Submitted: 24 June, 2024 Accepted: 07 August, 2024 Published: 03 May, 2025 DOI:10.22514/jocpd.2025.047

SYSTEMATIC REVIEW

Journal of Clinical Pediatric Dentistry

# Maternal depression increases the risk of early childhood caries (ECC): a systematic review and meta-analysis

Wentao Bian[1,*,†], TingTing Gao[2,†], Wenkai Bian[3], Qiang Zhang[4]

[1]Shaanxi Provincial People's Hospital, 710000 Xi'an, Shaanxi, China
[2]Department of Pharmacy, Shanghai Fifth People's Hospital, Fudan University, 200240 Shanghai, China
[3]National Radio Spectrum Research Institute, 71000 Xi'an, Shaanxi, China
[4]Shaanxi Aviation Electric Co, Ltd, Xi'an, 710000 Shaanxi, China

***Correspondence**
bianwt3776@163.com
(Wentao Bian)

† These authors contributed equally.

## Abstract

**Background**: Maternal depressive symptoms may negatively affect children's oral health (COH). This study aimed to systematically review the literature to investigate whether maternal depression is associated with early childhood dental caries. **Methods**: The PubMed, Embase, Web of Science, and Cochrane Library databases were systematically searched from the earliest available date to June 1, 2024, to identify relevant studies on maternal depression and early childhood caries (ECC) status. After literature screening, data were independently extracted and summarized via random effects or fixed effects models, depending on the magnitude of heterogeneity. The GRADE methodology was used to rate the certainty of the evidence. **Results**: A total of 7 studies (22,764 patients) were included. The results of the random effects model revealed that maternal depressive symptoms could significantly lead to early childhood caries (OR (odds ratio), 1.40; 95% CI (Confidence interval), 1.09–1.80; $I^2$ = 71.9%). **Conclusions**: Considering our findings, the need for better mental health education for parents must be emphasized. **The PROSPERO Registration**: This systematic review was conducted according to PRISMA and the protocol was registered at PROSPERO under the identification: CRD42024556728.

## Keywords

Maternal; Depression; Early childhood caries (ECC) status; Systematic review; Meta-analysis

## 1. Introduction

Early childhood caries (ECC) is defined as the development of at least one caries lesion on primary teeth within 72 months of birth [1]. It can lead to the destruction of primary teeth and damage to permanent teeth and is one of the most common chronic diseases in children [2, 3]. Early childhood caries (ECC) can have serious adverse physical and behavioral effects, which seriously affect learning and quality of life [4, 5]. If not properly addressed, ECC increases the risk of dental problems in adulthood and optimal growth and development [6]. A meta-analysis involving studies from 29 countries with 59,018 children revealed that the incidence of early childhood caries was 48% [7]. The high prevalence of caries in this group is suspected to be caused by poor oral hygiene and preventive behaviors, but this may require a multimodel factor explanation [8, 9]. Some factors, such as maternal dental caries and a maternal preference for sweets, are associated with ECC [10, 11], but other factors, such as depressive symptoms and tooth brushing frequency, need to be further explored in the future [12, 13].

In today's competitive society, mothers face more pressure and responsibilities, which may increase the vulnerability of the psychological state and increase the likelihood of experiencing anxiety and depression in this group [14]. In addition, maternal psychological stress and related conditions may affect parenting behaviors, thereby increasing children's risk of ECC [15]. However, these ECC risks have not been well studied, and the few available studies have shown different results. Therefore, we explored the potential impact of maternal depression on early childhood caries (ECC) status.

## 2. Methods

### 2.1 Search strategy

The meta-analysis was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) list according to the Guidelines for Meta-Analysis of Epidemiological Research and this study protocol [16] (ID: CRD42024556728). The complete checklist file has been added in the **Supplementary material 1**. We conducted a systematic literature search of PubMed, Embase, Cochrane Library and Web of Science databases (up to 01 June 2024) by combining MeSH/Emtree and title/abstract keywords. The keywords used were "maternal", "depression" and "early den-


  

tal caries (ECC) status". The detailed search strategy is provided in **Supplementary material 2**. Fig. 1 shows the complete search strategy. Two junior investigators (WKB and QZ) screened the titles, abstracts and keywords of the identified works, articles not related to the research topic were excluded. All the remaining articles were subsequently meticulously reviewed according to the screening criteria. References were also carefully checked to ensure that no relevant studies were missed. Any disagreements were resolved through consultation between two senior researchers (TTG and WTB). We used Zotero 6.0 software (Zotero 6.0, Corporation for Digital Scholarship, Fairfax, VA, USA) to determine deduplication and selection of articles.

