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Obstetrician Advice as a Key Determinant of Dental Visits During Pregnancy: A Cross-Sectional Study in China

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Abstract

Objectives

To assess oral health knowledge, attitudes, and practices (KAP) among pregnant women in Fuzhou, China, and to identify factors associated with dental visits during pregnancy.

Materials and Methods

A cross-sectional survey was conducted from 10 September to 31 October 2025 at a tertiary obstetrics clinic in Fuzhou, China. Participants were recruited at Fuzhou University Affiliated Provincial Hospital. Using consecutive recruitment with trimester quota sampling (DEFF ≈ 1), 452 pregnant women completed a structured questionnaire covering demographics, oral health knowledge (7 items), attitudes (6 items), behaviors, barriers, and information needs. Internal consistency was assessed (Attitudes: Cronbach's α; Knowledge: KR-20), and construct validity of the attitude scale was examined (KMO and Bartlett's test). Spearman correlation and multivariable logistic regression were performed.

Results

Mean Knowledge, Attitude, and Practice scores were 4.29 ± 1.79 (0–7), 24.35 ± 4.38 (6–30), and 2.96 ± 1.88 (0–10), respectively. Overall, 13.1% (59/452) reported a dental visit during pregnancy, increasing by trimester (7.3% ≤12 weeks; 11.8% 13–27 weeks; 20.0% ≥28 weeks). While 68.6% brushed at least twice daily, only 14.4% used dental floss. Knowledge and attitudes correlated positively with practice (Spearman r = 0.248 and r = 0.178; both p < 0.001). Among non-attenders, the most common primary barrier was lack of obstetrician advice or referral information (53.2%, 209/393). In adjusted analyses, obstetrician advice/referral was the strongest predictor of dental visits during pregnancy (aOR 6.30; 95% CI 3.22–12.32). Higher household income was also associated with dental attendance (15,000–24,999 RMB: aOR 3.32, 95% CI 1.02–10.75; ≥25,000 RMB: aOR 6.09, 95% CI 1.61–23.04, vs. <8,000 RMB), as was having a dental check within 6 months prior to pregnancy (aOR 2.19; 95% CI 1.18–4.07). Late pregnancy (≥ 28 weeks) showed a borderline association with utilization (aOR 2.22; 95% CI 0.99–4.99; p = 0.054). Education was not independently associated after adjustment.

Conclusions

Despite generally positive attitudes, dental service utilization and several preventive behaviors remained low. Integrating obstetrician-delivered counseling/referral into routine antenatal care and addressing pregnancy-specific safety misconceptions may improve timely dental attendance.

Clinical Relevance:

Embedding oral health counseling and a streamlined referral pathway within antenatal visits could reduce missed opportunities for dental care during pregnancy.

Trial Registration:

This study was registered in the China National Medical Research Registration System with the registration number: MR-35-25-062116. Registered on September 8, 2025.

1. Introduction

Pregnancy is accompanied by substantial hormonal and immunological changes that may increase susceptibility to oral diseases, particularly gingivitis and periodontal conditions [1, 2]. Periodontal disease is common during pregnancy; a recent systematic review and meta-analysis reported a pooled prevalence of approximately 40% worldwide [3]. In line with this vulnerability, clinical evidence has also documented measurable immunological and microbiological shifts in the oral environment during and after pregnancy [4].

Beyond local symptoms, maternal oral infections have attracted attention because of their potential association with adverse pregnancy outcomes (APOs). Proposed pathways include hematogenous dissemination of oral microorganisms or their products to the feto-placental unit, and systemic spillover of inflammatory mediators that may contribute to uterine activation and membrane weakening [1, 2]. Systematic reviews and umbrella reviews have reported associations between periodontitis and increased risks of preterm birth (PTB) and low birth weight (LBW), although heterogeneity in periodontal definitions, confounding control, and study quality remains a recurring concern [5–7]. The scope of concern may also extend beyond periodontitis: a systematic review suggests that apical periodontitis could be associated with APOs, albeit based on a limited evidence base [8]. Collectively, these findings underscore the clinical relevance of oral health within prenatal care.

Whether periodontal treatment during pregnancy reduces APOs remains debated. While recent evidence syntheses continue to refine the field—highlighting differences in intervention components, timing, and baseline risk profiles—conclusions on PTB prevention are not fully consistent [9]. This uncertainty does not negate the importance of timely dental assessment and management of symptomatic oral disease during pregnancy. Accordingly, professional bodies increasingly advocate incorporating oral health into antenatal care. A recent Chinese expert consensus provides trimester-informed recommendations regarding the management of common oral conditions and the safety considerations of dental procedures during pregnancy, and calls for strengthened interprofessional collaboration [10]. Internationally, the FDI World Dental Federation emphasizes perinatal and infant oral health and the integration of screening and referral into maternal care systems [11].

In practice, however, dental service utilization during pregnancy is often suboptimal. A systematic review of maternal beliefs shows that misconceptions about the safety of dental care—particularly local

anesthesia and radiography—are common and frequently reported as barriers to seeking care [12]. This pattern reflects an "attitude–practice gap," where women may endorse the importance of oral health yet still defer dental visits. Such a gap has also been observed in China; for example, a cross-sectional study in Shanghai reported high endorsement of the importance of regular oral examinations but relatively low uptake of preventive behaviors and limited dental attendance during pregnancy [13]. These observations suggest that improving awareness alone may be insufficient to translate into care-seeking behavior.

