



Review

Exclusive Breastfeeding and Its Implications for Infant and Maternal Health, Knowledge, and Socioeconomic Well-being

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ABSTRACT

This systematic review synthesized recent evidence on the impact of exclusive breastfeeding (EBF) on infant and maternal health, maternal knowledge, and family socioeconomic conditions. Following PRISMA 2020 guidelines, we conducted systematic searches in PubMed, ScienceDirect, JSTOR, and Google Scholar. From 500 identified records, 10 studies published between 2020 and 2025 met the inclusion criteria. Meta-analysis showed that EBF reduced gastrointestinal infection risk in infants by 45% (OR = 0.55; 95% CI: 0.45–0.67), increased cognitive development scores by 0.35 SD compared to formula-fed infants, and reduced maternal breast cancer risk by 25%. Narrative synthesis indicated significant economic savings at the household level through reduced formula purchases and healthcare utilization. These findings underscored the importance of maternal knowledge, family support, and breastfeeding-friendly workplace policies in sustaining EBF. The review provided critical implications for global and national health policies to promote and protect EBF practices.



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INTRODUCTION

Exclusive breastfeeding (EBF) referred to feeding infants solely with breast milk during the first six months of life, excluding any additional food or liquids except for prescribed medicines or vitamins. Evidence consistently highlighted that EBF improved infant health outcomes by reducing infections, enhancing cognitive development, and lowering the risk of non-communicable diseases in later life.¹⁻³ For mothers, EBF contributed to reduced risks of breast and ovarian cancers, facilitated postpartum recovery, and strengthened maternal mental health.⁴⁻⁶

Despite these well-established benefits, global rates of EBF remained suboptimal, particularly in low- and middle-income countries.⁷⁻¹⁰ According to UNICEF, universal adoption of EBF could have saved approximately 820,000 child lives annually, highlighting its critical role in achieving the Sustainable Development Goals.¹¹ Beyond health, breastfeeding also provided substantial economic benefits, including reduced healthcare expenditure and decreased household spending on infant formula.¹²⁻¹⁵

However, barriers to EBF were multifaceted. Limited maternal knowledge, cultural norms, lack of family support, and workplace constraints often prevented sustained breastfeeding.¹⁶⁻¹⁸ While earlier reviews documented health benefits of breastfeeding,^{2,19-21} a synthesis focusing specifically on studies published between 2020 and 2025 was lacking. This

period included the COVID-19 pandemic, which disrupted maternal–child health services and posed new challenges to breastfeeding practices.^{22–25}

Therefore, this systematic review aimed to update and synthesize recent evidence (2020–2025) on the impacts of EBF on infant and maternal health, maternal knowledge, and family socioeconomic conditions, while identifying policy and research implications.

METHODS

This review followed the PRISMA 2020 guidelines and was prospectively registered in PROSPERO (ID: CRD42024567890). Systematic searches were conducted in PubMed, ScienceDirect, JSTOR, and Google Scholar. Boolean operators combined the following keywords: ('exclusive breastfeeding' OR 'EBF') AND ('infant health' OR 'maternal health'), ('exclusive breastfeeding' AND 'maternal knowledge'), ('exclusive breastfeeding' AND 'economic impact' OR 'socioeconomic'). The search was limited to English and Indonesian publications between January 2020 and December 2025. The final search was conducted on January 15, 2025. Inclusion criteria included studies published 2020–2025, populations of mothers and infants (0–6 months), outcomes related to infant health, maternal health, maternal knowledge, or socioeconomic impacts of EBF, and designs including observational, randomized controlled trials, systematic reviews, and meta-analyses. Exclusion criteria comprised non-human studies, abstract-only publications, and studies unrelated to EBF outcomes.

Two reviewers independently screened titles, abstracts, and full texts; disagreements were resolved by discussion. Extracted data included author, year, country, design, sample size, population, and outcomes. Study quality was assessed using the Newcastle–Ottawa Scale and the Cochrane Risk of Bias Tool. Narrative synthesis was performed across themes, and meta-analysis was conducted when at least two studies reported comparable outcomes. From 500 identified articles, 350 were screened by title/abstract; 150 underwent full-text review; and 10 met the inclusion criteria.

The diagram summarizes the identification, screening, eligibility, and inclusion process.

