

EXPLORING THE RISK FACTORS REGARDING PNEUMONIA AMONG CHILDREN UNDER THE AGE OF FIVE YEARS

Ashok Kumar¹, Khushboo Chandio², Shaila Mirjat³, Mukesh Madan Malhi⁴, Sadia Sathio⁵,
Rukan Ul Din Rahimoon⁶, Mairaj Hafeez^{*7}

^{1,3,4,6}BSN student, People's Nursing School LUMHS Jamshoro

^{2,*7}Lecturer, People's Nursing School LUMHS Jamshoro

⁵BSN student, Liaquat College of Nursing (Female) Jamshoro

¹ashok216948@gmail.com, ^{*7}hafeezmairaj@gmail.com

DOI: <https://doi.org/10.5281/zenodo.15606249>

Keywords

Mothers, pneumonia, risk factors, under 5 children.

Article History

Received on 29 April 2025

Accepted on 29 May 2025

Published on 06 June 2025

Copyright @Author

Corresponding Author: *
Mairaj Hafeez

Abstract

Background: Pneumonia is a leading cause of mortality among children under-five years of age globally. The WHO (2014) has reported that indoor air pollution caused by cooking and heating with biomass fuel, living in crowded homes and parenting smoking are risk factors of pneumonia.

Objective: To Identify the risk factors of pneumonia and to explore the different strategies to reduce the risk of pneumonia.

Methodology: A case control study was carried out among the mothers having under-5 years children who were admitted in the pediatric ward of LUH Hospital in 2025. A convenience sampling technique was used to select children with pneumonia matched on age, sex and setting. A semi-structured interview consisting of questions related to risk factors for pneumonia was used to collect data from mothers of both cases and controls.

Results: The study involved a total of 45 participants, with females representing 55.55% and males 44.45% of the population. All the patients suffering from pneumonia were from rural areas, where most of the population lacks formal education and awareness about pneumonia and its risk factors. The distribution of affected individuals by age showed that 26.7% were aged 1–11 months, 20% were 12–23 months, another 20% were 24–35 months, 15.6% were 36–47 months, and 17.8% were above 48 months. These findings highlight that children under one year of age are at the highest risk. The study emphasizes that the prevalence of pneumonia is strongly associated with lack of knowledge, poor health practices, and low awareness in underserved rural communities.

Conclusion: This study was conducted to exploring the risk factors for pneumonia in children among the age of five years. Overall, the study highlights which risk factors most significantly affect patients. By addressing these insights through targeted educational programs and training, the impact of pneumonia risk factors can be reduced.

INTRODUCTION

Pneumonia is one of the major public health problems in children under 5 years of age.

According to the World Health Organization (WHO), more than 150 million episodes of

pneumonia occur every year and these account for more than 95% of all new cases worldwide[1]. It is the second leading cause of mortality, accounting for greater than 30,000 deaths in this age group annually. This study sought to identify risk factors for severe pneumonia in children under the age of five years[2]. There is a wide variation in the risk factors for pneumonia in the published studies. Most of the studies for risk factors of pneumonia were hospital-based and represented only a small proportion of pneumonia cases. Few studies had focused on the risk factors that were associated with progression to severe or very severe pneumonia. The identified risk factors for childhood pneumonia are undernutrition, incomplete immunization, use of solid fuels in the household, over-crowding, lack of exclusive breastfeeding, low degree of maternal education, and limited access to secondary care. These risk factors are characteristics of low socioeconomic status and are interrelated. However, due to the linear relation of these risk factors, it is difficult to estimate their individual risk [3]. In 2005, World Health Organization (WHO) proposed that acute respiratory infections be divided into three categories including non-pneumonia respiratory tract infection, pneumonia, and severe pneumonia according to clinical criteria[4]. According to another report of WHO, nearly 2 million children under 5 years die of pneumonia each year around the world. It is estimated that 500 to 900 million acute respiratory infection (ARI) episodes occur per year in developing countries[5]. Previous research has shown that in low resource settings, risk factors for pneumonia in children have included malnutrition, inadequate paternal education, bad ventilated living room, and smoking habits of parents[6]. While pneumonia can affect any age group, at most risk are adults aged ≥ 65 years, and infants and young children, who do not have a fully developed immune system. Patients at risk include those with splenic dysfunction[7].

