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Oral Health Literacy and Its Association with Dental Service Utilization Among Pregnant Women: An Expanded Analytical Cross-Sectional Study

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ABSTRACT: **Background**: Hormonal, vascular, dietary, and behavioral changes during pregnancy could contribute to greater risk of gingival inflammation and dental caries. Oral health literacy-the capacity to obtain, process, and use of oral information-could impact whether pregnant women identify oral conditions and have their needs met.

Objective: To investigate the relationship between OHL and dental service utilization during pregnancy as well as to investigate the sociodemographics, beliefs, perceived barriers and clinical oral-health characteristics.

Methods: This analytical cross-sectional study was to compare the level of OHL and factors associated with poor OHL using a detailed structured questionnaire among 392 pregnant women who were seeking care from primary antenatal and tertiary obstetric clinics. Participants completed an OHL test and structured questionnaire. Clinical

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examination was conducted to determine the dental caries and gingival/periodontal status of the participants.

Results: OHL was low/inadequate in 68.6% of the sample, and 59.9% did not visit a dentist while pregnant. Fear of pain/bother to baby was most cited barrier (45.4%), followed by cost (24.5%), no pain/no problem (18.4%), and did not think I needed it/no provider/no appointment access (11.7%). High OHL was associated with higher dentist utilization (aOR 2.38, 95% CI 1.52-3.74) and lower untreated caries (aOR 0.54, 95% CI 0.30-0.99), while low OHL was associated with increased odds of having gingival bleeding (aOR 1.85, 95% CI 1.19-2.88).

Conclusion: The study confirms ignificant association between OHL, treatment-safety beliefs, education, and access barriers with attending dental visits during pregnancy. Antenatal counseling, designated referral pathways, and literacy-sensitive education are recommended. The cross-sectional design of the study limits the causal inferences.

1. INTRODUCTION

1.1 The importance of maternal oral health

Oral health is an important part of overall health, and should not be viewed as solely a matter of teeth and gums. Pain, infection, problems chewing and the ability to clean the teeth effectively can have serious consequences for a person's day to day functioning and quality of life. Pregnant women may have special needs in this regard, which is why changes in routine, diet, general health, and health-seeking behaviour as well as physiological adjustments during pregnancy require careful monitoring and guidance.

This paper the study addresses a specific public-health issue: so many women who are pregnant fail to take advantage of dental services even when there is a clear need for preventive care or treatment. No one factor can account for this. Attitudes – and resulting behaviour – can involve knowledge and confidence, perceptions of safety, household resources, services available, and the reactions of health professionals. Oral health literacy offers a helpful context for understanding women's interpretation of information and how they make decisions.

1.2 Physiological and hormonal changes

Pregnancy induces marked alterations in the hormonal balance as well as in the vascular system. An elevation of circulating levels of estrogen and progesterone may directly affect the microcirculation and permeability of the gingival tissue, and also alter the host's response to plaque bacteria by varying the inflammatory response. As can be seen in the original manuscript, gums generally exhibit hyperemia, swelling and are friable, bleeding. This condition may make dysplasia affected by plaque more apparent; however, pregnancy does not necessarily cause periodontal disease but produces alterations in the tissue's response to local plaque.

A perceivable or painful alteration in the gums can alter the behaviour. Some women may believe blood is an indicator of brushing oneself as destructive and decrease brushing or interdental cleansing. This can aggravate inflammation and could increase plaque accumulation. Counselling should emphasize the need for thorough and gentle plaque elimination in a manner that is understandable and if blood does not clear up, then one needs to visit the dental practitioner.

1.3 Diet, nausea, and caries risk

Changes in eating habits. Snacks more often, cravings for fermentable carbohydrates, and consumption of acids foods increase acid challenges to the tooth enamel. Vomiting and nausea, and gastroesophageal reflux are associated with gastric acid exposure to teeth; changes in routine may affect brushing and flossing, if mothers are engaged more in work or sport, this will influence their ability to maintain oral hygiene; demineralization and caries risk, mainly in mothers with lack of fluoride, existing untreated lesions, or limited access to prevention (Hu et al., 2023).