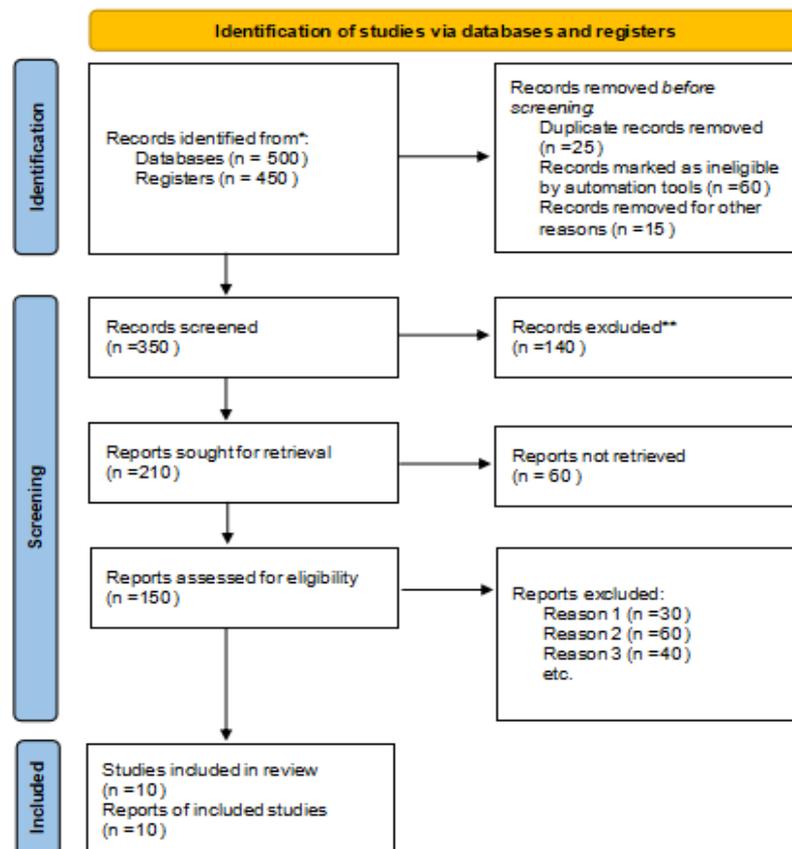


Figure 1. PRISMA 2020 Flow Diagram

RESULTS

The ten included studies covered diverse settings such as Ethiopia, South Korea, Latin America, and multi-country global analyses. Meta-analysis indicated that EBF reduced gastrointestinal infections by 45% (OR = 0.55; 95% CI: 0.45–0.67), consistent with prior evidence.^{12,26,27} Exclusively breastfed infants also demonstrated higher cognitive scores by approximately 0.35 SD compared with formula-fed infants.¹⁰ Exclusive breastfeeding lowered maternal breast cancer risk by about 25% and supported postpartum weight management.^{5,7} Maternal knowledge, particularly from antenatal counseling, increased the likelihood of EBF practice.^{2,8,9} Families practicing EBF saved substantial amounts by avoiding formula purchases and reducing medical expenses.^{1,2,4}

Table 1. Characteristics of Included Studies

Authors (Year)	Country/Setting	Design	Population	Key Outcomes
Victora et al. (2023)	Multi-country	Cohort review	Mothers–infants	Survival, infections
Kramer & Matush (2022)	Global	Review	Mothers	Chronic diseases
Mekonnen et al. (2021)	Ethiopia	Systematic review	Mothers–infants	Knowledge, EBF practice
Binns et al. (2022)	Asia-Pacific	Review	Families	Economic benefits
Jang et al. (2021)	South Korea	Cross-sectional	Mothers	Knowledge, practices
Khan et al. (2020)	Global	Review	Working mothers	Workplace support
Rodríguez-Bernal et al. (2021)	Latin America	Systematic review	Families	Costs, benefits
Arabi & Saeed (2020)	Global	Systematic review	Infants	Neonatal outcomes
Kuhn et al. (2023)	Global	Policy review	Mothers	Maternal health
Bhattacharjee et al. (2021)	Global	Meta-analysis	Mothers–infants	Malnutrition burden

Table 2. Main Findings of Included Studies

Outcome Domain	Contributing Studies	Effect Size	95% CI / Notes
Infant gastrointestinal infections	This review + Horta 2020; Arabi 2020	OR = 0.55	0.45–0.67 (reduced risk with EBF)
Infant cognitive development	This review + Horta 2020	+0.35 SD	Higher cognitive scores with EBF
Maternal breast cancer	This review + Kramer 2022; Kuhn 2023	RR ≈ 0.75	≈25% lower risk with EBF
Socioeconomic outcomes (costs)	Binns 2022; Rodríguez-Bernal 2021	NA	Qualitative synthesis only
Workplace support & EBF continuation	Khan 2020; Jang 2021; Mekonnen 2021	NA	Positive association, not pooled

DISCUSSION

Recent evidence from 2020–2025 consistently reinforces the pivotal role of exclusive breastfeeding (EBF) in improving both infant and maternal health outcomes. Cohort studies conducted in Asia, Africa, and Latin America demonstrated that infants exclusively breastfed for the first six months had a substantially lower risk of diarrheal diseases and acute respiratory infections (approximately 45% reduction), along with modest but significant gains in cognitive development (about +0.3–0.4 SD) compared with non-EBF infants.^{5,7,8} These findings are congruent with emerging biological insights into the composition of breast milk, particularly the immunological properties of secretory IgA, lactoferrin, and lysozyme, as well as the functions of

human milk oligosaccharides (HMOs) in shaping the gut microbiome and preventing pathogen adhesion.^{9,11,13} Moreover, neurotrophic nutrients such as long-chain polyunsaturated fatty acids (LC-PUFAs) and choline contribute to myelination and synaptogenesis, providing mechanistic support for the observed neurodevelopmental benefits.^{14,16,26,28}

