

Maternal smoking and alcohol use in association with breastfeeding initiation, duration, and infant health – a scoping review

Women's Health

Volume 21: 1–14

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DOI: 10.1177/17455057251352297

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Abstract

Introduction: Excessive alcohol consumption is associated with reduced milk production, altered milk composition, and increased risk of adverse outcomes such as sudden infant death syndrome (SIDS), highlighting the importance of managing alcohol intake during breastfeeding. Additionally, maternal smoking is associated with challenges in breastfeeding initiation and an elevated risk of infant respiratory issues, with a significant proportion of women resuming smoking postpartum. The review examined the association between maternal alcohol consumption and smoking during pregnancy and postpartum with breastfeeding initiation, continuation, and infant health.

Methods: A scoping review was conducted through a comprehensive search of PubMed, ScienceDirect, and Scopus for human studies on the association of alcohol consumption and smoking during breastfeeding, including articles up to April 2024. The primary focus was to examine the association with maternal alcohol use, smoking, and breastfeeding initiation and continuation. Retrospective and prospective observational studies, as well as clinical trials, were included if they assessed the association between smoking and alcohol on breastfeeding, and infant health.

Results: Alcohol consumption was not associated with breastfeeding duration. However, maternal smoking during pregnancy was associated with a shorter breastfeeding duration and an increased risk of childhood overweight up to 7 years of age. Maternal smoking was also linked to adverse mental health outcomes in offspring, including elevated levels of anxiety, depression, and neuroticism. Additionally, breastfeeding rates across different populations were also associated with socioeconomic factors, such as maternal age, educational attainment, and socioeconomic status.

Conclusion: This study demonstrates that alcohol consumption was unrelated to breastfeeding duration. Addressing maternal smoking, alcohol use, and breastfeeding requires more than education, as sustainable behavior change is often hindered by limited resources. Public health strategies should focus on addressing socioeconomic and structural barriers while also acknowledging the diverse circumstances of individuals who may not conform to traditional expectations of pregnancy and parenting. It is important to consider the unique needs and experiences of all individuals, respecting their autonomy and choices in the context of their health and well-being.

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Plain language summary

How alcohol and smoking is linked to starting, continuing breastfeeding and infant health: a review of existing research

This review looked at how alcohol and smoking by mothers is associated with breastfeeding. Drinking too much alcohol while breastfeeding can lower milk supply, change its quality, and increase risks like sudden infant death syndrome (SIDS). Smoking is linked to difficulties in starting breastfeeding and more health problems for babies, such as breathing issues. Many women also return to smoking after giving birth. The review examined different studies to understand how alcohol and smoking are associated with breastfeeding and infant health. It found that alcohol use did not have a major association on how long mothers breastfeed. However, mothers who smoked during pregnancy were more likely to breastfeed for a shorter time and had a higher risk of having children who became overweight by age. Smoking was also linked to mental health issues in children, such as higher levels of anxiety and depression. Factors like age, education, and income also played a role in breastfeeding rates. Overall, this review shows the importance of educating women on the risks of smoking and alcohol during breastfeeding to improve health outcomes for both mothers and babies.

Keywords

breastfeeding, pregnancy, alcohol, smoking, infant

Received: 24 October 2024; revised: 21 May 2025; accepted: 2 June 2025

Introduction

Breastfeeding is widely acknowledged for its numerous health benefits, including optimal nutrition for infants, enhanced immune protection, and the fostering of a strong mother-infant bond.¹ However, maternal behaviors such as alcohol consumption and smoking can be negatively associated with breastfeeding initiation and continuation. Alcohol use and smoking are widely recognized for their unfavorable association with breastfeeding and infant health. Both behaviors have been associated with delayed breastfeeding initiation, reduced milk supply, and shorter breastfeeding duration, which pose risks to maternal and infant well-being.² Despite the recognized importance of breastfeeding, the literature on the prevalence of alcohol consumption during breastfeeding remains limited, and the effects of alcohol on breastfeeding success are not thoroughly understood. Alcohol concentrations are regularly highest in breast milk 30–60 min after an alcoholic drink has been consumed and can be mostly detected in breast milk for about 2–3 h per drink after it is consumed.³ Excessive postnatal alcohol consumption may impair a mother's judgment and ability to safely care for her child and may cause damage to an infant's development, growth, and sleep patterns.⁴ Similarly, significant and much less known are the prevalence and factors associated with changes in alcohol use during pregnancy and postpartum; however, a few studies have examined changes in alcohol use before and following pregnancy recognition, with absolute reductions of between 9% and 15%.⁵ Excessive alcohol consumption could be associated with a shortened breastfeeding duration due to decreased milk production, increase in the risks of cot death, and accidentally smothering the child.⁶ Alcohol consumption during breastfeeding has been shown to inhibit oxytocin release, leading to

delayed milk ejection and reduced milk production, which can negatively affect breastfeeding success.⁷ This suppression results in longer let-down times, decreased milk transfer, and altered infant suckling patterns, potentially contributing to early weaning.⁸ Studies indicate that infants consume about 20% less milk per feeding when their mothers have ingested alcohol, reinforcing the disruption in breastfeeding effectiveness.⁹ However, breastfeeding women have been encouraged to delay nursing their infants until any ingested alcohol is eliminated from the milk or to pump out and store milk before drinking. Cultural and socioeconomic factors also play a role in maternal alcohol use during breastfeeding. Women from higher socioeconomic backgrounds are more likely to adhere to breastfeeding recommendations and limit alcohol intake, whereas those from lower socioeconomic backgrounds tend to report higher alcohol consumption postpartum, potentially affecting breastfeeding duration.¹⁰

