consensus on periodontal health knowledge assessment. Our study used straightforward, easy-to-understand questions to

define periodontal health knowledge. No open-ended questions were asked. To reduce the chance of misinterpretation, the questions were answered as yes or no. Comparing periodontal knowledge levels among different occupational categories, professionals and intermediate employees had higher levels, while jobless had lower levels. Graduates have a stronger awareness and knowledge of periodontal disease than illiterates. Our study observed a higher prevalence of periodontitis among individuals with lower levels of education, income, and occupation, which aligns with findings from other studies.¹⁸ Furthermore, our research revealed that patients with low socioeconomic status and education may not be aware of the importance of oral health education, which may be explained by their inability to afford oral hygiene products.¹⁹ Additionally, this study revealed that well-educated professionals who will build our modern civilization are no better than the general population in terms of educational knowledge. overall, the level of awareness and knowledge about oral health and diseases remains suboptimal. In a South Australian study, 96% of respondents believed that frequent teeth brushing helps prevent gum disease.²⁰ Brushing and flossing were rated as the best approach to avoid gum infections by 65% of our respondents. Apart from media knowledge, most of them acquired basic dental instruction during early school life which emphasizes brushing. However, just half of the responders recognized that brushing their teeth before bedtime is useful. This means further education is needed. The study found that age is associated with periodontal knowledge, which aligns with similar findings by Diofode and colleagues.²¹ Contrary to findings in Jordan ⁶ and Sweden ²², there was no clear association between periodontal knowledge level and age. In our study, women in public clinics had higher periodontal knowledge about how dry mouth can lead to bad breath, and they understood that bacterial plaque

and dental calculus play a crucial role in initiating periodontal disease. Additionally, these women were aware that periodontal diseases are the primary cause of tooth loss. A similar observations among Japanese teenagers²³ which implies that women prioritize dental health more than males, and are more open to receiving pertinent information.²⁴

Overall, we found a notable discrepancy in periodontal knowledge based on educational levels, with higher education being positively associated with greater knowledge. This highlights the crucial role of oral health education. A study by Khanal et al. also emphasized how education level impacts oral hygiene awareness.²⁷ Furthermore, our research aligns with a Swedish study that demonstrated higher education levels correlate with increased knowledge about oral health among adults.²⁵

Conclusion

The study showed differences in periodontal knowledge among patients attending different types of dental clinics, with variations based on age, gender, education, and occupation. Better socio-economic status is associated with better knowledge.

Practice implications

Long-term awareness programs are needed to improve the knowledge, attitudes, and behaviors among patients with different socioeconomic levels toward periodontal health and disease. Health education programs should place more emphasis on the causes and manifestations of periodontal disease. All target groups must be educated to avoid any variation between different social class levels.

