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A Literature Review on Risk Factors for Pneumonia in Toddlers

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ABSTRACT

Background: Pneumonia leading morbidity and mortality in <5 years old children, with high incidence rates in developing countries, so a deep understanding of its health determinants is crucial in prevention efforts. Factors such as nutritional status, immunization status, home ventilation conditions, occupancy density, and ambient temperature have been reported to contribute to the incidence of pneumonia, but findings between studies show variations that require a comprehensive synthesis study. Objective: analyze the main risk factors on pneumonia in toddlers through a systematic review of accredited studies. Method: literature review was used by selecting articles from Scopus Q1–Q5 and SINTA 1–SINTA 5 indexed journals obtained through keyword-based searches on Google Scholar and ScienceDirect. Result: of the study showed that poor nutritional status, incomplete immunization, inadequate ventilation, high occupancy density, and sub-ideal room temperature were consistently associated with an increase in pneumonia incidence in toddlers. Conclusion:, pneumonia is a multifactorial disease requires an evidence-based holistic prevention approach. Novelty: this study lies in the presentation of a comparative synthesis of various recent accredited sources, thus providing an integrative picture of the dominant risk factors relevant to public health interventions.

Keywords: Pneumonia, Risk factors, Toddlers, Nutrition, Environmental factor

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INTRODUCTION

Pneumonia, often referred to as wet lungs, is an inflammatory condition that occurs in the lung tissue. This inflammation results in the alveolus (air sacs) filling with fluid, so the lungs cannot function properly. Air bags that have been filled with fluids can cause coughing up phlegm or sputum or sputum cough, fever, chills, and difficulty breathing (1).

World Health Organization (WHO), stated it as acute infection which attacks the lung tissue and one of causing the child death worldwide. This disease affected by bacteria, viruses, and fungi, so transmission can occur quickly, especially in vulnerable groups. Pneumonia worldwide is shown to cause 740,000 deaths in children <5 years age, or equivalent to 14% of the total deaths of toddlers worldwide (2).

In Indonesia, pneumonia still main causes of morbidity and mortality in toddlers. Ministry of Health data shows that pneumonia continues to be a threat to children's health, with thousands of cases reported annually and placing it as a priority in the national health program (3). Factors that can increase this pneumonia include age (such as children under five and seniors over 65), certain health conditions (such as chronic lung disease, diabetes, or immune system disorders), as well as certain habits or behaviors (such as smoking and exposure to air pollution)(4).

In addition to individual factors, the causes of pneumonia in children are also related to environmental and pathogenic factors. Bacteria including Streptococcus pneumoniae and Haemophilus influenzae type B, as well as viruses including Respiratory Syncytial Virus (RSV), are the most common infectious agents in toddlers, especially in environments with poor indoor air quality(4). In developing countries like Indonesia, the high rate of pneumonia in toddlers is largely influenced by household environmental conditions, like unsuitable ventilation, high occupancy density, and indoor air pollution. These factors worsen respiratory infections risk, especially in toddlers whose immune systems are immature(5).

Cases of pneumonia in toddlers need special attention so that children's health can be maintained from an early age, thereby supporting the creation of quality human resources in the future. Therefore, this literature review is analyze the risk factors that contribute to pneumonia in toddlers, focusing on nutritional status, immunization status, and the physical environment like home including ventilation, occupancy density, and temperature(6).