Similarly, maternal smoking has well documented implications for breastfeeding, including a negative impact on breastfeeding initiation and duration, as well as an increased risk of sudden unexpected infant death.^{11,12} Although many women stop smoking during pregnancy, relapse rates are high in the postpartum period. Studies have shown that smoking relapse during breastfeeding is a major barrier to achieving optimal breastfeeding practices.¹³ Given these challenges, interventions focused on reducing smoking relapse postpartum and promoting breastfeeding should consider both the physiological and behavioral aspects of smoking cessation. Socioeconomic disparities play a significant role in maternal smoking behaviors, with low-income women being more likely to smoke due to higher stress levels, targeted tobacco marketing, and limited access to cessation support.¹⁴ Additionally,

postpartum relapse to smoking is common, particularly among women who quit during pregnancy, further influencing breastfeeding patterns. Maternal smoking may expose infants to both cigarette smoke (second-hand smoking) and nicotine transferred via breast milk, which could lead to the worsening and development of allergic diseases such as asthma and rhinitis, the onset of chronic respiratory illnesses, increased duration and frequency of upper and lower airway infections, and a greater frequency of hospitalizations.¹⁵

The presence of peer support networks and targeted interventions has shown promise in promoting breastfeeding among smokers.¹³ For instance, Kaunonen et al. found that breastfeeding peer support significantly improved breastfeeding continuation rates, particularly for women facing multiple barriers.¹⁶ Public health policies also play a crucial role in mitigating the impact of maternal smoking on breastfeeding.¹⁷ Higgins et al.¹⁸ highlighted that financial incentives and structured smoking cessation programs led to higher quit rates among pregnant smokers. Moreover, workplace policies such as paid maternity leave have been associated with higher breastfeeding initiation and duration, especially among low-income and smoking mothers.¹⁹

Maternal alcohol and smoking use are complex behaviors influenced by a range of sociodemographic, psychological, and environmental factors that may also independently affect breastfeeding practices. Key potential confounders include maternal age, education level, socioeconomic status, mental health conditions (such as depression or anxiety), parity, and social support systems. For instance, younger mothers or those with lower educational attainment may be more likely to engage in smoking or alcohol use postpartum and less likely to initiate or sustain breastfeeding. Higher rates of maternal smoking are observed among women with lower educational levels and those facing financial instability.^{20,21} Conversely, women with higher education levels tend to have greater awareness of the health benefits of breastfeeding and access to breastfeeding support, including lactation consultations and maternity leave benefits. Conversely, women with lower socioeconomic status (SES) face structural barriers such as workplace policies that do not support breastfeeding, limited access to healthcare, and economic pressures that make formula feeding a more viable option.²² Additionally, maternal stress and poor mental health have been associated with both substance use and shorter breastfeeding duration.²³ Studies by Iliadou et al. and Skoglund et al. have highlighted the importance of adjusting for such confounders when assessing the association between maternal behaviors and breastfeeding.^{24,25}

Studies indicate that higher SES, often measured by income and educational attainment, is positively associated with higher breastfeeding initiation and longer breastfeeding duration.²⁶ Studies have shown that smoking and alcohol consumption during pregnancy and postpartum are

more prevalent among women from lower socioeconomic backgrounds.^{27,28} Socioeconomic stressors, including job insecurity and housing instability, contribute to increased substance use as a coping mechanism.²⁸ Additionally, marginalized communities may experience higher rates of tobacco and alcohol marketing, exacerbating these behaviors. The presence of social support networks, including family, partners, and healthcare providers, significantly influences breastfeeding outcomes.²⁹ Women with strong social support are more likely to continue breastfeeding, whereas those lacking support may struggle with the challenges of early breastfeeding, leading to early cessation. Furthermore, social stigma around breastfeeding in public spaces, particularly in lower-income communities, may discourage breastfeeding continuation.³⁰ Public health initiatives aimed at reducing socioeconomic disparities in maternal behaviors have proven effective in promoting healthier choices. For instance, policies that provide financial incentives for smoking cessation during pregnancy have led to reductions in tobacco use.³¹ Similarly, breastfeeding-friendly workplace policies and paid maternity leave programs have been associated with improved breastfeeding rates, particularly among low-income populations.³² Understanding the dynamics between breastfeeding, alcohol use, and smoking status can inform interventions aimed at reducing postpartum relapse and increasing rates of breastfeeding among women. This review aims to critically assess the existing literature on the association between maternal alcohol consumption, smoking during pregnancy, and postpartum with breastfeeding initiation, continuation, and effects on infant health.

Methods

Data sources and search strategy

This scoping review aimed to systematically explore and synthesize the available evidence regarding the associations between alcohol use and smoking during pregnancy, breastfeeding, and infant health. The review also sought to identify knowledge gaps and provide a comprehensive overview of the existing literature to inform clinical practice and guide future research. The exposures of interest included maternal smoking, alcohol use during pregnancy, and breastfeeding practices. The review was conducted following the PRISMA reporting guidelines for scoping reviews. We conducted the first search of all relevant, indexed publications in November 2023. An updated search was performed in April 2024. A thorough and relevant search strategy was used to search articles in PubMed, Science Direct, and Scopus. The search strategy included the following search terms: (“Nursing women” OR “nursing mothers” OR “breastfeeding women” OR Pregnant OR “pregnant women” OR “lactating mother” OR infants