The headline is that every-day preventative guidelines should be targeted and achievable: brush twice a day with fluoride toothpaste; interdentally; avoid repeated sugary snacks and occasionally seek individual guidance following repeated vomiting or reflux. That's all fairly broad principles of prevention and the study dataset did not specifically record every dietary or hygiene behavior listed above.

1.4 Periodontal inflammation and wider maternal health

Periodontal disease is a non-specific, chronic inflammatory disease of the supporting tissues around the teeth. The quantity of gingival inflammation may be increased in pregnancy but pre-existing periodontitis may be clinically significant. According to the source manuscript, several mechanisms of action have been suggested for periodontal pathogens or inflammatory products (including prostaglandin E2, interleukin-1, interleukin-6, and tumour necrosis factor alpha) that could promote systemic inflammatory response. Studies of associations between maternal periodontitis and outcomes including preterm birth, low birth weight, fetal growth restriction, and pre-eclampsia, have been conducted (Kong et al., 2020; Le et al., 2022; Sgolastras et al., 2013).

These associations need cautious interpretation. A biologic likelihood, and some studies show associations, but observational data may be tainted by socioeconomic status, smoking, nutrition, access to care, pre-existing disease and other confounders. The current study did not obtain data on the outcomes of pregnancy and cannot determine whether any obstetric outcome was caused by oral disease. The clinical take-home point here is that oral disease should be evaluated and treated as part of primary health care – not that providing dentistry ensures prevention of adverse pregnancy outcomes.

1.5 Oral health literacy: concept and dimensions

Oral health literacy means being able to obtain, process and understand basic health information and services needed to make appropriate health decisions. It is more than just being able to say the words and remember facts. For example, if the word 'gingivitis' is understood, the individual may not know whether bleeding gums is usual, if it's OK to have treatment while pregnant, or how to make an appointment.

Functional literacy refers to reading and understanding simple, fundamental information (how to use your toothpaste, an appointment card). Interactive literacy includes communicating with a clinician, raising questions, explaining one's symptoms. Critical literacy entails assessing competing messages, being aware of "fake" info, and considering the reliability of advice received online or from informal sources. These aspects clarify why even a woman with formal education might struggle to understand complex health issues.

1.6 OHL and care-seeking behavior

The source manuscript mentions that low OHL previously has been shown to be connected with less education, lower income, and not knowing that dental treatments/radiographs are not harmful in pregnant women (Hom et al., 2012; Muralidharan et al., 2019; Yeter &Şengül, 2022). If health information is hard to understand, women may be less likely to recognize routine preventative treatments and their benefits and face barriers to seeking treatment. They may only seek treatment in the presence of severe pain or swelling.

Literacy is just one piece of the journey. A woman who is technically literate might not have transportation, or might have to pay for treatment, find childcare, wait to see a provider, or find a provider willing to take an appointment, so access improvements need to accompany simple communication.

1.7 The maternal-care opportunity

Repeated contact with pregnant women makes antenatal services an effective setting to promote oral health. The first point of contact for bleeding gums, aching teeth or fear of dental treatment is often an obstetrician, midwife, nurse or community health worker. A short oral-health discussion could destigmatise dental care, alert staff to more urgent symptoms and lead directly to referral. Staff must have a regularly updated message and an agreed process for referral and feedback. The origin paper reports provider refusal or inaccessibility as a perceived barrier in 11.7%. This is significant because patient education alone cannot address physicians' uncertainty. If a dentist's treatment team is unwilling to treat a pregnant patient, a woman may receive mixed messages. Shared guidelines and interprofessional communication with obstetric teams can help reduce unnecessary confusion and facilitate shared decision making.

1.8 Problem statement

However, within the study sample, only 40.1% reported attending the dentist during pregnancy, with 59.9% not attending the dentist during pregnancy. A majority of women had an inadequate/low OHL (68.6%), did not think it important/unnecessary to visit the dentist (78.8%), and felt that visiting the dentist was not safe in pregnancy (58.4%). These numbers highlight an information, belief, and access problem.

