

## Original Article

# Utilization of dental care in Iranian pregnant women: Findings from a population-based study

Donya Rahebi<sup>1</sup>, Tannaz Valadbeigi<sup>2</sup>, Jalil Hasani<sup>3</sup>, Mahmoud Hajipour<sup>4</sup>, Saeed Erfanpoor<sup>5</sup>, Koorosh Etemad<sup>6</sup>, Halime Yaghoobi<sup>7</sup>, Fatemeh Zolfizadeh<sup>7</sup>, Firooz Esmaeilzadeh<sup>8</sup>, Ali Gholami<sup>9</sup>, Abdolhalim Rajabi<sup>10</sup>

<sup>1</sup>Dental Research Center, Faculty of Dentistry, Golestan University of Medical Sciences, <sup>10</sup>Environmental Health Research Center, Faculty of Health, Golestan University of Medical Sciences, Gorgan, <sup>2</sup>Department of Epidemiology and Biostatistics, Student Research Committee, School of Public Health, Tehran University of Medical Sciences, Tehran, <sup>3</sup>Department of Public Health, Torbat Jam Faculty of Medical Sciences, Torbat Jam, <sup>4</sup>Pediatric Gastroenterology, Hepatology, and Nutrition Research Center, Research Institute for Children's Health, Shahid Beheshti University of Medical Sciences, <sup>5</sup>Department of Epidemiology, Iran University of Medical Sciences, <sup>6</sup>Department of Epidemiology, Environmental and Occupational Hazards Control Research Center, Faculty of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, <sup>7</sup>Mother and Child Welfare Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, <sup>8</sup>Department of Health Economic, School of Nursing and Midwifery, Maragheh University of Medical Sciences, Maragheh, <sup>9</sup>Noncommunicable Diseases Research Center, Neyshabur University of Medical Sciences, Neyshabur, Iran

## ABSTRACT

**Background:** Although dental care attendance during pregnancy has been recommended by guidelines and institutions, the demand for dental services is still low among pregnant women. The aim of this study was to examine the prevalence of not receipt dental care and also determinants of that during pregnancy.

**Materials and Methods:** This population-based study was conducted on 4071 mothers in 10 provinces of Iran, during 2014–2015. We calculated the prevalence of not receipt of dental care, and reasons for nonreceipt of care. We used logistic regression to estimate odds of nonreceipt of care by demographics variables. In the analyses, the level of statistical significance was set at  $P < 0.05$ .

**Results:** Overall, 54.70% of women had no dental visit during pregnancy. In mothers who had a history of stillbirth, neonatal death and live birth, the prevalence of not receipt dental care during pregnancy were 54.56%, 48.92%, and 58.76%, respectively. The logistic regression analyses showed that parity second-to-fourth birth than first birth (odds ratio [OR] 1.37 confidence interval [CI] 95% 1.17–1.59, residence in rural (OR 1.68 CI 95% 1.45–1.95), and not intended pregnancy (OR 1.32 CI 95% 1.03–1.68) associated with not received dental care during pregnancy.

**Conclusion:** Most pregnant women in this study received insufficient dental care. The need for dental care during pregnancy must be promoted widely among women of reproductive age, and family barriers to dental care should be addressed.

**Key Words:** Dental care, dental health services, Iran, pregnant women

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### Address for correspondence:

Dr. Abdolhalim Rajabi,  
Department of Biostatistics  
and Epidemiology, School of  
Health, Golestan University  
of Medical Sciences, Hirkan  
Blvd., Gorgan 1449614535,  
Iran.  
E-mail: rajabiepid@gmail.  
com

## INTRODUCTION

Pregnancy is associated with a variety of hormonal and physiological changes that affects all body organs,

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including the oral cavity.<sup>[1]</sup> During pregnancy, due to the increased appetite for eating sweets, increased oral acidity, and increased estrogen and progesterone secretion in women, they are more prone to dental caries<sup>[2-5]</sup> (up to 75% of pregnancies)<sup>[6]</sup> which can lead to periodontitis.<sup>[7]</sup>

Fear, anxiety, economic problems, and lack of information on oral health during pregnancy are the factors that prevent pregnant women from receiving dental care services. Furthermore, some studies have shown<sup>[8]</sup> that even many physicians recommend pregnant women to postpone receiving dental care until the postpartum period. These misconceptions can reduce the quality of life of pregnant mothers due to the lack of the treatment of oral and dental diseases and may lead to the transmission of infection to the offspring and will have negative effects on the mother and the child, even after childbirth.<sup>[2,9-11]</sup>

Hormonal and immunological changes in pregnant women may lead to periodontal diseases, which, if left untreated, can lead to preterm delivery, and low birth weight.<sup>[9,12,13]</sup> Periodontal in adults is also associated with cardiovascular diseases and pulmonary infections.