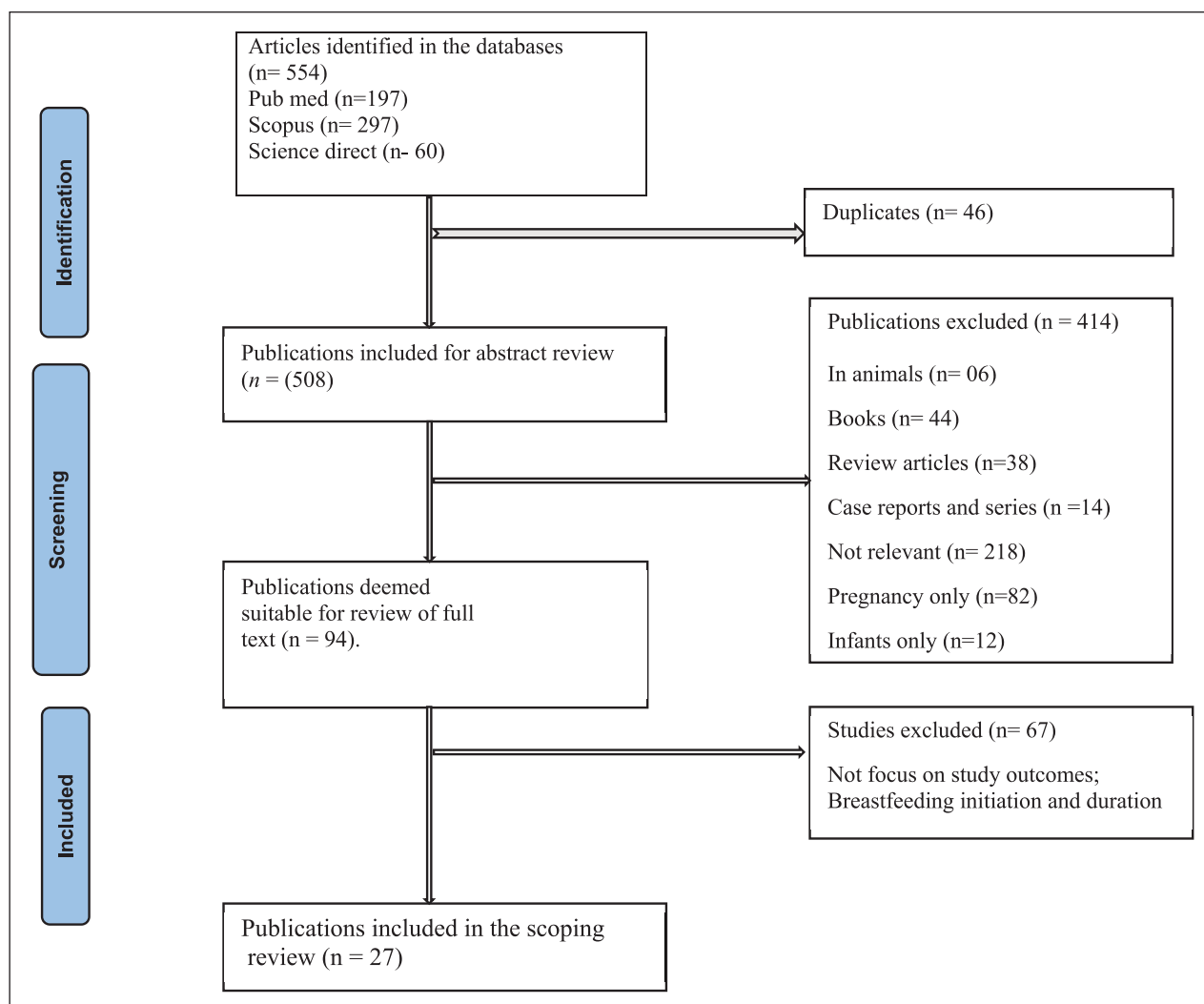


Figure 1. Flow diagram on article selection criteria.

OR neonates OR “newborn babies”)) AND (alcohol OR “drug use” OR smoking* OR “alcohol use” OR alcohol intake OR infant development OR “smoke exposure”) AND (“breastfeeding” OR lactation OR “human milk”) AND (exclusive OR initiation OR continuation OR “infant exposure”). The PRISMA framework was used to guide the process of identifying relevant studies, as illustrated in Figure 1.

Eligibility criteria

All retrospective and prospective observational studies investigating alcohol and smoking use among breastfeeding women were included. Eligible study designs encompassed cross-sectional quantitative studies, cohort studies, observational studies, and clinical trials with no geographical restrictions. The review incorporated studies evaluating the extent to which alcohol use is associated with breastfeeding, as well as studies involving postpartum

women who were breastfeeding or had breastfed within the postpartum period. Furthermore, it included studies examining the association between alcohol consumption or smoking during the postpartum period and breastfeeding initiation, duration, or cessation. Additionally, the review included studies assessing the prevalence of alcohol or tobacco use among breastfeeding women and those investigating the effects of alcohol consumption or smoking during breastfeeding on infant health outcomes. These outcomes encompassed but were not limited to growth, development, sleep patterns, respiratory illnesses, and allergic diseases. The studies were selected for several reasons, including inclusiveness, practicality, and competence. Publications were selected from a 20-year range for the scoping review to be exhaustive and feasible. Only English-language publications were reviewed to maintain accessibility and relevance. Studies focusing solely on alcohol consumption or smoking during pregnancy without examining their association with breastfeeding were

excluded, as well as studies not directly relevant to the research questions and objectives of the scoping review. The following were excluded: Studies that reported alcohol and smoking exposure in only infants and pregnant women, studies that only focused on interventions to reduce alcohol consumption or smoking without considering their association with breastfeeding practices, studies that focused solely on substances (cocaine, marijuana) other than alcohol or tobacco, and animal studies as they may not directly relate to human breastfeeding practices and outcomes.

Study selection

After finalizing the search string, two research team members (RN, KI) conducted a title review to ensure the relevance of identified publications. Following this, the abstracts were screened, and those meeting the inclusion criteria were organized in Google Sheets. The inclusion criteria at this stage were (1) exposure defined as alcohol consumption or smoking, (2) reported breastfeeding outcomes, (3) an assessment of the association between exposure and outcome, (4) breastfeeding women or women enrolled during pregnancy and followed up through delivery were a primary study population, and (5) publications focused on global data. Once a list of potentially relevant studies based on abstract screening was compiled, full-text copies of the publications were retrieved and entered into the Rayyan tool. Full-text versions were successfully obtained at this stage. The list was then divided between the two reviewers (RN and KI), with each reading full publications to determine relevance. Case series and case reports were excluded as they did not explore the association between alcohol or smoking exposure and breastfeeding initiation and continuation post delivery. Studies included in the review were assessed for relevance, and any publications lacking clear relevance were discussed, with inclusion or exclusion decisions reached by consensus.