A potentially modifiable determinant is the role of antenatal care providers. Obstetricians and prenatal care teams are the most frequent and trusted point of contact for pregnant women, positioning them as practical "gatekeepers" for oral health counseling and referral. Nevertheless, evidence indicates that this opportunity is not fully leveraged. In Australia, almost all antenatal care providers agreed that maternal oral health is important, yet routine counseling and referral practices were limited [14]. More recent interprofessional studies similarly highlight gaps in guideline awareness and system-level barriers, including unclear referral pathways and limited training, which impede effective collaboration between antenatal and dental services [15, 16]. Importantly, oral health promotion programs initiated in prenatal settings have shown potential to improve knowledge and, in some contexts, increase dental attendance, supporting the feasibility of embedding brief "ask-and-refer" strategies into routine antenatal workflows [17]. However, evidence quantifying the strength of association between obstetrician-delivered advice/referral and dental attendance among pregnant women in Fujian Province remains scarce.

Therefore, this study aimed to assess oral health knowledge, attitudes, and practices (KAP) among pregnant women attending a tertiary hospital in Fuzhou, China, and to test whether receiving obstetrician advice/referral is an independent determinant of dental visits during pregnancy, using a pilot-tested questionnaire.

2. Materials and methods

2.1 Study design and setting

This cross-sectional study was conducted from 10 September to 31 October 2025 at the Department of Obstetrics, Fuzhou University Affiliated Provincial Hospital, Fuzhou, China. The survey assessed oral health knowledge, attitudes, and practices (KAP) and collected information on dental visits during the current pregnancy..

2.2 Participants, recruitment and sampling

Pregnant women attending routine antenatal visits were consecutively approached and invited to participate. To improve representativeness across gestational stages, recruitment was implemented with trimester-stratified quotas (≤ 12 weeks, 13–27 weeks, and ≥ 28 weeks). The recruitment process was therefore treated as approximately simple random sampling for analysis (design effect, DEFF = 1).

Eligibility criteria were: (1) confirmed pregnancy; (2) age ≥ 18 years; and (3) ability to complete a self-administered questionnaire. Questionnaires were excluded if they failed the built-in attention check (item A7) or if the primary outcome (dental visit during the current pregnancy) was missing. A total of 452 questionnaires were included in the final analysis.

2.3 Questionnaire development and content validation

Data were collected using the Pregnant Women Oral Health KAP Questionnaire (Version 1.1), developed for this study based on relevant literature, guideline/consensus recommendations, and clinical practice considerations. The initial item pool and wording were reviewed by a multidisciplinary panel (obstetrics and dental professionals) to evaluate item relevance, clarity, and comprehensiveness. Minor revisions were made before pilot testing and field implementation. The Chinese questionnaire used in this survey is provided as Online Resource 1, and an English translation is provided as Online Resource 2.

2.4 Questionnaire pre-testing

Prior to the main survey, the questionnaire was pre-tested in 50 pregnant women to assess feasibility and comprehensibility. Based on participant feedback, minor wording refinements were made, and the final Version 1.1 was used for the formal survey. Reliability and validity were evaluated in the main sample; results from the pre-test were used only as supportive information.

2.5 Measures and scoring

2.5.1 Sociodemographic and obstetric characteristics

Participants reported age group, gestational week and trimester, residence (urban/rural), gravidity, education level, occupation, and household monthly income. Oral health history included pre-pregnancy dental check within 6 months and self-reported oral problems before pregnancy. Obstetrician advice/referral was measured by asking whether, during this pregnancy, the obstetric provider had explicitly advised a dental visit or provided referral information (yes/no/don't remember).

2.5.2 Knowledge (K)

Knowledge was assessed using 7 items (K1–K7) addressing pregnancy-related oral conditions and the safety/timing of dental care (e.g., routine dental check-ups, scaling/restoration, local anesthesia, radiography under protection, and second-trimester timing). Each item had three response options ("Yes/No/Unclear"). As all knowledge statements were formulated as correct statements, "Yes" was scored 1, while "No/Unclear" was scored 0, yielding a total score ranging from 0 to 7 (higher scores indicating better knowledge).

2.5.3 Attitudes (A)

Attitudes were measured using 6 items (A1–A6) on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Item content covered perceived importance of oral hygiene in pregnancy, perceived safety of dental care under professional protection, willingness to accept treatment if advised, and the

desire for antenatal oral health guidance. The attitude total score ranged from 6 to 30. Item A7 was used as an attention-check and was not included in the attitude score.

2.5.4 Practices/behaviors (P)

Oral health practices included brushing frequency, use of oral hygiene aids, routine preventive dental habits prior to pregnancy, and dental service utilization during pregnancy. A composite practice score (range 0–10) was constructed a priori by summing points assigned to (1) brushing frequency (0–3 points), (2) use of oral hygiene aids (toothbrush, electric toothbrush, dental floss, interdental brush; 0–4 points), (3) routine annual scaling/check habit prior to pregnancy (0–1 point), and (4) dental visit during pregnancy (0–2 points). Higher scores indicated better self-reported practices.

2.5.5 Barriers, facilitators, information sources and intention

Among participants who reported no dental visit during pregnancy, the main barrier was recorded using a single-choice item (BR1). Facilitators (BR2; up to three selections), information sources (I1), receipt of antenatal oral health education (I2), and intended actions in response to toothache (E1) were also collected. An optional open-ended item captured suggestions regarding desired hospital services.

2.6 Outcome definition

The primary outcome was dental service utilization during the current pregnancy, defined as a self-reported visit to dental/oral health services (including examination, scaling, restoration, or treatment) and analyzed as a binary variable (yes/no). Secondary outcomes included K, A, and P scores, and self-reported barriers/facilitators.