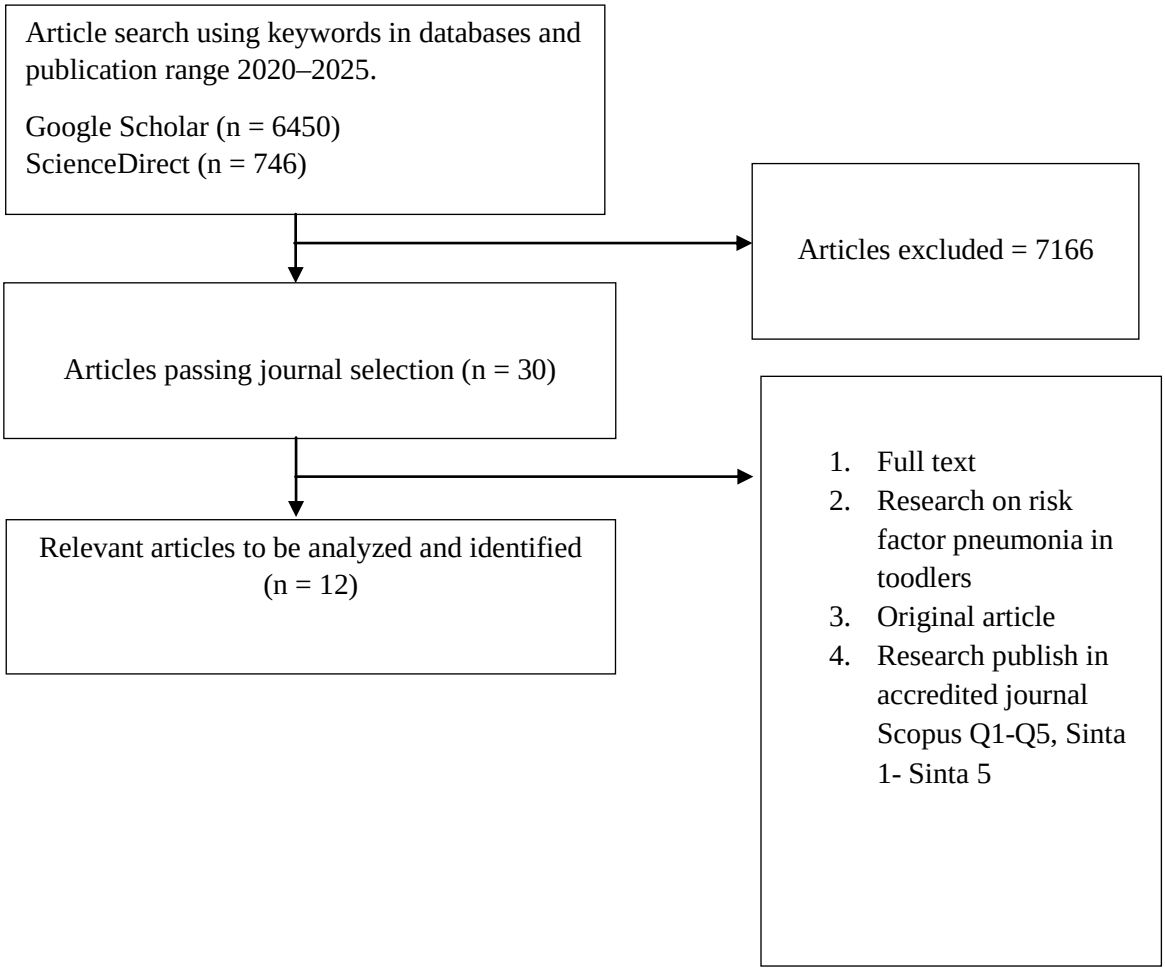
METHOD

This literature review is limited to using only accredited journals, namely journals indexed in Scopus Q1–Q5 and SINTA 1–SINTA 5. The selection of journals was carried out selectively ensuring information quality and validity used.

Literature sources are obtained from academic databases like Google Scholar, and Science Direct. by searching using keywords such as "Pneumonia in toddlers," "Risk factors for pneumonia in children," "Nutritional status and pneumonia," "Immunization status and pneumonia," "Ventilation and pneumonia," "Occupancy density and pneumonia," and "Temperature and pneumonia." Word combinations are also used to expand the scope of relevant references.

In addition to the keyword-based search method, this study also applies inclusion and exclusion criteria. Only studies that addressed risk factors for pneumonia, specifically nutritional status, immunization status, ventilation, occupancy density, and temperature, were included in this study. Journals published in the last five years are prioritized to ensure that the information obtained remains up-to-date and relevant. this study, all types of research designs that discuss pneumonia in toddlers can be used as a reference. However, sources

from opinion articles, electronic news, non-scientific papers, and journals that are only available in abstract form were not included in this study



RESULTS AND

Based on the results of the search and article selection, a number of articles have been obtained that are in accordance with the research topic in this literature review. The articles have gone through a screening process based on relevance to the focus of the research. The article search results are as follows:

Table 1. Matrix Literature Review

No	Researchers	Research Title	Research Results	Journal Ranking
1	Rosmawati, Windari, Anggraini, and Ningsih, (2024) (7)	Risk Factors Related to Pneumonia in Toddlers in the Working Area of the Hajj Health Center in Central Lampung Regency in 2023	There is a relationship between nutritional status and pneumonia in toddlers Hajj Pemanggilan Health Center The Ventilation and Pneumonia are not connected in Summoning Hajj Health Center Immunization Status and Pneumonia related in Summoning Hajj Health Center	Sinta 1
2	Indah, Suryani, and Rosalina (2022) (8)	Analysis of risk factors for the incidence of pneumonia in toddlers in the working area of the Sidorejo Health Center, Pagar Alam City	Poor bedroom ventilation, inappropriate room temperature, and high housing density related with pneumonia in toddlers. Nutritional status shows a significant relationship	Sinta 4