Data extraction

Data from the included studies were systematically extracted and organized using a Google Sheet. The following key information was extracted from each publication: author, year of publication, study setting, sample size, study design, population characteristics, study aims, outcome measures, and any reported limitations. The exposure variables extracted included maternal alcohol consumption, smoking during pregnancy, and breastfeeding behaviors. Outcome variables focused on breastfeeding initiation and duration, infant sleep and activity rhythms, infants' intake and sucking responses, infant development, and offspring mental health outcomes. To ensure consistency, data were extracted according to

predetermined categories, and any discrepancies were resolved through discussion between the two reviewers. The extracted data provided a comprehensive overview of the scope and quality of each study, enabling further analysis and synthesis of the evidence.

Data synthesis

A synthesis of the findings within each predetermined category was conducted to identify patterns, trends, and gaps in the literature. For each study, the associations between maternal alcohol consumption, smoking during pregnancy, and infant health were examined. The key outcomes reviewed included breastfeeding initiation and duration, infant sleep and activity rhythms, infant intake and sucking responses, infant development, and offspring mental health outcomes. A narrative synthesis was employed to summarize the results across the studies. Patterns in breastfeeding initiation and duration of maternal alcohol and smoking exposure were identified, with particular attention to the association of these exposures on infant feeding behaviors and developmental milestones. Additionally, gaps in the existing literature were highlighted, particularly where data on infant mental health outcomes were limited or inconsistent. The synthesis also included a detailed summary of the study limitations across all categories, providing insights into the methodological challenges and evidence gaps.

Results

Selection of sources of evidence

The search string produced 554 publications across all databases. After removing duplicates, 508 articles remained (Figure 1). A total of 94 articles were initially identified and deemed suitable for full-text review, resulting in the inclusion of 27 articles in this scoping review, as shown in Figure 1. We included 94 publications for full-text review; of these, 67 articles were excluded for the following reasons: did not report breastfeeding initiation and maternal drinking, or maternal smoking and breastfeeding, or infant outcomes.

Design and methods of selected studies

Among the selected articles, the study designs included three cross-sectional studies, thirteen cohort studies, three longitudinal studies, one retrospective study, and seven observational studies, as detailed in Table 1. Sample sizes varied widely, ranging from 23 to 927,424 participants, and included women, infants, and children. The selected articles' target populations were breastfeeding, pregnant women, and infants. Nine studies enrolled participants during pregnancy and followed women up to six months

Table 1. Design and outcome of the selected studies.

Author	Country	Aim	Study design	Sample size	Duration of study (Months/years)	Outcome assessed	Study limitation
Magnus ³³	Norway	To examine maternal alcohol intake during pregnancy and lactation about risk of current asthma at 36 months	Cohort	49,138 women and infants	36 months	Maternal alcohol consumption	Potential bias due to loss of follow-up. The study follow-up was 36 months. Likelihood of severe selection bias of study participants
Dumney ³⁴	Ireland	To establish if women embrace this advice when pregnant and if there is a need for additional midwifery-led education about alcohol consumption and breastfeeding	Cross-sectional	907 women	13 months	Alcohol consumption Intention for exclusive breastfeeding	Data on alcohol consumption and breastfeeding intention relied on self-reporting by the pregnant women and alcohol consumption during pregnancy may be underreported. Despite written reminders and telephone contact there was a loss of responders in the third trimester
May ³⁵	South Africa	To determine any effects of maternal alcohol consumption during the breastfeeding period on child outcomes	Retrospective Population-based study	1047 breastfeeding women and children	7 years	Alcohol use and breastfeeding	The low socioeconomic status conditions in this population may independently worsen the effects attributed to postpartum alcohol exposure via breast milk. The data were collected retrospectively hence recall bias may exist. The study did not measure exact levels of alcohol in breast milk via biological samples at any time during the breastfeeding period
Wilson ³⁶	Australia	To examine the frequency, correlates, and outcomes of alcohol use during lactation	Cohort	Breastfeeding women 621	12 months	Alcohol use and breastfeeding	Different socioeconomic patterns of breastfeeding and alcohol consumption may limit the generalization of results. Analyses did not control for the timing of alcohol consumption during breastfeeding.
Giglia ³⁷	Australia	To investigate the relationships between alcohol consumption and breastfeeding initiation and duration	Longitudinal study	587 women	September 2002–July 2003	Alcohol consumption and breastfeeding initiation and duration	Recall and reporting biases due to reliance on mothers' reports of alcohol consumption and infant development
Tearne ³⁸	Australia	To identify the drinking profile of ante- and postnatal women in this population	A perspective cohort	489 pregnant and breastfeeding women	April 2010–November 2011	Drinking profiles and breastfeeding	All alcohol intake data were self-reported and hence underreported particularly during the antenatal period when there is an increased stigma associated with drinking
Maloney ³⁹	Australia	To determine the prevalence and correlates of alcohol use in pregnancy and lactation	Cross-sectional National Drug Strategy Household Survey	10,447 pregnant and breastfeeding women	2007 NDSHS survey	Alcohol use and breastfeeding	Potential bias may have been introduced due to a response rate of only 52% of eligible women participating
Mennella ⁴⁰	Philadelphia, Pennsylvania	To test the hypothesis that exposure to alcohol in breast milk affects infants' sleep and activity levels in the short term	Observational	13 mother-infant pairs	Unreported	Amount of alcohol ingested Infant Sleep and Activity Rhythms	Results of this study are based on self-report data in which alcohol use during pregnancy or while breastfeeding is likely to be underreported because of social desirability bias
Mennella ⁴¹	Philadelphia, Pennsylvania	To evaluate the infants' intake and sucking responses to alcohol-flavored human milk outside of the context of breastfeeding	Cross-sectional	40 mother-infant pairs	Unreported	Infants' intake and sucking responses to alcohol-flavored human milk	Results do not address the issue of whether exposure to higher doses of alcohol in breast milk has more pronounced sedative effects on the recipient's infant
Chien ⁴²	Taiwan, Republic of China	To examine whether ethanol exposure influences lactation parameters	Cross-sectional	23 women	Unreported	Alcohol diet and breastfeeding characteristics	Response bias may have been introduced into the data-collection questionnaire by respondents giving socially acceptable replies
Alvik ⁴³	Oslo, Norway	To study alcohol use and smoking after delivery, and to relate this to breastfeeding	Longitudinal	1873 women	June 2000–May 2001	Maternal drinking, smoking, and breastfeeding	The study focused on short-term effects, complementary studies with a longer follow-up would be useful to elucidate the long-term effects of an alcoholic diet on the composition of breast milk and breastfeeding characteristics
Little ⁴⁴	Michigan, USA	To determine the effect of maternal drinking pregnancy on fetal health	Cohort	400 mother-infant pairs	Unreported	Alcohol use infant development	The presence of a husband/partner when filling out the questionnaire could have influenced reported alcohol use.
Little ⁴⁴	Michigan, USA	To determine if these lower levels of maternal drinking and smoking during pregnancy persist into the postpartum period, and if so, to determine if they are related to breastfeeding	Cohort	463 women	11 months	Maternal drinking, smoking, breastfeeding	High-item non-response using the self-administered questionnaire The study sample consisted of women of high socioeconomic status thus the homogeneity of the sample limits the generalization of the results
Gibson ⁴⁵	Australia	To examine whether drinking or smoking while breastfeeding lowers children's cognitive scores	Longitudinal	5107 infants and breastfeeding women	7 years	Drinking or smoking children's cognitive scores	Selection bias as women who received prenatal care after the sixth month of pregnancy were not included A sample size of infants who had never breastfed may have been too small to detect a relationship. The frequency and quantity of milk consumed by infants was not recorded, nor was the timing of alcohol consumption or the amount of ethanol in breastmilk