2.7 Reliability and validity assessment

Internal consistency reliability was assessed for the knowledge scale using Kuder–Richardson Formula 20 (KR-20) and for the attitude scale using Cronbach's alpha. Construct validity of the attitude items was examined using exploratory factor analysis based on the inter-item correlation matrix, with standard adequacy checks (KMO and Bartlett's test) and factor loadings evaluated for interpretability.

2.8 Statistical analysis

Analyses were conducted in SPSS (version 26.0). Categorical variables were summarized as frequency and percentage; continuous variables were summarized as mean (standard deviation) or median (interquartile range) depending on distribution. Associations with dental service utilization were examined using chi-square tests (or Fisher's exact tests when appropriate) for categorical variables and appropriate non-parametric tests for score comparisons when distributional assumptions were not met.

Spearman's rank correlation was used to evaluate associations among K, A, and P scores. Multivariable logistic regression was used to identify independent predictors of dental visits during pregnancy, with

adjusted odds ratios (aORs) and 95% confidence intervals (CIs) reported. A two-sided $P < 0.05$ was considered statistically significant.

2.9 Ethics

This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Fujian Provincial Hospital (Approval No. K 2025-09-001). Written informed consent was obtained from all participants prior to participation.

3. Results

3.1 Participant flow and dental attendance during pregnancy

A total of 480 questionnaires were returned. After excluding 28 questionnaires due to incomplete or invalid responses, 452 pregnant women were included in the final analysis (Fig. 1). Among the included participants, 59 (13.1%) reported at least one dental visit during the current pregnancy, whereas 393 (86.9%) reported no dental visit. Dental visit rates appeared to increase across gestational stages, as further illustrated in Fig. S2 (Online Resource 3)

A total of 480 questionnaires were returned; 28 were excluded due to incomplete or invalid responses, and 452 were included in the final analysis. Among included participants, 59 reported a dental visit during pregnancy and 393 reported no dental visit.

3.2 Participant characteristics by dental visit status

Participant characteristics stratified by dental visit status are presented in Table 1. Dental attendance during pregnancy differed significantly by gestational stage ($P = 0.004$), household monthly income ($P = 0.013$), dental check within 6 months prior to pregnancy ($P = 0.008$), and receipt of obstetrician advice/referral during antenatal care ($P < 0.001$). In particular, the proportion reporting obstetrician advice/referral was higher among women who visited a dentist than among those who did not (61.0% vs 20.9%).

No statistically significant differences were observed for age, residence, gravidity, education level, or occupation (all $P > 0.05$).

Table 1
Participant characteristics and dental service utilization during pregnancy (n = 452)

Characteristic	Category	Total (n = 452)	Dental visit (n = 59)	No dental visit (n = 393)	P value
Age (years)	18–24	45 (10.0)	4 (6.8)	41 (10.4)	0.246
	25–29	177 (39.2)	30 (50.8)	147 (37.4)	
	30–34	163 (36.1)	20 (33.9)	143 (36.4)	
	35–39	59 (13.1)	5 (8.5)	54 (13.7)	
	≥ 40	8 (1.8)	0 (0.0)	8 (2.0)	
Gestational stage	≤ 12 weeks	150 (33.2)	11 (18.6)	139 (35.4)	0.004
	13–27 weeks	152 (33.6)	18 (30.5)	134 (34.1)	
	≥ 28 weeks	150 (33.2)	30 (50.8)	120 (30.5)	
Residence	Urban	357 (79.0)	48 (81.4)	309 (78.6)	0.758
	Rural	95 (21.0)	11 (18.6)	84 (21.4)	
Gravidity	First pregnancy	241 (53.3)	31 (52.5)	210 (53.4)	0.988
	Second pregnancy	172 (38.1)	23 (39.0)	149 (37.9)	
	Third or more	39 (8.6)	5 (8.5)	34 (8.7)	
Education	Junior high or below	38 (8.4)	2 (3.4)	36 (9.2)	0.657
	High school/technical secondary	70 (15.5)	9 (15.3)	61 (15.5)	
	College/associate	111 (24.6)	16 (27.1)	95 (24.2)	
	Bachelor	184 (40.7)	26 (44.1)	158 (40.2)	

Notes: Data are presented as n (%). P values were calculated using the chi-square test (or Fisher's exact test where appropriate).

Characteristic	Category	Total (n = 452)	Dental visit (n = 59)	No dental visit (n = 393)	P value
	Master or above	49 (10.8)	6 (10.2)	43 (10.9)	
Occupation	Employed	349 (77.2)	46 (78.0)	303 (77.1)	0.732
	Homemaker	56 (12.4)	8 (13.6)	48 (12.2)	
	Student	12 (2.7)	0 (0.0)	12 (3.1)	
	Unemployed	23 (5.1)	3 (5.1)	20 (5.1)	
	Other	12 (2.7)	2 (3.4)	10 (2.5)	
Household monthly income (RMB)	< 8000	65 (14.4)	4 (6.8)	61 (15.5)	0.013
	8000–14999	185 (40.9)	18 (30.5)	167 (42.5)	
	15000–24999	155 (34.3)	26 (44.1)	129 (32.8)	
	≥ 25000	47 (10.4)	11 (18.6)	36 (9.2)	
Dental check within 6 months before pregnancy	Yes	150 (33.2)	29 (49.2)	121 (30.8)	0.008
	No	302 (66.8)	30 (50.8)	272 (69.2)	
Pre-pregnancy oral problems	Any problem	305 (67.5)	45 (76.3)	260 (66.2)	0.290
	None	110 (24.3)	11 (18.6)	99 (25.2)	
	Uncertain	37 (8.2)	3 (5.1)	34 (8.7)	
Obstetrician advice/referral during antenatal care	Yes	118 (26.1)	36 (61.0)	82 (20.9)	< 0.001
	No	288 (63.7)	17 (28.8)	271 (69.0)	
	Not sure/Do not recall	46 (10.2)	6 (10.2)	40 (10.2)	

Notes: Data are presented as n (%). P values were calculated using the chi-square test (or Fisher's exact test where appropriate).