## 2.2 Inclusion and exclusion criteria

The question studied in this paper is whether maternal depression leads to an increased risk of early childhood dental caries. The subjects of the study are mothers, the exposure factor is maternal depression, and the result is the risk of early childhood dental caries. The following inclusion criteria were used in this study: (1) randomized controlled trials, cohort studies, case-control studies, and cross-sectional studies; (2) the mothers of the children had depressive symptoms and the relevant depression scales met the diagnostic criteria for depression; (3) the dental health of the offspring was investigated, and children who met the WHO (World Health Organization) definition of early childhood caries (ECC) were included in the analysis. ECC is defined as the presence of one or more decayed (regardless of whether caries have formed), missing (due to caries), or filled surfaces in any deciduous tooth of a child aged 6 years or younger [7]. The exclusion criteria were as follows: (1) studies in which the children's mothers had no depression and only anxiety symptoms; and (2) studies focusing on children's dental anxiety, dental care and dental habits. We did not review the gray literature, nor did we review congressional papers, editorials, abstracts, *etc*. We reviewed only the English literature and there were no restrictions about year.

## 2.3 Data extraction

To minimize data entry errors, all data were entered by the two independent researchers via predetermined forms, with any discrepancies resolved through discussion. The collected information included the author, year of publication, country or region, age, study design, prevalence of early childhood caries, total number of people, prevalence of depression among mothers, prevalence of dental caries among children, period of data collection, tools for diagnosing major depression in mothers, criteria for assessing dental caries in children, covariables and findings. The kappa statistic for data extraction between 2 independent reviewers was 0.76.

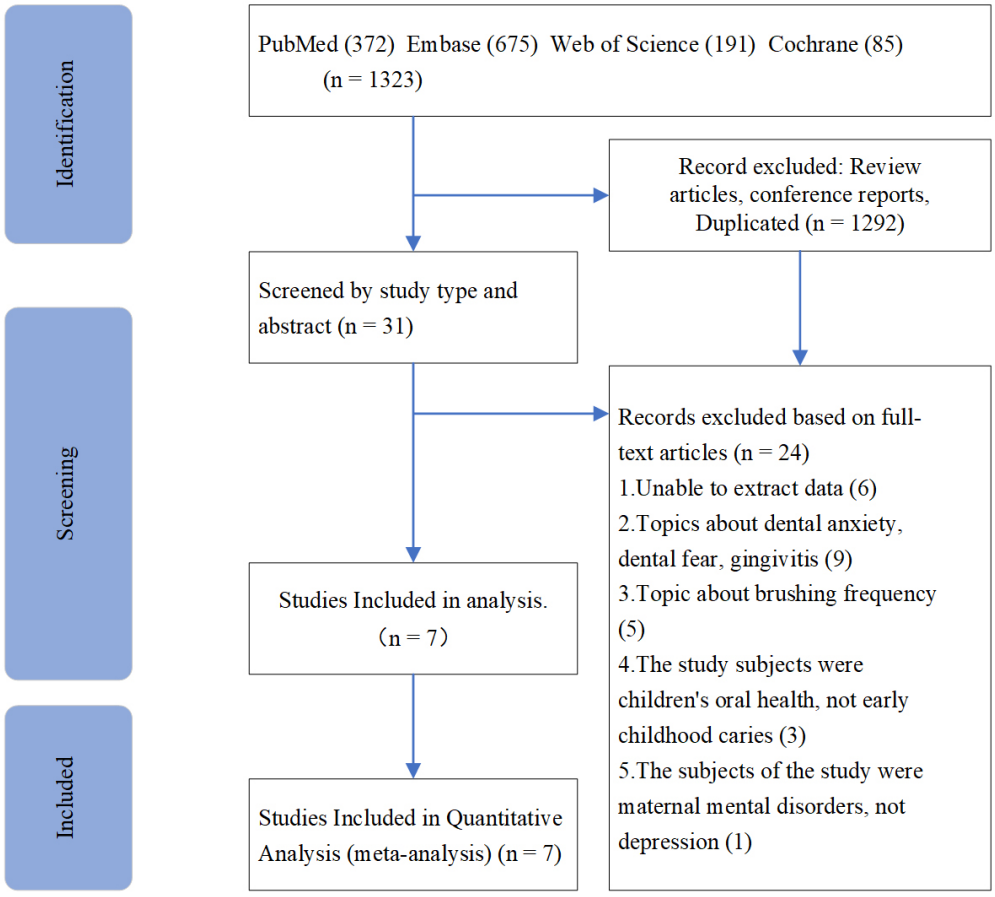


**FIGURE 1. Literature search and selection.**

### 2.4 Assessment of study quality

The quality of the eligible studies was assessed via the Newcastle-Ottawa Quality Assessment Scale [17]. Studies were assessed considering three categories, namely, the selection of study groups (0–4 points), comparability (0–2 points), and exposure (0–3 points), and a total score of 7 points or more was considered to indicate high-quality research. Disagreements were resolved through discussion.

