

Original Article

## A Comprehensive Literature Review Exploring the Factors behind Tooth Loss in Pregnant Women

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### ABSTRACT

Physiological changes during pregnancy can affect oral health and often lead to tooth loss, which is a common concern among expectant mothers. This review aimed to review the available literature on the diagnosis of tooth loss during pregnancy. A comprehensive search was conducted across Cochrane, ScienceDirect, Medline, CINAHL via EBSCOhost, and Google Scholar, resulting in the inclusion of 6 relevant studies. Several factors were found to be significantly associated with tooth loss in pregnant women. Demographic influences included place of residence, parity, and household size, while psychological factors were represented by lifetime anxiety. Dietary factors encompassed magnesium intake and vegetable consumption, excluding those categorized as yellow and green. Behavioral factors such as active and passive smoking, along with the duration since the last dental visit, were also identified as influential. These findings highlight the necessity of integrating oral health education into prenatal care. Further high-quality studies are needed to validate these results and enhance understanding of the mechanisms behind pregnancy-related tooth loss. This knowledge is essential for developing effective preventive and intervention strategies to improve maternal and child health outcomes.

**Keywords:** Oral health, Pregnancy, Prenatal care, Preventive dentistry, Primary healthcare, Dental care.

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### Introduction

During pregnancy, the body undergoes significant hormonal changes, including increased levels of progesterone and estrogen released by the placenta, which affect various tissues in the body [1, 2]. Clinical studies have shown that these hormonal fluctuations impact oral tissues as well [3]. The exposure to hormones during pregnancy influences periodontal health throughout a woman's life, as periodontal tissues contain receptors for estrogen, progesterone, and androgen [4-6]. Estrogen has been found to play a role in the synthesis and maintenance of fibrous collagen in these tissues [7], while progesterone

directly contributes to the formation of bone and reabsorption in the periodontium [8, 9].

Periodontal disease has been linked to a range of systemic conditions, including complications during pregnancy [10, 11]. Mothers with periodontal issues, such as attachment loss, would deliver more babies with low birth weights compared to those with healthy periodontal tissues [12-15]. Studies have also shown a significant association between periodontal disease and preterm birth [12, 16, 17]. Lopez et al. found that periodontal treatment reduced the risk of low birth weight and preterm birth in women with periodontitis. Gingivitis affects more than one-third of pregnant women [18], causing symptoms like swollen, red, and inflamed gums. If left untreated, gingivitis can progress

to periodontitis, which would result in bone loss and, eventually, tooth loss. Research by Lieff *et al.* suggests that around 40% of pregnant women experience periodontitis [19]. Additionally, many cultural beliefs, such as the old German saying “every child costs the mother one tooth,” reinforce the notion that pregnancy leads to tooth loss [20-22].

Tooth loss is a permanent condition that can have significant consequences for both oral and overall health. It has been linked to an increased risk of various chronic conditions such as chronic inflammatory changes in the gastric lining, cancers of the gastrointestinal tract and pancreas, gastric ulcers, kidney diseases, diabetes, sleep apnea, hypertension, heart disease, and stroke. Additionally, missing teeth are associated with a decline in oral health-related quality of life (OHRQoL), with the extent of impairment influenced by the type and pattern of tooth loss. Tooth loss often leads to challenges in everyday activities like eating, speaking, and smiling. Beyond the physical issues, it can also cause emotional distress, leading to embarrassment, lowered self-esteem, and social isolation.

Understanding the factors that contribute to tooth loss is essential for developing effective prevention strategies. This review aims to identify and summarize the key determinants of tooth loss during pregnancy, highlighting the importance of raising awareness and educating expectant mothers about the necessity of dental care during this period.

Tooth loss is a permanent condition that adversely affects both oral and overall health. It has been linked to increased risk factors for a range of health issues, including chronic inflammatory conditions in the stomach lining, cancers in the upper gastrointestinal tract and pancreas, chronic kidney disease, gastric ulcers, non-insulin-dependent diabetes, obstructive sleep apnea, heart failure, hypertension, ischemic heart

disease, and even strokes [23-30]. Studies have shown that tooth loss has a significant impact on OHRQoL, with the extent of this effect being influenced by the pattern and location of the lost teeth [31]. Missing teeth can make basic functions such as eating, speaking, and smiling challenging, while also contributing to cosmetic concerns that may result in social isolation. Additionally, psychological effects such as loss of self-esteem and embarrassment are common [32-35].