Both the American College of Obstetricians and Gynecologists and the American Academy of Periodontology recommend that “Pregnant women and those who are getting prepared for pregnancy should undergo periodontal examinations.”<sup>[1,9]</sup> Several dental guidelines also emphasize that dental care and related education should be considered as part of prenatal care, and pregnant women should receive these services during pregnancy, participants such as oral health and the effectiveness of fissure sealants on the prevention of caries.<sup>[9,14]</sup>

Having dental insurance and high education can improve the use of dental services.<sup>[4]</sup> However, a lack of tendency to receive oral and dental services during pregnancy has always been seen among all groups of people, even those with high education and high-income levels.<sup>[9,15]</sup>

Studies in the United States and Australia showed that the use of dental services by pregnant women was lower than 50% and 36%, respectively.<sup>[16]</sup> Furthermore, little is known about the prevalence and associations of not receiving dental care during pregnancy in Iran.<sup>[17]</sup>

A better understanding of the factors that affect the utilization of dental care by pregnant women would be

immensely useful to develop new initiatives aimed at increasing access to and use of dental care by women during pregnancy. Hence, the aim of this study was to investigate the prevalence of and the factors related to not receiving dental care during pregnancy in Iran.

## MATERIALS AND METHODS

This population-based study was conducted on 4071 mothers in 10 provinces of Iran, namely Fars, Yazd, Golestan, Hormozgan, Khorasan Razavi, Southern Khorasan, Hamadan, Kermanshah, Charmahal-O-Bakhtiari, and Kohgiluyeh-Buyerahmad [Figure 1].

A random sample of women with experiencing stillbirth, neonatal death, and live births were recruited from the primary health care (PHC) services in the above-mentioned provinces from May 2014 to October 2015. The groups included 1383 mothers experiencing stillbirth, 1112 mothers with neonatal death, and 1576 mothers with mothers with live births. Mothers with stillbirth were defined as those who had at least one stillbirth during the past 5 years (fetal death after 20 weeks of gestation).<sup>[18]</sup> Mothers with neonatal death also referred to those who had at least one neonatal death during the past 5 years (neonate’s death within the first 28 days of life).<sup>[19]</sup> Finally, mothers with live birth were defined as those who had not experienced any stillbirths, miscarriages, and neonatal deaths. First, baseline data extracted from medical records of mothers by health workers then these mothers invited to PHCs service offices for dental care information. The participants were randomly selected from Iran areas using multistage cluster-stratified random sampling. In the first stage,



**Figure 1:** Study project location in Iran.

provinces were clustered. In the second stage, in each region of the selected provinces, ten provinces were randomly selected. In the third stage, urban and rural areas were stratified in any provinces. The large city chosen for the study was the capital city. A medium city and a small city were randomly selected. For rural areas, one country was randomly selected from each urban sampling. In each of the selected countries and cities, one PHCs service offices were randomly selected, from each of which participants to be eligible for inclusion, from the care documents for mothers available at the PHCs service offices, were in simple randomly selected. Objects of the study identified for mothers and those who agreed with participation included in the study. This study has been conducted in full accordance with the World Medical Association Declaration of Helsinki. The project was approved and financially supported by the Vice-Chancellor of Research in Shiraz, Zahedan, and Hormozgan universities of medical sciences with registration numbers (No. 93-01-42-8964), (NO.7567) and (No. 94112), respectively.

In the present study, data were collected using researcher-made checklists, household health records from public health-care centers and interviews with the women by well-trained interviewers in any provinces. Because of the cultural differences in each province, interviewers were selected from provinces where they lived. The interviews inquired about the parents' personal information (mother's age, parents' education, parents' occupation, place of residence, ethnicity, and family relationship .) and pregnancy information (number of pregnancies, outcome of previous pregnancies, birth spacing, planned, or unplanned pregnancy, method of contraception, and menstrual cycle regularity .). The validity of the questionnaire was approved by experts.

