Journal of Midwifery & Reproductive Health

JMRH.mums.ac.ir

Social Determinants of Oral Health Behaviors in Iranian Pregnant Women: A Cross-sectional Study

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ARTICLE INFO

Article tyPe:
Original article

Article History:
Received: 14-Feb-2024
AccePted: 23-Jul-2024

Key words:
Pregnant Women
Social Factors
Oral Health
Dental Care

ABSTRACT

Background & aim: Performing oral health behaviors during pregnancy is crucial for maternal and fetal health, affecting both short-term and long-term health outcomes. In Iran, like many other countries, behavioral and social factors influence the oral health of pregnant women. This study investigated social determinants related to oral health behaviors in Iranian pregnant women.

Methods: This cross-sectional study was conducted over the two months from December 2022 to January 2023 in Mashhad, Iran.300 pregnant women were selected through a multi-stage cluster random sampling method. on two key social determinant variables— access to educational services and support from family and friends—were collected using a researcher-developed questionnaire that demonstrated acceptable validity and reliability. Statistical analyses were performed using the Mann–Whitney test, Kruskal–Wallis test, Spearman correlation, and univariate regression model in SPSS version 22.

Results: All participants completed the questionnaire71% of them used to brush their teeth daily, and 18% used dental floss. A significant association was found between oral health behaviors and employment status(β = 0.335, P = 0.034), education level(β = 0.315, P = 0.006), access to educational services(β = 0.154, P = 0.022), and support from family and friends(β = 0.193, P = 0.003). The regression models accounted for 12% of the variance in oral health behavior scores.

Conclusion: This study underscored the significance of social determinants in influencing oral health behaviors among pregnant women. These insights can aid healthcare providers in delivering tailored services during pregnancy.

► *Please cite this PaPer as*:
Abdollahi M, Tehrani H, Jamali J, Nemati-Karimooy A, Gholian-Aval M. Social Determinants of Oral Health Behaviors in Iranian Pregnant Women: A Cross-sectional Study. Journal of Midwifery and ReProductive Health. 2026; 14(1): 1-10. DOI: 10.22038/jmrh.2024.78102.2330

Introduction

Pregnancy is associated with a range of physiological, anatomical, and hormonal changes in the mother's body, affecting oral and dental health. High progesterone and estrogen levels, crucial for a healthy pregnancy, can have detrimental effects on periodontal tissues, leading to an increased susceptibility to gingival and periodontal diseases (1-2). In addition, the changing hormone levels during pregnancy can indirectly contribute to tooth decay and cause gum problems (2). Higher levels of the hormone progesterone during pregnancy can indeed make women more susceptible to gum disease and poor gum health (3).

The global prevalence of oral issues in the group of pregnant women is a notable concern. Numerous studies indicate a higher occurrence

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of oral diseases in pregnant women compared to those who are not pregnant (4). It was reported that approximately 50% of pregnant women globally experience dental pain, and around 40% of pregnant women suffer from periodontal (gum) disease (5). The figures highlight the significant burden of oral and dental problems faced by pregnant women, emphasizing the need for enhanced oral healthcare services and preventive measures to address these challenges effectively.

A study conducted (2023) in Iran specifically noted that 35.80% of pregnant women experienced dental problems during pregnancy. Also, the study results found that 29.10% of pregnant women brushed their teeth twice or more a day, while 59.40% had inadequate oral health literacy (6). Approximately 40% of pregnant women were reported to have some form of periodontal disease, highlighting the significant prevalence of this oral health issue among pregnant women (7).

Pregnant women must maintain good oral hygiene and seek dental care to prevent potential oral health issues that can arise during pregnancy. Some key points to consider include maintaining oral hygiene, Regular dental check-ups, monitoring gum health, less consumption of food and drinks with high added sugar, away from tobacco products, and reducing alcohol consumption (8). There is a strong connection between the oral and dental health of a pregnant woman and the health outcomes for both the mother and the developing fetus, making it an important aspect of prenatal care (9).