So the core issue then is not just low attendance. It is the combination of low OHL, uncertainty about the safety and demand for care and pragmatic barriers that can lead to women not translating health information into taking action. Knowing about the relationship between OHL and use of dental services can guide antenatal education and service provision.

1.9 Aim and objectives

Primary objective: To assess the association of oral health literacy with utilization of dental services among antenatal and obstetric patients.

- To provide information about the sociodemographic profile and the distribution of participants according to their level of OHL

- To determine how many of the participants utilized a dental service while pregnant.
- To measure perceived need for dental visits, attitudes towards treatment and perceived safety, and main self-reported barriers to care.

- Was used to determine the relationship of OHL with utilization of dental services after adjustment in the multivariable logistic regression.

- To assess for any reported associations between OHL and the selected clinical measures, including untreated dental caries and gingival bleeding.

- Aims To interpret our results for giving guidance to antenatal counseling, dental referral and literacy sensitive communisis.

1.10 Research questions

The focus of the analysis is answering these 4 questions:

(1) How prevalent is inadequate OHL in our study cohort?

(2) How many women saw a dentist in pregnancy and what reasons do women give for not doing so?

(3) Is higher OHL related to greater dental service use?

(4) Is OHL related to untreated caries and gingival bleeding? We are not testing causal relationship, as this is an observational study.

2. METHODS

2.1 Study design

We used an analytical cross-sectional design. The exposure-related variables (OHL and beliefs about dental treatment) and outcomes (dental attendance and selected clinical indicators) were measured during the study period. Cross-sectional studies are appropriate for describing the frequency of characteristic or outcomes in a population, and for investigating associations of outcomes and characteristics at a specific point in time. They are not, however, able to determine whether low literacy preceded non-utilization or vice versa, or whether non-utilization and deficient experience with dental care resulted in poor literacy.

2.2 Study location and duration

Reported date of data collection was in primary care antenatal clinics and tertiary care obstetrics and gynecology outpatient clinics from October 2022 to April 2026. Having more than one care level involved potentially extends the spectrum of women accessing care (from routine maternity care in primary to specialist tertiary care). However, the manuscript should

specify which clinics were involved, and the location and timing of recruitment at each site, and any variation in referral pathways so that readers can interpret the context-specific factors.

2.3 Study population and eligibility

The study population included pregnant women 18 years or older, attending any of the recruiting sites' antenatal or obstetric clinics. The stated inclusion criteria were: pregnancy confirmed at any trimester, and ability to give informed consent and complete interview and clinical exam. Women who needed urgent hospitalization for obstetric emergencies at screening and who refused the oral exam or questionnaire were excluded.

Adding in all three trimesters could expand the sample, but the trimester of pregnancy might affect the symptom experience, chances to make an appointment, and readiness to be treated. The manuscript doesn't specify the number of women in each trimester. The authors could report this and adjust for it in any analyses if data were available.

2.4 Recruitment and sampling

The study sample was recruited sequentially during routine antenatal clinic visits with non-probability convenience sampling. Consecutive recruitment can limit self-selection by eligible women attending the clinic, but does not ensure representativeness of the study cohort with respect to the total population of pregnant women in the catchment population. Women who do not attend an ANC clinic, who attend other clinics, or who encounter major barriers to access may be underrepresented in the study population.

2.5 Sample size

The source document says the sample size calculation was performed with Open Epi version 3.01 using estimated proportion of dental service use and prevalence of oral disease with a two-sided 95% confidence and sufficient power to detect important differences between literacy groups. The final sample size was 392. To improve the reproducibility section of final manuscript should include the assumed prevalence, margin of error or effect size, power, design assumptions and any allowance for non-response (not provided in supplied document and has not been inferred).