OBJECTIVE

To Identify the risk factors of pneumonia & to explore the the different strategies to reduce the risk of pneumonia at Liaquat University Hospital Jamshoro.

RESEARCH QUESTION:

- What are the risk factors associated with pneumonia in children under the age of five?
- What are the most effective strategies to reduce the risk of pneumonia in children under the age of five?

PURPOSE OF THE STUDY:

Pneumonia is a leading cause of morbidity and mortality in children under five, particularly in low- and middle-income countries. Understanding the risk factors associated with pneumonia is essential for developing targeted prevention and treatment strategies.

METHODOLOGY

Cross sectional study was conducted at Liaquat University Hospital Hyderabad to identify the risk factors of pneumonia under the age of five years old childrens. The target population five year old childrens consisted of both male and female gender, The sample size was 45 using raosoft software according to 50 population size. Non-Probability convenience Sampling Technique was used to collect the data, The instrument for data collection used a validate questionnaire which consists of 2 sections. Section A consists of socio demographic data. This enquires concerning their name, age, gender, and Section B consist of 13 practice bases questionnaires. Data was analyzed on IBM SPSS version 27, and the descriptive statistics include the demographic data, factors and represented using frequencies and percentage, etc. to characterize the study population concerning pertinent variables.

ETHICAL PERMISSION

Participation was entirely voluntary, and individuals had the freedom to withdraw at any point without providing a reason. Patients were required to sign an informed consent form, Patients were provided with information about the study's objective, methodologies, potential risks, and benefits prior to participation. The autonomy and confidentiality of the participants was maintained on top priority.

LITERATURE REVIEW

Pneumonia is one of the major public health problems in children under 5 years of age. According

to the World Health Organization (WHO), more than 150 million episodes of pneumonia occur every year and these account for more than 95% of all new cases worldwide[8].nearly 2 million children under 5 die of pneumonia each year is outdated. According to more recent data from the World Health Organization (WHO) and UNICEF, pneumonia remains a leading cause of death among young children, but the number of deaths has decreased over time.In 2019, pneumonia killed approximately 740,180 children under the age of 5, accounting for 14% of all deaths in this age group . Similarly, in 2018, over 800,000 children under 5 died from pneumonia, equating to one child every 39 seconds[9]. Pneumonia is a major health problem for children under five, especially in developing countries like Nepal.In Nepal, pneumonia is the leading cause of death among children under five, causing more deaths than malaria, tuberculosis, and HIV combined . Data from Nepal's Department of Health Services indicates that about 30% of under-five child deaths are due to pneumonia, which is double the global estimate of 15% reported by the World Health Organization, Acute respiratory infections (ARIs), including pneumonia, are the most common reasons for hospital admissions among children under five in Nepal.These infections are a significant cause of illness and death in young children, particularly in low- and middle-income countries [10]. children in remote areas with high poverty and hunger levels are more vulnerable to pneumonia. Studies show that malnutrition, overcrowding, poor sanitation, and indoor air

pollution significantly increase the risk of pneumonia in these settings[11,12]. A recent study looked at how strong the link is between 19 different risk factors and severe lung infections in children under five. It also checked how good the evidence was for each risk factor[13].In the studies evaluated, seven risk factors were shown to be significantly associated: low birth weight, under-nutrition, household air pollution, humanimmunodeficiency virus (HIV) infection, non-exclusive breastfeeding, household crowding and incomplete immunization[14,15]. Despite the widespread availability of vaccines and antibiotics, the incidence of pneumonia among children under five years of age remains high, with the underlying causes not yet fully understood. In Tanzania, pneumonia accounts for up to 15% of pediatric hospital admissions[16].5-12% of whom have X-ray-confirmed pneumonia" refers to a subset of a group in which 5 to 12 percent have been diagnosed with pneumonia based on chest X-ray imaging, which is considered a standard method for confirming the presence of pneumonia[17]. The purpose of this study was to identify the risk factors associated with pneumonia in children under five years of age at LUH Jamshoro. Understanding these factors may help reduce preventable childhood deaths and support Sustainable Development Goal three ensuring healthy lives and promoting well-being for all at all ages. Improvements in living conditions and healthcare services over time may have influenced these risk factors, making this investigation important.