Despite exhibiting symptoms or signs of oral disease, many women do not receive dental care due to low oral health awareness, financial constraints, and myths about the safety of oral care during pregnancy (10-11). However, regular and emergency dental care can be safely provided at any stage of the pregnancy. Pregnant women need to be aware of the critical value of prioritizing and maintaining oral health and searching for dental care to prevent potential oral health issues that can arise during pregnancy (12).

Social factors, including participation in social networks and receiving support from friends and family, significantly contribute to the maintenance of oral health and the encouragement of self-care practices among pregnant women (13).

Mobile technology, including patient-oriented mobile phone apps, effectively improves oral hygiene knowledge and behavior. It plays a significant role in healthcare education and practice, and its use in promoting oral health, particularly during pregnancy, can have a positive effect on maternal and child health outcomes (14-16). Zahid et al. (2020) carried out a cross-sectional investigation that contrasted the impacts of two distinct educational methodologies - conventional lectures and a mobile phone application - on participants' oral health knowledge and behaviors. This study highlights the potential of mobile technology in oral health education and promotion of oral hygiene (17).

The family environment is a key factor influencing the oral health of pregnant women. Research indicates that pregnant women who receive support from their family members are more inclined to uphold good oral hygiene practices and seek dental care while pregnant (18,19). Friends and family can foster a supportive atmosphere for the expectant pregnant woman, ensuring she has access to essential oral care products and can maintain proper oral hygiene routines (20).

A review study demonstrated that interventions targeting oral health through social networks can effectively reduce gingival index scores and uphold oral health standards (20). Additionally, research indicates that women who live in neighborhoods with lower levels of social capital and those with limited personal social capital (characterized by a lack of social support and a restricted communication network) are more likely to report better scores of oral health outcomes (21). Despite this, the influence of social factors on the oral health of pregnant women in Iran remains unclear. Hence, this study investigated social determinants related to prenatal oral health behaviors in Iranian pregnant women.

Materials and Methods

The research data were collected as part of a cross-sectional survey. This cross-sectional study was conducted over the two months from December 2022 to January 2023 in Mashhad, Iran. The study included participants who were

Iranian residents of Mashhad, at least 12 weeks pregnant, over 18 years of age, and did not smoke or drink alcohol. Participants who did not complete the questionnaire were excluded.

The sample size was determined using the formula for estimating population proportions, with a 95% confidence level, a hypothetical proportion of p = 0.5, and a precision of d = 0.06. The initial calculated sample was 267 participants, which was then adjusted for an anticipated 10% attrition rate, yielding a final required sample size of approximately 300 participants.

A multi-stage cluster random sampling method was used with the following steps: In the first stage, using a stratified approach, each of the five health centers in Mashhad city was selected, proportional to the number of pregnant women covered by each center. In the second stage, the required sample size was selected from the comprehensive health service centers affiliated with each health center throughout the city using simple random sampling. In total, data were collected from 10 comprehensive health service centers, ensuring appropriate geographical distribution throughout the city.

The instruments of the study were a research-made questionnaire. Drawing on the findings of a previous qualitative study, the key variables related to the social determinants of oral health behaviors among pregnant women were identified(13), and the research questions were developed using a review of the literature and qualitative data, and then their validity and reliability were assessed.

In total, the questionnaire consists of three parts:

1-Demographic items included participants' age, gestational age, educational level, employment status, and number of pregnancies.

2-The oral health behavioral checklist comprises three items focusing on brushing, flossing, and mouthwash usage. The assessment was conducted using a 5-point Likert scale, where 1 represents "rarely," 2 represents "Sometimes," 3 represents "Two to three times a week," 4 represents "daily," and 5 represents "more than once a day." Higher scores on this scale indicate improved oral.

