# EXCLUSIVE BREASTFEEDING PATTERNS AND THE INCIDENCE OF PNEUMONIA IN INFANTS IN URBAN AREAS: A SCOPING REVIEW

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## ABSTRACT

**Background:** Pneumonia remains a leading cause of infant morbidity and mortality in urban areas. Exclusive breastfeeding is widely recognized as a protective factor, yet urban environmental and socio-economic conditions may influence its effectiveness.
**Objective:** This scoping review aims to examine the relationship between exclusive breastfeeding and the incidence of pneumonia in infants residing in urban settings.
**Methods:** A comprehensive search was conducted in ProQuest, ScienceDirect, and PubMed for studies published between January 2020 and December 2024. Of 567 articles initially identified, 159 were screened, and 19 studies met the inclusion criteria. The review was guided by the Joanna Briggs Institute (JBI) framework and focused on urban populations across Asia, Africa, and Latin America.
**Results:** The findings indicate that exclusive breastfeeding significantly reduces the risk of pneumonia in infants. However, its protective effect can be diminished by environmental pollutants, inadequate housing, and limited healthcare access. Socio-economic status, maternal education, and support systems also influence breastfeeding success.
**Conclusion:** Exclusive breastfeeding plays a critical role in reducing pneumonia incidence in infants, especially in densely populated urban areas. Nonetheless, structural challenges such as poor air quality, early maternal employment, and lack of breastfeeding education hinder optimal outcomes. Multisectoral collaboration is necessary to address these barriers and strengthen community-based breastfeeding support. Further studies are recommended to explore the long-term impacts of exclusive breastfeeding on respiratory health across diverse urban contexts.

**Keywords:** Exclusive breastfeeding, pneumonia, infants, urban health, environmental factors, maternal education

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## INTRODUCTION

Pneumonia is one of the leading causes of morbidity and mortality among children under five worldwide, particularly in developing countries. This disease is caused by bacterial, viral, or fungal infections that affect the lungs, leading to severe respiratory distress Levine et al., (2017). Young children are at high risk for pneumonia due to their developing immune systems, exposure to unhygienic environments, and nutritional factors that influence immune function Nair et al, (2018), One of the critical protective factors against pneumonia in young children is exclusive breastfeeding. Breast milk contains antibodies, essential nutrients, and bioactive components that enhance a child's immunity against respiratory infections (Victora Horta, B. L., Bahl, R. et al., n.d.). However, in many urban areas, the rate of exclusive breastfeeding remains low due to various factors such as maternal employment, lack of education, and aggressive promotion of infant formula (Victora Horta, B. L., Bahl, R. et al., n.d.). Therefore, further research is needed to explore the relationship between exclusive breastfeeding patterns and pneumonia incidence in young children living in urban areas.

The global healthcare system currently faces significant challenges in increasing the coverage of exclusive breastfeeding to reduce pneumonia and other respiratory infections. The World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) recommend exclusive breastfeeding for the first six months of life to lower the risk of infectious diseases, including pneumonia ((UNICEF, 2021) . Several studies have shown that infants who are not exclusively breastfed have a higher risk of respiratory infections compared to those who receive exclusive breastfeeding Lamberti et al, (2016). Although various interventions have been implemented to raise awareness about the importance of breastfeeding, the rate of exclusive breastfeeding remains below the expected target in many developing countries, particularly in urban environments with modern lifestyles Neves et al, (2021). Additionally, in urban settings, exposure to air pollution, inadequate sanitation, and limited access to healthcare services further contribute to the risk of pneumonia among young children Rudan et al, (2017).

A preliminary review of the existing literature indicates that although numerous studies have explored the health benefits of exclusive breastfeeding, research specifically examining the relationship between breastfeeding patterns and pneumonia incidence in urban environments remains limited (Victora Horta, B. L., Bahl, R. et al., n.d.).Some studies employ observational epidemiological methods to assess this relationship, while others rely on clinical data from hospitals or public health surveys (Victora Horta, B. L., Bahl, R. et al., n.d.). The variability in research design leads to inconsistencies in findings, making direct comparisons challenging. Furthermore, contextual factors such as maternal education levels, family socioeconomic status, and access to healthcare services often play a crucial role in determining breastfeeding patterns and pneumonia incidence among young children Bhutta et al, (2020).