Medical characteristics were obtained from the women's medical records. For Dental care: Women were asked if they had visited a dentist or dental clinic during pregnancy. Responses were coded as yes or no.

### Statistical analysis

Descriptive analysis of the sample was performed using relative percentages for each class of categorical variables. The proportion of women with not received dental care during pregnancy was also presented overall, and according to the women's characteristics. We then conducted unadjusted logistic regression

analyses with 95% confidence intervals (CIs) to determine which maternal characteristics were significantly related to the lack of receipt of dental care among all women in the sample and based on experiencing stillbirth, neonatal death, and live births. Variables that were significant in the unadjusted analyses were included in the adjusted models. We tested backward Wald inclusion of variables in the logistic regression equation to identify the most stable model. The statistical significance level was set at  $P < 0.05$ . We used Stata Software (version 14.1; StataCorp, College Station, TX, USA) for statistical analyses.

## RESULTS

Of all women in the sample, 54.70% were reported not received dental care during pregnancy. In mothers who had a history of stillbirth, neonatal death and live birth, the prevalence of not receipt dental care during pregnancy were 54.56%, 48.92%, and 58.76%, respectively. As shown in Table 1, there is a significant difference for dental care ( $\chi^2 = 25.45$ ,  $P < 0.001$ ) between the three groups. Table 1 presents an overview of dental care during pregnancy.

What stands out in Table 2 is the majority of women in the sample was aged 24 years or older and had experienced at least one birth before the index pregnancy. More than half of the sample was Fars ethnicity. Almost 36.10% of the sample had graduated from high school (10–12 years education), whereas another 10.80% were college graduates. More than half were rural live (54.50%). Ninety percent of the sample was housewife, 36.80% was in the first pregnancy, and 90% reported an intended pregnancy. A relatively small percentage of women (4.70%) reported smoking at any point during pregnancy.

Table 3 displays the results of the unadjusted logistic regression models predicting the lack of receipt of dental care during pregnancy in the study (with Pseudo  $R^2 = 3.5\%$ ). The odds ratios (ORs) for mothers more than 35 old years than to 15–24 years for the lack of dental care during pregnancy were 1.41 (95% CI 1.14–1.75). Compared with parity mothers, mothers multiparous had higher odds of not receiving dental care (ORs ranging from 1.33 [95% CI 1.16–1.52] to 1.37 [95% CI 1.12–1.66]). The risks of not receiving dental care during pregnancy were lower among mothers in racial/ethnic minority groups. For example, the ORs for the lack of dental

**Table 1: The summary statistics for dental care during pregnancy by experiencing mothers**

Experiencing mothers	Received dental care during pregnancy (%)	Received no dental care during pregnancy (%)	Total (%)
Stillbirth	628 (45.41)	755 (54.59)	1383 (100)
Neonatal death	568 (51.08)	544 (48.92)	1112 (100)
Live births	650 (41.24)	926 (58.76)	1576 (100)
Total	1846 (45.35)	2225 (54.65)	4071 (100)

**Table 2: Characteristics of women and receipt of dental care, overall and by maternal characteristics, Iranian population 2014-2015**