### 2.5 Data analysis

We used Stata software (Stata 15, StataCorp Texas, College Station, TX, USA) to perform correlation analysis. Depending on the degree of heterogeneity, we selectively interpreted the results of the random effects model or the fixed effects model. When $I^2 = 0$, we interpreted the results of the fixed effects model; otherwise, we interpreted the results of the random effects model.

## 3. Results

### 3.1 Search result

According to the originally planned search strategy, we systematically retrieved literature from the earliest available date to 01 June 2024, from the PubMed, Embase, Web of Science and Cochrane Library databases, and identified a total of 1323 articles on maternal depression and early childhood dental caries. After removing duplicates and screening applicable titles, abstracts and full texts, we retained 7 trial reports for detailed analysis (Fig. 1). The relevant excluded studies are shown in **Supplementary Table 1**.

### 3.2 Characteristics of the included studies

Table 1 (Ref. [10, 15, 18–22]) shows the relevant specific characteristics of the included studies. A total of 7 relevant studies with a total of 22,764 pairs of patients were included. Different studies had different observation windows for early childhood dental caries. In addition, different studies used different scales for the diagnosis of maternal depression. The definitions of early childhood caries are also different. Decayed, Missing, Filled Surfaces (DMFS), Decayed, Missing, Filled Teeth (DMFT), and the International Caries Detection and Assessment System (ICDAS) standards are commonly used to assess childhood caries. Covariates such as maternal education level, maternal age and family income were also included in the analysis, but the interference of these different factors may have led to greater heterogeneity among the studies. Notably, Finlayson [18] divided children with early childhood dental caries into two different groups: those aged 1–3 years and those aged 4–5 years. Seow [19] included different research environments, such as childcare locations and public clinics, and reported two main results. Alade [10] presented the effects of mild to moderate depression on early childhood dental caries and the effects of severe depression on early childhood dental caries according to the degree of maternal depression. The seven included studies included a total of 10 relevant outcomes, which we distinguished when summarizing the results and included in a unified analysis (Fig. 2).

### 3.3 Quality assessment results

The study by Seow *et al*. [19] received a low overall score because of unclear case definitions, poor case representativeness, and ambiguous control selection. The remaining studies were rated as having high or medium quality overall. The specific scoring scale can be found in **Supplementary Table 2**.

### 3.4 Outcomes

Seven studies summarized the effects of maternal depression on early childhood dental caries (ECC). The results of the random effects model revealed that maternal depression significantly increased the risk of early childhood dental caries (ECC) (OR, 1.40; 95% CI, 1.09–1.80; $I^2 = 71.9\%$).

### 3.5 Sensitivity analyses and publication bias

We used Stata software to conduct sensitivity analysis and publication bias analysis. Sensitivity analysis revealed no significant differences between the pooled results for calculations that did not exceed the 95% confidence limit (Fig. 3). Since the number of studies included in this study was less than 10, we did not draw a funnel plot.

## 4. Discussion

To the best of the researchers' knowledge, this is the first meta-analysis to investigate the possible association between maternal depression and early childhood caries (ECC). The results of this study showed that maternal depression can increase the risk of early childhood caries (ECC), suggesting that we need to pay attention to maternal mental health in the future.

The key factor is that mothers may not pay enough attention to their children's oral care due to psychological disorders [23]. Mothers with depression may not understand methods for preventing dental caries in children, such as reducing sugar intake and using fluoride toothpaste, or may ignore the prevention of dental caries in children [24]. In addition, the fatigue and low energy caused by depression may weaken mothers' participation in preventive measures, especially those that need to be repeated regularly, such as brushing and flossing [25, 26]. A systematic review of the association between depression and oral diseases revealed a positive correlation between depression and dental caries in adults and elderly individuals [27], which indirectly supports this hypothesis.

There was also obvious heterogeneity among the studies included in this analysis. Owing to the small number of relevant studies in this field, the number of studies obtained after careful literature search was limited, and there is limited potential for further subgroup analysis. However, Pinto *et al*. [20] studied children's dental caries through the DMFS (Decayed-Missing-Filled-Sealed) index according to the WHO standard, with two critical points: a DMFS score $\geq$1 and a DMFS score $\geq$3 [1]. The Mini International Neuropsychiatric Interview (MINI Plus) scale was used to assess maternal depression [28].