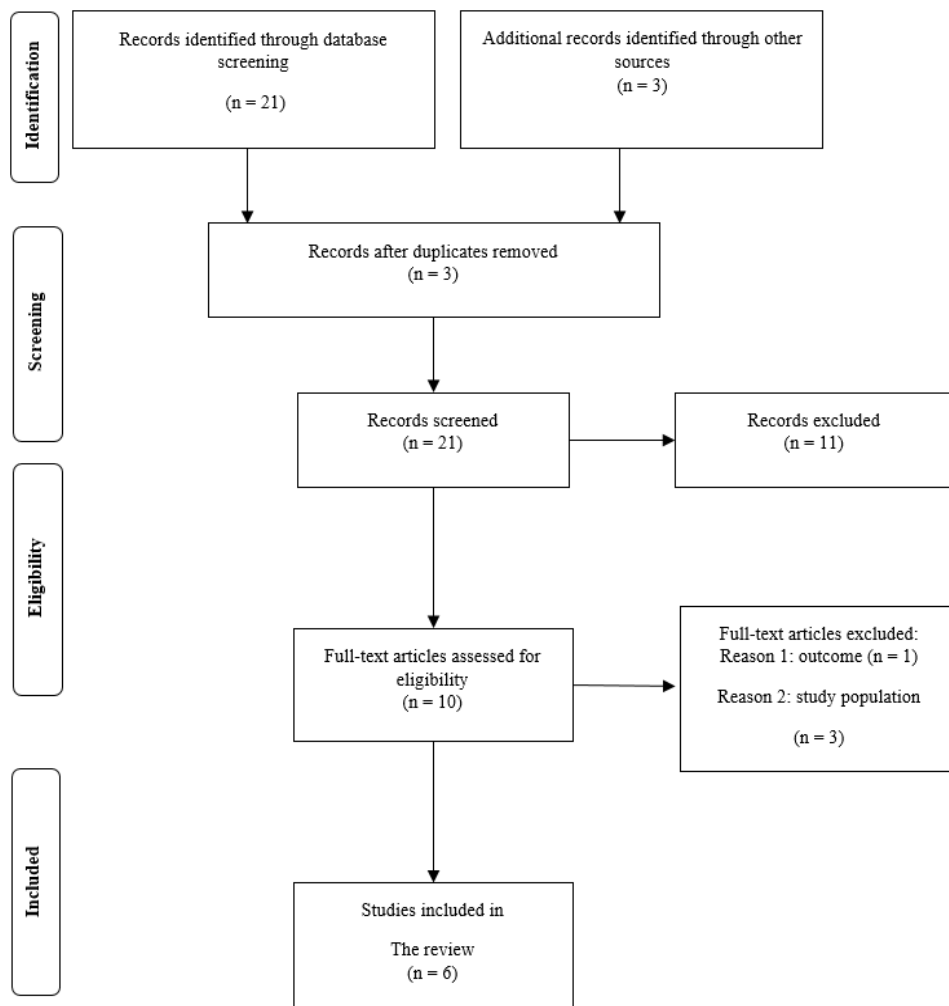
Recognizing the key factors that contribute to tooth loss is essential for developing effective prevention strategies to address this chronic condition. This review aims to highlight the determinants of tooth loss during pregnancy, providing valuable insights to enhance public awareness and inform pregnant women about the importance of dental care throughout their pregnancy.

## Materials and Methods

In June 2022, a comprehensive search was conducted using the following databases: ScienceDirect, Medline, CINAHL via EBSCOhost, Cochrane, and Google Scholar. The search was performed using the terms “tooth loss” or “teeth loss” in combination with “pregnancy” or “pregnant.” No restrictions were applied regarding the publication date or language.

## Results and Discussion

24 articles were gathered in the Mendeley reference manager, and any duplicates were eliminated. Following this, 21 articles underwent abstract screening, and 10 articles were selected for full-text screening (**Figure 1**). The key characteristics of the studies that were part of this review are outlined in **Table 1**.



**Figure 1.** Flow diagram of the selection of articles

**Table 1.** The key characteristics of the studies

Study	Location	Study design	Sample size	Age in years (mean/ range)	Exposure and its measurement	Outcome and its measurement	Main findings
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Wandera <i>et al.</i> [36]	Mbale region, Eastern Uganda	Cross-sectional	A total of 713 pregnant women, each around seven months into their pregnancy, participated in a clinical examination.	Mean age: $25.5 \pm 6.6$ years Age range: $\leq 20-45$ years	Socio-demographic factors, parity, dental care utilization, and oral hygiene care  Assessed by face-to-face interview	Tooth loss Measured by clinical examination	The occurrence of tooth loss was found to be higher in urban areas, with 42.5% of individuals affected, compared to 33.8% in rural areas. After accounting for potential confounding factors, certain variables were found to have a notable impact on tooth loss. Larger household size was associated with an increased likelihood of tooth loss (adjusted odds ratio (AOR): 1.5; 95% Confidence Interval (CI): 1.0-2.5). Interestingly, more children (higher parity) were linked to a reduced likelihood of tooth loss (AOR: 0.4; 95% CI: 0.2-0.8). Additionally, the timing of the last dental visit also played a role—those who had not visited the dentist recently had a significantly higher chance of experiencing tooth loss (AOR: 0.04; 95% CI: 0.02-0.1).
Silveira <i>et al.</i> [37]	USA	Cross-sectional	The study involved 402 pregnant women who answered questions as part of the 2010 behavioral risk factor surveillance system survey.	Pregnant women aged 18 years and above  Mean age was not reported	Lifetime anxiety, lifetime depression, and current depression  Lifelong anxiety and depression were assessed using the anxiety and depression module (ADM).  Current depression was assessed using the modified version of the patient health questionnaire 8 (PHQ-8).	Tooth loss Assessed by self-administered questionnaire	Among pregnant women, 21.2% experienced tooth loss. Notably, a history of lifetime anxiety was significantly correlated with tooth loss (AOR: 3.30, 95% CI: 1.01-10.77). However, no significant association was found between tooth loss and lifetime depression or current depression (AOR: 1.45, 95% CI: 0.54-3.85 for lifetime depression; AOR: 1.18, 95% CI: 0.44-3.16 for current depression).