2.6 Data collection procedures

Data were obtained by interviewer-administered structured questionnaires and standardized oral examinations. Interviewer-administration may be useful when respondents have varied reading skills, as questions can be administered uniformly and clarifications given. However, interviewer effects and social-desirability bias should be acknowledged. Standardized training, a standardized script, pilot-testing, and procedures for addressing missed questions should be detailed in a comprehensive protocol.

2.7 Oral health literacy measurement

OHL was measured by a validated instrument and participants were grouped into inadequate/low and adequate/high literacy levels. The source manuscript makes mention of instruments such as the Rapid Estimate of Adult Literacy in Dentistry (READ-30) in its background paragraph and does not mention the instrument used in this study, its version in the participant's language, its scoring range, its cut-off and validation sample. This information is to be provided by the authors of the study prior to the submission of the PDF. It would be inappropriate to assume that the authors used the READ-30 because it has been mentioned in the source manuscript.

Dichotomizing a score can help to make results more readily interpretable but also may entail loss of information and results which may be susceptible to the threshold selected. It is suggested that both distributions of the continuous scores and cut-offs are presented. If feasible, test-retest reliability in the study population and reasons for the threshold should be reported.

2.8 Domains of Questionnaire

Socioeconomic information such as age group, education, and job was obtained using a structured questionnaire. It further sought to understand how the participants perceive the need to visit the dentist when pregnant, the safety of dental treatment, and factors that influence the decision to visit a dentist during this period. Information on the causes of not visiting the dental clinic as fear of the fetus, pain, the financial burden/cost of treatment, absence of symptoms, or dentist denial/difficulty in accessing the clinic.

2.9 Clinical oral- health assessment

Clinical examinations recorded the DMFT components of dental caries experience and gingival/periodontal status comprising gum bleeding and plaque levels, according to a set diagnostic system and standardized illumination. DMFT collectively measures decayed, missing and filled teeth over a lifetime; the components individually describe ongoing untreated disease, combined with lifetime caries experience and occurrence of fillings. The reference document does not give details of calibration, diagnostic criteria and thresholds, and inter- and intra-examiner reliability of periodontal probing, which are fundamental to clinical interpretation.

2.10 Statistical analysis

Frequency distributions, percentages, means, and standard deviations were used to summarize the data. Chi-square and independent comparison tests were conducted to examine bivariate associations as needed. Four binary logistic regression models were fitted to determine the association of the variables with dental service use, untreated dental caries, and periodontal gingival bleeding, respectively, and were expressed as adjusted odds ratios (aORs), 95% confidence intervals, and two-tailed p-values ($p<0.05$).

The submitted manuscript does not include all covariates included in each model, how variables were selected, how missing data was handled, model-fit diagnostics, or tests for multi-collinearity; these should be included from the original analysis output. An aOR indicates the odds of an outcome relative to the variables included in a model; it cannot be interpreted as a risk ratio, or proof of causation.

3. RESULTS

3.1 Study cohort

A total of 392 pregnant women completed the study protocol. The largest age group was 24–30 years, comprising 184 participants (46.9%). A further 116 women (29.6%) were older than 30 years, while 92 (23.5%) were younger than 24 years. Most participants were classified as housewives or unemployed (332; 84.7%), whereas 60 (15.3%) were employed or working.

Characteristic	Category	n	%	Mean OHL score ± SD
Age	<24 years	92	23.5	11.2 ± 3.4
Age	24–30 years	184	46.9	14.8 ± 2.9
Age	>30 years	116	29.6	16.5 ± 3.1
Education	Primary / matriculate	148	37.8	10.4 ± 3.2
Education	Intermediate / graduate	164	41.8	15.1 ± 2.7
Education	Post-graduate	80	20.4	18.9 ± 2.2
Employment	Employed / working	60	15.3	17.2 ± 2.6
Employment	Housewife / unemployed	332	84.7	13.1 ± 3.5

3.2 Distribution of OHL

Participants with poor/low OHL had 269 (68.6%) as opposed to 123 (31.4%) in the adequate/high OHL group. The mean was 9.1 ± 1.8 in the low-OHL group and 19.4 ± 2.1 in the high-OHL group. The difference between these two reported group means is very large and corresponds with the categorization used to separate the 2 groups in the manuscript.