**TABLE 1. Methodological characteristics of the included studies.**

| Study | Region | Study design | Early child-hood caries | Total sample | Prevalence of depres-sion among mothers | Prevalence of dental caries among children whose mothers had depression | Period of data collection | Tools for assessing depression in mothers | Criteria for assessing dental caries in children | Covariables | Findings |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pinto 2017 [20] | Brazil | Cross-sectional study | 24–36 mon | 538 | 32.6% (n = 168) | 15.1% (n = 82) | October 2009 and March 2011 | The Mini International Neuropsychiatric Interview (MINI Plus) | The presence of caries was dichotomized using 2 cutoff points: DMFS ≥1 (presence of 1 or more surfaces affected by caries) and DMFS ≥3. | Parents' education, household income data, living with a partner and mother's occupation | Maternal major depressive episodes were negatively associated with childhood dental caries. OR 4 (1.29–12.41) |
| Sun 2020 [21] | China | Cross-sectional study | 24–37 mon | 337 | 28.2% (n = 95) | 9.8% (n = 33) | June 2018 to December 2018 | Mothers reported their depressive symptoms using the Chinese version of Edinburgh Postpartum Depression Scale (EPDS) | The examiner performs an oral examination using a disposable dental mirror and a probe. Only those cavities that can be detected by the probe are recorded as caries positive. | Maternal age at conception, maternal education level, family income, maternal work status, breastfeeding duration (months), child sex, number of people under 18 years old living together, *etc*. | Children of depressed mothers more likely to experience early childhood dental caries. OR 1.53 (1.09–2.15) |
| Auger 2020 [22] | Canada | Retrospective cohort study | before 6 yr of age | 15,359 | Unable to obtain | 62.9 per 1000 children had mothers with mental disorders (95% CI: 58.6–67.3) | 2006 and 2016 | ICD diagnostic codes that were recorded on discharge summaries of maternal hospitalization records before delivery were used | Identified using diagnostic and procedure codes | Maternal age at birth, parity and multiplicity of births, socioeconomic deprivation, place of residence and period of birth. | Children of mothers with depressive symptoms were more likely to have dental caries. OR 1.81 (1.6–2.03) |

**TABLE 1. Continued.**

| Study | Region | Study design | Early child-hood caries | Total sample | Prevalence of depres-sion among mothers | Prevalence of dental caries among children whose mothers had depression | Period of data collection | Tools for assessing depression in mothers | Criteria for assessing dental caries in children | Covariables | Findings |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cumerlato 2023 [15] | Brazil | Prospective study | 48 mon | 3645 | 18.8% | 26.7% | January 2019 and last until September 2019 | Edinburgh Postnatal Depression Scale (EPDS) | Early childhood caries was assessed using the International Caries Detection and Assessment System (ICDAS) | Maternal education, maternal age, and household income. | Children whose mothers had more severe depression had a higher risk of dental caries at 48 mon compared with children whose mothers had less severe depression. OR 1.19 (1.05–1.35) |
| Alade 2021 [10] | Nigeria | Secondary analysis of a dataset | 6–71-months-old | 1549 | Normal (1175) Mild-moderate (207) Major (167) | 4.3% | December 2018 and January 2019 | The 20-item Centre for Epidemiologic Studies and Depression Scale, developed by Radlof and validated for use in Nigeria | Maternal and infant caries status was determined using the decayed-missing-filled teeth (DMFT) (according to the World Health Organization criteria) | Maternal age, education and income, social support, Sense of coherence, Fatalism | Maternal depression had no significant effect on the incidence of early dental caries in children. Moderate: 0.91 (0.41–2.01). severe: 0.6 (0.21–1.7) |

**TABLE 1. Continued.**

| Study | Region | Study design | Early child-hood caries | Total sample | Prevalence of depres-sion among mothers | Prevalence of dental caries among children whose mothers had depression | Period of data collection | Tools for assessing depression in mothers | Criteria for assessing dental caries in children | Covariables | Findings |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Seow 2009 [19] | Australia | Case-control study | 0–4 yr | 617 | Unable to obtain | 25.3% (n = 156) Childcare: ECC (n = 62); Public GA clinic: ECC (n = 65); Private GA clinic: ECC (n = 29) | Before 2008 | The Depression Anxiety Stress Scale (DASS) is a 21-question questionnaire that assesses symptoms of depression, anxiety, and stress in adults | The DMFT index was used according to WHO criteria (cutoff point: at least one decayed tooth, as recommended by the American Academy of Pediatric Dentistry in 2003) | Feeding and diet history, Sociode-mographic, Mother's medical status, and dental examination | Maternal depression had no significant effect on the incidence of early dental caries in children. childcare ECC *vs*. controls: 4.33 (0.64–29.41). public clinic ECC *vs*. controls: 0.87 (0.13–5.92) |
| Finlayson 2007 [18] | USA | Cohort study | 1–5 yr | 719 | 35% | One-third of children have ECC, and one-fifth of them are diagnosed as severe. | Unable to obtain | Psychosocial Measure of Depressive Symptoms (CES-D) | The dental team used the International Caries Detection and Assessment System (ICDAS) standard for caries detection. | Health Belief Scale of maternal self-efficacy, feelings of fatalism, knowledge about appropriate bottle use and children's oral hygiene needs, toothbrushing habits, the psychosocial measure of depressive symptoms (CES-D), parenting stress. | Maternal depression had no significant effect on the incidence of early dental caries in children. Age 1–3 yr: 1.04 (0.45–2.41). Age 4–5 yr: 1.40 (0.78–2.53) |