3-Social Determinants of Oral Health in Pregnancy questionnaire (SDOHP). The SDOHP consisted of 6 items addressing two factors, including access to educational services and family and friends support. The scoring utilized a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree), with elevated scores correlating with improved oral health behaviors.

The measurement tool employed in this study was a self-administered questionnaire. To improve the precision of self-reported responses, thorough explanations were given to the pregnant participants. The average time required to complete the questionnaire ranged from 7 to 14 minutes. After completion, the researcher reviewed each form to ensure that all items had been answered.

The evaluation of the formal and content validity of the tool was conducted using a combination of qualitative and quantitative approaches. For face validity, a qualitative evaluation involved distributing the questionnaire to ten eligible pregnant women. This assessment focused on aspects like comprehension difficulty, appropriateness of phrases, alignment with questionnaire dimensions, and identification of ambiguities. Then, the "Item Impact Score" was utilized to identify and eliminate unsuitable phrases, with a threshold of an impact score above 1.5 deemed acceptable (22).

In the content validity assessment, a qualitative review involved six dentists, nine health education experts, and tool design specialists evaluating the questionnaire for grammar, word choice, item placement, scoring accuracy, dimension relevance, and question appropriateness. Quantitatively, Content Validity Ratio (CVR) and Content Validity Index (CVI) were investigated. CVR values exceeding 0.5, as per the Lawshe table, were considered acceptable (23). CVI values were determined based on relevance, simplicity, and clarity using a four-point Likert scale, with a minimum acceptable index of 0.79 (24).

Reliability assessment was conducted using the internal consistency method, and Cronbach's alpha was determined to determine internal consistency (25). To evaluate the stability, 30 pregnant women, mirroring the target group,

underwent retesting after two weeks. The scores from these two assessments were then compared using the intraclass correlation coefficient (ICC). Agreement levels were categorized as follows: less than 0.4, indicating poor agreement, 0.41-0.6 denoting moderate agreement, 0.61-0.8 signifying good agreement, and above 0.8 representing excellent agreement (26). Reliability analysis of Cronbach's alpha coefficient equal to 0.7 indicated good internal consistency of the tool (0.717), and the ICC value for Test-retest Stability in 30 pregnant women was 0.76, which is considered acceptable.

Quantitative variables were represented by the mean and standard deviation, while qualitative variables were reported as counts and percentages. The normality of the data was assessed using the Kolmogorov-Smirnov test. Due to the non-normal distribution of the variables, the Mann-Whitney, Kruskal-Wallis, and Spearman correlation tests were utilized. Regression analysis was employed to explore the impact of social determinants on oral health predictor behaviors. All analyses were conducted using SPSS 22. A significance level of less than 0.05 was considered for all tests mentioned above.

Results

A total of 300 participants were invited to the present study, and all 300 pregnant women completed the questionnaire. The age range of the pregnant women studied ranged from 18 to 49 years old. The mean gestational age and number of pregnancies were 26.35 (7.78) weeks and 2.00 (0.97), respectively. Most of them had an educational level of high school (63.7%) and were housewives (85.7%) (Table 1).

Table 1. Frequency distribution of demographic characteristics and oral health behaviors of women pregnant (N = 300)

Variable	N(%)
Age	
18-32	157(52.3)
33-49	143(47.7)
Education level	
High school	191(63.7)
university education	109(36.3)
Employment status	
Housewife	257(85.7)
Employed	43(14.3)
Gestational age	
12-24	120(40)
25-36	180(60)
Number of pregnancies	
1	109(36.3)
2	109(36.3)
>2	82(27.3)
Brushing	
Rarely	6(2)
Sometimes	31(10.3)
2-3 times a week	63(21)
Once a day	146(48.7)
More than once a day	54(18)
Flossing	
Rarely	88(29.3)
Sometimes	118(39.3)
2-3 times a week	40(13.3)
Once a day	34(11.3)
More than once a day	20(6.7)
Use mouthwash	
Rarely	183(61)
Sometimes	102(34)
2-3 times a week	11(3.7)
Once a day	3(1)
More than once a day	1(0.3)

