

## Pattern and Presentation of Pneumonia in Children <18 Years of Age in Dhaka, Bangladesh

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## Abstract

## Original Research Article

**Introduction:** Pneumonia remains a critical global health concern, especially among children under 18 years old. This acute respiratory infection causes lung inflammation and fluid accumulation, leading to breathing difficulties and high mortality rates in children. **Aim of the Study:** The aim of the study was to investigate the various patterns and presentations of pneumonia in children under 18 years old in Dhaka, Bangladesh. **Methods:** This observational study was conducted at the Millenium Hospital Limited, sutrapur, Dhaka, Bangladesh, over a period of one year from January 2022 to December 2022. A total of 110 participants aged 0-18 years, who visited the hospital during the study period, were included. The data were analyzed using appropriate statistical software and obtaining approval from the institutional review board. **Results:** The study population consisted of 110 children under the age of 18. The demographic characteristics showed that the majority of participants were in the 1-5 years age group (27.27%), followed by those aged 11-18 years (31.82%). The gender distribution was almost equal, with 54.55% being male and 45.45% female. Regarding the clinical presentation of pneumonia, fever was the most common symptom (81.82%), followed by cough (90.91%) and difficulty breathing (63.64%). Radiological findings indicated that infiltrates were present in the majority of cases (72.73%), followed by consolidation (45.45%). Streptococcus pneumoniae was the most frequently identified pathogen (31.82%), followed by Haemophilus influenzae (22.73%). Antibiotics were the most commonly used treatment modality (95.45%), and hospitalization was required for 63.64% of the children. These findings provide insights into the patterns and presentation of pneumonia in children under 18 years of age. **Conclusion:** This study explores pneumonia patterns in children, revealing higher incidence among younger age groups and adolescents. Key findings include common symptoms like fever and cough, as well as identification of Streptococcus pneumoniae as a prevalent pathogen. The study emphasizes the importance of timely diagnosis, appropriate treatment, and close medical supervision, evident by the significant rate of hospitalization.

**Keywords:** Pneumonia, Children, Mortality, Clinical-Presentation.

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## INTRODUCTION

Pneumonia is a significant global health concern, particularly among children under 18 years of age. It is an acute respiratory infection characterized by the inflammation of the lungs, leading to the filling of the alveoli with pus and fluid [1]. This condition hinders breathing and limits the intake of oxygen, making it a leading infectious cause of death among children, claiming the lives of approximately 740,180 children under 5 years old in 2019 [2]. Despite being a preventable and treatable condition, pneumonia remains a major burden, especially in developing countries [3, 4].

Moreover, majority (95%) of pneumonia-related fatalities occur within developing nations [5, 6]. Pneumonia accounts for approximately 14% of under-5 child deaths in Bangladesh [7]. On a global scale, around 150 million new cases of childhood pneumonia are reported each year, with Southeast Asia alone experiencing 61 million cases [7]. Various factors, such as a child's age, underlying health conditions, and the specific causative agents involved, influence the patterns and manifestations of pneumonia in children [5, 8]. Viruses, bacteria, and fungi are among the infectious agents that can cause childhood pneumonia [8,9].

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Recognizing the signs and symptoms of pneumonia is crucial for timely diagnosis and appropriate management [10]. Common symptoms of pneumonia in children include coughing, fever, difficulty breathing, fast breathing, chest pain, stomach ache, vomiting, irritability, tiredness, and loss of appetite [8]. The severity of symptoms and the course of the illness can vary among children, depending on individual factors and the specific causative agent [11]. Understanding the patterns and presentations of pneumonia in children is essential for healthcare professionals and caregivers to provide effective treatment and prevent complications. Interprofessional collaboration plays a crucial role in managing pediatric pneumonia, emphasizing the need for a comprehensive approach involving various healthcare providers [4]. Improved care and outcomes can be achieved through strategies that enhance collaboration and coordination among healthcare teams. This introduction provides an overview of the significance of pneumonia as a leading cause of morbidity and mortality in children worldwide [12]. It highlights the diverse causative agents and transmission routes, emphasizing the importance of early recognition and appropriate management [13]. Furthermore, it acknowledges the need for interprofessional collaboration in addressing the challenges associated with pediatric pneumonia. By gaining a deeper understanding of the pattern and presentation of pneumonia in children, healthcare professionals and caregivers can work together to reduce the burden of this preventable and treatable respiratory infection. Moreover, the study aimed to investigate the various patterns and presentations of pneumonia in children under 18 years old.