*OR: Odds Ratio; CI: Confidence interval; ICD: International Classification of Diseases; ECC: Early Childhood Caries; GA: General anaesthesia; DMFT: Decayed, Missing, Filled Teeth; WHO: World Health Organization.*

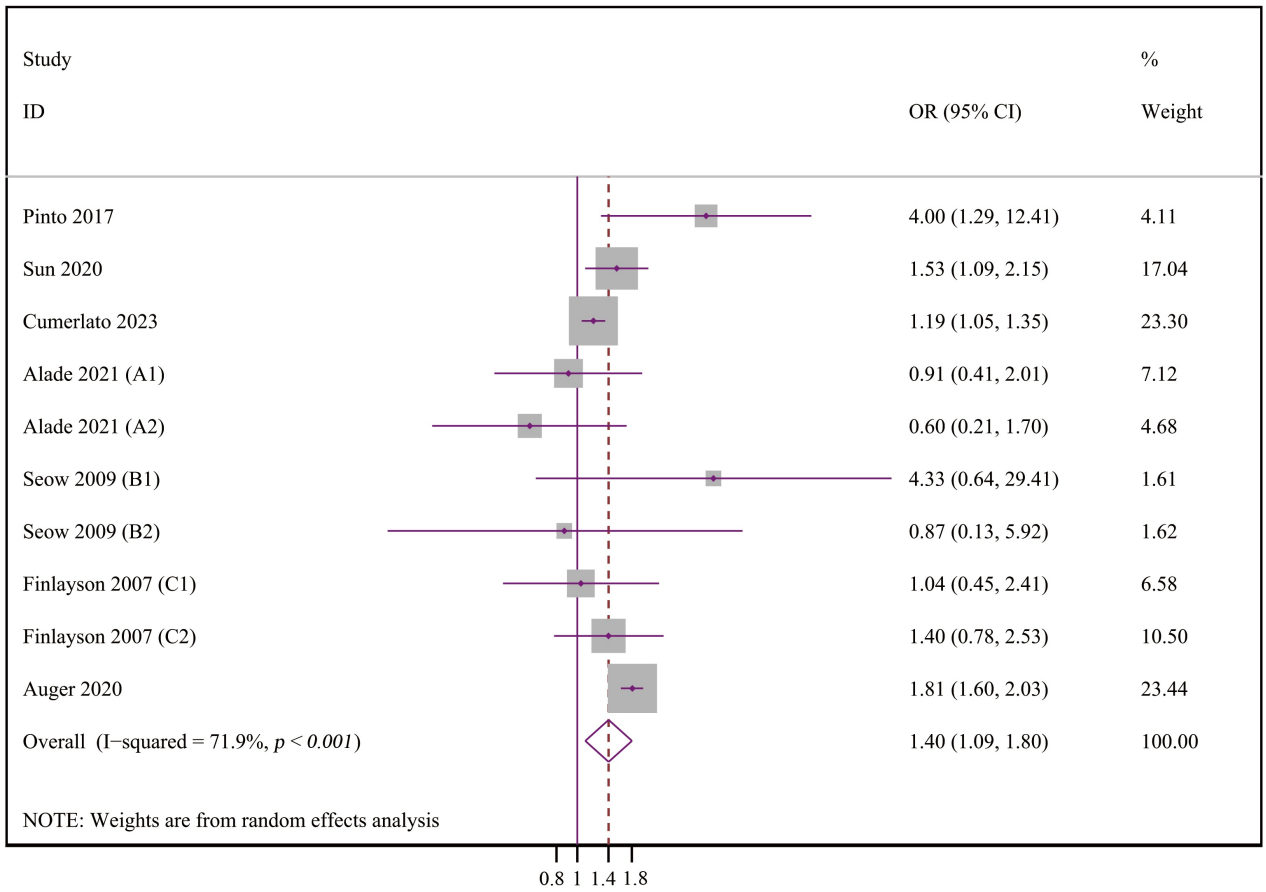


**FIGURE 2. Forest plot of the effect of maternal depression on early childhood dental caries.** (A1, Moderate depression in mothers; A2, Severe depression in mothers; B1, Results for childcare settings; B2, Results for public clinic settings; C1, Effect of maternal depression on dental caries in children aged 1–3 years; C2, Effect of maternal depression on dental caries in children aged 4–5 years). OR: Odds ratio; CI: Confidence interval.