About half of the respondents (50.2%) used social security insurance, 65 pregnant women (26.9%) had supplementary insurance, and 59 pregnant women (19.6%) were not covered by any insurance. Only 44 of them (14.6%) had visited a dentist before pregnancy, which was mainly due to the need for treatment (60%). Dentists and internet information were the main source of oral health information for most participants (81.6%). The majority of them (36%) did not feel the need for a dental examination during pregnancy. As shown in Table 2, about 17% of pregnant women reported brushing at least twice a day, 18% flossing at least daily, and 1.3% used mouthwash daily (Table 1).

The mean and standard deviation of the scores for oral health behaviors, use of educational resources, and support from family and friends were 7.43±2.26, 11.73±1.93, and 12.45± 2.00, respectively.

The statistical tests conducted in the present study confirm a significant relationship between oral health behaviors in pregnant women and factors such as educational level, employment status, use of educational resources, and support from family and friends (Table 2). Spearman regression analysis further indicated that access to educational servicesand support from family

and friends were significant predictors of oral health care behaviors in pregnant women (P < 0.001).

In the univariate regression model, working pregnant women demonstrated significantly higher scores in oral health behavior(β=0.48, P < 0.001), as did pregnant women with a university education(β=0.39, P < 0.001). In terms of social factors, pregnant women who were supported by their families, encouraged by their husbands regarding oral health, and served as positive role models for their children by demonstrating good oral hygiene practices were more inclined to adopt oral hygiene behaviors(β = 0.24, P < 0.001).

Table 2. Relationships between oral health behaviors and charateristics of pregnant women (N = 300)

Variable	Behavioral oral health Mean±SD	P-Value
Age		
18-32	7.39±2.12	0.959*
33-49	7.46±2.41	
Educational level		
High school	7.17±2.29	0.007*
university education	7.87±2.14	
Employment status		
Housewife	7.25±2.21	0.001*
Employed	8.51±2.26	
Gestational age		
12-24	7.53±2.23	0.423*
25-36	7.36±2.28	
Number of pregnancies		
1	7.30±2.53	0.404**
2	7.64±2.36	
>2	7.30±2.42	

* Mann-Whitney test, p<0.05 ** Kruskal–Wallis, p<0.05

Table 3. Effect of social determinants and demographic characteristics on oral health behaviors in pregnant women (N = 300)

Variable	Unstandardized Coefficient, β	SE	standardized Coefficient, β	t	P-Value
Demographic characteristics					
Constant	2.016	0.993		2.031	0.043
Educational level	0.315	0.113	0.157	2.786	0.006
Employment status	0.335	0.157	0.120	2.131	0.034
Social determinants access to educational services	0.154	0.067	0.131	2.300	0.022
Family and friends support	0.193	0.064	0.171	2.989	0.003
R2=0.120, Wald F=10.01, P<0.001					

SE: standard error

Also, regarding oral and dental hygiene behaviors, pregnant women who were more interested in obtaining information about oral and dental hygiene were more likely to watch

educational videos and join virtual groups related to these topics (β=0.20, P < 0.001). A multiple regression model was employed to examine the factors influencing oral health behaviors among pregnant women. 3Overall, these factors accounted for 12 percent of the variance in oral health behavior scores (Table 3).

Discussion

The present studyinvestigated social determinants and related to prenatal oral health behaviors in Iranian pregnant Iranian women.Findings indicated that about 20% of pregnant women adhere to twice-daily tooth brushing and daily flossing. Additionally, the majority (95%) of pregnant women were reluctant to use mouthwash daily.