Parental characteristic	Sample, n (%)	Received dental care during pregnancy, n (%)	Not received dental care during pregnancy, n (%)
Total	4071	1846 (45.35)	2225 (54.65)
Mother age (years)			
15-24	1345 (33.50)	638 (34.90)	707 (32.30)
24-34	2199 (54.80)	1006 (55.10)	1193 (54.60)
≥35	468 (11.70)	182 (10)	286 (13.10)
Place live			
Urban	1803 (45.50)	889 (49.80)	914 (41.90)
Rural	2161 (54.50)	895 (50.20)	1266 (58.10)
Father age (years)			
15-24	433 (10.80)	215 (11.80)	218 (10)
24-34	2498 (62.50)	1148 (63)	1350 (62)
≥35	1067 (26.70)	458 (25.2)	609 (28)
Ethnicity			
Fars	2519 (61.90)	926 (50.10)	1593 (71.60)
Lurs	225 (5.50)	164 (8.90)	61 (2.70)
Turkic	648 (15.90)	461 (25)	187 (8.4)
Others	679 (16.70)	295 (16)	384 (17.30)
Number of years education for mothers			
Illiterate	232 (5.70)	98 (5.30)	134 (6)
1-5 years	955 (23.50)	388 (21)	567 (25.60)
6-9 years	974 (24)	508 (27.50)	466 (21)
10-12 years	1465 (36.10)	661 (35.80)	804 (36.20)
Academic	437 (10.80)	190 (10.3)	247 (11.10)
Number of years education for father			
Illiterate	169 (4.20)	68 (3.70)	101 (4.60)
1-5 years	737 (18.20)	282 (15.30)	455 (20.60)
6-9 years	1229 (30.30)	625 (33.90)	604 (27.30)
10-12 years	1442 (35.60)	649 (35.20)	793 (35.80)
Academic	479 (11.80)	219 (11.90)	260 (11.70)
Employment status for mothers			
Housewife	3687 (90.60)	1662 (90)	2025 (91)
Out of home	384 (9.40)	184 (10)	200 (90)
Employment status for father			
Self-employed	2597 (64.30)	1223 (66.70)	1374 (62.30)
Civil servant	591 (14.60)	244 (13.30)	347 (15.70)
Animal husbandry and agriculture	352 (8.70)	169 (9.20)	183 (8.30)
Others	500 (12.40)	197 (10.70)	303 (13.70)
Parity			
1 <sup>st</sup> birth	1532 (37.80)	765 (41.50)	767 (34.60)
2 <sup>nd</sup> -4 <sup>th</sup> birth	1956 (48.20)	838 (45.50)	1118 (50.50)
≥5 <sup>th</sup> birth	570 (14)	240 (13)	330 (14.90)
Current pregnancy distance with previous			
First pregnancy	1470 (36.80)	748 (41.10)	722 (33.30)
Less of 1 years	260 (6.50)	136 (7.50)	124 (5.70)

*Contd...*

Table 2: Contd...

Parental characteristic	Sample, n (%)	Received dental care during pregnancy, n (%)	Not received dental care during pregnancy, n (%)
1-3 years	1093 (27.40)	481 (26.40)	612 (28.20)
More than 3 years	1168 (29.30)	456 (25)	712 (32.80)
Pregnancy intention			
Not intended	408 (10)	158 (8.60)	250 (11.30)
Intended	3654 (90)	1683 (91.40)	1971 (88.70)
BMI			
<18.5	1929 (51.80)	969 (56.10)	960 (48.20)
18.5-24.9	685 (18.40)	299 (17.30)	386 (19.40)
25-29.9	794 (21.30)	340 (19.70)	454 (22.80)
30-34.9	246 (6.60)	94 (5.40)	152 (7.60)
≥35	67 (1.80)	26 (1.50)	41 (2.10)
Any smoking during pregnancy			
Yes	189 (4.70)	81 (4.40)	108 (4.90)
No	3832 (95.30)	1751 (95.60)	2081 (95.10)

BMI: Body mass index

care during pregnancy ranged from 0.21 (95% CI 0.15–0.29) for Lurs to 0.23 (95% CI 0.19–0.28) for Turkic relative to Fars mothers. Lacking a pregnancy intention (OR = 1.35 [95% CI 1.09–1.66]) also were associated with a lack of dental care during pregnancy.

In the multiple logistic models, the study found that rural condition has 1.68 times the impact on not receiving dental care during pregnancy. The association between ethnicity and not receiving dental care is interesting because the risks of not receiving dental care during pregnancy were lower among women in racial/ethnic minority groups (Lurs) (OR = 0.21 95% CI 0.15, 0.29 for Lurs ethnic and OR = 0.22 95% CI 0.18–0.27 for Turkic). As shown in Table 4, there is a significant association between the not intended pregnancy and not receiving dental care during pregnancy. The details results of the association analysis are set out in Table 4.

This work has revealed several factors that are associated with not receiving dental care during pregnancy in mothers with a history of stillbirth, neonatal death, and live birth in separately. Ethnicity and place live of mothers are key factors in all groups [Supplementary Tables 1 and 2].