3.3 Oral health knowledge, attitudes, and practices

Overall KAP results are summarized in Table 2. The mean knowledge score was 4.29 ± 1.79 (range 0–7). Knowledge was relatively high for pregnancy-related gingival inflammation (83.6%) and the potential link between severe gum problems and adverse pregnancy outcomes (75.2%). However, uncertainty was common regarding the safety and timing of dental care during pregnancy, including local anesthesia (41.4% “not sure”), dental radiography (39.2% “not sure”), and the second trimester as the safest period for dental treatment (48.2% “not sure”).

Attitudes toward oral health during pregnancy were generally positive, with a mean attitude score of 24.35 ± 4.38 (range 9–30). In contrast, practice scores were comparatively low (mean 2.96 ± 1.88, range 0–9). Although 68.6% of participants reported brushing at least twice daily, use of interdental cleaning aids was uncommon (dental floss 14.4%; interdental brush 8.6%). The a priori scoring rubric used to derive the composite practice score is detailed in Table S2 (Online Resource 3). The distribution of the composite practice score by dental visit status is shown in Fig. S1 (Online Resource 3), and KAP score distributions across gestational stages are presented in Fig. S2a (Online Resource 3).

Table 2
Oral health knowledge, attitudes, and practices among pregnant women (n = 452).

Domain	Item/indicator	Value
Knowledge	K1. Hormonal changes during pregnancy may aggravate gingival inflammation	Yes 378 (83.6%); No 29 (6.4%); Uncertain 45 (10.0%)
	K2. Severe gum problems may increase the risk of preterm birth	Yes 340 (75.2%); No 34 (7.5%); Uncertain 78 (17.3%)
	K3. Routine dental check-ups are permissible during pregnancy	Yes 317 (70.1%); No 50 (11.1%); Uncertain 85 (18.8%)
	K4. Dental cleaning and fillings are generally safe during pregnancy under professional care	Yes 251 (55.5%); No 45 (10.0%); Uncertain 156 (34.5%)
	K5. Local anesthesia may be used when necessary during pregnancy	Yes 226 (50.0%); No 39 (8.6%); Uncertain 187 (41.4%)
	K6. Dental X-rays are usually safe during pregnancy with proper assessment and protection	Yes 227 (50.2%); No 48 (10.6%); Uncertain 177 (39.2%)
	K7. The second trimester (13–27 weeks) is the safest period for dental treatment	Yes 201 (44.5%); No 33 (7.3%); Uncertain 218 (48.2%)
Attitudes	A1. Keeping teeth clean is important for pregnancy health	4.35 ± 0.91 (1–5)
	A2. Dental visits are usually safe during pregnancy with professional assessment and protection	3.73 ± 1.21 (1–5)
	A3. If recommended by a doctor, I would accept treatment during pregnancy	4.03 ± 1.15 (1–5)
	A4. I would like to receive oral care guidance during antenatal visits	4.23 ± 1.03 (1–5)
	A5. I am willing to attend an oral health education session for pregnant women	3.80 ± 1.26 (1–5)
	A6. Pregnant women should have regular oral examinations	4.22 ± 1.06 (1–5)
Practices	Brushing frequency	0/day 26 (5.8%); 1/day 116 (25.7%); 2/day 162 (35.8%); ≥3/day 148 (32.7%)
	Brushing ≥ 2/day	310 (68.6%)
	Electric toothbrush	158 (35.0%)

Notes: Data are presented as n (%) or mean ± SD. Total scores are presented as mean ± SD and median (IQR). **Abbreviations**: IQR, interquartile range; SD, standard deviation.

Domain	Item/indicator	Value
	Dental floss	65 (14.4%)
	Interdental brush	39 (8.6%)
	No listed aids used	19 (4.2%)
	Gingival bleeding during pregnancy	Often 29 (6.4%); Sometimes 277 (61.3%); Never 146 (32.3%)
	Routine annual scaling/check prior to pregnancy	Yes 125 (27.7%); No 221 (48.9%); Not sure 106 (23.5%)
	Toothache during pregnancy	114 (25.2%)
	If toothache: visited a dentist	Yes 54 (47.4%); No 53 (46.5%); Not sure 7 (6.1%)
	Dental visit during pregnancy (B7)	59 (13.1%)
Total scores	Knowledge total score (0–7)	4.29 ± 1.79; median 5 (IQR 3–6); range 0–7
	Attitude total score (6–30)	24.35 ± 4.38; median 25 (IQR 21–28); range 9–30
	Practice total score (0–10)	2.96 ± 1.88; median 3 (IQR 2–4); range 0–9

Notes: Data are presented as n (%) or mean ± SD. Total scores are presented as mean ± SD and median (IQR). **Abbreviations**: IQR, interquartile range; SD, standard deviation.

3.4 Psychometric properties and correlations among KAP scores

Internal consistency was acceptable for the attitude scale (Cronbach's α = 0.738) and modest for the knowledge scale (KR-20 = 0.609) (Table S4,Online Resource 3). Construct validity of the attitude items was supported by exploratory factor analysis (KMO = 0.823; Bartlett's test of sphericity $P < 0.001$), with factor loadings ranging from 0.575 to 0.726 (Table S3,Online Resource 3). Spearman correlation analysis showed that knowledge and attitudes were positively correlated with practice (knowledge–practice $\rho = 0.248$; attitude–practice $\rho = 0.178$; both $P < 0.001$), and knowledge was positively correlated with attitudes ($\rho = 0.283$; $P < 0.001$) (Table S5,Online Resource 3).