The trend was striking. Mean OHL was 10.4 ± 3.2 for the primary/matriculate group, 15.1 ± 2.7 for the intermediate/graduate group, and 18.9 ± 2.2 for the post-graduate group. As can be seen in the figure on page 6 of the source document, low OHL was least common among postgraduate participants and most common among primary/matriculate level students, whereas adequate/high OHL was most common among postgraduate students.

3.3 Employment and age trends

Mean OHL was greater among the employed/working group (17.2 ± 2.6) than among housewives/unemployed (13.1 ± 3.5). The means by age-group increased along the categories reported, from 11.2 ± 3.4 among women aged less than 24 years old to 16.5 ± 3.1 among women aged over 30 years. These are descriptive gradients. Without presenting the full adjusted models of the OHL outcome, they should be read as trends and not independent effects of age or employment. Overall, the cohort profile shows that low OHL was prevalent and was associated with less education and unemployment in the descriptive analysis. This pattern underscores the importance of communication strategies that do not presume that written information or lengthy clinical explanations will be easily understood by all patients.

3.4 Use of dental services

A total of 157 (40.1%) women had seen a dentist during this pregnancy, with 235 (59.9%) of the women reporting no dental consultation. Thus around three in five women in this group did not seek dental treatment during this time of pregnancy. This finding is of interest, as this group was sampled from antenatal and obstetric clinics, which are the settings within which oral-health related advice and referral could be given.

3.5 Perceived need and safety beliefs

Indicator	Response	n	%
Visited a dentist during pregnancy	Yes	157	40.1
Visited a dentist during pregnancy	No	235	59.9
Perceived need for a dental visit	Important / essential	83	21.2
Perceived need for a dental visit	Not important / unnecessary	309	78.8
Belief about treatment safety	Safe during pregnancy	163	41.6
Belief about treatment safety	Unsafe during pregnancy	229	58.4

A large majority (309; 78.8%) considered a dental visit unimportant or unnecessary during pregnancy, while only 83 (21.2%) considered it important or essential. In addition, 229 participants (58.4%) believed dental treatment was unsafe during gestation; 163 (41.6%) believed it was safe. These beliefs may influence care-seeking even when services are physically available.

3.6 Primary barriers to care

Reported primary barrier	n	%
Fear of fetal harm / pain	178	45.4
Financial constraints / cost	96	24.5
Lack of perceived symptoms	72	18.4

Dentist refusal / access denial	46	11.7

The primary barrier was fear of fetal harm or pain in 178 (45.4%) women, cost in 96 (24.5%), no perceived signs or symptoms in 72 (18.4%), and denial or refusal of service by the dentist in 46 (11.7%) women. Figure 1 presents the distribution of barriers by the number of women reporting each barrier. The estimates imply that barriers are cognitive and structural. Fear and lack of perceived need may be addresses through counseling, while cost and denial of care require provider or policy solutions.
Total adds up to 100% and 392 participants, suggesting that only a single major barrier was used for each participant in the table. If participants could tick more than one barrier in the questionnaire, it would be worth commenting on how the 'major' barrier was defined in each case, and how overlap was dealt with.

3.7 Logistic regression findings

The multivariable models revealed three factors were associated with use of dental services. Participants in the adequate / high OHL category were more likely to have visited a dentist compared to those in the inadequate / low OHL category (aOR= 2.38, 95% CI 1.52-3.74, p < 0.001). Post-graduate education and positive beliefs about the safety of receiving treatment during pregnancy were also associated with utilization of dental services (aOR = 2.45, 95% CI 1.42-4.22, p = 0.001 and aOR = 2.10, 95% CI 1.38-3.20, p <0.001).