The results of Study Praharaj et al. (2020) showed that good oral hygiene, including flossing and using mouthwash, is crucial during pregnancy to control or prevent many pregnancy-related dental issues and reduce the risk of passing bacteria to the baby, which can lead to problems such as low birth weight (27). In Iran, the percentage of pregnant women who use dental floss varies across studies, and the prevalence of flossing during pregnancy in Iran can range from 26.3% to 83%, based on the specific investigation and location (28, 29). In our study, about 18% of pregnant women flossed daily, 77% used a toothbrush, and the half of them (50%) brushed once a day.

A study of 407 pregnant women in Tehran by Deghatipour et al (2019) found that more than half of the participants (64.1%) reported brushing their teeth once a day or more. However, this frequency was lower compared to pregnant women in Finland (90%), Australia (91%), Kuwait (92%), and England (73.7%) (30). Similarly, another study by Bushehab et al. (2022) highlighted that 29.8% of pregnant women went to the dentist for regular checkups, and 93.3% brushed their teeth more than once a day, emphasizing the positive correlation between regular dental visits and good brushing practices (31). However, in the present study, regular visits to the dentist were underreported. Additionally, a study in Rwanda found that improving brushing habits among pregnant women may help reduce the risk of developing periodontal disease (32).

Our study results showed that employed pregnant women with higher education are more likely to perform regular oral health behaviors. The results of Study Hebbal et al. (2025) showed that women with higher education levels generally have more knowledge and a higher priority on maintaining good health, including proper oral care during pregnancy(33). Additionally, the results of Study Choi et al. (2019) indicated that individuals who are employed usually have a steady source of income, which can make it easier to afford regular dental care and treatments. In addition, the employment context can provide individuals with financial resources, access to dental care, and professional incentives to maintain better oral health(34). Results of a study conducted by Bunnatee et al. (2023) in Thailand found that pregnant women with higher educational levels had better oral healthcare behaviors (35). Another study conducted in Iran has revealed a correlation between the level of education attained by pregnant women and their oral health (30). Also, a study conducted by Bushehab et al. (2022) in Japan found that pregnant women who worked longer hours and often worked night shifts had poorer oral health (31). Our study findings demonstrated the correlation between educational level, employment status, and oral health behavior, and highlighted the existence of a clear relationship between various socio-demographic factors and oral health outcomes. However, further research is warranted to validate this relationship.

Pregnant women who were socially active had better oral health behaviors. Our study emphasized the utilization of social media by pregnant women as a valuable resource for enhancing awareness and knowledge regarding oral care during pregnancy. Consistent with our research, other studies' findings indicated a significant effect of social media on oral health behaviors. The accessibility and user-friendliness of social media emerged as key factors in accessing online oral health information. Moreover, in the results of studies by Althunayan et al. (2018) and Vettore et al (2019), stronger social support correlated with improved oral health (36, 37).

Educational interventions delivered through social networks or by combining traditional methods can have a positive effect on improving the oral and dental health of mothers and their children during pregnancy (38). Virtual channels and groups related to health can provide access to educational resources, support groups, and telehealth services, which can help overcome barriers to accessing traditional in-person care (30). For instance, a randomized controlled trial by Bashirian et al (2023) showed that a virtual educational program could promote oral health behavior during pregnancy, leading to positive outcomes (18). Additionally, online support groups can provide a platform for pregnant women to share experiences and receive emotional support, which can positively impact their oral health behaviors (39).

Furthermore, telehealth services can provide remote access to dental care, including consultations, screenings, and referrals, which can improve access to care for pregnant women in underserved areas (40). The study by Vamos et al (2019) in the United States found that pregnant women are more receptive to health messages that facilitate better communication between the pregnant woman and her prenatal healthcare provider regarding oral health literacy. Social media platforms like Snapchat, Facebook, YouTube, and Instagram can be effective channels for promoting oral health awareness and education among patients, including pregnant women (41).

