

## Pattern of Hospitalization Due to Pneumonia in Under-Five Children

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### ABSTRACT

#### Background

Pneumonia remains a leading cause of hospitalization among under-five children worldwide and contributes significantly to childhood morbidity and mortality. Understanding the pattern of hospitalization is essential for improving clinical management and preventive strategies.

#### Methods

This hospital-based descriptive cross-sectional study was conducted among under-five children admitted with a diagnosis of pneumonia in the Department of Paediatrics at Barrister Rafique-ul-Huq Medical College and Hospital, Dhaka. A total of 300 children were included. Data were collected using a structured questionnaire and hospital records, covering socio-demographic factors, clinical features, nutritional and immunization status, duration of hospital stay and treatment outcomes. Data were analyzed using SPSS version 25.

#### Results

Infants constituted the largest proportion of admissions, with 112 (37.3%) aged 0–11 months. Males were more commonly affected (58.7%). The most frequent clinical features were cough (95.3%), fever (91.3%) and fast breathing (89.0%). Chest indrawing and respiratory distress were also common. Regarding nutritional status, 53.7% had some degree of malnutrition, while 70.3% were fully immunized. Most children required 4–7 days of hospital stay (52.3%). The majority recovered and were discharged (91.3%), while mortality was 2.3%.

#### Conclusion

Pneumonia-related hospitalization is more common in younger children, particularly infants, with male predominance and typical respiratory symptoms. Malnutrition and incomplete immunization remain important associated factors. Although most children recover with appropriate management, a small proportion still experience poor outcomes, including mortality. Strengthening preventive measures, early diagnosis and timely treatment is essential to reduce the burden of childhood pneumonia.

**Keywords:** Pneumonia, under-five children, hospitalization pattern, malnutrition, immunization.

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#### Introduction

Pneumonia is an acute infection of the lung parenchyma and remains one of the most common causes of illness and hospitalization among children under five years of age worldwide [1]. The disease affects the alveoli and surrounding lung tissues, leading to impaired gas exchange and a spectrum of clinical manifestations ranging from mild respiratory symptoms to severe respiratory distress and life-threatening complications [2]. Despite significant advances in preventive and therapeutic measures, pneumonia continues to impose a substantial burden

on child health, particularly in low- and middle-income countries [3,4].

Children under five years are especially vulnerable to pneumonia because of their immature immune systems and increased susceptibility to respiratory infections [3]. Several factors contribute to the occurrence and severity of pneumonia in this age group, including malnutrition, inadequate breastfeeding practices, incomplete immunization, overcrowded living conditions, indoor air pollution and poor socioeconomic status [5]. These factors not only increase the risk of developing pneumonia but also influence disease progression and hospitalization

## RESEARCH PAPER

outcomes [6].

Hospitalization due to pneumonia represents a significant challenge for healthcare systems. Children admitted with pneumonia often require close monitoring, supportive care, oxygen therapy and appropriate antimicrobial treatment [7]. The pattern of hospitalization may vary according to age, sex, nutritional status, clinical severity, associated comorbidities and treatment response [8]. Understanding these patterns is important for healthcare providers and policymakers in planning preventive strategies, optimizing resource allocation and improving the quality of pediatric care [9].

The clinical presentation of pneumonia in children commonly includes cough, fever, fast breathing, chest indrawing, respiratory distress and feeding difficulties. The severity of symptoms may differ among patients, resulting in variations in the duration of hospital stay and treatment outcomes [10]. Furthermore, complications such as hypoxemia, pleural effusion, sepsis and respiratory failure can contribute to increased morbidity and mortality if not recognized and managed promptly [11].

Therefore, the present study was undertaken to evaluate the pattern of hospitalization due to pneumonia in under-five children, with particular emphasis on demographic characteristics, clinical presentation, nutritional and immunization status, duration of hospital stay, complications and treatment outcomes.

### Methodology & Materials

This hospital-based descriptive cross-sectional study was conducted in the Department of Paediatrics at Barrister Rafique-ul-Huq Medical College and Hospital, Dhaka, Bangladesh, over a period of one year from July 2025 to June 2026. The study aimed to assess the pattern of hospitalization due to pneumonia among under-five children. A total of 300 children aged below five years who were admitted with a diagnosis of pneumonia during the study period were included in the study. Participants were selected using a purposive consecutive sampling technique. The diagnosis of pneumonia was established based on clinical findings and relevant investigations as documented by the attending pediatricians.