3.5 Barriers and facilitators to dental visits among non-visitors

Among the 393 women who did not visit a dentist during pregnancy, the most frequently reported primary barrier was lack of obstetrician advice/referral information (53.2%, 209/393). Other common barriers included being unaware that dental care is allowed during pregnancy (8.4%) and not knowing

where to seek dental care (8.4%). Concerns about fetal harm (5.6%), cost/insurance issues (5.6%), and lack of time (5.3%) were also reported; full distributions are shown in Table 3 and visualized in Fig. 2.

Regarding potential facilitators (multiple response), the most frequently endorsed were family support/accompaniment (37.9%) and explicit recommendation from an obstetrician (31.6%), followed by a priority pathway for pregnant women (30.0%) and reimbursement of most costs (29.0%).

Table 3
Barriers and facilitators for dental visits during pregnancy among non-visitors (n = 393).

Item	n	%
A) Primary barrier (single choice)		
No obstetrician advice/referral	209	53.2
Unaware dental care is allowed during pregnancy	33	8.4
Do not know where to seek dental care	33	8.4
Concern about fetal harm	22	5.6
Cost/insurance issues	22	5.6
Lack of time	21	5.3
Fear of dental treatment (pain/drilling)	17	4.3
Cannot find a trusted dental clinic	16	4.1
Symptoms not serious	12	3.1
Prefer postpartum treatment	6	1.5
Lack of family support	2	0.5
Other	0	0.0
B) Potential facilitators (multiple response; up to three options)		
Family support/accompaniment	149	37.9
Obstetrician explicitly recommends/requests	124	31.6
Priority pathway for pregnant women	118	30.0
Most costs reimbursed	114	29.0
Evidence that treatment is safe	105	26.7
Attended a relevant health lecture	89	22.6
Would not go under any circumstance	18	4.6

Notes: Data are presented as n (%). Percentages are calculated using the number of non-visitors as the denominator. Panel B is multiple response, percentages do not sum to 100%.

3.6 Factors associated with dental visits during pregnancy

Multivariable logistic regression results are presented in Table 4 (full model in Table S1,Online Resource 3; Fig. 3).. After adjustment for residence and gravidity, obstetrician advice/referral was the strongest independent predictor of dental attendance. Compared with women who reported no advice/referral, those who reported receiving obstetrician advice/referral had substantially higher odds of visiting a dentist during pregnancy (aOR 6.30, 95% CI 3.22–12.32; P < 0.001).

Higher household monthly income was also independently associated with dental visits: compared with < 8,000 RMB, women with 15,000–24,999 RMB (aOR 3.32, 95% CI 1.02–10.75; P = 0.046) and ≥ 25,000 RMB (aOR 6.09, 95% CI 1.61–23.04; P = 0.008) showed higher utilization. Additionally, a dental check within 6 months prior to pregnancy was associated with higher odds of dental visits during pregnancy (aOR 2.19, 95% CI 1.18–4.07; P = 0.013). Late pregnancy (≥ 28 weeks) showed a borderline association (aOR 2.22, 95% CI 0.99–4.99; P = 0.054).

Points represent adjusted odds ratios (aORs) and horizontal lines indicate 95% confidence intervals. The vertical reference line indicates aOR = 1. The model was adjusted for residence and gravidity (see Table 4; full model in Table S1).

Table 4
Multivariable logistic regression for dental visit during pregnancy (n = 452).

Variable	Category	aOR	95% CI	P value
Obstetrician advice/referral (D10)	No (ref)	—	—	—
	Not sure/Do not recall	1.95	0.70–5.42	0.2
	Yes	6.30	3.22–12.32	< 0.001
Household monthly income (RMB)	< 8,000 (ref)	—	—	—
	8,000–14,999	1.89	0.57–6.29	0.298
	15,000–24,999	3.32	1.02–10.75	0.046
	≥ 25,000	6.09	1.61–23.04	0.008
Gestational stage (weeks)	≤ 12 (ref)	—	—	—
	13–27	1.21	0.51–2.86	0.663
	≥ 28	2.22	0.99–4.99	0.054
Dental check within 6 months pre-pregnancy	No (ref)	—	—	—
	Yes	2.19	1.18–4.07	0.013
Education	Junior high or below (ref)	—	—	—
	High school/technical	2.82	0.53–15.07	0.225
	College	3.08	0.62–15.40	0.17
	Bachelor	2.53	0.53–12.15	0.245
	Postgraduate	1.80	0.30–10.76	0.52
Notes: Model adjusted for residence and gravidity (full model shown in Table S1).				

4. Discussion

This cross-sectional study offers a detailed examination of the oral health knowledge, attitudes, and practices among pregnant women in Fuzhou, China, and highlights the factors influencing dental service utilization during pregnancy. Despite a generally positive attitude toward maternal oral health, the actual

rate of dental attendance was surprisingly low, with only 13.1% of participants reporting a dental visit during pregnancy. This finding mirrors previous reports from both China and other countries, underscoring the ongoing issue of underutilization of dental care during pregnancy, even in settings where antenatal care access is relatively strong [13,18,19].

The dental attendance rate observed in our study aligns with findings from other regions in eastern China, though it is notably lower than the rates reported in some high-income countries. This disparity points to the significant role that contextual and healthcare system-related factors play in shaping care-seeking behavior [18,19]. Existing systematic reviews have consistently shown that factors such as socioeconomic status, perceived need, health beliefs, and the advice of healthcare professionals are key determinants of dental attendance during pregnancy, while knowledge alone is not sufficient to drive action[19]. Our results support this broader body of evidence, suggesting that although women may hold favorable attitudes toward oral health, these attitudes do not automatically lead to increased dental service utilization.