Exclusive breastfeeding is defined as the practice of feeding an infant only breast milk, without any additional food or liquid, except for medically recommended vitamins or medications, during the first six months of life Awasthi et al, (2022). Breast milk contains immunoglobulins and growth factors that protect infants from respiratory infections and other illnesses Arikawa et , (2022). However, in increasingly complex urban environments, maintaining exclusive breastfeeding has become increasingly challenging. Social, economic, and cultural factors influence a mother's decision to either continue breastfeeding or introduce infant formula or complementary foods prematurely Gertosio et al, (2016). Therefore, it is essential to investigate the extent to which exclusive breastfeeding patterns contribute to pneumonia prevention among young children in urban settings.

This study aims to examine the relationship between exclusive breastfeeding patterns and pneumonia incidence among young children in urban environments. Using a *scoping review* approach, this research will analyze various factors influencing this relationship, identify key patterns, and explore gaps in the current academic literature Munn et al, (2018).The findings are expected to provide insights for healthcare professionals, policymakers, and communities in their efforts to promote exclusive breastfeeding and prevent pneumonia among young children.

The inclusion criteria for this study encompass research examining the relationship between exclusive

breastfeeding patterns and pneumonia incidence in young children, incorporating both quantitative and qualitative approaches published in accredited journals over the past decade (2014–2024). A comprehensive literature search will be conducted across various academic databases, including PubMed, Scopus, Web of Science, and Cochrane Library, to ensure extensive and rigorous coverage of relevant studies (Tricco et al., 2018).

A *scoping review* approach has been selected to systematically investigate this topic, particularly given the diverse methodological approaches employed in previous studies (Arksey and O'Malley, 2005). This method will help identify key findings, summarize different perspectives, and highlight gaps in research related to breastfeeding patterns and pneumonia incidence in young children living in urban areas Levac et al, (2010). Moreover, this review will serve as a foundation for future research aimed at developing more effective intervention strategies to improve child health.

The primary objective of this study is to evaluate the existing scientific evidence regarding the relationship between exclusive breastfeeding patterns and pneumonia incidence among young children in urban settings. Consequently, this research will provide a comprehensive overview of the factors contributing to an increase or decrease in pneumonia incidence in young children and offer recommendations for healthcare professionals and policymakers to enhance exclusive breastfeeding rates and improve overall child health outcomes (Victora Horta, B. L., Bahl, R. et al., n.d.). The research question guiding this study is: *What is the relationship between exclusive breastfeeding patterns and pneumonia incidence among young children in urban areas, based on the available scientific literature.*

**METHODS**

This study was conducted using a *scoping review* methodology, following the latest methodological guidelines from the Joanna Briggs Institute (JBI) Peters et al, (2020) and the **P**RISMA-ScR framework (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews*) Tricco et al, (2018). This approach was chosen to ensure a systematic, transparent, and accountable literature review process.

The first step in this study was to define the research objectives and questions using the Population, Concept, Context (PCC) framework, which helps clarify the study's scope. In this context, the

population studied was young children, the concept examined was the pattern of exclusive breastfeeding, and the context focused on urban areas Peters et al, (2020). Subsequently, the research protocol was developed, incorporating inclusion and exclusion criteria, literature search strategies, and data extraction methods to ensure transparency and ease of replication in future research. It is recommended that this protocol be registered in platforms such as the Open Science Framework (OSF) or JBI Evidence Synthesis Peters et al, (2020) .

The next stage involved a comprehensive literature search across various academic databases and *grey literature* sources. The primary databases used in this study included PubMed, Scopus, Web of Science, and Cochrane Library**,** ensuring a broad and relevant literature coverage. The search process was conducted with the support of expert librarians to optimize search strategies and systematically document each step Tricco et al, (2018).