(Continued)

Table 1. (Continued)

Author	Country	Aim	Study design	Sample size	Duration of study (Months/years)	Outcome assessed	Study limitation
Wein ⁴⁶	Boston, MA, USA	To examine the association between exposure to tobacco compounds in breast milk and risk of childhood overweight	National Cohort	21,063 mother-child pairs	Analyzed historical data from 1959–1969–1974	Breastfeeding Heavy maternal smoking	Likelihood of misclassifications of feeding, the type could substantially bias the magnitude of our estimated associations. The exclusion of children born preterm from the final analysis decreases its generalizability
Vassilaki ⁴⁷	Greece	To assess the frequency of breastfeeding and its sociodemographic predictors	Cohort	1181 mothers and 1208 infants	30 months	Breastfeeding Sociodemographic predictors	Not all participants were included in the analysis models, due to missing information which hence potentially biased estimates
Hernández ⁴⁸	Spain	To study the longitudinal effects of, taking into consideration prenatal and postnatal second-hand smoke exposure	Cohort	158 infants and women	2005–2009	Prenatal nicotine exposure on cognitive development	Reporting information on breastfeeding initiation and duration was prone to recall bias
Joseph ⁴⁹	USA	To understand factors related to breastfeeding intention, initiation, duration, and weaning among women who quit smoking as a result of pregnancy	Retrospective Cross-sectional study	300 breastfeeding women	March 2008–December 2012	Smoking and breastfeeding intention, initiation, duration	Findings may not apply directly to other populations, particularly to higher socioeconomic status, better nourished, more highly-stimulated, and advantaged populations. Data were collected retrospectively; This research was limited to women who visited the vaccination clinic of the primary healthcare center
Timur ⁵⁰	Turkey	To examine the relationship between smoking only postnatally, both during pregnancy and postnatally, and the newborn sex, birth weight, and breastfeeding	Cross-sectional	664 women	20 February 2010 and 20 July 2010	Maternal Smoking Newborn sex, birth weight	Information collected in the study was based on an individual's recall, which may be subjected to recall bias
Liu ⁵¹	Republic of China	To explore the combined effects of smoking and breastfeeding on offspring mental health outcomes	Cohort	342,846 pregnant and breastfeeding women	Cohort from 2007–2010	Smoking and breastfeeding offspring mental health outcomes	The cohort had a loss to follow up, which can bias results. The generalizability of study results to other populations is limited. They included Ukrainian women and lacked heterogeneity in characteristics, such as race/ethnicity, marital status, and education level
Schaffer ⁵²	Ukraine	To examine whether the association between breastfeeding and neurodevelopment is modified by prenatal drinking patterns	Cohort	385 pregnant, infants and breastfeeding women	2008 and 2014	Neurodevelopment	Self-reported use of cigarettes tends to underestimate the amount of smoking
Donath ⁵³	Melbourne, Australia	To investigate whether maternal smoking remains associated with decreased breastfeeding duration after adjustment for the mother's infant feeding intention	Longitudinal cohort study	14000 pregnant and breastfeeding women	April 1991 and 31 December 1992, 6 months postpartum	Maternal-infant feeding intention, Maternal smoking	Low quality due to the use of secondary data prone to inconsistencies. The observational design of this study did not enable the establishment of a causal relationship between variables
Lechosa ⁵⁴	Spain Carolina	To estimate the prevalence of maternal smoking and its association with exclusive breastfeeding vs. formula feeding	Cross-sectional	948 postpartum women	January and August 2018	Smoking habits Infant feeding	The study also did not distinguish between exclusive or partial breastfeeding or assess potential differences in experiences that directly impacted decisions regarding breastfeeding
Godleski ⁵⁵	Rochester, New York	To examine maternal/child factors that influence breastfeeding in a low-income, racially diverse at-risk sample of smoking and non-smoking women	Observational	247 breastfeeding women	24 months	Cigarettes smoked Breastfeeding behavior Infant reactivity	Selection bias in recruitment, only Aboriginal mothers were all self-identified, following a population of Aboriginal women
Gilchrist ⁵⁶	Western Australia	To document the smoking practices of Aboriginal mothers living in Perth during pregnancy	Cohort	425 mothers	May 2000 and July 2001, 12 months follow-up	Breastfeeding initiation rates Smoking	Smoking status on the birth records was self-reported hence underreporting or misclassification resulting in an underestimate of our effect size estimates
Moore ⁵⁷	Cincinnati, Ohio	To quantify the preterm birth risk of various trimester-specific smoking behaviors	Population-based retrospective cohort study	927 424 live births	Birth records 2006–2012	Pregnancy and preterm birth risk, maternal race, education, age, Medicaid use, marital status, and parity	Smoking habits were recorded by self-reported data hence underestimating of smoking status
Ariz ⁵⁸	Bizkaia, Spain	To analyze the association between maternal smoking and breastfeeding success	Prospective observational study	401 pregnant women who intended to breastfeed	July 2012 and June 2013	Breastfeeding maternal smoking	

postpartum, and children were followed up to 7 years of age, as shown in Table 1.