No	Researchers	Research Title	Research Results	Journal Ranking
			with pneumonia occurrence, and vaccine status similarly correlates with developing pneumonia	
3	Sa'diyah, Utomo, and Hikmandari (2022) (9)	Risk Factors for Physical Conditions at Home with the incidence of pneumonia in toddlers	Inadequate household ventilation and high housing density are connected with pneumonia in toddlers, while room temperature shows no significant effect.	Sinta 4
4	Hasanah, and Santik (2021)(10)	Intricate and Extrinsic Factors Related to the Incidence of Pneumonia in the Rembang Health Center Area	Nutritional status, immunization status, and population density are connected with pneumonia incident.	Sinta 4
5	Melynia, Parwati, and Indriana (2024) (11)	Analysis of Intrinsic Factors Related to the Incidence of Pneumonia in Toddlers at Puskesmas I South Denpasar	There is no significant relation among toddlers' nutritional status and pneumonia, while immunization linked to the incidence.	Sinta 5
6	Harahap, Kusmawati, and Lestari (2021)(12)	The Relationship between the Physical Environment of the Home and the Incidence of Pneumonia in Toddlers in Tarai Village Bangun Work Area of the Mining Health Center UPT	Ventilation area and housing density are linked with the pneumonia incident in toddlers.	Sinta 5
7	Jannah, Abdullah, Hidayat, and Asrar (2020) (13)	Analysis of risk factors related to the incidence of pneumonia under five in the working area of UPTD Banda Raya Health Center, Banda Aceh City in 2019	There housing density and the incidence of pneumonia are not connected, and there is a relationship between ventilation and the pneumonia in the work area of the UPTD Banda Raya Health Center, Banda Aceh City in 2019.	Sinta 4
8	Sari, Setiaji, and Widodo (2021)(14)	Factors related to the incidence of pneumonia in toddlers in the working area of the Hanura Health Center, Peswaran Regency in 2015	Nutritional status and immunization status are connected with the incidence of pneumonia.	
9	Novarianti, Syukri, Izhar, Ridwan and Faisal (2021)(15)	Nutritional Status and Administration of Vitamin A Capsules as Risk Factors for Pneumonia in Toddlers Aged 18-59 Months	There is no significantly connection among immunization status and pneumonia incidence, where nutritional status was linked to pneumonia in toddlers	Sinta 2
10	Sutriana, Sitaresmi, and Wahab (2021) (16)	Risk factors for childhood pneumonia: a case-control study in a high prevalence area in Indonesia	There is a relationship between incomplete immunization status and Pneumonia	Q3
11	Kicoco, and Maren (2021) (17)	Prevalence and associated factors of pneumonia among under-fives with acute respiratory symptoms: a cross sectional study at a Teaching Hospital in Bushenyi District, Western Uganda	The immunization status and the pneumonia incidence in toddlers are connected	Q3
12	Yuliniar, Wijayanti, and	An Analysis Factors Affecting the Cases of Pneumonia in	There are an influence nutritional status and pneumonia incident There is	Sinta 4

No	Researchers	Research Title	Research Results	Journal Ranking
	Indriyanti (2021)(18)	Toddlers at Public Health Center (Puskesmas) Pati I	an effect between vantilation on the incidence of pneumonia.	

DISCUSSION

Analysis of Risk Factor fo Pneumonia in Toodlers

According to the analysis conducted, there are several main risk factors that affect on pneumonia insicent in children<5 years old. These factors include nutritional status, immunization status, housing density, house ventilation, and ambient temperature. A review of the literature suggests that these factors significantly connected with an increased risk of pneumonia, although there are some differences in findings between different studies.

1. Nutrional Status

   The toddlers nutritional status significantly influence pneumonia. Malnutrition is the main cause of a decline in the immune system. Low immune systems in toddlers make them susceptible to pneumonia and lead to death(15). Of the 12 journals reviewed, 8 journals found a significant association poor nutritional status with pneumonia incidence, while 4 journals found no significant correlation. These differences can occur due to variations in nutritional status assessment methods, differences in home environment, and hygiene conditions.