Predictor	Outcome	aOR	95% CI	p-value
High OHL tier	Dental service utilization	2.38	1.52–3.74	<0.001
Post-graduate education	Dental service utilization	2.45	1.42–4.22	0.001
Belief treatment is safe	Dental service utilization	2.10	1.38–3.20	<0.001
High OHL tier	Untreated dental caries	0.54	0.30–0.99	0.045
Low OHL tier	Periodontal gingival bleeding	1.85	1.19–2.88	0.006

3.8 Clinical oral-health outcomes

High OHL was associated with lower odds of untreated dental caries (aOR = 0.54, 95% CI 0.30–0.99, p = 0.045). This estimate indicates 46% lower odds in the high-OHL group relative to the reference group, conditional on the variables included in the model. It does not mean that literacy reduced caries incidence by 46%, because the design is cross-sectional and the outcome is odds rather than incidence.

Low OHL was associated with higher odds of periodontal gingival bleeding (aOR = 1.85, 95% CI 1.19–2.88, p = 0.006). This corresponds to 85% higher odds relative to the model's reference group, subject to the same caution about adjustment and causal interpretation. The source manuscript does not provide the full model specification or absolute prevalence of these clinical outcomes.

3.9 Interpretation of the figures

The educational-gradient chart on page 6 of the source file visually reinforces the tabulated OHL means: low literacy is most frequent among women with primary/matriculate education, while high literacy is most frequent among post-graduates. The dental-utilization chart on the same page reports attendance of 26.4% in the low-OHL group and 68.3% in the high-OHL group. These percentages illustrate a marked unadjusted difference between literacy tiers.

The barrier chart on page 7 ranks fear of fetal harm or pain first, followed by financial constraints, lack of perceived symptoms, and dentist refusal/access denial. These graphics are useful for communicating the central patterns, but figure denominators and any rounding should be checked against the final analysis dataset.

4. DISCUSSION

4.1 Summary of the main findings

A consistent pattern of associations was seen across the constructs of literacy, beliefs, utilization, and clinical indicators. Over two-thirds of women had inadequate/low OHL, nearly three-fifths did not utilize dental services during pregnancy, most did not view a dental visit as important, and over half were not in favor of receiving dental treatment due to safety concerns, and fear of harm or pain to the fetus was the most common reported barrier. Adjusted odds ratios showed that dental utilization was greater in women who had high OHL, post-graduate education, and who believed that dental treatment was safe. The findings imply that OHL is important not only to knowledge but to the actual challenge of how to manage care. If a woman understands a recommendation, then considers it is relevant to her, asks questions, and can locate a suitable provider, she is more likely to have a dental visit. Nonetheless, this relation should not be taken as evidence that access to literacy alone will increase attendance. Service provision, cost, provider perspectives, and pregnancy are still relevant.

4.2. Schooling gradients in OHL

The change in scores with different educational categories is an interesting aspect. The difference between primary/matriculate and post-graduate categories indicates the influence of formal education and literacy on the processing of oral-health information (Hom et al., 2012; Muralidharan et al., 2019; Yeter & Şengül, 2022).

Education isn't a perfect proxy for health literacy. People of comparable levels of education can have very different language skills, knowledge of health systems, confidence to question, and access to credible information. The opposite is also true: those with limited formal education may have considerable practical knowledge when explained to clearly and caring staff. The evidence therefore recommends the universal use of plain-language communication with additional support for those who need it.

4.3 Job situation and material circumstances

The greater mean OHL score among employed respondents may also be caused by other factors such as access to resources, knowledge or previous experience of services, or education and income level. There is no evidence in the present data as to which of these factors account for the higher OHL scores among employed people. There may be similar links between employment and time, transport or insurance.

A holistic interpretation of the results must therefore not diminish what the results have to say about motivation of the individual. Literate practices are learned and taken place in social and institutional contexts. Health services can either facilitate patients' access to understanding or make the burden of interpreting complex instructions, referrals, and costs even heavier.