Tanaka <i>et al.</i> [38]	Japan	Cross-sectional	A larger cohort of 1002 pregnant women from the Osaka maternal and child health study participated in the research.	Mean age: 29.8 years Age range: 15 to 44 years	Mineral intake: magnesium, calcium, copper, iron, zinc, and phosphate  Assessed by validated self-administered questionnaire of dietary intake in the past month	Tooth loss  Assessed by self-administered questionnaire	Among pregnant women, 25.6% reported tooth loss, with 21.4% losing between one and four teeth and 4.2% losing five or more. The study found a significant negative correlation between magnesium intake and tooth loss. Pregnant women in the highest quartile of magnesium intake had a lower likelihood of tooth loss compared to those in the lowest quartile (AOR: 0.64, 95% CI: 0.42-0.99). However, there was no significant relationship between tooth loss and the intake of calcium, phosphate, iron, zinc, or copper.
Tanaka <i>et al.</i> [39]	Japan	Cross-sectional	Another 1002 pregnant women, also from the Osaka maternal and child health study, were included in this investigation.	Mean age: 29.8 years	Fruits and vegetables intake  Assessed using a validated, self-completed past month dietary history questionnaire	Tooth loss  Assessed by self-administered questionnaire	Pregnant women who consumed higher amounts of vegetables, excluding yellow and green varieties, had a lower likelihood of tooth loss compared to those with lower vegetable intake (AOR: 0.64; 95% CI: 0.42-0.98), with the association showing a significant linear trend (P = 0.04). No such correlation was found between tooth loss and the consumption of vitamins, insoluble fiber, fruits, yellow/green vegetables, or grains.

Tanaka <i>et al.</i> [40]	Japan	Cross-sectional	A further group of 1002 pregnant women from the same Osaka maternal and child health study was studied for this research.	Mean age: 29.8 years	Beverage consumption and its frequency: milk, coffee, green tea, black tea, cola, 100% fruit juice  Assessed by validated self-administered diet history questionnaire in the past month	Tooth loss Assessed by self-administered questionnaire	Pregnant women who consumed higher amounts of coffee had a reduced likelihood of tooth loss compared to those who consumed less (AOR: 1.52, 95% CI: 1.04-2.22). Similarly, moderate consumption of green tea was linked to lower tooth loss when compared to lower consumption (AOR: 1.53, 95% CI: 1.10-2.13). However, neither coffee nor green tea consumption was associated with the number of teeth lost.
Tanaka <i>et al.</i> [41]	Japan	Cross-sectional	Similarly, 1002 pregnant women from the Osaka maternal and child health study were involved in the study.	Mean age: 29.8 years	Passive and active smoking at work and home  Assessed by self-administered questionnaire	Tooth loss Assessed by self-administered questionnaire	Smoking habits also had a significant impact on tooth loss. Among never-smokers, 22.8% experienced at least one missing tooth; this number increased to 30.6% in former smokers, 32.9% in heavy smokers, and 32.4% in light smokers. A clear independent association was found between light smoking and tooth loss (adjusted odds ratio (AOR) 1.71; 95% CI: 1.02-2.83). Furthermore, heavy smoking (8+ pack-years) significantly increased the risk of tooth loss (AOR: 2.35; 95% CI: 1.46-3.78). Passive smoking also had an impact—current heavy passive smoking at home was linked to a higher chance of tooth loss (AOR: 1.79, 95% CI: 1.08-2.94), though no significant association was found with passive smoking at work.