This cross-sectional study included 538 pairs of mothers and children aged between 24 and 36 months. The study revealed that children whose mothers had depression were more likely to develop dental caries than those whose mothers did not have depression, and the impact of mothers' lack of dental caries experience was greater (OR 4.00; 95% CI 1.29–12.41). Seow *et al*. [19] used the Depression Anxiety Stress Scale (DASS) to assess maternal depression [29], which was different from the scale used by Finlayson *et al*. [18], who used the Psychosocial Measure of Depressive Symptoms (CES-D) to assess maternal depression [30]. In summary, different studies used different scales, which may be the main source of heterogeneity in this study. In addition, the analysis of covariates was also different, but we can see that maternal education level, family income data, and dental examinations are commonly analyzed variables; however, Finlayson *et al*. [18] also analyzed fatalism, toothbrushing habits, *etc.*, which may be possible sources of heterogeneity in this study. Fortunately, the results of the random effects model in this study are more credible.

A limited number of studies were included in our review. Although most of the studies we included are of high quality, there may still be a discrepancy between reality and the reported results due to the interference of confounding factors. Therefore, the conclusions should be interpreted with caution. In addition, the GRADE system shows that the level of evidence for the results is low (Table 2). In the future, confounding factors need to be controlled, and cohort studies should be conducted to verify the results of this article.

Possible future related research can be expanded in the following ways. First, we can explore how maternal depression affects children's oral health through biological pathways [31]. For example, we can study how changes in hormone levels and immune system responses in depressed mothers affect fetal tooth germ development and the oral microecological environment after birth. Second, we need to analyze the impact of maternal depression on children's oral hygiene habits, eating habits and other behavioral patterns in detail. Finally, we need to conduct long-term follow-up studies with depressed mothers and perform large cohort studies to further verify and determine the association between maternal depression and the risk of dental caries in children.

This study is the first to use quantitative analysis to explore the impact of maternal depression on early childhood dental caries. However, the obvious disadvantage is that the number of included studies was limited, and the data were insufficient; therefore, no further subgroup analysis was performed due to high heterogeneity.

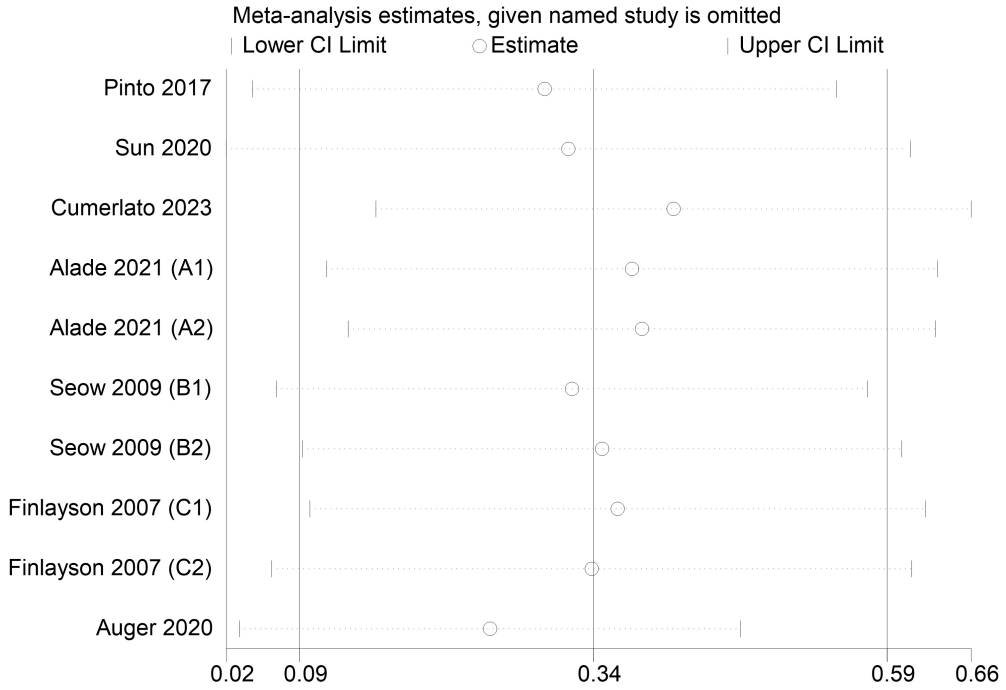


**FIGURE 3. Sensitivity analysis of maternal depression on early childhood dental caries.** (A1, Moderate depression in mothers; A2, Severe depression in mothers; B1, Results for childcare settings; B2, Results for public clinic settings; C1, Effect of maternal depression on dental caries in children aged 1–3 years; C2, Effect of maternal depression on dental caries in children aged 4–5 years); CI: Confidence interval.