4.4 Misconceptions about dental care during pregnancy

The concern that 58.4% felt that treatment was unsafe is significant, as the perceived risks can sometimes be greater than the perceived benefit of going. The fear can be even greater when it is reinforced by family advice, health advice online, previous experiences, or uncertainty among health care professionals. It was also found in this study that 78.8% found dental visits unnecessary. These two beliefs can combine to make a woman more likely to delay seeking the dental care she needs. Counseling must be distinguish between routine preventive advice and assessment/ treatment for specific condition. Pregnant patients should be invited to let the dental team know that they are pregnant and to discuss their trimester, medical history, symptoms and planned treatment. Clinical advice should be given to the individual and in conjunction with the obstetric team if clinically indicated. The study did not assess specific procedures or treatment outcomes and must not be used to make specific statement regarding safety of procedures.

4.5 Fear, cost, symptoms, and provider barriers

Approximately 50 percent cited concern for fetal harm or pain as their primary barrier. This emphasizes the importance of respectful, neutral communication that prompts women to voice their fears. Directly addressing patients' incorrect beliefs without listening can undermine trust. Asking them what they have heard, stating you do not know, explaining why you are suggesting a certain treatment, and giving the patient a chance to voice her concerns can be more productive.

Cost was the second most prevalent barrier. Even if women value care, out of pocket fees, transport, lost income and childcare may prevent women from attending. The symptom free barrier reflects the idea that many women may only know dentistry as a treatment for pain and not as a service to prevent pain. Provider refusal and access denial suggest the system itself is a barrier to the woman attending, these barriers need specific actions and are not simply interchangeable.

4.6 OHL and Caries not treated

While the positive association of high OHL with lower odds of untreated caries aligns with the hypothesis that information on preventive advice, and how to access dental services, may contribute to receiving treatment early in the disease process, caries is complex. Beyond barriers to care and the role of OHL in treatment-seeking, diet, fluoride, saliva, oral hygiene, previous disease, and restorative care access all play important roles. This cross-sectional analysis cannot determine whether OHL preceded or resulted from reduced untreated disease.

4.7 OHL and bleeding of the gums

The link between low OHL and gingival bleeding could indicate less plaque control or awareness of symptoms, less frequent use of preventive measures and less access to periodontal examination. The increased gingival response to plaque caused by the increased hormonal level in pregnancy can be stimulated, but does not invalidate the use of oral hygiene measures. Sound advice on brushing and interdental hygiene, as well as referral for periodontal examination when necessary is appropriate.

4.8 Implications for antenatal and dental services

These findings support adding oral-health promotion to antenatal care, instead of depending on women to trigger a dental appointment. A short screening measure could include asking women if they have any current pain, swelling, bleeding gums, when they last visited the dentist and any barriers to care. Women reporting urgent symptoms can be referred for clinical assessment, and all women can be provided with brief oral health promotion and referral pathways.

Referral processes must be transparent. Maternity staff should be aware of which dental services will accept pregnant women, how to make an appointment, what information to pass on with a referral, and how urgent issues are communicated. The dental team should be well supported with professional guidance and an accessible consultation pathway with maternity clinicians – minimising the possibility of patients being refused or given conflicting advice.

4.9 Strengths

- The sample size was 392, providing an adequately-sized cohort for descriptive and regression analyses.
- Recruitment in both primary care and tertiary care obstetric settings may include women with different levels of care.

- We included four measures of oral-health practices at the same time as we examined literacy, beliefs, use, and clinical oral-health indicators.

- Significance was assessed after accounting for multiple variables using multivariable logistic regression.
- The article identifies practical barriers to access that could help to inform patient education and service organization.

4.10 Limitations

- Cross-sectional design does not allow for temporal sequence and causal relationship to be determined.
- Sampling of clinic attendees only may limit generalizability to other pregnant women not attending antenatal clinics.

- Self-reported dental attendance and barriers may be subject to recall and social-desirability bias.
- The particular OHL instrument, language adaptation, score cut-off and psychometric properties are not detailed in the manuscript provided.

- Clinical examination details, examiner calibration, diagnostic criteria used and sensitivity and specificity calculations are not described.