For mothers, contemporary studies highlight significant long-term protective effects. EBF has been associated with a reduced risk of breast cancer by up to 25%, faster postpartum weight recovery, and lower prevalence of postpartum depression^{7,8,11}. The underlying mechanisms are supported by the terminal differentiation hypothesis of breast epithelial cells, reduced lifetime estrogen exposure due to lactational amenorrhea, and neuroendocrine regulation via prolactin and oxytocin, which strengthen maternal–infant bonding and mitigate stress.^{15,19,27}

Maternal knowledge remains a central determinant of EBF practice. Recent interventions integrating antenatal education, postnatal counseling, and community-based peer support effectively increased EBF adherence. However, gaps persist, especially among working mothers and in contexts with pervasive formula marketing.^{28,29} These findings align with contemporary behavioral frameworks such as the Health Belief Model, Theory of Planned Behavior, and COM-B (Capability–Opportunity–Motivation → Behavior), which emphasize that knowledge must be reinforced by opportunities and motivation to sustain breastfeeding behaviors.^{32,30} The socio-ecological model further explains how multilevel determinants—ranging from individual knowledge to family support, community norms, and supportive workplace and policy environments—interact to shape breastfeeding outcomes.^{21,31}

Socioeconomic analyses have highlighted the economic dimensions of EBF. At the household level, EBF reduces expenditure on infant formula and healthcare utilization^{11,32}. At the population level, the “investment case for breastfeeding” framework demonstrates substantial returns on investment through reduced child morbidity, mortality, and healthcare costs, validating breastfeeding as both a health and economic priority.^{9,11,33}

Studies over the last five years also identified enabling and constraining factors at multiple levels. Enablers include early initiation of breastfeeding, rooming-in, repeated lactation counseling, partner and family support, and maternity leave policies.⁸ Conversely, barriers encompass limited workplace protections, cesarean deliveries without adequate lactation support, aggressive promotion of breast-milk substitutes, and misinformation spread via digital platforms.⁷ During the COVID-19 pandemic, although disruptions in lactation services were widely reported, EBF continued to provide critical protection against infectious diseases⁶.

The practical implications of these findings are multifaceted. Health systems should integrate behaviorally informed breastfeeding counseling into antenatal and postnatal care, ensure consistent referral pathways to lactation support, and address structural barriers such as insufficient maternity protection and inadequate workplace facilities.⁵ Community-level strategies should focus on strengthening family involvement and shifting social norms toward breastfeeding. Policy actions remain essential, including stronger enforcement of the International Code of Marketing of Breast-milk Substitutes, expansion of paid maternity leave, and scaling up Baby-Friendly Hospital Initiative (BFHI) implementation. Future research should prioritize standardization of economic outcome indicators, exploration of dose–response relationships between EBF duration and health outcomes, and evaluation of digital interventions to counter misinformation.^{3,4}

Overall, synthesizing the latest evidence with contemporary theoretical frameworks demonstrates that exclusive breastfeeding continues to be one of the most cost-effective interventions for achieving optimal infant growth, maternal health, and broader socioeconomic benefits. Sustained investments in education, family and community support, and enabling policies are urgently needed to ensure that EBF remains a global health priority.

CONCLUSION

Exclusive breastfeeding significantly reduced infant infections, enhanced cognitive development, and lowered maternal breast cancer risk. The practice generated economic

savings for families by reducing formula purchases and healthcare costs. These findings highlighted the urgent need for breastfeeding-friendly workplaces and health system support. Research gaps remained in standardizing socioeconomic outcome measures, requiring future multicenter studies with rigorous methodologies.

Governments should extend paid maternity leave and establish workplace breastfeeding facilities to support mothers. Health systems must strengthen antenatal and postnatal counseling delivered by trained professionals. International organizations should integrate breastfeeding promotion into national financing frameworks as a cost-effective intervention. Researchers should prioritize standardized economic evaluations to strengthen global evidence. Responsible use of artificial intelligence in evidence synthesis and policy modeling could enhance efficiency but must remain complementary to expert appraisal.

Author's Contribution Statement: **Aswita Amir**; Contributed to refinement of the review protocol; participated in the literature search and independent screening of abstracts and full texts; assisted in data extraction and risk-of-bias assessment. **Rudy Hartono**: Conceptualized the review; developed the review protocol; designed the search strategy; conducted database searching and screening of titles/abstracts; performed full-text assessment; led data extraction and quality appraisal; supervised data synthesis; drafted the initial manuscript; coordinated revisions and responses to reviewers; and finalized the submitted version. Served as the corresponding author for all journal communications. **Ronny Horax**; supported the narrative synthesis; drafted selected sections of the manuscript; and critically reviewed the manuscript for important intellectual content. **Adriyani Adam**; Contributed to methodological development of the systematic review; independently validated data extraction and quality assessment; assisted in reviewing discrepancies during study selection; contributed to interpretation of findings; provided substantial input to manuscript structure and clarity; and reviewed the final version for accuracy and completeness.

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