   One study from Uganda paints a similar picture: the country also faces high rates of malnutrition and pneumonia among children under five. UNICEF in 2022 stated malnutrition is the largest contributing factor to pneumonia deaths in low-middle-income countries (LMICs), both in Asia and Africa. This shows that both Indonesia and Uganda have the same risk pattern, namely a combination of malnutrition, exposure to an unhealthy environment, and limited access to health services causes pneumonia to remain a major threat to children under five(19)

   Thus, although the geographical contexts differ, the findings from Uganda reinforce the global evidence that nutritional status is a consistent risk factor in various LMIC countries, including Indonesia. Toddlers with poor nutritional status are very easy to get infections due to disorders in the immune system. Poor nutritional status will result in risk factors for pain and death (20).

2. Immunizations Status

   Immunization strengthens a person’s immunity that help to resist infection or experience mild illness if exposed to the disease.(21). Immunization plays an important role in preventing various infectious diseases, including pneumonia. Some vaccines that contribute to the prevention of pneumonia in toddlers include the pneumococcal vaccine (PCV), the Haemophilus influenzae type B (Hib) vaccine, and the measles vaccine. According to the result (16,17). The studies or from 12 studies 7 studies showed incomplete immunization status and an increased risk of pneumonia in toddlers relationship. However, some other studies showed insignificant results, which may be due to other factors such as immunization adherence levels, environmental conditions, or differences in research methods.

3. Ventilations

Ventilation is a vent through which air enters and exits freely, one of the functions of ventilation is to maintain the oxygen balance needed. Ventilation issue lead to oxygen lack especially inside the house Good home ventilation plays a role in maintaining air circulation and reducing the respiratory infections issue. Among 12 studies studied, 7 studies showed that unqualified ventilation increased the pneumonia risk in children <5. Poor ventilation can lead to increased concentrations of indoor pollutants, including cigarette smoke, dust, and pathogenic microorganisms. Lack of ventilation also leads to faster transmission of infections, especially in home conditions with dense family members.

4. Occupamcy Density

Residential Density is information about the average building area per household member. Housing density is one of the indicators of quality of life because it affects the safety and health of housing for household members. Overcrowded homes increase the risk of various diseases, such as Respiratory Tract Infections (22). Studies show that homes with excessive occupants and limited space increase the likelihood of spreading pathogenic microorganisms through the air and direct contact. Children who live in homes with high occupancy are more likely to get pneumonia, This is because houses with a large number of occupants can cause the house to become unhealthy due to oxygen problem in the house. Many people in a house will also accelerate the transmission of microorganisms that cause pneumonia from one person to another (6)

5. Temperature

Changes in environmental temperature can also affect the pneumonia incident in toddlers. Some studies have found room temperatures that are too cold or too hot can increase the risk of respiratory infections. Temperatures that are too cold can lead to a decrease in mucociliary function in the airways, making it easier for pathogens to enter the respiratory system. Bacteria as agents of pneumonia can easily grow and survive at high room air temperatures and do not meet health standards. Changes in temperature in the room can affect the survival of pneumonia pathogenic microorganisms. Conversely, overheating can lead to dehydration and disruption of the child's immune system (23).

Prevention based on analyzed factors

Prevention of pneumonia in children can be done through complete basic immunization, exclusive breastfeeding for first six months, the clean and healthy living behaviors, the fulfillment of balanced nutrition, and the reduction of exposure to air pollution crucial to reducing the mortality rate of toddlers due to acute respiratory infections(24)

The Government of Indonesia is highly committed to the prevention and control of pneumonia through increased immunization coverage, including the gradual introduction of PCV vaccines with a national target by 2024. Indonesia also reduces the mortality rate of children under five due to pneumonia with strategies such as improving nutrition for pregnant women, promoting exclusive breastfeeding, controlling air pollution, promoting healthy homes, and improving access to health

services. This effort has reduced the child mortality rate by 87% since 1990. The government is also strengthening cross-program and sectoral cooperation through the National Action Plan for Pneumonia and Diarrhoea (NAPPD) to comprehensively expand and improve the quality of pneumonia interventions(25).

CONCLUSION

The pneumonia in toddlers is affected by various risk factors, including nutritional status, immunization status, home ventilation, occupancy density, and environmental temperature. These factors significantly have contribution to increasing the incidence of pneumonia, although some studies show mixed results. Therefore, prevention of pneumonia requires a holistic and evidence-based approach to reduce the rate of illness and mortality in toddlers

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