



Oral Health of Pregnant Women Attending Primary Healthcare Facilities in District of Ain Sebaâ, Hay Mohammadi in Morocco

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Abstract

Introduction: Pregnancy is a period of profound physiological changes that can impact the oral health of women. Several studies have established a link between poor oral health and obstetric complications, highlighting the importance of regular dental monitoring during pregnancy. The present study aimed to measure the prevalence of caries and gingivitis among pregnant women attending primary healthcare facilities in the district of Ain Sebaâ-Hay Mohammadi, Morocco. **Methods:** A quantitative cross-sectional study was conducted in three primary healthcare facilities in the prefecture of Ain Sebaâ-Hay Mohammadi, involving 200 pregnant women. Dental caries was assessed by the Decayed, Missing and Filled teeth (DMFT) index and gingivitis was evaluated by the Gingival Bleeding Index (GBI). A structured questionnaire on oral health status and its factors was administered by the examiner. Statistical analysis was carried out using Jamovi software (version 2.3.28). **Results:** Of the 200 pregnant women examined, 80.5% were of Moroccan nationality, and 19.5% were of Sub-Saharan African origin. The mean age was 30.1 ± 5.88 years. Caries was recorded in 162 women, corresponding to a prevalence of 81%, with a mean DMFT index of 6.30 ± 5.42 . Gingivitis was present in 98% of participants, with a mean gingival index of 1.60 ± 0.66 . Caries experience was statistically significantly associated with nationality ($p < 0.001$), marital status ($p = 0.004$), occupation ($p = 0.007$), toothbrushing frequency ($p = 0.039$), and dental attendance ($p < 0.001$). Gingivitis was significantly associated with nationality ($p < 0.001$), socioeconomic status ($p = 0.003$), toothbrushing frequency ($p < 0.001$), and dental attendance ($p = 0.006$). **Conclusion:** Our findings highlight the im-

portance of extending oral health prevention programmes to pregnant women, with a focus on oral hygiene and dietary habits. Prevention messages must be simple and adapted to the educational level of the population consulting primary healthcare facilities, in order to effectively meet their oral healthcare needs.

Subject Areas

Dentistry, Public Health

Keywords

Pregnant Women, Dental Caries, Gingivitis

1. Introduction

Pregnancy is defined as the period between fertilization and childbirth, during which the embryo (and later the fetus) develops within the uterus. This physiological state is marked by profound hormonal, cardiovascular, and immunological changes that affect the entire body, including the oral cavity. These transformations can lead to significant oral health issues, such as pregnancy gingivitis, which may progress to periodontitis and result in tooth loss if left untreated. Hormonal fluctuations during pregnancy also alter the quantity and quality of saliva, increasing its acidity and reducing its buffering capacity. These changes contribute to a heightened risk of dental erosion and caries, and may accelerate the progression of pre-existing lesions. Despite the focus often being placed on fetal development and maternal nutrition, oral health is an essential component of prenatal care that is frequently overlooked. Several studies have demonstrated the prevalence of oral lesions among pregnant women. For instance, Adesina *et al.* [1] reported that 188 out of 225 pregnant women in Ilorin, Nigeria, exhibited oral lesions, with gingivitis, pregnancy epulis (pyogenic granuloma), dental erosion, and excessive salivation being the most common. Similarly, a systematic review by Pecci-Lloret *et al.* [2] found that dental caries was the most frequently observed oral condition in pregnant women, with some studies reporting prevalence rates as high as 100%.

In France, recent data indicate that approximately 50% of pregnant women have at least one untreated decayed tooth. Moreover, 57% of women surveyed reported experiencing oral health problems during pregnancy, and 20% mentioned dental pain. Alarmingly, more than half of these women (56%) had not consulted a dentist during their pregnancy, and only 26% and 18% had done so for oral pathology or routine check-ups, respectively [3].

Oral disorders during pregnancy are not without consequences. Beyond maternal discomfort, poor oral health has been associated with adverse pregnancy outcomes, including preterm birth and low birth weight. Women with pregnancy complications exhibited more severe gingivitis and required more frequent dental

interventions than those with normal pregnancies [4].

Although numerous studies have assessed the oral health of pregnant women globally, there is a lack of quantitative data in Morocco. Understanding the epidemiological landscape is essential for developing effective preventive strategies. For this reason, we conducted a study to evaluate the oral health status of pregnant women attending urban health centers in the Ain Sebaa-Hay Mohammadi district of Morocco. Our goal is to highlight the magnitude of the issue and support the implementation of targeted oral health interventions during pregnancy.