One of the most significant and novel findings from this study is the strong correlation between obstetrician advice or referral and dental visits during pregnancy. Women who reported receiving advice from their obstetrician were over six times more likely to attend dental services, making this the most powerful factor identified in the multivariable model. This finding is consistent with prior research, which has demonstrated that recommendations from prenatal care providers can play a critical role in normalizing dental care during pregnancy and alleviating concerns regarding its safety[14,15,20]. Obstetricians are frequently the most trusted and accessible healthcare providers during pregnancy, and their recommendations may serve as a crucial prompt for patients to seek dental care, especially in contexts where misconceptions about dental treatment, anesthesia, and radiography are still widespread.

Socioeconomic factors also contributed to disparities in dental attendance. Higher household income and a dental check within six months prior to pregnancy were independently associated with dental visits during pregnancy, reflecting the importance of continuity of preventive care and existing engagement with oral health services. Similar associations have been reported in other populations, where women with established dental care habits before pregnancy were more likely to maintain dental attendance during pregnancy [19,21]. In contrast, education level was not independently associated with utilization after adjustment, suggesting that formal education alone may be insufficient to overcome practical, perceptual, and system-related barriers to care.

Within the KAP framework, knowledge and attitudes were positively correlated with oral health practices, although these associations were modest. This pattern reflects a persistent attitude–practice gap that has been documented in multiple studies of pregnant women, both in China and internationally [12,22,23]. While adequate knowledge and positive attitudes are necessary components of behavior change, they appear insufficient in isolation to prompt dental attendance during pregnancy. Our findings

suggest that the translation of knowledge into action may depend heavily on reinforcing signals from healthcare providers and on the removal of structural barriers within the healthcare system.

The analysis of barriers and facilitators further supports this interpretation. Among women who did not attend dental services, lack of obstetrician advice was the most commonly reported primary barrier, followed by uncertainty regarding the safety of dental care and limited awareness of service access. These barriers mirror those identified in systematic reviews and qualitative studies, which consistently highlight safety concerns, cost, time constraints, and unclear referral pathways as major impediments to prenatal dental care [12,16,19]. Conversely, the most frequently endorsed facilitators—explicit obstetrician recommendation, family support, priority access for pregnant women, and cost reimbursement—point toward actionable strategies that extend beyond individual education.

Taken together, these findings underscore the importance of integrating oral health into routine antenatal care. Evidence from interprofessional and health promotion studies suggests that brief oral health screening, counseling, and referral delivered within prenatal care settings can improve knowledge and, in some contexts, increase dental attendance during pregnancy [17,24]. Our results add to this evidence by quantifying the magnitude of the association between obstetrician advice and dental visits, highlighting provider engagement as a particularly promising and modifiable intervention target.

Of course, there are several limitations to this study. The cross-sectional design prevents us from making causal inferences, and self-reported data may be susceptible to recall bias or social desirability bias. Moreover, because participants were recruited from a single tertiary hospital, the generalizability of our findings to other regions or healthcare settings may be limited. Nonetheless, the use of a pilot-tested questionnaire, comprehensive assessment of KAP domains, and multivariable adjustments strengthen the validity of our conclusions.

In conclusion, while attitudes toward oral health are generally positive, dental service utilization during pregnancy remains low in this population. Obstetrician advice and referral emerged as the most influential and potentially modifiable determinant of dental attendance. These findings support the integration of structured oral health counseling and referral mechanisms into routine antenatal care, serving as a practical strategy to bridge the attitude–practice gap and improve maternal oral health outcomes.

5. Conclusion

Despite generally positive attitudes toward oral health, dental service utilization during pregnancy remains low among women attending a tertiary hospital in China. Obstetrician advice or referral emerged as the strongest determinant of dental attendance, highlighting the pivotal role of antenatal care providers in influencing oral health–related behaviors during pregnancy. Integrating oral health counseling and streamlined referral pathways into routine antenatal care may help reduce missed opportunities for timely dental care and improve maternal oral health during pregnancy.

Abbreviations

KAP - Knowledge, Attitudes, and Practices

aOR - Adjusted Odds Ratio

CI - Confidence Interval

DEFF - Design Effect

KR-20 - Kuder-Richardson Formula 20

Cronbach's α - Cronbach's Alpha

KMO - Kaiser-Meyer-Olkin

SD - Standard Deviation

IQR - Interquartile Range

SPSS - Statistical Package for the Social Sciences

α - Alpha

Declarations

6.2 Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki. The protocol was approved by the Ethics Committee of Fuzhou University Affiliated Provincial Hospital (Approval No. K 2025-09-001). Written informed consent was obtained from all participants before participation in the study.

6.3 Consent for publication

Written informed consent for publication was obtained from all participants.

6.4 Availability of data and materials

Data is available upon reasonable request.

6.5 Competing Interests

The authors declare no competing interests.

6.6 Funding

This paper was not funded.

6.7 Authors' contributions

Kaijia Xue: Conceptualization; Methodology; Investigation; Data curation; Formal analysis; Visualization; Writing—original draft; Writing—review & editing.

Jiaju Liu: Conceptualization; Supervision; Methodology; Writing—review & editing; Corresponding author.

Yi Lin: Methodology; Supervision; Writing—review & editing.