Children aged less than five years who were admitted with pneumonia and whose parents or legal guardians provided informed consent were included in the study. Children with congenital heart disease, chronic respiratory diseases such as bronchial asthma or cystic fibrosis, known immunodeficiency disorders, or incomplete clinical records were excluded from the study.

Data were collected using a structured data collection form through review of hospital records and direct

interviews with parents or caregivers. Information regarding socio-demographic characteristics, clinical presentations, nutritional status, immunization status, seasonal distribution of admissions, duration of hospital stay, complications and treatment outcomes was recorded. All collected data were checked for completeness and accuracy before analysis.

Data were entered, cleaned and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics were employed to summarize the data. Continuous variables were presented as mean and standard deviation, while categorical variables were expressed as frequencies and percentages.

### Results

**Table 1: Distribution of the Study Participants by Age Group and Sex (N=300)**

Variable	Frequency (n)	Percentage (%)
Age Group (months)		
0–11	112	37.3
12–23	89	29.7
24–35	46	15.3
36–47	31	10.3
48–59	22	7.4
Mean age	18.9 ± 13.6 months	
Sex		
Male	176	58.7
Female	124	41.3

Table 1 shows the majority of hospitalized under-five children with pneumonia were in the youngest age group. Specifically, 112 children (37.3%) were aged 0–11 months, followed by 89 (29.7%) in the 12–23 months group, while the remaining 99 children (33.0%) were distributed across the 24–59 months age range. The overall mean age of the study participants was 18.9 ± 13.6 months. Regarding sex distribution, male children predominated, accounting for 176 cases (58.7%), compared to 124 females (41.3%).

**Table 2: Clinical Presentation of Hospitalized Pneumonia Patients (N=300)**

Clinical Features*	Frequency (n)	Percentage (%)
Cough	286	95.3
Fever	274	91.3
Fast breathing	267	89.0

## RESEARCH PAPER

Chest indrawing	193	64.3
Respiratory distress	151	50.3
Poor feeding	127	42.3
Hypoxemia (SpO <sub>2</sub> <90%)	84	28.0
Cyanosis	29	9.7
Convulsion	17	5.7

\*Multiple responses were possible.

Table 2, cough was the most common clinical feature, present in 286 children (95.3%), followed by fever in 274 (91.3%) and fast breathing in 267 (89.0%). Chest indrawing was observed in 193 cases (64.3%), while respiratory distress and poor feeding were documented in 151 (50.3%) and 127 (42.3%) children, respectively. Hypoxemia (SpO<sub>2</sub> <90%) was identified in 84 patients (28.0%), whereas cyanosis and convulsion were less frequent, occurring in 29 (9.7%) and 17 (5.7%) cases, respectively.

**Table 3: Nutritional and Immunization Status of the Study Participants (N=300)**

Variable	Frequency (n)	Percentage (%)
Nutritional Status		
Normal	139	46.3
Mild malnutrition	72	24.0
Moderate malnutrition	58	19.3
Severe malnutrition	31	10.4
Immunization Status		
Fully immunized for age	211	70.3
Partially immunized	68	22.7
Non-immunized	21	7.0

Table 3, regarding nutritional status, nearly half of the children (139, 46.3%) had normal nutrition, while 72 (24.0%) had mild malnutrition, 58 (19.3%) had moderate malnutrition and 31 (10.4%) had severe malnutrition. Concerning immunization status, the majority of the study participants (211, 70.3%) were fully immunized for their age, followed by 68 (22.7%) who were partially immunized and 21 (7.0%) who were completely non-immunized.

**Table 4: Hospitalization Pattern and Treatment Outcome (N=300)**

Variable	Frequency (n)	Percentage (%)
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Duration of Hospital Stay (days)		
≤3 days	64	21.3
4–7 days	157	52.3
8–10 days	52	17.3
>10 days	27	9.0
Treatment Outcome		
Recovered and discharged	274	91.3
Referred to higher center	11	3.7
Left against medical advice (LAMA)	8	2.7
Death	7	2.3

Table 4 found the majority of children (157, 52.3%) had a hospital stay of 4–7 days, followed by 64 (21.3%) who stayed ≤3 days, 52 (17.3%) who stayed 8–10 days and 27 (9.0%) who remained hospitalized for more than 10 days. Regarding treatment outcomes, the vast majority of patients (274, 91.3%) recovered and were discharged. Eleven children (3.7%) were referred to a higher center, 8 (2.7%) left against medical advice (LAMA) and 7 (2.3%) died during hospitalization.