2. Materials and Methods

2.1. Study Design and Sample

A descriptive cross-sectional study was conducted by a single calibrated examiner. Prior to data collection, intra-examiner reliability was assessed through the re-examination of 10 patients on two separate occasions. The study aimed to evaluate oral health among pregnant women attending urban health centers in the district of Ain Sebaâ-Hay Mohammadi in Casablanca, Morocco. Data collection took place between April and June 2025, corresponding to the period allocated for completing the fieldwork phase.

The calculation of the sample size was carried out using Epi-Info software. As we did not have Moroccan statistical data on the subject, we opted for an expected percentage of 50%. So, we used the formula to calculate the sample size by taking an α precision of 7%.

$$\text{Ideal sample size} = (\text{score } \varepsilon)^2 * p(1-p) / (\text{margin of error } \alpha)^2$$

- p being unknown in our country, we are going to work with $p = 0.5$.
- $\alpha = 7\%$.
- $\varepsilon = 1.96$.

$$\frac{1.96^2 * 0.5(1-0.5)}{0.07^2} = 170 \text{ individuals}$$

With an increase of 10% to improve accuracy, which gave us a sample of about 200 pregnant women. Afterwards, we conducted a random draw of three health centers: Beausite, Derb Moulay Cherif and Hay Jamal (representing the three municipalities of the prefecture: Ain Sebaâ, Hay Mohammadi and Roches Noires) from among the 14 health centers present in the prefecture. We excluded from our study pregnant women under the age of 18 and those who had refused to participate.

2.2. Questionnaire

The questionnaire was developed based on items previously used in the literature by Vergnes *et al.* [3], with adaptations to the Moroccan context, and served as the primary data collection tool. It comprised three sections: the first addressed the

sociodemographic characteristics of the participants; the second assessed dietary habits and oral hygiene practices; and the third focused on oral health status and perceptions. Informed consent was obtained from all participants prior to data collection, following an explanation of the study objectives and assurance of anonymity. The questionnaire was pre-tested with 10 women.

2.3. Clinical Examination

The clinical examination was performed in well-lit rooms in daylight, using a sterile mirror and Dental explorer 6 and 17. The third molars were not examined. And X-rays were not taken.

Dental caries using the Decayed, Filled and Missing Tooth Index and Indices (DMFT) in accordance with World Health Organization criteria [5] for the diagnosis of dental caries. The periodontal state using the gingival index of Loe and Silness 1963 (Score 0: Normal gingiva, score 1: Mild inflammation, score 2: Moderate inflammation, score 3: Severe inflammation) [6].

2.4. Ethical Considerations

An authorization has been obtained from the National School of Public Health. And all the women who agreed to participate in the study after explanation of its objectives were included in the study. Finally, our research was conducted in full compliance with the World Medical Association's Declaration of Helsinki, <https://www.wma.net/what-we-do/medical-ethics/declaration-of-helsinki/>.

Each participant provided informed consent prior to enrolment, having been fully informed of the study objectives and assured that all responses would remain strictly anonymous. To preserve confidentiality, every participant was assigned a unique identification number, and no questionnaire contained personally identifiable information such as name, surname, or home address. Women who declined participation were reassured that their decision would not affect the medical follow-up of their pregnancy at the health centre.

2.5. Statistical Methods

All questionnaire data were recorded and compiled in a Microsoft Excel spreadsheet. Data processing was performed using Jamovi version 2.3.28. Descriptive statistics were applied to summarise the data: qualitative variables were expressed as frequencies and proportions, while quantitative variables were presented as means and standard deviations. Bivariate analyses were conducted using the chi-square test or Fisher's exact test to examine associations between the presence of caries and the variables studied. A p-value of less than 0.05 was considered statistically significant.

3. Results

3.1. Profile of Pregnant Women (Table 1)

A total of 200 women were enrolled in our study, all recruited from three selected

urban health centers. Among them, 115 women (57.5%) had received prenatal care at Beausite center during the study period. Regarding nationality, the majority of participants were Moroccan (80.5%), while 39 women (19.5%) were of sub-Saharan origin.

The mean age of participants was 30.1 years $\pm$ 5.88, with ages ranging from 19 to 44 years. The most represented age group was 25 to 35 years, accounting for 59.5% of the sample. Most women were married (75%) and 66% identified as housewives. In terms of education, 56% had completed primary or middle school.

3.2. Perceived Oral Health and Practice (Table 2)

When asked about the importance of oral health during pregnancy: 66.3% of the women reported that they did not know whether it was important or not.