**TABLE 2. GRADE summary of findings.**

| Certainty assessment | | | | | | | Effect | Certainty | Importance |
|---|---|---|---|---|---|---|---|---|---|
| No of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | Odds ratio (95% CI) | | |
| 7 | Observation study | Serious[a] | Serious[b] | Not serious | Not serious | None | OR 1.40 (1.09–1.80) | ⨂⨂◯◯ LOW | CRITICAL |

[a], *The included studies were observational studies with an obvious risk of selection bias.*
[b], *There was considerable heterogeneity among studies, with* $I^2$ *values greater than 50%.*
*OR: Odds Ratio; CI: Confidence interval.*

## 5. Conclusions

In conclusion, our study revealed that maternal depression significantly increased the risk of early dental caries in children, which suggests that we need to pay further attention to education related to maternal mental health issues.

### AVAILABILITY OF DATA AND MATERIALS

The datasets are available from the corresponding author upon reasonable request.

### AUTHOR CONTRIBUTIONS

WTB and WKB—contributed to the conception and design of the work; substantially revised this work. WTB, TTG and QZ—collected information and analyzed the data used in the systematic review and meta-analysis. WKB—provided software and participated in the production of the images. All the authors read and approved the final manuscript.

### ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

### ACKNOWLEDGMENT

We thank all the people who conducted the studies that contributed to this meta-analysis and systematic review.

### FUNDING

This research received no external funding.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.jocpd.com/files/article/1917112581381603328/attachment/Supplementary%20material.zip.

## REFERENCES


[1] Zou J, Du Q, Ge L, Wang J, Wang X, Li Y, *et al*. Expert consensus on early childhood caries management. International Journal of Oral Science. 2022; 14: 35.

[2] Tinanoff N, Baez RJ, Diaz Guillory C, Donly KJ, Feldens CA, McGrath C, *et al*. Early childhood caries epidemiology, aetiology, risk assessment, societal burden, management, education, and policy: global perspective. International Journal of Paediatric Dentistry. 2019; 29: 238–248.

[3] Anil S, Anand PS. Early childhood caries: prevalence, risk factors, and prevention. Frontiers in Pediatrics. 2017; 5: 157.

[4] Thang Le VN, Kim JG, Yang YM, Lee DW. Risk factors for early childhood caries: an umbrella review. Pediatric Dentistry. 2021; 43: 176–194.

[5] Corrêa-Faria P, Viana KA, Raggio DP, Hosey MT, Costa LR. Recommended procedures for the management of early childhood caries lesions—a scoping review by the Children Experiencing Dental Anxiety: Collaboration on Research and Education (CEDACORE). BMC Oral Health. 2020; 20: 75.

[6] Folayan MO, Schroth RJ, Ayouni I, Nguweneza A, Arheiam A, Al-Batayneh OB, *et al*. A scoping review linking early childhood caries to violence, neglect, internally displaced, migrant and refugee status. BMC Oral Health. 2023; 23: 747.

[7] Uribe SE, Innes N, Maldupa I. The global prevalence of early childhood caries: a systematic review with meta-analysis using the who diagnostic criteria. International Journal of Paediatric Dentistry. 2021; 31: 817–830.

[8] George A, Sousa MS, Kong AC, Blinkhorn A, Patterson Norrie T, Foster J, *et al*. Effectiveness of preventive dental programs offered to mothers by non-dental professionals to control early childhood dental caries: a review. BMC Oral Health. 2019; 19: 172.

[9] Foláyan MO, Virtanen JI, Gaffar B, Abodunrin O, Sun IG, Duangthip D, *et al*. Scoping review on the association between early childhood caries and responsible resource consumption and production: exploring Sustainable Development Goal 12. BMC Oral Health. 2024; 24: 98.

[10] Alade M, Folayan MO, El Tantawi M, Oginni AB, Adeniyi AA, Finlayson TL. Early childhood caries: are maternal psychosocial factors, decision-making ability, and caries status risk indicators for children in a sub-urban Nigerian population? BMC Oral Health. 2021; 21: 73.

[11] Bernabé E, Ballantyne H, Longbottom C, Pitts NB. Early introduction of sugar-sweetened beverages and caries trajectories from age 12 to 48 months. Journal of Dental Research. 2020; 99: 898–906.

[12] Kumar S, Tadakamadla J, Johnson NW. Effect of toothbrushing frequency on incidence and increment of dental caries: a systematic review and meta-analysis. Journal of Dental Research. 2016; 95: 1230–1236.

[13] Gomes MAB, Cademartori MG, Goettems ML, Azevedo MS. Are maternal mental disorders associated with children's oral health? A systematic review. International Journal of Paediatric Dentistry. 2020; 30: 252–264.