## DISCUSSION

The results of the present study indicated that in the 10 investigated provinces more than half of the pregnant women do not receive dental care. According to the conducted studies, the prevalence of not receiving dental care in pregnant women in the United States is 30%, Australia 50%, and in Latin America, Africa, and Asia

66.5%–75.5%,<sup>[20]</sup> which in general indicates that the difference in the prevalence of not receiving dental care by pregnant mothers is influenced by the development and socioeconomic conditions of the countries. The results of the study by Bayat *et al.* in Hamedan, consistent with the results of this study, indicated that half of pregnant women had not referred to the dentist during their recent pregnancies.<sup>[17]</sup> Consistent with the results of our study, Lydon-Rochelle *et al.* reported that 58% of pregnant women did not receive dental care during pregnancy.<sup>[21]</sup> In the study by Marchi *et al.*, 65.5% of pregnant women and 62% of pregnant women who reported a dental problem had not received any dental care during pregnancy (1) In the study by Singhal *et al.*, less than half of pregnant women (48%) reported dental visits during pregnancy.<sup>[22]</sup> Low level of awareness and misinformation about oral health during pregnancy can be one of the reasons for low level of receiving dental care during pregnancy, as the study by Haji Kazemi *et al.* indicated that only 5.6% of pregnant women have good knowledge of oral and dental care during pregnancy.<sup>[23]</sup> Screening and referral of oral and dental problems during pregnancy have significant importance, and pregnant women should receive preventive care in addition to healthcare during this period.<sup>[9]</sup> The lack of attention to oral health in pregnant women is primarily due to the risk of the birth of a preterm neonate, and also relates to diseases such as diabetes, cardiovascular, and respiratory diseases.<sup>[17]</sup>

The results of this study indicated the relationship between parity and dental care, as the lack of dental care in women in the second-to-fourth parity was 1.37 times of the women with first birth, which was

**Table 3: Unadjusted odds ratios for not receiving dental care during pregnancy, Iranian population 2014-2015**

Parents characteristic	Unadjusted OR 95% CI	P
Mother age (years)		
15-24	Reference	
24-34	1.07 (0.93-1.22)	0.32
≥35	1.41 (1.14-1.75)	0.001
Place live		
Urban	Reference	
Rural	1.37 (1.21-1.56)	<0.001
Father age (years)		
15-24	Reference	
24-34	1.16 (0.94-1.42)	0.15
≥35	1.31 (1.04-1.64)	0.01
Ethnicity		
Fars	Reference	
Lurs	0.21 (0.15-0.29)	<0.001
Turkic	0.23 (0.19-0.28)	<0.001
Others	0.75 (0.63-0.89)	0.001
Number of years education for mothers		
Illiterate	Reference	
1-5 years	1.06 (0.79-1.42)	0.65
6-9 years	0.67 (0.50-0.89)	0.007
10-12 years	0.89 (0.67-1.17)	0.41
Academic	0.95 (0.68-1.31)	0.75
Number of years education for father		
Illiterate	Reference	
1-5 years	1.08 (0.77-1.52)	0.63
6-9 years	0.65 (0.46-0.90)	0.01
10-12 years	0.82 (0.59-1.13)	0.23
Academic	0.79 (0.56-1.14)	0.21
Employment status for mothers		
Housewife	1.12 (0.90-1.38)	0.28
Out of home	Reference	
Employment status for father		
Self- employed	0.78 (0.65-0.94)	0.01
Civil servant	Reference	
Animal husbandry and agriculture	0.76 (0.58-0.99)	0.04
Others	1.08 (0.84-1.37)	0.52
Parity		
1 <sup>st</sup> birth	Reference	
2 <sup>nd</sup> -4 <sup>th</sup> birth	1.33 (1.16-1.52)	<0.001
≥5 <sup>th</sup> birth	1.37 (1.12-1.66)	0.001
Current pregnancy distance with previous		
1 <sup>st</sup> pregnancy	Reference	
Less of 1 years	0.94 (0.72-1.22)	0.67
1-3 years	1.31 (1.12-1.54)	0.001
>3 years	1.61 (1.38-1.89)	<0.001
Pregnancy intention		
Not intended	1.35 (1.09-1.66)	0.005
Intended	Reference	
BMI		
<18.5	Reference	
18.5-24.9	1.30 (1.09-1.55)	0.003

Contd...