Synthesis of results

The results are presented in three sections: (1) The association between alcohol use and breastfeeding initiation and duration. (2) The association between smoking and initiation and duration of breastfeeding; and (3) Maternal alcohol and smoking intake on infant health. We discuss in detail common themes arising from the publications, including the ascertainment of exposures and outcomes.

The association between alcohol consumption, breastfeeding initiation, and duration

Thirteen studies reported the prevalence of alcohol intake in lactating women ranging from 31% to 69%, respectively, with the highest prevalence seen in high-income countries.^{36,38,39} See Table 1. The majority of women (95%) reported a decrease in their alcohol consumption during pregnancy or while breastfeeding. Additionally, older age was linked with alcohol use during both pregnancy and breastfeeding,³⁷ although the studies did not stipulate the specific age range of older age. The drinking profile of women during pregnancy may fluctuate after delivery, as demonstrated in Australian women who consume alcohol during pregnancy, with a predominance of women from older age groups and smokers.

At 4, 6, and 12 months postpartum, 45.9%, 47.0%, and 51.9% of breastfeeding mothers were consuming alcohol, respectively.³⁸ Socioeconomic status and educational attainment played significant roles in influencing alcohol consumption patterns, particularly among women who breastfeed for at least 6 months after delivery. Specifically, those with higher levels of education were less likely to engage in binge drinking following childbirth.^{39,43} Additionally, women who were still breastfeeding were less inclined to report occasional episodes of heavy drinking (binges) in the current month compared to women who had terminated breastfeeding early or had never breastfed, as observed in the Australian women cohort.⁴⁴ In some populations, women demonstrated similar patterns of alcohol consumption regardless of their breastfeeding intentions. For example, studies from Ireland and South Africa observed that pregnant women who intended to exclusively breastfeed continued to consume alcohol at rates comparable to those who did not plan to breastfeed. In Ireland, 30.2% of women who intended to exclusively breastfeed consumed alcohol during pregnancy, compared to 27.5% of those who did not intend to breastfeed, with no statistically significant difference observed (OR 1.13; 95% CI: 0.84–1.53).^{34,35}

Lastly, alcohol consumption was unrelated to breastfeeding duration as observed in a cohort of breastfeeding

women in Australia, although most women drank at low levels (≤ 14 standard drinks per week, < 3 per occasion) and employed strategies (e.g., timing of alcohol use) to minimize alcohol passed onto infants via breastmilk.³⁶

The association between smoking, initiation, and duration of breastfeeding

Fourteen studies reported the prevalence of smoking intake among lactating women, ranging from 31% to 69%. In Greece, breastfeeding women who were ex-smokers or smokers during pregnancy had a statistically significantly shorter duration of breastfeeding, with almost three-quarters of women (73.6%) ceasing any breastfeeding after 4 months postpartum,⁴⁷ and smoking cessation during breastfeeding was associated with longer breastfeeding duration.⁵⁸ Contrary to Aboriginal women in Australia, there was no difference in the percentage of smokers and non-smokers who initiated breastfeeding.⁵⁶ A study in Turkey examined the association between smoking only postnatally, both during pregnancy and postnatally, and breastfeeding. Women who smoke were 3.9 times more likely to start feeding their babies with supplementary infant foods at 4 months or earlier than those who do not smoke.⁵⁰ Likewise, the rate of smoking was dependent on the postpartum period as women nursing in the third month postpartum were also significantly less likely to smoke during the month, and the probability of feeding the newborns with formula milk doubled.⁵⁴ Smokers were found to have lower rates of breastfeeding initiation and shorter breastfeeding duration compared to demographically similar non-smokers. However, it was suggested that one of the contributing factors to reduced breastfeeding rates could be attributed to psychosocial factors such as younger age, lower levels of education, and the lack of motivation to breastfeed rather than a physiological impact of smoking on their milk supply.^{53,55,58}

Association with maternal alcohol use and smoking on infant health. The selected studies demonstrated that alcohol intake may be associated with the risk of asthma among infants and children, as demonstrated in Norway among breastfeeding women. However, in children who were breastfed throughout the first 3 months of life, maternal alcohol intake during this time was not significantly associated with any of the outcomes.³³ One study observed that neurodevelopment is modified by prenatal drinking patterns, with a significant interaction between prenatal alcohol exposure (PAE) and breastfeeding. Infants with high PAE who were breastfed for at least 4 months had neurodevelopment BSID-II scores of 14 or more points using the Bayley Scales of Infant Development II, higher compared to those with moderate PAE who had poorer performance scores at 12 months when breastfed longer.⁵² Also, breastfed infants from Australia were examined to determine