Enhanced social support among pregnant women correlated with improved oral and dental hygiene practices. Our study findings are consistent with the review conducted by Dahlan et al. (2019), which investigated the relationship between social support and oral health behaviors. Research revealed that families with robust social networks, including supportive relatives or friends, exhibited better oral hygiene habits like regular brushing. Conversely, inadequate social support is indirectly linked to unfavorable oral health behaviors, often associated with lower education levels or diminished self-esteem among individuals (42).

In the study of Koletzko et al (2018), Family and friends' support can encourage pregnant women to seek dental care and adopt positive oral health behaviors. For example, family members can assist pregnant women in maintaining a healthy diet, avoiding sugary snacks and drinks, and reminding them to brush and floss regularly. Furthermore, emotional support from loved ones can indeed help reduce stress, which has a positive impact on oral health during pregnancy (43). A study by Hamid et al (2019) in Indonesia found that the lack of encouragement from family is associated with poorer maternal oral health behaviors (44). Therefore, promoting the involvement of family and friends can significantly improve the oral health behaviors and overall well-being of pregnant women.

The study is robust due to its use of reliable and valid questionnaires to collect data. Additionally, the large and representative sample size, which reflects the Iranian population, ensures that the findings are generally significant. However, the study's limitations should be recognized, while a cross-sectional study design may not suffice to elucidate causal relationships, the significance of this study is underscored by the shortage of research on social determinants impacting oral health in pregnant women. Additionally, reliance on self-reported data may introduce recall bias or subjectivity, potentially compromising the accuracy of the data. Individual health behaviors are influenced by numerous factors, and it is crucial to consider the relationship and discrepancy between oral health awareness and actual oral health practices. Follow-up studies will be conducted to further investigate the oral health care of pregnant women and improve organizational determinants in this area. Despite these constraints, the study offers valuable insights for future research in prenatal oral health. The findings can be beneficial for identifying priorities and customizing oral health promotion efforts for expectant mothers.

Conclusion

The study emphasizes the need for tailored oral health interventions and prevention strategies that account for these sociodemographic and lifestyle determinants. Conducting similar research in other cities would provide a more comprehensive, comparative understanding, which could then

inform the development of effective oral health policies and preventive strategies. This, in turn, could lead to improved oral health and overall well-being among pregnant women. Additionally, the findings emphasize the importance of implementing oral health interventions during pregnancy, including the need for educational programs and preventive measures to enhance the oral health of expectant mothers.

Declerations

Acknowledgments

This article is taken from the Ph.D. thesis on health education & health promotion (code:981268). we sincerely thank the Vice Chancellor for Research and Technology of Mashhad University of Medical Sciences, Mashhad, Iran, as well as the esteemed pregnant women who participated in this study. Without their cooperation, conduction of this research was not possible.

Conflicts of interest

The authors declared no conflicts of interest.

Ethical considerations

The study was conducted by the principles outlined in the 1964 Declaration of Helsinki, which provides ethical guidelines for research involving human participants. Before participation, all subjects provided Written Informed Consent. Participant identities and specific details were anonymized through coding, ensuring confidentiality. There were no charges associated with study participation. Additionally, participants were made aware of their right to withdraw or decline participation at any stage of the process without any consequences or penalties.

Code of Ethics

The research conducted at Mashhad University of Medical Sciences (IR.MUMS.REC.1399.323) received approval from the Ethics Committee.

Use of Artificial Intelligence (AI)

No artificial intelligence (AI) tools were used in the writing or analysis of this manuscript.

Funding

The present article is taken from the PhD thesis (Grant Number: 981268), supported financially by Mashhad University of Medical Sciences, Mashhad, Iran. .

Authors' contribution

MA designed the study as part of her PhD thesis, collected, analyzed, and interpreted the data, and wrote the manuscript. JJ contributed to data analysis. HT and MGH made significant contributions to the study's concept and design as well as the drafting of the manuscript. Along with AN and JJ, they also contributed to revising the article. All authors have read and approved the final manuscript.

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