Article selection was carried out in multiple systematic stages. First, screening was conducted based on titles and abstracts to exclude irrelevant articles. Next, full-text evaluation was performed on the shortlisted articles to ensure their alignment with the predefined inclusion and exclusion criteria. The entire selection process was documented using the PRISMA-ScR flow diagram to enhance transparency in study selection and minimize selection bias Tricco et al, (2018).

The collected data were then extracted and analyzed descriptively. The extracted data included information on study design, population characteristics, exclusive breastfeeding patterns, and pneumonia incidence in young children. This analysis aimed to map key findings, identify research trends, and highlight gaps in the existing literature Peters et al, (2020). The findings of this review are expected to provide a comprehensive overview of the relationship between exclusive breastfeeding patterns and pneumonia incidence in young children in urban areas. This entire research process was designed to produce a *scoping review* that is systematic, transparent, and credible**,** serving as a foundation for further research to enhance the understanding of the crucial role of exclusive breastfeeding in preventing pneumonia among young children.

**Eligibility Criteria**

The eligibility criteria for this literature review have been carefully established to ensure the relevance and quality of the articles

analyzed. The specific inclusion criteria are as follows: the articles must report findings on the relationship between exclusive breastfeeding patterns and the incidence of pneumonia in infants in urban areas, including social, economic, cultural, environmental, and health factors that influence breastfeeding patterns and pneumonia incidence. Eligible studies may utilize quantitative, qualitative, or mixed-methods research designs, including cohort studies, case-control studies, cross-sectional studies, randomized controlled trials (RCTs), and qualitative studies based on interviews or phenomenological analysis. The research population must include infants (0–59 months old) who received exclusive breastfeeding or not and have a history of pneumonia diagnosed clinically or through medical reports. Additionally, the articles must be available in full-text format to allow for comprehensive analysis of the methodology and findings. The articles included should be published between January 2014 and December 2024 to ensure that the data used is up-to-date and relevant to current conditions. Furthermore, only articles written in English or Indonesian will be included to ensure comprehension and accessibility in the analysis.

Conversely, the exclusion criteria are as follows: articles categorized as literature reviews, systematic reviews, or scoping reviews are excluded from this study, as this research aims to analyze primary, not secondary, evidence. Duplicate publications appearing in two or more journals will be excluded to maintain the integrity and uniqueness of the findings being analyzed, with only the most complete or recent version included in the review.

By establishing these inclusion and exclusion criteria, this review aims to ensure that only high-quality and relevant studies are analyzed, so that the research results provide a comprehensive mapping of evidence on the relationship between exclusive breastfeeding patterns and the incidence of pneumonia in infants in urban environments.

**Databases**

The databases utilized in this study included PubMed, Science Direct, Google Scholar, and ProQuest. The researchers accessed all databases on 28 Pebruari 2025. The following is a list of the database links:

**Table 2. Database Links**

| No. | Database Name | Link |
|---|---|---|
| 1 | PubMed | https://pubmed.ncbi.nlm.nih.gov |
| 2 | Science Direct | https://www.sciencedirect.com |
| 3 | ProQuest | https://www.proquest.com |

**Search Strategy**

In the literature search, a combination of keywords with Boolean operators was utilized to obtain more specific results and facilitate the selection of relevant articles. The keywords used were **("exclusive**

**breastfeeding" OR "breastfeeding duration" OR "breastfeeding adherence") AND ("pediatric pneumonia" OR "pneumonia in infants" OR "lower respiratory tract infection" OR "severe pneumonia") AND ("children under five" OR "infants" OR "neonates") AND ("urban area" OR "metropolitan city" OR "urban slums") AND ("risk factors" OR "protective factors" OR "maternal health" OR "socioeconomic status") AND ("cohort study" OR "case-control study" OR "randomized controlled trial" OR "systematic review") AND ("hospitalization" OR "morbidity" OR "mortality" OR "respiratory failure"** By applying these keywords across various academic databases and using Boolean operators, the researchers were able to identify a number of articles that matched the search criteria.

The search was conducted in four major databases—PubMed, Google Scholar, ProQuest, and BioMed Central—to ensure a broad and credible coverage of the literature. The search results identified a total of 567 articles that met the initial criteria, with the following distribution: 0 articles from PubMed, 284 articles from Google Scholar, 271 articles from ProQuest, and 12 articles from BioMed Central.