In response to the question, “Have you received any information on this topic?”, 98.5% of participants stated they had never received any information. Only one woman reported being informed by a healthcare professional, while two others mentioned obtaining information via the Internet.

When questioned about the possibility of receiving dental care during pregnancy, 80% of the women believed it was not feasible, while 20% thought that dental treatment should be postponed until after childbirth—even in cases of emergency.

3.3. Dietary Habits and Oral Practices during Pregnancy (Table 3)

Fifty-one percent of the participants acknowledged an increased consumption of sugary foods during pregnancy.

Regarding oral hygiene practices, 41.5% of the women reported brushing their teeth twice a day.

Regarding the visit to the dentist: 69.5% of pregnant women consult the dentist only in case of oral emergency.

Table 1. Profile of pregnant women attending urban health centers of district Ain-Sebaa Hay Mohammadi.

	N	%
Nationality		
Moroccan	161	80.5
Sub-Saharan	39	19,5
Marital status		
Single	44	22
Divorced	6	3
Married	150	75

Continued

Urban primary health care center		
Beausite	115	57.5
Hay Jamal	49	24.5
Derb Moulay Cherif	36	18
Healthcare coverage		
Yes	107	53.5
No	93	46.5
Level of education		
Primary-middle school	112	56
High school	35	17.5
Academic	31	15.5
None	22	11
Occupation		
Housewife	132	66
Worker	68	34
Monthly household income		
Low: ≤3000 dhs	110	55
Lower middle: 3000 - 5999 dhs	69	34.5
Higher middle: 6000 - 9999 dhs	14	7
High: 10,000 - 15,999 dhs	7	3.5
Stage of pregnancy		
First trimester	36	18
Second trimester	73	36.5
Third trimester	91	45.5
Parity		
Nulliparous	36	18
Primiparous	73	36.5
Multiparous	91	45.5

Table 2. Perception regarding oral health among pregnant women attending urban health centers of district Ain-Sebaa Hay Mohammadi.

	N	%
Importance of oral health during pregnancy?		
I don't know	132	66.3
Yes	54	27.1
No	13	6.5
Link between gum disease and pregnancy complication?		
Yes	9	4.5
No	191	95.5
Have you already received information on this subject?		
No	197	98.5
Yes, from a health care professional	1	0.5
Yes, via the internet	2	1
Are you aware of the increased risk of cavities and periodontal diseases during pregnancy?		
Yes	138	69
No	62	31
Do you think it's possible to receive dental treatment during pregnancy?		
Yes	160	80
No	40	20

Table 3. Dietary habits and oral practices during pregnancy.

	N	%
Increase in the consumption of sweets during pregnancy		
Yes	102	51
No	98	49
Sugar-sweetened drinks		
1 time/day	22	11
1 times/week	27	23.5

Continued

2 - 3 times/week	59	29.5
Never	55	27.5
Several times/Day	17	8.5
Frequency of brushing teeth		
1 time/day	58	29
2 time/day	83	41.5
Sometimes	51	25.5
Never	8	4
Visit to the dentist		
Never	59	29.5
Less than 6 months	10	5
6 - 12 months	22	11
More than a year	109	54.5
Reason for consultation		
Never	59	29.5
Emergency	139	69.5
Routine check-up	2	1

3.4. Dental Caries Status in the Study Population

Among the 200 women included in the study 73.5% had at least one decayed tooth, while 81% of participants presented with dental caries, defined as a DMFT index ≥ 1 .

The mean DMFT (Decayed, Missing, and Filled Teeth) index in the study population was 6.30 ± 5.42 , with a median of 6, ranging from 0 to 25.

In total, 665 decayed teeth, 345 missing teeth, and 250 filled teeth were recorded. Of all teeth examined, 53% were decayed, 27% were filled, and 20% were missing due to caries.

3.5. Gingival Status of the Study Population

No case of pregnancy epulis was noted in our sample.

The average gingival index in our sample was 1.60 ± 0.66 and the median is 2.

The results of our study showed that the gingival index is 2 to 3 in 54.5% of the studied population with a middle to high level of gingival inflammation, and that 43.5% of women had mild inflammation, while only 2% of our population had normal gingiva.

Table 4. Bivariate analysis.