REFERENCES

1. Albandar JM, Rams TE. Global epidemiology of periodontal diseases: an overview. *Periodontol* 2000.2002;29(1):7-10.
2. Albandar JM, Tinoco E. Global epidemiology of periodontal diseases in children and young persons. *Periodontol* 2000.2002;29(1):153-76.
3. Chapple IL, Van der Weijden F, Doerfer C, Herrera D, Shapira L, Polak D, et al. Primary prevention of periodontitis: managing gingivitis. *J Clin Periodontol*. 2015;42:S71-S6.
4. Needleman I, Nibali L, Di Iorio AJJoCP. Professional mechanical plaque removal for prevention of periodontal diseases in adults-systematic review update. *J Clin Periodontol*. 2015;42:S12-S35.
5. Phipps KR, Stevens VJ. Relative contribution of caries and periodontal disease in adult tooth loss for an HMO dental population. *J Public Health Dent*. 1995;55(4):250-2.
6. El-Qaderi S, Quteish Ta'ani D. Assessment of periodontal knowledge and periodontal status of an adult population in Jordan. *Int J Dent Hyg*. 2004;2(3):132-6.
7. Gholami M, Pakdaman A, Jafari A, Virtanen JJ. Knowledge of and attitudes towards periodontal health among adults in Tehran. *EMHJ*. 2014; 20 (3): 196-202.
8. Mariotti AJAop. Dental plaque-induced gingival diseases. *Ann Periodontol*. 1999;4(1):7-17.
9. Peeran SW, Altaher OB, Peeran SA, Alsaid FM, Mugrabi MH, Ahmed AM, Grain A. Oral health in Libya: addressing the future challenges. *Libyan J Med*. 2014;9(1).
10. Tarhuni H, Benghasheer HF, Naser Y, Arheiam AJJJoPD. Molar incisor hypomineralisation: A survey of awareness and management strategies among Libyan dentists in Benghazi. *Dent J Pediatr Dent*. 2024.
11. Arheiam A, Alhashani A, Kwidir T, Bosif Y, Ballo L, Tantawi ME. Untreated dental caries among Libyan children during and after the war and in internally displaced person camps. *Community Dent oral Epidemiol*. 2023;51(4):636-43.
12. Arheiam A, Aloshiby A, Gaber A, Fakron S. Dental fluorosis and its associated factors amongst Libyan schoolchildren. *Int Dent J*. 2022;72(6):853-8.
13. Arheiam A, Abbas S, Ballo L, Borowis E, Rashwan S, El Tantawi M. Prevalence, distribution, characteristics and associated factors of molar-incisor hypo-mineralisation among Libyan schoolchildren: a cross-sectional survey. *Eur Arch Paediatr Dent*. 2021;22:595-601.
14. Varela-Centelles P, Diz-Iglesias P, Estany-Gestal A, Seoane-Romero JM, Bugarín-González R, Seoane J. Periodontitis awareness amongst the general public: a critical systematic review to identify gaps of knowledge. *J Periodontol*. 2016;87(4):403-15.
15. Chandola T, Jenkinson C. The new UK National Statistics Socio-Economic Classification (NS-SEC); investigating social class differences in self-reported health status. *J Public Health*. 2000;22(2):182-90.
16. Hamilton ME, Coulby WM. Oral health knowledge and habits of senior elementary school students. *J Public Health Dent*. 1991;51(4):212-9.
17. Persson GR, Persson RE, Hollender LG, Kiyak HA. The impact of ethnicity, gender, and marital status on periodontal and systemic health of older subjects in the Trials to Enhance Elders' Teeth and Oral Health (TEETH). *J Periodontol*. 2004;75(6):817-23.
18. Torrungruang K, Tamsailom S, Rojanasomsith K, Sutdhibhisal S, Nisapakultorn K, Vanichjakvong O, et al. Risk indicators of periodontal disease in older Thai adults. *J Periodontol*. 2005;76(4):558-65.
19. Jain M, Mathur A, Sawla L, Choudhary G, Kabra K, Duraiswamy P, et al. Oral health status of mentally

- disabled subjects in India. *J oral Sci.* 2009;51(3):333-40.
20. Roberts-Thompson KF, Spencer AJ. Public knowledge of the prevention of dental decay and gum diseases. *Aust Dent J.* 1999;44(4):253-8.
 21. Doifode V, Ambadekar N, Lanewar A. Assessment of oral health status and its association with some epidemiological factors in population of Nagpur, India. *Indian J Med Sci.* 2000;54(7):261-9.
 22. Mårtensson C, Söderfeldt B, Andersson P, Halling A, Renvert S. Factors behind change in knowledge after a mass media campaign targeting periodontitis. *Int J Dent Hyg.* 2006;4(1):8-14.
 23. Tada A, Hanada NJPh. Sexual differences in oral health behaviour and factors associated with oral health behaviour in Japanese young adults. *Public Health.* 2004;118(2):104-9.
 24. Galdas PM, Cheater F, Marshall P. Men and health help-seeking behaviour: literature review. *J Adv Nurs.* 2005;49(6):616-23.
 25. Khanal K, Shrestha D, Ghimire N, Younjan R, Sanjel S. Assessment of knowledge regarding oral hygiene among parents of pre-school children attending pediatric out patient department in Dhulikhel hospital. *Kathmandu Univ Med J.* 2015;13(1):38-43.