[14] Nisar A, Yin J, Waqas A, Bai X, Wang D, Rahman A, *et al*. Prevalence of perinatal depression and its determinants in Mainland China: a systematic review and meta-analysis. Journal of Affective Disorders. 2020; 277: 1022–1037.

[15] da Fonseca Cumerlato CB, Cademartori MG, Barros FC, Dâmaso AH, da Silveira MF, Hallal PC, *et al*. Maternal depression in first 1000 days of life and early childhood caries prevalence at 48 months of age. Clinical Oral Investigations. 2023; 27: 7625–7634.

[16] Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, *et al*. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. Journal of Clinical Epidemiology. 2021; 134: 178–189.

[17] Norris JM, Simpson BS, Ball R, Freeman A, Kirkham A, Parry MA, *et al*. A modified newcastle-ottawa scale for assessment of study quality in genetic urological research. European Urology. 2021; 79: 325–326.

[18] Finlayson TL, Siefert K, Ismail AI, Sohn W. Psychosocial factors and early childhood caries among low-income African-American children in Detroit. Community Dentistry and Oral Epidemiology. 2007; 35: 439–448.

[19] Seow WK, Clifford H, Battistutta D, Morawska A, Holcombe T. Case-control study of early childhood caries in Australia. Caries Research. 2009; 43: 25–35.

[20] Dos Santos Pinto G, de Ávila Quevedo L, Britto Correa M, Sousa Azevedo M, Leão Goettems M, Tavares Pinheiro R, *et al*. Maternal depression increases childhood dental caries: a cohort study in Brazil. Caries Research. 2017; 51: 17–25.

[21] Sun L. The association between postpartum depression and early childhood caries. Acta Odontologica Scandinavica. 2020; 78: 352–357.

[22] Auger N, Low N, Lee G, Lo E, Nicolau B. Maternal mental disorders before delivery and the risk of dental caries in children. Caries Research. 2020; 54: 242–249.

[23] Costa VPP, Correa MB, Goettems ML, Pinheiro RT, Demarco FF. Maternal depression and anxiety associated with dental fear in children: a cohort of adolescent mothers in Southern Brazil. Brazilian Oral Research. 2017; 31: e85.

[24] Ludovichetti FS, Zuccon A, Zambon G, Signoriello AG, Zerman N, Stellini E, *et al*. Maternal mental health and children oral health: a literature review. European Journal of Paediatric Dentistry. 2023; 24: 99–103.

[25] Adeniyi AA, Folayan MO, Arowolo O, Oziegbe EO, Chukwumah NM, El-Tantawi M. Associations between oral habits, dental anxiety, dental service utilization, and maternal mental health status among 6- to 12-year-old children in Ile–Ife, Nigeria. European Archives of Paediatric Dentistry. 2023; 24: 177–185.

[26] Tsuchiya S, Tsuchiya M, Momma H, Nagatomi R, Arima T, Yaegashi N, *et al*. Influence of maternal postpartum depression on children's toothbrushing frequency. Community Dentistry and Oral Epidemiology. 2022; 50: 300–310.

[27] Cademartori MG, Gastal MT, Nascimento GG, Demarco FF, Corrêa MB. Is depression associated with oral health outcomes in adults and elders? A systematic review and meta-analysis. Clinical Oral Investigations. 2018; 22: 2685–2702.

[28] Korte KJ, Jaguga F, Kim HH, Stroud RE, Stevenson A, Akena D, *et al*. Psychometric Properties of the Mini International Neuropsychiatric Interview (MINI) psychosis module: a Sub-Saharan Africa cross country comparison. Psychological Medicine. 2023; 53: 7042–7052.

[29] Moya E, Larson LM, Stewart RC, Fisher J, Mwangi MN, Phiri KS. Reliability and validity of depression anxiety stress scale (DASS)-21 in screening for common mental disorders among postpartum women in Malawi. BMC Psychiatry. 2022; 22: 352.

[30] Aibibula W, Cox J, Hamelin AM, Moodie EEM, Naimi AI, McLinden T, *et al*. Impact of food insecurity on depressive symptoms among HIV–HCV co-infected people. AIDS and Behavior. 2017; 21: 3464–3472.

[31] Chapple IL, Bouchard P, Cagetti MG, Campus G, Carra MC, Cocco F, *et al*. Interaction of lifestyle, behaviour or systemic diseases with dental caries and periodontal diseases: consensus report of group 2 of the joint EFP/ORCA workshop on the boundaries between caries and periodontal diseases. Journal of Clinical Periodontology. 2017; 44: S39–S51.


**How to cite this article:** Wentao Bian, TingTing Gao, Wenkai Bian, Qiang Zhang. Maternal depression increases the risk of early childhood caries (ECC): a systematic review and meta-analysis. Journal of Clinical Pediatric Dentistry. 2025; 49(3): 30-38. doi: 10.22514/jocpd.2025.047.