whether drinking or smoking while breastfeeding lowered their cognitive scores. Results showed that increased or riskier maternal alcohol consumption was associated with reductions in Matrix Reasoning scores at age 6 to 7 years in children who had been breastfed, and this association was not evident in infants who had never been breastfed.⁴⁵ In a case-control analysis, children of mothers who drank postpartum and breastfed were significantly lighter, had lower verbal IQ scores, and had more anomalies in comparisons controlling for prenatal alcohol exposure and final fetal alcohol spectrum disorder diagnosis. One study examined the association with tobacco compounds in breast milk and the risk of childhood overweight;⁴⁶ they observed a modest positive interaction between breastfeeding and heavy maternal smoking on obesity risk at age 7. A study in Australia that examined whether smoking while breastfeeding lowers children's cognitive scores indicated that smoking during lactation was not associated with scores at age 6 to 7 years in children who had been breastfed.⁵⁹ In addition, the effects of smoking and breastfeeding on offspring's mental health outcomes have been examined in China; maternal smoking during pregnancy was associated with the effects of breastfeeding on the adult offspring's anxiety, depression, and neuroticism.⁵¹ Also, in a national cohort of women in the USA among exclusively breastfed children, the odds of being overweight at age 7 were elevated with maternal smoking, particularly among moderate and heavy smokers.⁴⁶ Likewise, smoking throughout pregnancy was associated with an increased risk of preterm birth; however, quitting early in pregnancy was associated with a significant increase in the risk of extreme spontaneous preterm birth <28 weeks.⁵⁷

Discussion

This study found no significant association between maternal alcohol consumption and breastfeeding duration. However, maternal smoking during pregnancy was associated with shorter breastfeeding duration and increased risk of adverse infant outcomes, including obesity. These findings are consistent with existing literature showing a stronger, more consistent association between smoking and negative infant health outcomes than with alcohol consumption.^{60,61}

While this study did not observe a clear link between alcohol use and breastfeeding duration, previous studies have found that women consuming more than two drinks per day were nearly twice as likely to discontinue breastfeeding by 6 months.^{62,63} The divergence in findings may reflect differences in maternal behavior, such as intentional timing of alcohol intake to reduce infant exposure. In this study, many women reported moderating their alcohol consumption and adjusting timing around breastfeeding, a strategy supported by other studies examining alcohol pharmacokinetics in lactating women. For example, peak alcohol concentration in

breast milk typically occurs about an hour after ingestion on an empty stomach, and is delayed further if alcohol is consumed with food.

Several studies did not control for critical variables, such as exclusive versus mixed feeding, or the timing and frequency of alcohol intake, making it difficult to assess true infant exposure. Additionally, alcohol's bioavailability and its impact on lactation physiology complicate interpretation. Acute alcohol intake is known to reduce maternal serum oxytocin levels, temporarily suppressing milk ejection, with reductions in oxytocin response up to 80% depending on dose. However, this effect is reversible once alcohol is cleared from the bloodstream.⁶⁴

Although limited evidence links alcohol consumption during lactation to cognitive or motor developmental delays, some studies have reported associations between maternal alcohol use and sleep disturbances, gross motor delays, and asthma risk in children, particularly among boys and in settings with high alcohol intake during pregnancy.^{65,66}

Despite this, the literature lacks consistency, possibly due to small sample sizes and inadequate control for sociodemographic confounders. For example, socioeconomic status, maternal health, age, and education factors that influence both alcohol use and infant outcomes are often insufficiently adjusted for. This study also observed a higher prevalence of alcohol intake among women with higher-income employment, aligning with evidence that alcohol use is associated with greater income and educational attainment.⁶⁷⁻⁶⁹

In contrast, maternal smoking during pregnancy has more consistently been associated with adverse outcomes. In this study, smoking was related to shorter breastfeeding duration, increased infant obesity risk, and greater likelihood of offspring anxiety, depression, and neuroticism. This finding is consistent with prior research, including a U.S. study linking prenatal smoking to obesity risk in children under 8 years of age.⁷⁰ Smoking exposure in utero is also known to increase risks of low birth weight, preterm birth, and placental complications.⁷¹⁻⁷³ Additionally, breast milk of smoking mothers contains tobacco-derived toxins, exposing infants to harmful substances even postnatally.

Socioeconomic and educational factors significantly influence smoking behaviors. Women with lower income or education levels are more likely to smoke during pregnancy and less likely to be aware of the associated risks.⁷⁴ Qualitative studies suggest that continued smoking often reflects a coping mechanism rather than ignorance, with some women attempting to balance stress management and fetal harm mitigation. Therefore, educational interventions should avoid framing smoking as purely a knowledge deficit, as doing so can foster guilt and stigma without offering meaningful support.¹⁴

Biological mechanisms and caregiving behaviors may both mediate the impact of maternal substance use on

infant development. Nicotine and alcohol can cross into breast milk and potentially interfere with neurodevelopmental processes, such as neurotransmitter activity and synaptic plasticity. Simultaneously, substance use may affect maternal behavior, diminishing the quality of caregiving and maternal responsiveness, which are crucial for infant cognitive and emotional development. This dual pathway may partly explain observed associations with lower IQ scores and behavioral issues in children exposed to prenatal or postnatal substance use.⁷⁵⁻⁷⁸

Despite widespread health messaging, gaps remain in supporting lactating women. For instance, healthcare providers typically recommend smoking cessation or substantial reduction during breastfeeding, along with avoiding second-hand smoke exposure to the infant. However, fewer evidence-based interventions exist for alcohol reduction in lactating women. A review by Louise et al.⁷⁶ found that while interventions targeting smoking, diet, and physical activity improved birth outcomes, there was a striking lack of studies focused on alcohol reduction during lactation. Promisingly, psychosocial interventions, including brief counseling and culturally tailored support, have shown efficacy in promoting abstinence during pregnancy. At the same time, pharmacological treatments such as naltrexone and acamprosate are used in managing severe alcohol use disorder. Cassidy TM et al. have developed a protocol to assess psychological and cultural interventions to reduce postnatal alcohol use among breastfeeding women, addressing a key evidence gap.⁷⁹

Finally, this study highlights the complex interplay between substance use, breastfeeding practices, and sociodemographic context. While alcohol consumption did not predict breastfeeding duration in this study, this may reflect women's deliberate strategies to minimize infant exposure. Conversely, smoking's association with early weaning emphasizes the multifactorial influences biological, social, and economic on maternal behaviors. Notably, some studies suggest no association between smoking during lactation and cognitive scores, but prenatal exposure may have long-term mental health impacts, even if causality remains debated.⁵⁹

Overall, more research is needed to clarify how maternal alcohol and tobacco use affect infant outcomes through both direct (biological) and indirect (behavioral, socioeconomic) mechanisms. Future studies should employ robust designs that account for breastfeeding practices, timing of alcohol use, and maternal sociodemographic characteristics. Targeted, non-judgmental interventions that support vulnerable populations are crucial for promoting safe breastfeeding practices and optimizing infant health.