Liang Lin: Data curation; Formal analysis; Visualization; Software.11 Data Availability Statement

6.8 Acknowledgements

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Supplementary information The online version contains supplementary material. The Chinese questionnaire used in this survey is provided as **Online Resource 1**, and an English translation is provided as **Online Resource 2**. Additional tables and figures are provided as **Online Resource 3**, including the full regression model (Table S1), the practice score rubric (Table S2), psychometric diagnostics (Tables S3–S5), and additional visualizations (Figs. S1–S2).

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Figures

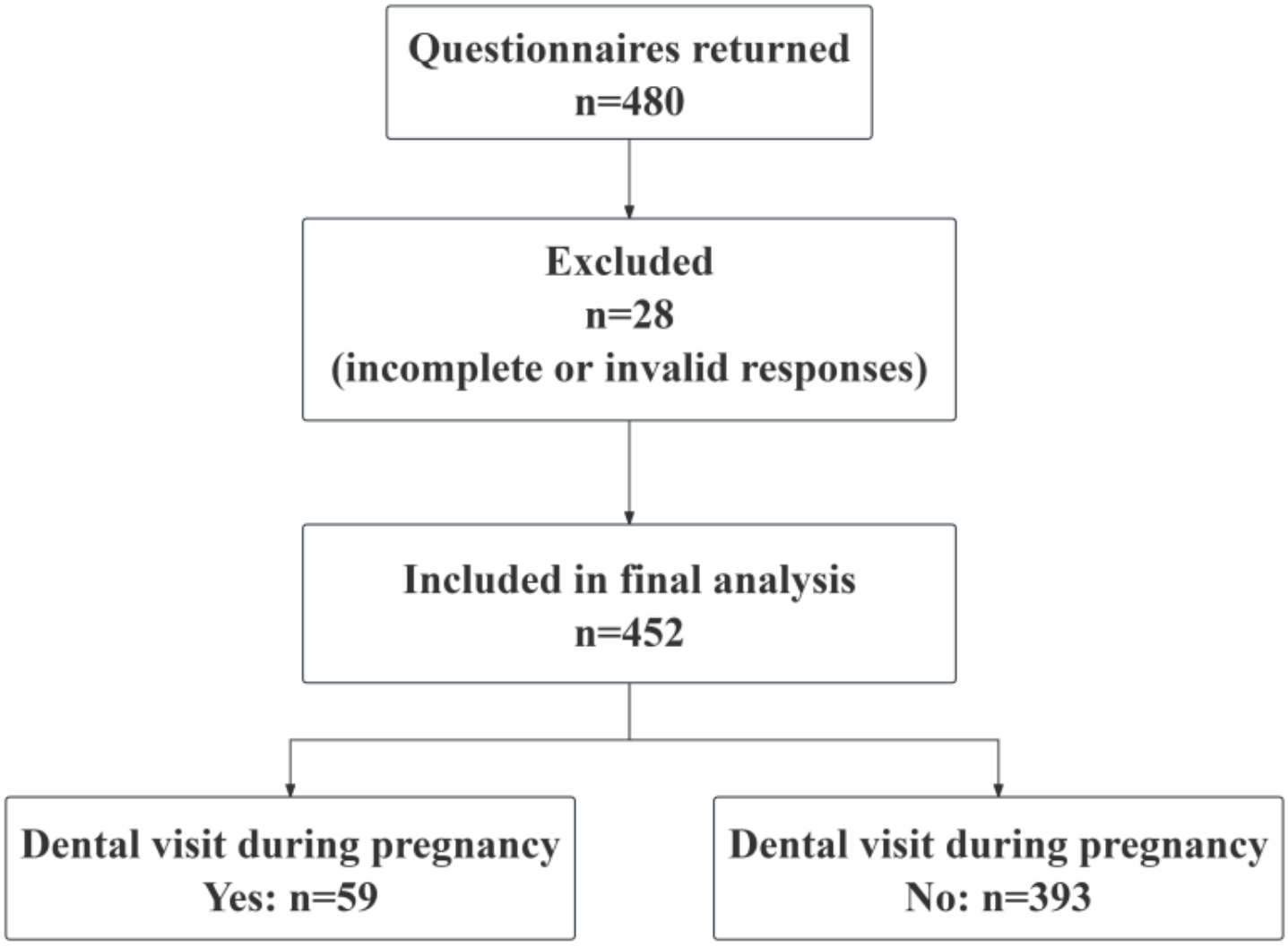

Figure 1