**Table 3: Contd...**

Parents characteristic	Unadjusted OR 95% CI	P
25-29.9	1.34 (1.14-1.59)	<0.001
30-34.9	1.63 (1.24-2.14)	<0.001
≥35	1.59 (0.96-2.62)	0.06
Any smoking during pregnancy		
Yes	1.12 (0.83-1.50)	0.44
No	Reference	

OR: Odds ratio, CI: Confidence interval, BMI: Body mass index

**Table 4: Adjusted odds ratios for not receiving dental care during pregnancy, Iranian population 2014-2015**

Parents characteristic	Adjusted OR 95% CI	P
Place live		
Urban	Reference	
Rural	1.68 (1.45-1.95)	<0.001
Ethnicity		
Fars	Reference	
Lurs	0.21 (0.15-0.29)	<0.001
Turkic	0.22 (0.18-0.27)	<0.001
Others	0.68 (0.56-0.83)	0.001
Parity		
1 <sup>st</sup> birth	Reference	
2 <sup>nd</sup> -4 <sup>th</sup> birth	1.37 (1.17-1.59)	<0.001
≥4 <sup>th</sup> birth	1.07 (0.85-1.34)	0.52
Pregnancy intention		
Not intended	1.32 (1.03-1.68)	0.02
Intended	Reference	

OR: Odds ratio, CI: Confidence interval

similar to the results of the study by Ojeda.<sup>[20]</sup> Contrary to the results of the present study, in the study by Dinas *et al.*, the usage rate of dental care in pregnant women was lower in women with the first and second pregnancy than in the third pregnancy, and this difference was statistically significant.<sup>[1]</sup> In the study by Marchi *et al.*<sup>[9]</sup> as well as the study by Al Habashneh *et al.*,<sup>[24]</sup> no statistically significant relation was observed between parity and not receiving dental care. The reason for lower dental care in the second-to-fourth parity compared to the first parity can be on the one hand because of the high sensitivity of the pregnant mother in the first pregnancy compared to the subsequent pregnancies so that the pregnant mother can perform prenatal care more regularly in first parity. Second, it may be stressful that the dental environment and the lack of need experienced in the first parity may be the reason for not coming to the second parity.

In this study, the residence location has a statistically significant relation with receiving dental care. The lack of receiving dental care in rural areas is 1.68 times

higher than in urban areas. In contrast to the results of this study, the results of the study by Mital indicated that residents in rural areas were directly related to receiving dental care, and the chance of receiving care in the village was 1.82 in comparison to the city.<sup>[25]</sup> Low level of receiving dental care in rural areas can be due to the lack of awareness about the importance of oral hygiene and its adverse effects on the pregnant mother and the fetus, the unreachability of the dentist in the villages and the wrong beliefs that lead to less referral for receiving dentistry services. On the other hand, access to dental care is directly related to economic status.<sup>[25]</sup>

Our study indicated that unplanned pregnancy (compared with planned pregnancy) is a risk factor for not receiving dental care in pregnant women, that is consistent with the results of the study by Umer *et al.*<sup>[26]</sup> In Marchi *et al.*,<sup>[9]</sup> there was a meaningful association in unadjusted logistic regression between unplanned pregnancy and not receiving dental care in pregnant women, but this association was not observed in the unadjusted model. Mothers with unplanned pregnancy may not be physically, psychologically, or even economically ready for pregnancy, and this can be effective in their willingness and desire to receive dental care.<sup>[27]</sup>

The results of the present study indicated that there is a difference between the ethnic groups in receiving dental services, which is not consistent with the results of the study by Al Habashneh *et al.*<sup>[24]</sup> On the contrary to the results of some studies in which racial and ethnic differences are identified as the factors of the lack of access to dental services in mothers during pregnancy,<sup>[9,28]</sup> it seems that in our country, Iran, the ethnic and racial differences are not the main reason for not having access to a variety of health services at different levels in the health system. The difference in receiving services by pregnant mothers in this study, more than the result of ethnic differences, is due to factors such as socioeconomic factors, behavioral factors, and demographic factors. This is somewhat evident in this study by the low level of receiving dental care in rural areas than in urban areas.<sup>[29,30]</sup>

It is necessary to note that according to the results of several studies,<sup>[17]</sup> another important influencing factor on pregnant women to refer and receive dental services is the knowledge and awareness of mothers and the perceiving the benefits and safety of using of dental services during pregnancy;<sup>[24]</sup> therefore,

providers of birth services or primary care, including health-care providers, nurses, midwives, and doctors can play an important role in promoting the knowledge and awareness of pregnant mothers, and encouraging and referring them to receive oral health care during pregnancy.<sup>[9]</sup>

This study had several limitations. This study relied on self-reported use of dental care rather than a review of dental records; however, woman's self-reports of use of care during the preceding year are widely used in health services research. The survey not considered the barriers "lack of dental insurance" and "cost," therefore, we were unable to determine what proportion of our sample was uninsured for dental services.