Strengths and limitations

Among the study's strengths were the inclusion of large sample sizes and long-term follow-up assessments, which

strengthened the reliability and robustness of the results. The review lies in its ability to synthesize and map the existing literature on the association between maternal alcohol consumption and smoking during breastfeeding, providing a comprehensive overview of their association with infant health and development. By including a wide range of studies, the review highlights key trends and patterns in the data, the association between maternal behaviors, breastfeeding duration, and child outcomes such as cognitive development, obesity, and mental health. The review also identified gaps in the current literature, highlighting areas where further research is needed. These gaps include the long-term effects of alcohol and smoking during breastfeeding, as well as the association of smoking cessation on maternal and infant health. By drawing attention to these areas, the review provides a foundation for future research and public health interventions aimed at overcoming socioeconomic and structural barriers to support healthier choices.

The review's findings may have been limited by the selected study designs, where no trials investigated treatment effects on breastfeeding. Therefore, it would be crucial to replicate these findings through a clinical trial testing the hypothesis that quitting smoking leads to a longer duration of breastfeeding. All the data from the studies were collected using questionnaires. There is a likelihood that participants' reports were untrue if they knew the outcome measurements; however, given the general lack of understanding about the association of alcohol and smoking with breastfeeding, it is not probable. The studies were largely from high-income countries. Whether similar outcomes can be achieved in more diverse or low- and middle-income countries will have to be explored. The failure to distinguish between different categories of breastfeeding (e.g., exclusive, predominant, any) is a limitation. The study was not able to distinguish whether alcohol and smoking cessation enhance breastfeeding, depending on the different categories of breastfeeding: exclusive breastfeeding and complementary feeding. This will be addressed in future studies.

Some studies had a limited sample size, which hindered reaching a consensus regarding the potential adverse effects of increased alcohol consumption. Additionally, the studies failed to guarantee that abstaining from alcohol was not related to women's choice to breastfeed, despite reminders provided to study participants. Furthermore, there was a loss in the follow-up of respondents in the respective studies. None of the studies implemented controls for the timing of alcohol consumption during breastfeeding or variations in breastfeeding practices, such as exclusive breastfeeding versus supplementation with formula. These factors complicate the accuracy of estimating the amount of alcohol ingested by infants. Additionally, the studies did not account for the exact duration of exposure to alcohol through breast milk, nor did they control

for maternal physical and economic status. These unaddressed variables could have hurt the physical outcomes of the children. Also, the potential link between maternal alcohol consumption and adverse outcomes in cognitive reasoning and child development should be interpreted with caution due to limitations in study design, potential confounding factors, and variability in alcohol exposure measurement. In some studies, breastfeeding was assessed only during the mother's postpartum hospital stay, and a significant proportion of mothers might have altered their feeding type after discharge. This could bias the extent of assessed associations. Studies that did not explore information on the pattern and duration of breastfeeding limited the results and contributed to recall bias.

Conclusion

This study highlights the association between maternal alcohol consumption and smoking habits, breastfeeding practices, and their subsequent impacts on infant health. The findings suggest that while alcohol intake had no association with breastfeeding duration, it poses risks to the cognitive and developmental aspects of infants. In contrast, maternal smoking is strongly linked to shorter breastfeeding duration, increased risks of being overweight, and mental health issues in children. However, it is important to recognize that these maternal behaviors are often shaped by broader socioeconomic and structural factors, such as access to resources, social support, and systemic inequalities. These factors may be associated not only with the feasibility of breastfeeding but also with the likelihood of adverse child outcomes. Therefore, public health recommendations must go beyond focusing solely on individual behaviors to address the structural barriers and social determinants that disproportionately affect marginalized populations. These insights highlight the critical need for targeted interventions and health education initiatives to address maternal behaviors during breastfeeding. Further research is essential to deepen our understanding of these associations and to develop effective strategies to mitigate the risks associated with alcohol and smoking during this crucial period.

Acknowledgements

We wish to thank the supervisors and the reviewers who contributed to the publication screening, the Infectious Disease Institute, the University of Liverpool, and Makerere University, who provided the necessary resources.

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Ethical considerations

Not applicable. The scoping review was conducted using existing literature, and no personal data was collected from individual participants.

Consent to participate

Not applicable, as the study did not involve participant recruitment, obtaining consent was not required.

Consent for publication

Included studies reported patient/participant/guardian consent for publication.

Author contributions

Ritah Nakijoba: Conceptualization; Methodology; Investigation; Writing – original draft; Writing – review & editing.

Kyohairwe Isabella: Writing – review & editing; Methodology; Data curation.

Ronald Kiguba: Methodology; Writing – review & editing; Supervision.

Catriona Waitt: Funding acquisition; Writing – review & editing; Supervision; Methodology.

Lynn M. Atuyambe: Writing – review & editing; Supervision; Methodology.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The authors received financial support from a Wellcome Trust Clinical Research Career Development Fellowship awarded to Catriona Waitt. Ronald Kiguba is financially supported by an applied global health grant from the UK Medical Research Council (MR/V03510X/1) and an African Research Leader award (MR/V030434/1) funded by the UK Medical Research Council (MRC) and the Foreign Commonwealth and Development Office (FCDO) under the MRC/FCDO Concordat agreement.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data availability statement

This material is available as supplementary documents for the review. <https://doi.org/10.5281/zenodo.13985895>. <https://doi.org/10.5281/zenodo.14626853>. <https://doi.org/10.5281/zenodo.14626808>.

Supplemental material

Supplemental material for this article is available online.

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