RESULTS

4.1 DEMOGRAPHIC ANALYSIS

TABLE NO 1: Classification of Gender

CATEGORIES	FREQUENCY	PERCENTAGE
Male	20	44.44
Female	25	55.56
Total	45	100

Table:1shows that data was collected from both genders. The females respondents were 55.56% (n=25) while males account for 44.44% (n=20).

4.2 TABLE NO 2: Classification of Age

CATEGORY	FREQUENCY	PERCENT
1-11 MONTHS	12	26.7%
12-23 MONTHS	09	20.0%
24-35 MONTHS	09	20.0%
36-47 MONTHS	07	15.6%
ABOVE 48 MONTHS	08	17.8%
TOTAL	45	100.0%

Table No. 2: shows that 26.7% (n=12) respondents were 1-11 Months old, 20.0% (n=09) were 12-23 Months of age, while those between 24-35 Months were 20.0% (n=09). Participants aged 36-47 Months account for 15.6% (n=7), and those above 48 Months represent 17.7% (n=8) of the total sample.

4.3 TABLE NO: 03 ITEM ASKED RELATED TO RISK FACTOR OF PNEUMONIA

STATEMENT		Yes	No	Mean	St. Devi.
1. Do you or any household member have history of pneumonia?	Freq	34	11	1.76	.435
	%	75.6	24.4		
2. Are you familiar with pneumonia?	Freq	24	21	1.53	.505
	%	53.3	46.7		
3. Do you or household member smoke?	Freq	34	11	1.76	.435
	%	75.6	24.4		
4. How often do you experience respiratory infection?	Freq	45	00	1.00	.000
	%	100	00		
5. Do you live in the crowded household?	Freq	37	8	1.82	.387
	%	82.2	17.8		
6. Are you exposed to smoke or pollution?	Freq	23	22	1.49	.506
	%	51.1	48.9		
7. Do you practice regular handwashing?	Freq	43	02	1.04	.208
	%	95.6	4.4		
8. Do you wear mask in crowded or polluted area?	Freq	35	10	1.22	.420
	%	77.8	22.2		
9. Do you consume alcohol heavily or regularly?	Freq	45	00	2.00	.000
	%	100	00		
10. Are you currently experiencing malnutrition or poor nutrition?	Freq	31	14	1.69	.468
	%	68.9	31.1		
11. Do you often get cold or flu?	Freq	22	23	1.51	.506
	%	48.9	51.1		
12. Do you have weak immune system AIDS, Cancer, Organ transplant?	Freq	05	40	1.89	.319
	%	11.1	88.9		
13. Any history of COPD, Asthama, heart disease or diabetes?	Freq	23	22	1.51	.506
	%	51.9	48.1		

Table No: 3 The findings from this survey highlight a notable burden of pneumonia-related risk factors among participants. A majority reported household

smoking (75.6%), crowded living conditions (82.2%), and poor nutrition (68.9%), all of which are known contributors to respiratory illness.

Additionally, 51.9% had a history of chronic diseases such as COPD, asthma, or heart disease, which further increases vulnerability to pneumonia. Despite these risks, preventive behaviors were commonly reported. Most participants practiced regular handwashing (95.6%) and wore masks in crowded or polluted environments (77.8%). However, only 53.3% were familiar with pneumonia, indicating a gap in health knowledge that could hinder early detection and prevention efforts. Exposure to smoke or pollution (51.1%) and frequent respiratory infections (100%) underscore the need for improved environmental and public health measures. While some protective behaviors are encouraging, the persistence of modifiable risk factors calls for targeted interventions, including health education, lifestyle changes, and improved living conditions.

DISCUSSION

The results of this study show that a significant number of the population examined had risk factors for pneumonia, indicating important areas for public health intervention. In line with findings from community-based research, where women are more likely to engage in health surveys since they are frequently the primary caregivers, the demographic analysis showed a modest predominance of female participants (55.56%) [18]. According to the age classification, a sizable percentage of responders were younger than three years old, with 26.7% falling between the ages of one and eleven months. The World Health Organization (WHO), which considers children under five to be at high risk for pneumonia mortality, supports the idea that this age group is especially susceptible to pneumonia because of their developing immune systems and environmental exposures [19]. The evaluation of risk factors and knowledge revealed an alarming trend. Most participants said they were exposed to modifiable factors such as poor diet (68.9%), crowded living situations (82.2%), and smoking (75.6%). Numerous studies have shown that these variables significantly increase the risk of lower respiratory tract infections [20,21]. Their vulnerability to pneumonia was further increased by the fact that 51.9% of them had a history of chronic conditions such as heart disease, asthma, or COPD [22]. Preventive measures were rather well-practiced in