Incorporating dental care into prenatal health is essential for optimizing the health of pregnant women [42]. To improve the effectiveness of prenatal dental care, it is necessary to gain a comprehensive understanding of how oral health issues impact women

socially, psychologically, and functionally being pregnant [43]. A cross-sectional investigation conducted among Ugandan pregnant women assessed how socio-demographic variables influenced tooth loss [36]. The study found that women from larger households (five

or more members) were more prone to having missing teeth compared to those living in smaller households (AOR: 1.5; 95% CI: 1.0-2.5) [36]. Furthermore, women who had never visited a dentist did not experience tooth loss more than those who had dental appointments, potentially due to more severe dental issues being addressed during visits (AOR: 0.04; 95% CI: 0.02-0.1) [36]. Additionally, first-time mothers exhibited a lower risk of losing teeth compared to those who had multiple children (AOR: 0.4; 95% CI: 0.2-0.8) [36].

In another study, Silveira *et al.* explored the link between depression, anxiety, and tooth loss in pregnant women, utilizing the 2010 behavioral risk factor surveillance system data [37]. Their results indicated that women with a history of anxiety had significantly greater chances of tooth loss compared to those without anxiety (AOR: 3.30, 95% CI: 1.01-10.77) [37]. However, no significant association was found between tooth loss and either lifetime depression or current depression (AOR: 1.45, 95% CI: 0.54-3.85 for lifetime depression; AOR: 1.18, 95% CI: 0.44-3.16 for current depression) [37].

The Osaka maternal study was utilized to explore the relationship between mineral consumption and tooth loss among pregnant women in Japan [38]. The study revealed that 25.6% of participants experienced tooth loss, with at least one tooth missing [38]. It was observed that higher magnesium intake was inversely associated with tooth loss, with the highest quartile of magnesium intake showing lower odds of tooth loss compared to the lowest quartile [38]. However, no significant connection was found between tooth loss and the intake of copper, calcium, iron, zinc, or phosphate. Previous studies have suggested that magnesium intake may enhance immune function and decrease systemic inflammation, potentially leading to better oral health [44, 45]. Moreover, magnesium is essential for maintaining bone mineral balance and promoting bone crystal development and stability [46]. Another analysis using the Osaka maternal and child health study sample looked into the relationship between tooth loss and the consumption of fruits and vegetables among pregnant women [39]. The findings showed that an increased intake of vegetables (excluding yellow and green types) was linked to a reduced likelihood of tooth loss among the participants [39]. However, the study did not find any significant correlations between tooth loss and the consumption of vitamins, insoluble fruits, fiber, yellow and green vegetables, or grains [39].

A separate cross-sectional investigation focused on how beverage consumption is related to tooth loss

during pregnancy, using data from the Osaka Maternal Study [40]. It was found that pregnant women who drank higher amounts of coffee experienced more tooth loss compared to those with lower coffee intake (AOR: 1.52, 95% CI: 1.04-2.22) [40]. Furthermore, a moderate intake of green tea was associated with a reduced risk of tooth loss when compared to low intake (AOR: 1.53, 95% CI: 1.10-2.13) [40]. However, neither coffee nor green tea consumption seemed to affect the actual number of missing teeth [40]. The study's authors speculated that heavy coffee drinkers might have unhealthy lifestyle habits that could contribute to this link [40].

Another study by Tanaka *et al.* examined the impact of smoking on tooth loss [41]. The results showed the prevalence of tooth loss as follows: 22.8% among non-smokers, 30.6% among ex-smokers, 32.9% among heavy smokers, and 32.4% among light smokers [41]. Light smoking was found to have a notable positive association with tooth loss (AOR: 1.71, 95% CI: 1.02–2.83) [41]. Moreover, pregnant women who smoked more than 8 pack-years had a significantly higher likelihood of tooth loss compared to non-smokers (AOR: 2.35, 95% CI: 1.46-3.78) [41]. The study also found that heavy passive smoking at home was associated with an increased risk of tooth loss (AOR: 1.79, 95% CI: 1.08-2.94) [41], but passive smoking at the workplace did not show a similar trend [41].

When interpreting these results, several important factors must be taken into account. First, all the studies included in this study employed cross-sectional designs, which would not allow for the establishment of causal relationships. Additionally, the studies were conducted in different countries, namely Japan, Uganda, and the US, limiting the broader applicability of the findings. Another potential limitation is the use of self-reported questionnaires to assess tooth loss, which could have introduced recall bias. Despite these limitations, the findings provide valuable insights into the factors influencing tooth loss during pregnancy. This knowledge can help policymakers develop more effective strategies that integrate oral health education into prenatal care and address the challenges pregnant women face in accessing dental services.

## Conclusion

To summarize, the factors contributing to tooth loss during pregnancy encompass various demographic, psychological, dietary, and behavioral elements. Further validation of these findings through more recent and robust studies is necessary. Given that obstetrician-gynecologists are the primary healthcare providers women consult during pregnancy, they have

a significant opportunity to raise awareness among pregnant women regarding the importance of maintaining good oral health and seeking dental care.

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