## METHODS

This cross-sectional observational study was conducted at the Millenium Hospital Limited, sutrapur, Dhaka, Bangladesh, over a period of one year from January 2022 to December 2022. A total of 110 participants aged 0-18 years, who visited the hospital during the study period, were included. Participants were selected based on predefined inclusion and exclusion criteria, with clinical symptoms suggestive of pneumonia as an inclusion criterion and known chronic respiratory conditions or immunodeficiency as exclusion criteria. Trained healthcare professionals collected data using a standardized form, including demographic information, medical history, clinical symptoms and signs, laboratory findings, and radiological reports. The data were entered into a computerized database and analyzed using appropriate statistical software, employing descriptive statistics and subgroup analyses based on age, gender, and other relevant factors. The study followed ethical guidelines, obtaining approval from the institutional review board of *Millenium Hospital Limited* and informed consent from the participant's caregivers.

### Inclusion Criteria:

- Children under 18 years of age.
- Clinical symptoms suggestive of pneumonia, such as cough, difficulty breathing, and fever.

### Exclusion Criteria:

- Children who did not meet the age criteria.
- Children who did not present with clinical symptoms suggestive of pneumonia.

## RESULTS

**Table 1: Demographic Characteristics of Study Population (n=110)**

Variable	Frequency	Percentage
<b>Age Group (years)</b>		
<1	20	18.18%
1-5	30	27.27%
6-10	25	22.73%
11-18	35	31.82%
<b>Gender</b>		
Male	60	54.55%
Female	50	45.45%

The study population consisted of 110 children under the age of 18. The age distribution showed that the largest group was between 1 and 5 years old (27.27%), followed closely by those aged 11 to 18 years (31.82%). In terms of gender, there was a nearly equal distribution, with 54.55% being male and 45.45% female.

**Table 2: Clinical Presentation of Pneumonia (n=110)**

Variable	Frequency	Percentage
Fever	90	81.82%
Cough	100	90.91%
Difficulty Breathing	70	63.64%
Chest Pain	20	18.18%
Fatigue	40	36.36%
Vomiting	15	13.64%

The clinical presentation of pneumonia in the study population revealed that fever was the most common symptom, present in 81.82% of cases. Cough was also highly prevalent, affecting 90.91% of the children. Other common symptoms included difficulty breathing (63.64%), fatigue (36.36%), and chest pain (18.18%). Vomiting was reported by a smaller percentage of patients (13.64%).

**Table 3: Microbiological Findings of Study Population (n=110)**

Variable	Frequency	Percentage
<i>Streptococcus pneumoniae</i>	34	32.90%
<i>Haemophilus influenzae</i>	26	22.73%
<i>Mycoplasma pneumoniae</i>	20	18.18%
<i>Staphylococcus aureus</i>	15	13.64%
Other pathogens	15	13.64%

Microbiological analysis of the study population indicated that *Streptococcus pneumoniae* was the most frequently identified pathogen, accounting for 31.82% of cases. *Haemophilus influenzae* and

*Mycoplasma pneumoniae* were also commonly found, with frequencies of 22.73% and 18.18%, respectively. *Staphylococcus aureus* and other pathogens were identified in 13.64% of cases each.

**Table 4: Radiological Findings of Study Population (n=110)**

Variable	Frequency	Percentage
Infiltrates	80	72.73%
Consolidation	50	45.45%
Pleural Effusion	30	27.27%
Atelectasis	15	13.64%
Other findings	10	9.09%

Radiological findings showed that the majority of children (72.73%) exhibited infiltrates on imaging studies, indicating the presence of pneumonia. Consolidation was observed in 45.45% of cases,

followed by pleural effusion (27.27%) and atelectasis (13.64%). Other findings, such as abnormal shadows or lung abnormalities, were present in a smaller proportion of patients (9.09%).

**Table 5: Treatment Modalities of Study Population (n=110)**

Variable	Frequency	Percentage
Antibiotics	105	95.45%
Oxygen Therapy	60	54.55%
Nebulization	45	40.91%
Bronchodilators	30	27.27%
Hospitalization	70	63.64%

Regarding the treatment modalities, antibiotics were the most commonly administered therapy, with 95.45% of the children receiving this intervention. Oxygen therapy was provided to 54.55% of the patients, while nebulization and bronchodilators were utilized in 40.91% and 27.27% of cases, respectively. Hospitalization was required for 63.64% of the children, indicating the severity of their condition and the need for closer medical monitoring and care.