spite of these hazards. The majority of individuals reported wearing masks in crowded or polluted settings (77.8%) and regularly washing their hands (95.6%). These procedures are crucial in lowering the spread of disease and are in line with international guidelines for preventing respiratory infections [23,24]. Nonetheless, a lack of public awareness is highlighted by the fact that just 53.3% of participants knew what pneumonia was. According to earlier studies emphasizing the importance of information in illness outcomes, this low level of health literacy may postpone the early diagnosis and treatment of pneumonia [25]. The fact that all subjects (100%) had experienced respiratory illnesses is another significant discovery.

51.1% of respondents mentioned ongoing environmental exposures including indoor smoke and air pollution, which may be the cause of this. Long-term exposure to pollutants raises the incidence of acute and chronic respiratory diseases, according to numerous studies [26].

Intriguingly, the statistics indicate low rates of immunosuppressive diseases (such as AIDS and cancer) and little alcohol use, indicating that contextual and behavioral factors—rather than systemic or lifestyle-related ones—are the main causes of health problems in this group. These findings point to the necessity of comprehensive programs that address environmental risk, raise health literacy, and encourage long-term preventative measures.

CONCLUSION

This study emphasises the significant prevalence of pneumonia risk factors among children under five, such as poor nutrition, overcrowding, tobacco smoke exposure, and indoor air pollution. Despite strong cleanliness standards, carer awareness is still a crucial concern. To reduce pneumonia risk in this vulnerable group, interventions should include increasing nutrition, encouraging exclusive breastfeeding, lowering environmental exposures through clean cooking and better ventilation, improving carer education, and ensuring complete immunisation. Community-based health programs can help sustain these interventions and improve early childhood respiratory health.

LIMITATIONS:

The study was limited to a specific region, which may not reflect variations in pneumonia risk factors across different geographic or cultural settings.

Due to limited resources, pneumonia diagnosis was often based on clinical signs alone without confirmatory diagnostic tools such as radiography or laboratory testing.

There was shortage of time and patients were not available everytime.

Participants may have been selected based on their availability or willingness to participate, potentially introducing bias into the sample.

The study did not deeply investigate housing quality, parental education levels, or occupational exposures, which could influence pneumonia risk.

Seasonal variation, which can significantly impact the incidence of pneumonia, was not addressed in the study design or data analysis.

The study did not deeply investigate housing quality, parental education levels, or occupational exposures, which could influence pneumonia risk.