Study flow diagram

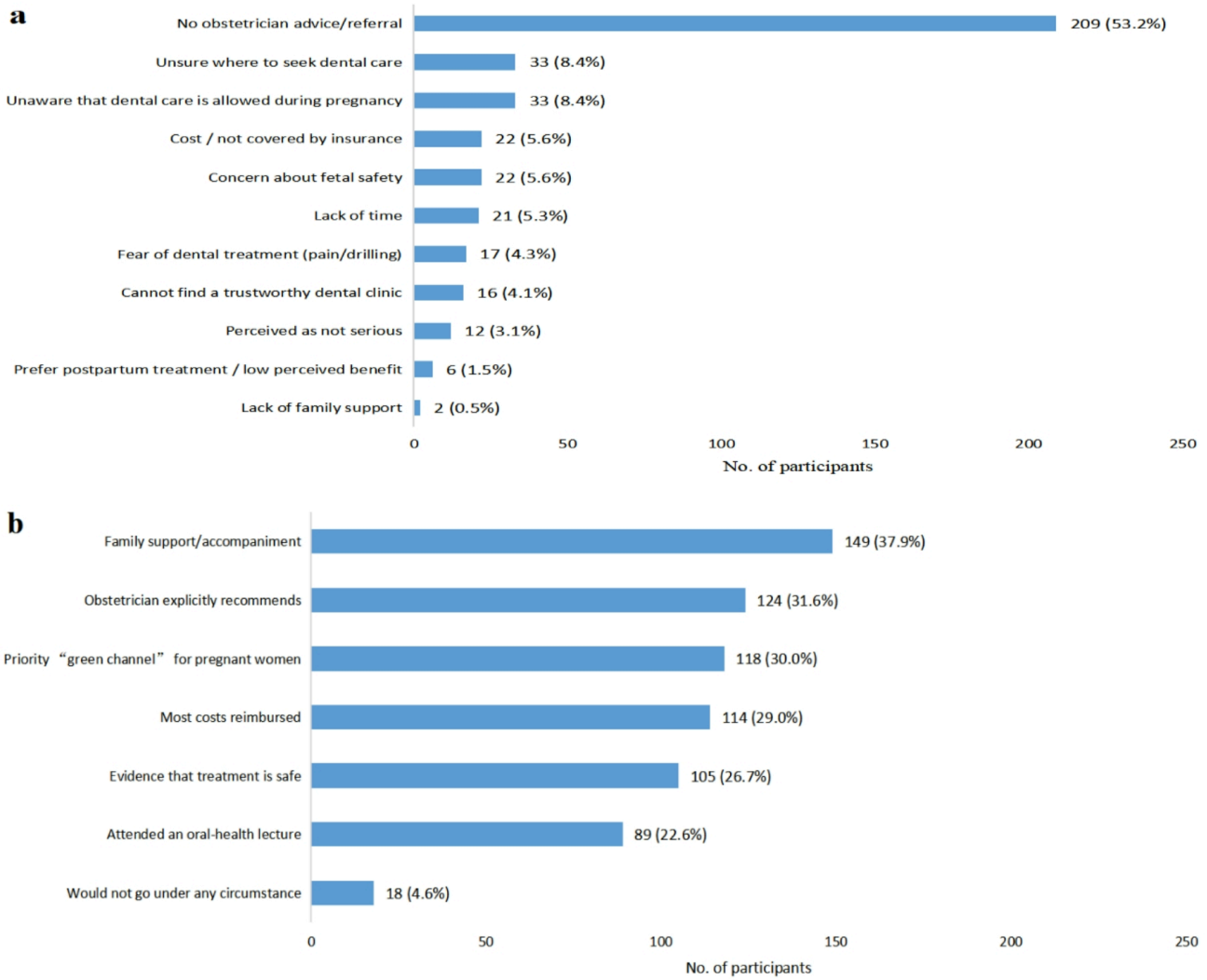

Figure 2

Barriers and facilitators to dental visits during pregnancy among non-visitors (n = 393)

(a) Primary barriers (single choice). (b) Potential facilitators (multiple response; percentages do not sum to 100)

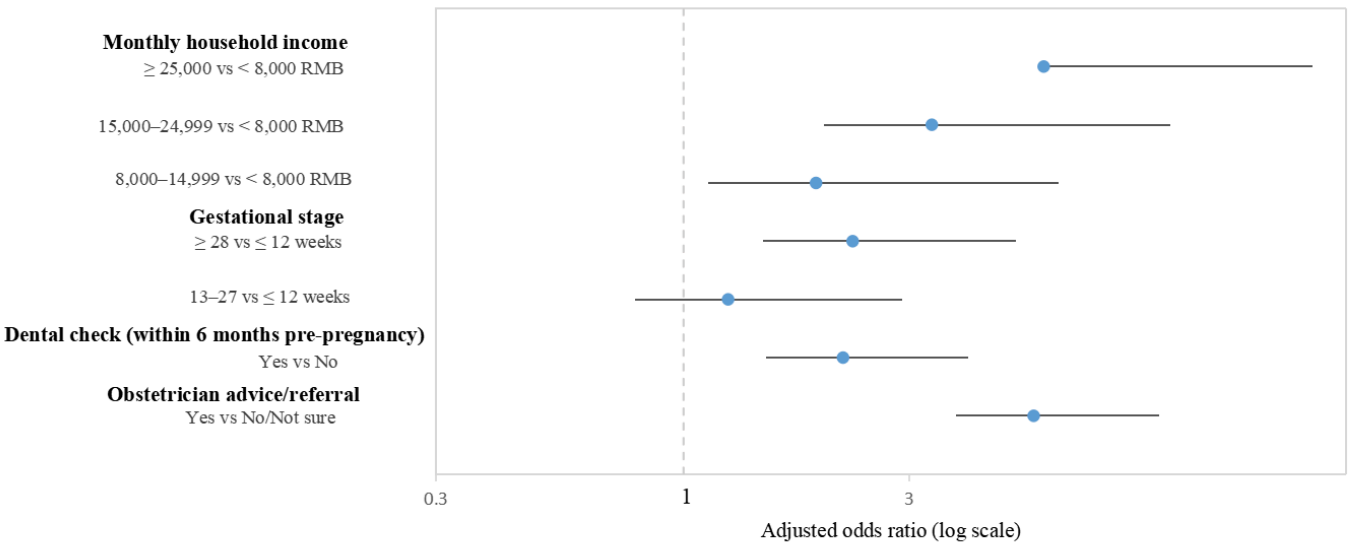

Figure 3

Factors associated with dental visits during pregnancy: multivariable logistic regression (n = 452)

Points represent adjusted odds ratios (aORs) and horizontal lines indicate 95% confidence intervals. The vertical reference line indicates aOR = 1. The model was adjusted for residence and gravidity (see Table 4; full model in Table S1).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- ESM1.pdf
- ESM2.pdf
- ESM3.pdf