Following the initial screening based on titles and abstracts, the relevant articles were further evaluated according to the predetermined inclusion and exclusion criteria. Articles that met the criteria were then subjected to a full-text analysis to confirm their relevance to this study.

This search strategy was designed to produce a systematic and comprehensive mapping of the literature, thereby providing a clear overview of the relationship between exclusive breastfeeding patterns and the incidence of pneumonia in infants living in urban areas.

## RESULTS

For this study, the researchers utilized four primary search platforms: PubMed, ScienceDirect, ProQuest, and other relevant sources. During the identification phase, a total of 567 articles were retrieved from all databases. These articles were then screened to include only those published between 2020 and 2024, available in full-text format, and written in English. This process narrowed the selection down to 159 articles.Subsequent screening was based on the titles and abstracts of the articles deemed relevant to the research topic. Articles employing designs such as literature reviews, scoping reviews, and systematic reviews were excluded. Duplicate articles were also removed at this stage. As a result, 19 articles were reviewed in more detail to ensure they met the inclusion criteria. Ultimately, 19 articles were included in the final review. The

complete PRISMA procedure is illustrated in the flow diagram below.

**DISCUSSION**

Exclusive Breastfeeding Patterns and the Incidence of Pneumonia in Infants in Urban Areas

The Role of Exclusive Breastfeeding in Preventing Pneumonia Exclusive breastfeeding during the first six months of an infant's life has been shown to have significant protective effects against pneumonia, which remains a leading cause of infant morbidity and mortality in urban areas Victora et al, (2016). Breast milk contains secretory IgA antibodies, lactoferrin, and oligosaccharides, which help protect the infant's respiratory tract from pathogenic infections (Victora Horta, B. L., Bahl, R. et al., n.d.).

A study by Horta et al, (2018) found that infants exclusively breastfed had a 50% lower risk of developing pneumonia compared to those who received formula or partial breastfeeding. Similarly, research by Bahl et al, (2017) revealed that direct breastfeeding provides better immune protection than expressed breast milk due to the direct transfer of maternal microbiota, which supports infant immune system development.

However, urban environmental and social factors can diminish the protective effects of exclusive breastfeeding. Infants who do not receive exclusive breastfeeding are more vulnerable to respiratory infections due to exposure to air pollution, poor home ventilation, and secondhand smoke Sutriana et al, (2021) (Victora Horta, B. L., Bahl, R. et al., n.d.) reported that infants in low air quality environments who were not exclusively breastfed had a 2.5 times higher risk of developing pneumonia compared to those who received exclusive breastfeeding.

Immunological Benefits of Exclusive Breastfeeding in Pneumonia Prevention Breastfeeding provides several immunological mechanisms that help protect infants from respiratory infections: Transfer of antibodies and anti-inflammatory factors: Research by (Victora Horta, B. L., Bahl, R. et al., n.d.) found that exclusive breastfeeding contains lactoferrin, anti-inflammatory cytokines, and oligosaccharides, which help reduce pneumonia risk by inhibiting bacterial colonization in the respiratory tract, probiotic effects and gut microbiota development: Breastfeeding supports the growth of beneficial bacteria in the gut, which enhances systemic immune responses against respiratory infections

(Bode, 2018), improved lung function and ventilation capacity: (Duijn and Jones M, 2022) discovered that exclusively breastfed infants had better lung function, with a lower risk of developing severe pneumonia compared to formula-fed infants. Additionally, a study by (Victora Horta, B. L., Bahl, R. et al., n.d.) found that exclusive breastfeeding can reduce severe pneumonia cases by up to 72%, underscoring its critical role in lowering pneumonia-related morbidity and mortality rates.