REFERENCES

- 1.Karki S, Fitzpatrick A, Shrestha S. Risk Factors for Pneumonia in Children under 5 Years in a Teaching Hospital in Nepal. Kathmandu University Medical Journal. 2015 Oct 19;12(4):247-52.
2. Onyango D, Gideon Kikui, Evans Amukoye, Omolo J. Risk factors of severe pneumonia among children aged 2-59 months in western Kenya: a case control study. Pan African Medical Journal [Internet]. 2019 [cited 2025 Apr 14];13(1).
3. Chekole DM, Andargie AA, MohammedYesuf K, Wale Mekonen M, Misganaw Geremew B, Fetene MZ. Prevalence and associated risk factors of pneumonia in under five years children using the data of the University of Gondar Referral Hospital. Schumacher U, editor. Cogent Public Health. 2022 Apr 24;9(1).
4. Hoang VT, Dao TL, Minodier P, Nguyen DC, Hoang NT, Dang VN, et al. Risk Factors for Severe Pneumonia According to WHO 2005 Criteria Definition Among Children <5 Years of Age in Thai Binh, Vietnam: A Case-Control Study. Journal of Epidemiology and Global Health. 2019;
- 5.WHO/ UNICEF, Report on ARI. CDD/ARI section, Child health division, department of health service, Ministry of Health, Nepal (1997)
- 6.MI Bari, AB Siddiqui, T Alam, A Hossain. Risk Factors of Pneumonia in Children- A Community Survey: 2007;doi: 10.3329/taj.v20i2.3072 TAJ 2007; 20(2): 122-126
- 7.Fletcher M, Laufer D, McIntosh E, et al. Controlling invasive pneumococcal disease: is vaccination of at risk groups sufficient? J Clin Pract 2006; 60(4): 450-456.
- 8.WHO/ UNICEF, Report on ARI. CDD/ARI section, Child health division, department of health service, Ministry of Health, Nepal (1997)
- 9.New-Era Project, Ministry of Health. Nepal Demographic and Health Survey (2006).
10. Nair H, Simões EA, Rudan I, Gessner BD, Azziz-Baumgartner E, Zhang JS, et al. Global and regional burden of hospital admissions for severe acute lower respiratory infections in young children in 2010: a systematic analysis. Lancet. 2013;381:1380-90.
- 11.Williams BG, Gouws E, Boschi-Pinto C, Bryce J, Dye C. Estimates of world-wide distribution of child deaths from acute respiratory infections. Lancet Infect Dis. 2002;2:25-32.
- 12.Williams BG, Gouws E, Boschi-Pinto C, Bryce J, Dye C. Estimates of world-wide distribution of child deaths from acute respiratory infections. Lancet Infect Dis. 2002;2:25-32.
13. Ribeiro GS, Lima JB, Reis JN, Gouveia EL, Cordeiro SM, Lobo TS, et al. Haemophilus influenzae meningitis 5 years after introduction of the Haemophilus influenzae type b conjugate vaccine in Brazil. Vaccine. 2007;25:4420-8
14. Ladhani S, Heath PT, Slack MP, McIntyre PB, Diez-Domingo J, Campos J, et al. Haemophilus influenzae serotype b conjugate vaccine failure in twelve countries with established national childhood immunization programmes. Clin Microbiol Infect. 2010;16:948-54.

15. Mahende C, Ngasala B, Lusingu J et al. Aetiology of acute febrile episodes in children attending Korogwe District Hospital in north-eastern Tanzania. *PLoS programmes*. Clin Microbiol Infect. 2010;16:948–54. One 2014; 9: e104197.
16. D'Acremont V, Kilowoko M, Kyungu E et al. Beyond malaria—causes of fever in outpatient Tanzanian children. *N Engl J Med* 2014; 370: 809–817.
17. Elfving K, Shakely D, Andersson M et al. Acute uncomplicated febrile illness in children aged 2–59 months in zanzibar – aetiologies, antibiotic treatment and outcome. *PLoS One* 2016; 11: e0146054.
18. Hussain H, Ali S, Ahmed B. Gender differences in health care-seeking behavior in South Asia: A review. *J Health Res Rev*. 2020;7(2):65–70.
19. World Health Organization. Pneumonia [Internet]. 2023 [cited 2025 Apr 23]. Available from: <https://www.who.int/news-room/fact-sheets/detail/pneumonia>.
20. Rudan I, Boschi-Pinto C, Biloglav Z, Mulholland K, Campbell H. Epidemiology and etiology of childhood pneumonia. *Bull World Health Organ*. 2008;86(5):408–16.
21. Brooks WA, Breiman RF, Goswami D, et al. The incidence of severe and fatal pneumonia in Bangladesh. *Am J Epidemiol*. 2007;165(12):1452–9.
22. Jackson ML, Neuzil KM, Thompson WW, et al. The burden of community-acquired pneumonia in seniors: results of a population-based study. *Clin Infect Dis*. 2004;39(11):1642–50.
23. Aiello AE, Coulborn RM, Perez V, Larson EL. Effect of hand hygiene on infectious disease risk in the community setting: a meta-analysis. *Am J Public Health*. 2008;98(8):1372–81.
24. Leung NHL, Chu DKW, Shiu EYC, et al. Respiratory virus shedding in exhaled breath and efficacy of face masks. *Nat Med*. 2020;26(5):676–80.
25. Yousafzai MT, Anwar S, Fatima S, Khan B. Knowledge and awareness of pneumonia among rural mothers in Pakistan. *J Pak Med Assoc*. 2017;67(8):1243–8.
26. Pope CA, Dockery DW. Health effects of fine particulate air pollution: lines that connect. *J Air Waste Manag Assoc*. 2006;56(6):709–42