- Full regression covariate sets, missing-data procedures, and model diagnostics are not included.
- Potential confounds including smoking, income, insurance, diet, previous dental attendance, to be less well described, such as section of pregnancy.

- The studied period was over a number of years, and differences in service at different times or practices may have contributed to this.

5. Recommendations and Practice Framework

5.1 Integrate oral-health screening into antenatal care

For an example of a simple oral-health assessment to be included in routine antenatal workflow see checklist 1. Ask if the woman has toothache, swelling, bleeding gums, problems with eating or if she has visited the dentist recently. The intention of this screening is not to undertake a dental examination but to identify and refer concern appropriately.

5.2 Provide literacy-sensitive counseling

Materials should be in plain language, in short sentences, with familiar examples and visual explanations where appropriate. Be cautious with technical terms and jargon; check if the patient understands them by asking her to rephrase what she believes she understood about the next step. This helps verify whether or not she has understood the content of the explanation, rather than evaluating her knowledge. Materials should be translated into the languages of the target group.

5.3 Respect concerns for safety

With fear of harm to the fetus being the most common barrier, counseling may proactively seek questions on treatment in pregnancy. Antenatal and dental teams should provide consistent evidence-based messaging and ensure that they state that decisions will be based on the clinical situation of the woman and the care proposed. Women should be asked to inform dental professionals if they are pregnant and relevant medical history.

5.4 Reduce financial and logistical barriers

- Help your patient understand what public, subsidised or insurance-approved dental services they can access and how much they will cost.

- Coordinate referral procedures with clinics where pregnant women can be received and who do not have secret appointment procedures.

- Think about transport assistance, adaptable scheduling and preparation for your antenatal visits where appropriate.
- Follow-up on uncompleted referrals and inquire about barriers to follow-through-without passing judgment.

5.5 Strengthen provider capacity and inter professional coordination

Clear referral pathways on assessment and management of pregnant women are needed, including when to seek input from the obstetric team. Antenatal teams need to be clear on urgent oral complaints and referral pathways. Other clinical skills and orientation sessions could harmonise the team messages and ensure continuous messaging and reduce the confusion. The estimated barrier of refusal/access-denial by providers at 11.7% indicates this to be an issue of service quality as well as patient education.

5.6 Monitor implementation

A feasible monitoring and evaluation plan should contain both process and outcome indicators. Process indicators could be the proportion of women attending ante natal visits who have been screened, proportion counseled, number of referrals made, proportion of women attending a dental appointment. Outcome indicators could be change in attendance to the dentist, change in confidence self-rated, lack of treated dental caries and gingival bleeding. Data should be disaggregated by education, age, language and socioeconomic status to capture inequity.

5.7 Suggested staged implementation

Stage	Core activity	Example indicator
1. Prepare	Agree referral protocol; train staff; map services	Protocol approved; staff trained

2. Introduce	Screen and counsel during antenatal visits	% screened and counseled
3. Connect	Issue and track dental referrals	% of referrals completed
4. Improve	Review barriers and patient feedback	Attendance and experience trends

6. CONCLUSION

The baseline survey (N=392) of this group of pregnant women showed that low/inadequate oral health literacy was prevalent and dental service utilization during pregnancy was sparse. Four in ten pregnant women reported a dental visit. Four out of ten pregnant women did not report a dental visit; the majority considered it unnecessary, 52% thought dental treatment was unsafe during pregnancy. The predominant reported barriers to care were concern about pain or harming the fetus, cost, lack of symptoms, provider refusal and provider access denial.

Higher OHL was linked to higher odds of dental service use and lower odds of untreated dental caries, whereas low OHL was linked to higher odds of gum bleeding. Post-graduate education and concern about the safety of treatment were also linked to dental attendance. These results bolster a comprehensive approach of screening during antenatal care, providing clear and respectful counseling, ensuring dental referral options are available, and training providers. As this was a cross sectional, clinic-based study, these are all associations, not causations.

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