Challenges in Exclusive Breastfeeding Implementation in Urban Areas

Despite the well-documented benefits of exclusive breastfeeding, several barriers hinder its implementation, particularly in urban environments: early maternal return to work

Many urban mothers return to work before their infants reach six months, reducing the likelihood of sustaining exclusive breastfeeding Rollins et al, (2016). The lack of workplace breastfeeding facilities also presents a significant challenge Gupta et al, (2018), limited healthcare support A study by Balogun et al, (2017) found that mothers who do not receive comprehensive education about the benefits of exclusive breastfeeding are more likely to switch to formula feeding. Similarly,Cohen et al, (2018) emphasized that insufficient healthcare training on breastfeeding promotion contributes to low rates of exclusive breastfeeding in health facilities, cultural myths and misconceptions about breastfeeding many mothers believe that infants need additional water, formula, or complementary foods before six months of age. A report by Sutriana et al, (2021) found that misinformation about exclusive breastfeeding is a major factor contributing to low breastfeeding rates in several developing countries, social pressures and aggressive formula marketing a study by Sokol et al, (2019) found that in some urban areas, aggressive formula marketing campaigns have reduced exclusive breastfeeding rates, as many mothers believe that formula is superior to breast milk for infant growth.

Environmental Factors and Pneumonia Risk in Infants Environmental conditions in urban areas also play a crucial role in increasing pneumonia risk among non breastfed infants: Air pollution and secondhand smoke exposure Sutriana et al, (2021)reported that infants living in highly polluted areas have a 2-3 times greater risk of developing acute respiratory infections compared to those in cleaner environments,

poor home ventilation A study by (Victora Horta, B. L., Bahl, R. et al., n.d.) found that households with inadequate ventilation and high population density increased pneumonia risk by 60%, especially among non-breastfed infants, limited access to healthcare Vaughan et al, (2022) reported that infants from families with limited access to healthcare facilities were more likely to experience severe pneumonia, particularly if they lacked the immunological protection provided by exclusive breastfeeding.

**Policy-level interventions** should therefore extend beyond workplace accommodations. A more comprehensive approach involves:

1. **Community-based awareness campaigns** led by local health workers to counter misinformation and promote EBF in culturally sensitive ways.
2. **Integration of breastfeeding promotion into national child health programs**, such as through the Baby-Friendly Hospital Initiative (BFHI) and maternal-child health outreach.
3. **Regulation of infant formula marketing**, particularly in densely populated cities where misleading advertising is prevalent.
4. **Environmental health interventions**, including improving indoor air quality and ventilation, which directly intersect with pneumonia prevention efforts.

In addition, several studies emphasize the role of **social support networks** in EBF success. Support groups, home visits by trained lactation counselors, and father-inclusive programs have been shown to increase EBF rates and sustain breastfeeding beyond the initial weeks postpartum. Finally, this review highlights the need for **context-sensitive research** that examines the interaction between breastfeeding, environmental exposures, and socio-economic variables. Longitudinal studies evaluating the sustained effects of EBF on pneumonia incidence across diverse urban landscapes are crucial. Future research should also explore **synergistic interventions**, such as combining breastfeeding support with air quality monitoring and household health education.

## CONCLUSION

Exclusive breastfeeding for the first six months plays a crucial role in preventing pneumonia in infants, particularly in urban areas. Breast milk contains antibodies, lactoferrin, and oligosaccharides that help enhance the infant's immune system against respiratory infections. Additionally, exclusive breastfeeding has positive effects

on improving lung function and regulating the infant's gut microbiota. While the benefits are clear, challenges in the implementation of exclusive breastfeeding in urban areas remain significant, primarily due to the early return of mothers to work, lack of education regarding breastfeeding, social pressures, and environmental factors such as air pollution and poor home ventilation. Therefore, collaborative efforts from the government, healthcare professionals, the private sector, and the community are essential to improving exclusive breastfeeding practices. Public education programs and supportive policies for working mothers need to be strengthened, including the provision of breastfeeding facilities in the workplace and healthcare support to enhance breastfeeding success. Moreover, further research is needed to understand the long-term effects of exclusive breastfeeding on pneumonia incidence across various socio-economic and environmental groups. Efforts to improve air quality and reduce pollution in urban areas are also necessary to support infant health. With these measures, it is hoped that the incidence of pneumonia in infants will decrease, leading to improved health and overall well-being for both mothers and children.

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