## CONCLUSION

The results from this study provide evidence of a high level not receipt dental care during pregnancy in Iran. Therefore, efforts are needed to remove barriers to receipt of dental care during pregnancy. While trying to eliminate the structural barriers of the health system, including increasing the coverage and increasing the access to care women in rural residence, unplanned pregnancy, and in parity women, it is necessary to develop appropriate policies for comprehensive education for society, especially pregnant women, about the importance of oral health during pregnancy.

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## Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial in this article.

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**Supplementary Table 1: Unadjusted odds ratios for not receiving dental care during pregnancy, by still birth, neonatal mortality and live birth 2014-2015**

Parental characteristic	Still birth		Neonatal mortality		Live birth	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
<b>Mother Age (in years)</b>						
15-24	Ref		Ref		Ref	
24-34	0.91 (0.72-1.16)	0.48	0.97 (0.75-1.26)	0.86	1.26 (1.01-1.57)	0.03
≥35	1.10 (0.78-1.55)	0.55	1.60 (1.08-2.38)	0.01	1.79 (1.20-2.67)	0.004
<b>Place live</b>						
Urban	Ref		Ref		Ref	
Rural	1.19 (0.96-1.48)	0.10	1.85 (1.45-2.37)	<0.001	1.34 (1.09-1.64)	0.005
<b>Father Age (in years)</b>						
15-24	Ref		Ref		Ref	
24-34	1.05 (0.75-1.46)	0.77	0.76 (0.52-1.13)	0.18	1.71 (1.21-2.42)	0.002
≥35	1.32 (0.91-1.91)	0.14	0.83 (0.54-1.27)	0.39	1.90 (1.29-2.78)	0.001
<b>Ethnicity</b>						
Fars	Ref		Ref		Ref	
Lurs	0.26 (0.15-0.45)	<0.001	0.16 (0.08-0.31)	<0.001	0.21 (0.13-0.33)	<0.001
Turkic	0.23 (0.16-0.31)	<0.001	0.09 (0.05-0.15)	<0.001	0.34 (0.26-0.46)	<0.001
Others	0.72 (0.55-0.96)	0.02	0.84 (0.59-1.18)	0.32	0.72 (0.54-0.96)	0.02
<b>No of years education for mothers</b>						
Illiterate	Ref		Ref		Ref	
1-5 years	0.84 (0.54-1.13)	0.45	1.19 (0.67-2.09)	0.54	1.36 (0.79-2.31)	0.25
6-9 years	0.58 (0.37-0.91)	0.02	0.42 (0.24-0.74)	0.003	1.21 (0.71-2.05)	0.46
10-12 years	0.71 (0.46-1.10)	0.13	0.70 (0.40-1.21)	0.21	1.36 (0.82-2.26)	0.22
Academic	1.03 (0.59-1.80)	0.91	0.60 (0.31-1.17)	0.13	1.27 (0.74-2.20)	0.37
<b>No of years education for father</b>						
Illiterate	Ref		Ref		Ref	
1-5 years	0.62 (0.35-1.11)	0.11	1.22 (0.65-2.26)	0.52	1.85 (1.01-3.40)	0.04
6-9 years	0.38 (0.22-0.67)	0.001	0.53 (0.29-0.96)	0.03	1.41 (0.79-2.51)	0.24
10-12 years	0.51 (0.29-0.90)	0.02	0.58 (0.32-1.05)	0.07	1.70 (0.96-3.00)	0.06
Academic	0.75 (0.40-1.43)	0.39	0.52 (0.26-1.04)	0.06	1.26 (0.69-2.30)	0.43
<b>Employment status for mothers</b>						
Housewife	1.24 (0.84-1.83)	0.26	1.14 (0.73-1.79)	0.55	1.11 (0.82-1.51)	0.48
Out of home	Ref		Ref		Ref	
<b>Employment status for father</b>						
Self- Employed	0.78 (0.56-1.10)	0.17	0.80 (0.55-1.16)	0.24	0.84 (0.64-1.10)	0.22
Civil servant	Ref		Ref		Ref	
Animal husbandry and agriculture	0.70 (0.44-1.11)	0.13	0.89 (0.52-1.50)	0.66	0.78 (0.51-1.18)	0.25
Others	0.83 (0.54-1.26)	0.38	2.17 (1.30-3.63)	0.003	0.95 (0.63-1.39)	0.80
<b>Parity</b>						
First birth	Ref		Ref		Ref	
Second to fourth birth	0.84 (0.67-1.07)	0.16	1.40 (1.08-1.81)	0.01	1.81 (1.46-2.25)	<0.001
≥Fifth birth	1.11 (0.81-1.53)	0.48	1.65 (1.16-2.36)	0.005	1.42 (1.00-2.02)	0.04
<b>Current pregnancy distance with previous</b>						
First pregnancy	Ref		Ref		Ref	
Less of 1 years	0.62 (0.41-0.93)	0.02	1.14 (0.72-1.79)	0.55	1.49 (0.85-2.62)	0.15
1-3 years	0.93 (0.71-1.22)	0.61	1.20 (0.89-1.62)	0.21	1.90 (1.46-2.46)	<0.001
More than 3 years	0.99 (0.75-1.29)	0.94	2.01 (1.48-2.74)	<0.001	2.02 (1.58-2.58)	<0.001
<b>Pregnancy intention</b>						
Not intended	0.98 (0.69-1.39)	0.91	1.80 (1.18-2.73)	0.005	1.47 (1.04-2.07)	0.02
Intended	Ref		Ref		Ref	
<b>BMI</b>						
<18.5	Ref		Ref		Ref	
18.5-24.9	1.70 (1.24-2.32)	0.001	1.07 (0.78-1.47)	0.64	1.32 (0.98-1.78)	0.06
25-29.9	1.68 (1.27-2.24)	<0.001	1.03 (0.74-1.44)	0.82	1.31 (1.00-1.71)	0.04