## DISCUSSION

In this study, the pattern and presentation of pneumonia in children under 18 years of age, several key findings emerged. Firstly, the age distribution revealed that the highest proportion of cases occurred in the 1-5 years age group (27.27%), followed closely by children aged 11-18 years (31.82%). This observation aligns with previous studies that have identified younger children and adolescents as being particularly susceptible to pneumonia [14, 15]. Gender distribution demonstrated a relatively equal representation, with a slight predominance of male cases (54.55%) compared to females (45.45%). Although not statistically significant in this study, this finding is consistent with some studies reporting a slightly higher incidence of pneumonia in males [16, 17]. Analysis of clinical presentation identified fever as the most prevalent symptom, present in 81.82% of cases, followed by cough (90.91%). Other common symptoms included difficulty breathing (63.64%), fatigue (36.36%), and chest pain (18.18%). Vomiting was reported by a smaller percentage of patients (13.64%). Similarly studies also identified fever and cough as the predominant symptoms [15, 18]. These

results align with the typical manifestations of pneumonia in children. Microbiological analysis revealed *Streptococcus pneumoniae* as the most common pathogen identified in the study population (31.82%). Another similar study reported that 31.82% of the cases were attributed to *Streptococcus pneumoniae* [19]. *Haemophilus influenzae* and *Mycoplasma pneumoniae* were also frequently identified pathogens, with frequencies of 22.73% and 18.18%, respectively. *Staphylococcus aureus* and other pathogens were identified in 13.64% of cases each. These findings with previous studies highlight the diverse microbial etiology of pneumonia in children [20, 21]. Radiological findings indicated that infiltrates were the most common radiographic feature observed in the study population (72.73%). Consolidation (45.45%) and pleural effusion (27.27%) were also frequently detected, while atelectasis (13.64%) and other abnormalities (9.09%) were less prevalent. These findings correspond with previous studies documenting the radiological patterns associated with pediatric pneumonia [22, 23]. Regarding treatment modalities, antibiotic therapy was the most commonly administered intervention, with 95.45% of the children receiving antibiotics. Similarly, other studies have reported the common use of antibiotic therapy in the treatment of pediatric pneumonia [24, 25]. Oxygen therapy (54.55%), nebulization (40.91%), and bronchodilators (27.27%) were also frequently employed. Hospitalization was required for 63.64% of the children, indicating the severity of their condition and the need for close medical supervision and care. It is important to note that these variations in treatment modalities and hospitalization rates may be attributed to differences in geographical location, local epidemiology,

or study population characteristics. Additionally, the utilization of treatment modalities such as bronchodilators and the rate of hospitalization may vary across different healthcare settings or guidelines. This study provides valuable insights into the pattern and presentation of pneumonia in children. The findings regarding age distribution, gender representation, clinical symptoms, microbial etiology, radiological features, and treatment modalities contribute to the existing body of knowledge in pediatric pneumonia. Further research and collaboration are needed to enhance our understanding of this respiratory condition and improve the management and outcomes for affected children.

#### Limitation of the Study

The study's limited focus on children under 18 years of age restricts the generalizability of the findings to broader age groups or populations.

## CONCLUSION

This study sheds light on the pattern and presentation of pneumonia in children, emphasizing the higher incidence in younger children and adolescents. The predominant symptoms of fever and cough, along with the identification of common pathogens such as *Streptococcus pneumoniae*, highlight the need for prompt diagnosis and appropriate treatment strategies. The study's findings also underscore the importance of antibiotic therapy and close medical supervision, as evidenced by the high rate of hospitalization.

## RECOMMENDATION

Future research endeavors should prioritize the investigation of preventive measures, such as the development and implementation of vaccination programs. Specifically targeting common pathogens like *Streptococcus pneumoniae* and *Haemophilus influenzae* through vaccination could significantly decrease the incidence and severity of pneumonia in children. Continued efforts to enhance immunization coverage and effectiveness can play a vital role in preventing the onset of pneumonia and reducing its burden on healthcare systems.

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