### Discussion

The present study assessed the pattern of hospitalization due to pneumonia among under-five children and found a higher burden among infants and younger age groups. The predominance of children below 24 months is consistent with the findings of Saha et al., who reported that younger children represent the most vulnerable group requiring hospitalization due to pneumonia in Bangladesh [12]. This increased susceptibility in early life may be attributed to immature immune responses, smaller airway caliber and higher exposure to infectious agents.

Male predominance observed in this study aligns with findings of El-Koofy et al., who also documented higher hospitalization rates among male children with respiratory tract infections in low- and middle-income settings [13]. Biological susceptibility along with health-seeking behavior differences may contribute to this variation.

Clinically, cough, fever and fast breathing were the most common presenting features in the present study, which is consistent with the classical clinical profile of childhood pneumonia described by Islam et al. and Pyash et al [14,15]. These studies emphasized that cough and tachypnea remain the most reliable indicators for early recognition of pneumonia in resource-limited settings. Chest indrawing and respiratory distress were also frequently observed,

## RESEARCH PAPER

indicating a significant proportion of children presented with moderate to severe disease.

Nutritional status plays a crucial role in the severity and outcome of pneumonia. In the current study, a considerable proportion of children had some degree of malnutrition. Similar observations were reported by Gamal et al., who demonstrated that malnutrition significantly worsens pneumonia outcomes and increases disease severity in under-five children [16]. Malnutrition weakens immune defense mechanisms, thereby increasing susceptibility to severe respiratory infections and prolonged recovery.

Regarding immunization status, a large proportion of children were fully immunized, although a notable proportion remained partially or non-immunized. Dharel et al., reported that incomplete immunization is strongly associated with increased risk of pneumonia and related hospital admissions [17]. This highlights the continued importance of strengthening routine immunization coverage to reduce pneumonia burden.

In the present study, most children required hospital stays of moderate duration, with a smaller proportion requiring prolonged admission. Similar patterns were observed by Beza et al., who reported that clinical severity, nutritional status and oxygen requirement significantly influence the duration of hospital stay among children with severe pneumonia [18]. The need for prolonged hospitalization often reflects more severe disease or delayed presentation.

The treatment outcomes in this study showed a high recovery rate with a small proportion of mortality. Comparable findings were reported by Tegenu et al., who observed favorable outcomes in most hospitalized pediatric pneumonia cases when timely treatment and supportive care were provided [19]. However, mortality still occurs due to complications such as hypoxemia, sepsis and respiratory failure, as also highlighted by Osman et al., in their analysis of risk factors associated with poor outcomes in under-five pneumonia [20].

The observed proportion of hypoxemia and severe clinical features in this study is consistent with findings of Zaman et al., who emphasized the role of oxygen saturation as a key predictor of severity and antibiotic resistance risk in childhood pneumonia [21]. Similarly, antibiotic resistance patterns and treatment challenges described by Pasupulati et al. may also contribute to variability in outcomes in hospitalized children [22].

Overall, the findings of this study reflect that pneumonia remains a significant cause of pediatric hospitalization, particularly among younger children with associated risk factors such as malnutrition and incomplete immunization. Studies by Odoom et al. and Mekuria et al. further support that pneumonia in under-five children continues to impose a major

burden in low-resource settings, with clinical outcomes strongly influenced by early recognition, nutritional status and appropriate management [23,24].

### Limitations of the study

This study was conducted in a single tertiary care hospital, which may limit the generalizability of the findings to the broader community population. As a hospital-based descriptive study, it may also be subject to selection bias, as only admitted cases of pneumonia were included, potentially excluding milder cases managed at outpatient level. In addition, some variables relied on caregiver information and hospital records, which may introduce recall or documentation bias.

### Conclusion

Pneumonia remains a major cause of hospitalization among under-five children, with a higher burden observed in younger age groups and those with associated risk factors such as malnutrition and incomplete immunization. The clinical presentation is typically characterized by cough, fever and fast breathing, with a significant proportion presenting with severe disease requiring inpatient care. Although most children recover with appropriate management, a small proportion still experience complications and mortality. Strengthening preventive strategies, improving nutritional status and ensuring timely healthcare access are essential to reduce hospitalization burden and improve pediatric outcomes.

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### Conflicts of interest

There are no conflicts of interest.

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