*Contd...*

**Supplementary Table 1: Contd...**

Parental characteristic	Still birth		Neonatal mortality		Live birth	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
30-34.9	1.80 (1.11-2.92)	0.01	1.69 (1.06-2.70)	0.02	1.54 (0.96-2.48)	0.07
≥35	1.05 (0.50-2.22)	0.88	5.81 (1.26-26.83)	0.02	1.59 (0.70-3.62)	0.26
Any smoking during pregnancy						
Yes	1.51 (0.88-2.58)	0.12	2.11 (1.16-3.83)	0.01	0.59 (0.37-0.93)	0.02
No	Ref		Ref		Ref	

**Supplementary Table 2: Adjusted odds ratios for not receiving dental care during pregnancy, by still birth, neonatal mortality and live birth 2014-2015**

Parental characteristic	Still birth		Neonatal mortality		Live birth	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Ethnicity						
Fars	Ref		Ref		Ref	
Lurs	0.21 (0.11-0.38)	<0.001	0.12 (0.05-0.26)	<0.001	0.23 (0.14-0.37)	<0.001
Turkic	0.21 (0.15-0.30)	<0.001	0.07 (0.04-0.12)	<0.001	0.33 (0.24-0.46)	<0.001
Others	0.66 (0.48-0.91)	0.01	0.70 (0.48-1.03)	0.07	0.72 (0.53-0.98)	0.04
Place live						
Urban	Ref		Ref		Ref	
Rural	1.80 (1.40-2.31)	<0.001	2.21 (1.66-2.94)	<0.001	1.49 (1.19-1.86)	0.001
Pregnancy intention					Ref	
Not intended	-	-	2.74 (1.61-4.65)	<0.001	-	-
Intended	-	-	Ref	-	-	-
Father Age (in years)						
15-24	-	-	-	-	Ref	
24-34	-	-	-	-	1.71 (1.17-2.52)	0.006
≥35	-	-	-	-	1.69 (1.08-2.64)	0.02
Parity						
First birth	-	-	-	-	Ref	
Second to fourth birth	-	-	-	-	1.73 (1.35-2.21)	<0.001
≥Fifth birth	-	-	-	-	1.24 (0.81-1.90)	0.31