	Caries		p	Gingivitis		p
	Yes	No		Yes	No	
	N (%)	N (%)		N (%)	N (%)	
Nationality						
Moroccan	143 (71.5)	18 (9)	<0.001	100 (50)	61 (30.5)	<0.001
Sub-Saharan	19 (9.5)	20 (10)		9 (4.5)	30 (15)	
Socioeconomic status						
Low	91 (45.5)	0 (0)	0.35	67 (33.5)	43 (21.5)	0.003
Middle	64 (32)	19 (9.5)		42 (21)	41 (40.5)	
High	7 (3.5)	19 (9.5)		0 (0)	7 (3.5)	
Marital status						
Single	28 (14)	16 (8)	0.004	22 (11)	22 (11)	0.31
Divorced	6 (3)	0 (0)		5 (2.5)	1 (0.5)	
Married	128 (64)	22 (11)		82 (41)	68 (34)	
Level of education						
Primary-middle school	18 (9)	4 (2)	0.05	15 (7.5)	7 (3.5)	0.17
High school	85 (42.5)	27 (13.5)		62 (31)	50 (25)	
Academic	29 (14.5)	6 (3)		20 (10)	15 (7.5)	
None	30 (15)	1 (0.5)		12 (6)	19 (9.5)	
Occupation						
Housewife	114 (57)	18 (9)	0.007	81 (40.5)	51 (25.5)	0.007
Worker	48 (24)	20 (10)		28 (14)	40 (20)	
Parity						
Nulliparous	76 (38)	20 (10)	0.78	50 (25)	46 (23)	0.79
Primiparous	35 (17.5)	8 (4)		24 (12)	19 (9.5)	
Multiparous	51 (25.5)	10 (5)		35 (17.5)	26 (13)	
Frequency of toothbrush						
<2*/day	102 (51)	17 (8.5)	0.039	78 (39)	78 (39)	<0.001
Twice a day	60 (30)	21 (10.5)		31 (15.5)	31 (15.5)	
Dental attendance						
<6 months	9 (4.5)	1 (0.5)	<0.001	3 (1.5)	7 (3.5)	0.006
6 - 12 months	20 (10)	2 (1)		15 (7.5)	7 (3.5)	
>12 months	104 (81)	5 (2.5)		68 (34)	41 (20.5)	
Never	29 (14.5)	30 (15)		23 (11.5)	36 (18)	

3.6. Bivariate Analysis (Table 4)

Sociodemographic analysis revealed multiple statistically significant associations with oral health outcomes. Nationality was significantly associated with both caries ($p < 0.001$) and gingivitis ($p < 0.001$): Moroccan women exhibited substantially higher caries rates (75% vs 9.5%) and gingivitis (50% vs 4.5%). While socioeconomic status was not significantly linked to caries ($p = 0.35$), it was meaningfully associated with gingivitis ($p = 0.003$), with women of low socioeconomic status bearing the greatest periodontal disease burden (67%). Regarding marital status caries prevalence was influenced ($p = 0.004$) but not gingivitis ($p = 0.31$), with married women accounting for the highest number of caries-positive cases (64%). Occupational status also proved significant, as housewives demonstrated elevated rates of both caries and gingivitis ($p = 0.007$). Oral hygiene practices emerged as a key modifiable factor, with toothbrushing frequency significantly associated with both caries ($p = 0.039$) and gingivitis ($p < 0.001$); women brushing fewer than twice daily consistently presented a higher disease burden across both conditions. Finally, dental attendance patterns were significantly associated with oral health status: both caries ($p < 0.001$) and gingivitis ($p = 0.006$) were most prevalent among women who had never visited a dentist or whose last visit exceeded 12 months.

4. Discussion

Dental caries remains one of the most prevalent health problems in Morocco. Our study represents the second epidemiological study to focus on the oral health of pregnant women in Morocco, following that of Ait Addi conducted in Marrakech in 2020 [7].

Our sample demonstrated a poor level of oral health, characterised by harmful oral hygiene and dietary habits, alongside an alarmingly low level of awareness regarding the importance of oral health during pregnancy.

Regarding pregnant women's perceptions of oral health, 69% affirmed that the risk of oral health conditions increases during pregnancy, compared to 54.6% in the study by Mokhtar Ahmed Javali [8], revealing a significant lack of information and awareness surrounding oral health during pregnancy. Concerning the association between prematurity and periodontal disease, only 4.5% of women acknowledged this link, compared to 31% in the study by Mokhtar Ahmed Javali [8]. As for the possibility of receiving dental care during pregnancy, only 20% responded affirmatively, compared to 62% in the same study [8]. The gap between these findings may be explained by the lower educational level of our study population.

A high caries prevalence of 81% was observed, with a DMFT index of 6.30 ± 5.42 . This score reflects a substantial level of caries severity within our study population. These results are comparable to those of the study conducted in Marrakech in 2020, which reported a prevalence of 87.72% and a DMFT index of 10.26 (4). The similarity between these findings may be explained by an analogous recruitment setting, as both studies were carried out in primary healthcare facilities.

Within the WHO Eastern Mediterranean Region (EMRO), the caries preva-

lence observed in our study is higher than that reported in Iran (67%) [9] and Sudan (75.5%) [10], but remains lower than that recorded in Palestine (100%) [11]. These results reflect an alarming state of oral health among pregnant women in this region. They confirm the regional trend while highlighting specific local factors, such as limited access to dental care, dietary habits rich in fermentable carbohydrates [12], inadequate or absent oral hygiene practices, and limited awareness among this vulnerable population.

In Africa, the caries prevalence observed in our study is lower than that reported in Lithuania (99.9%) [13], but substantially higher than that recorded in a similar study conducted in Nigeria (12.4%) [1]. It is, however, close to the rates reported in Tanzania (69%) [14] and Malawi (63.1%) [15]. The low caries rate observed among women in Nigeria was attributed to their higher educational level: 62.2% of participants had attained tertiary education, compared to only 15.5% of women in our sample.

In our study, the DMFT index of the examined population reflects a high level of caries experience and stands at 6.30 ± 5.42 . It is substantially higher than that recorded in countries such as Colombia (2.41) [12] and Tanzania (2.86) [14], but remains lower than that observed in Palestine (15.5) [11], Spain (8.6), the United States (6.6) [16], and South Africa (7.18) [17].

The DMFT component analysis revealed that decayed teeth predominated (53%), followed by filled (27%) and missing teeth (20%), reflecting a predominantly curative rather than preventive approach to oral healthcare. The high proportion of untreated decay and tooth extraction, combined with low restorative care uptake, highlights significant barriers to dental service access including financial constraints, low health literacy, and cultural factors. These findings underscore the urgent need for integrated oral health education, publicly funded dental care, and targeted national policies for pregnant women within antenatal healthcare programmes.

Our study revealed a particularly high prevalence of gingivitis, reaching 98%. This finding is consistent with a global trend, as several studies have confirmed a high frequency of gingivitis among pregnant women, with variations according to geographical and methodological contexts. Thus, Cornejo *et al.* in Buenos Aires [18] reported a rate of 93.75% among women aged 18 to 39 years, while Sari *et al.* [19] in Malaysia observed a prevalence of 100%, of which 46.9% were moderate cases and 6.8% were severe cases. Similarly, Soroye in Nigeria [20], and Bunnatee in Thailand [21] reported high rates of 85.2% and 88.1 % respectively. These results highlight the need for rigorous oral health monitoring during pregnancy, particularly in countries where preventive care remains insufficiently developed.

Several sociodemographic factors were significantly associated with caries and gingivitis among pregnant women. Nationality was strongly linked to both conditions, with Moroccan women showing higher caries rates and Subsaharan women presenting more gingivitis-free cases, suggesting potential differences in dietary habits, oral hygiene practices, and healthcare-seeking behaviour between the two

groups.

Low socioeconomic status was associated with poorer periodontal health, while married women showed higher caries prevalence. Housewives presented elevated rates of both conditions, likely due to dietary habits and reduced self-care. Infrequent toothbrushing and prolonged absence of dental visits were consistently associated with higher disease burden across both conditions.

Limitations and Potential Biases

This study has several limitations that should be taken into account when interpreting the findings. First, the cross-sectional design does not permit the establishment of causal relationships between the identified risk factors and oral health outcomes. Second, behavioural data (toothbrushing frequency, dietary habits, dental attendance) were self-reported and therefore subject to social desirability bias, which may have led to an overestimation of healthy behaviours. Third, recruitment was restricted to public primary healthcare facilities, which may not be representative of the overall pregnant population in Morocco, as women attending private facilities or those not seeking antenatal care were excluded. Finally, the DMFT index was calculated in accordance with WHO diagnostic criteria; however, the detection of proximal carious lesions requires radiographic examinations, which could not be performed in this study due to the pregnancy status of the participants.

5. Conclusion

In Morocco, the healthcare system bears a fundamental responsibility to enhance oral hygiene awareness during pregnancy, to integrate systematic dental follow-up into routine antenatal consultations, and to implement targeted educational programmes within primary healthcare facilities. Achieving these objectives requires a multidisciplinary approach, with gynaecologists, midwives, and dental practitioners working in close coordination throughout the antenatal care pathway. Moreover, future research should assess the effectiveness of preventive programmes implemented among pregnant women, thereby providing evidence to guide the development of national oral health policy.

Conflicts of Interest

The authors declare no conflicts of interest.

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