

# Assessment of Pneumonia Prevalence in Children Under Five at Salale University Comprehensive Specialized Hospital (2022-2024)

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## ABSTRACT

Pneumonia is a significant lower respiratory tract infection that primarily impacts the lungs, posing a heightened risk to vulnerable populations, particularly children under five years of age. This study aimed to assess the prevalence of pneumonia among children in this age group who visited Fiche Hospital between 2022 and 2024. Utilizing a retrospective approach, the research analyzed secondary data collected from patient records over this three-year period. The study focused on hospital charts of patients admitted to the medical wards at Salale University Comprehensive Specialized Hospital, Ethiopia, which included comprehensive information from patient history cards. The findings revealed that the overall prevalence of pneumonia was greater in males, with 1002 cases (54.2%), compared to females, who accounted for 832 cases (45.8%). Furthermore, the data indicated that children under three years old were particularly susceptible to pneumonia, exhibiting the highest infection rates. Notably, the peak prevalence of pneumonia occurred in 2023, while the lowest rates were recorded in 2024. Given the substantial burden of pneumonia in the study area, it is crucial for health officials and relevant organizations to implement effective community awareness campaigns focused on the transmission, causes, and prevention of pneumonia. Additionally, the government should prioritize healthcare initiatives aimed at preventing pneumonia and improving health outcomes for children in the region. Enhanced collaboration among health stakeholders is essential to address this pressing public health challenge effectively.

**Keywords:** Children; Fiche Hospital; Pneumonia; Prevalence; Respiratory Infection

## Introduction

Pneumonia is a significant lower respiratory tract infection that primarily affects the lungs, posing a heightened risk to vulnerable populations, particularly children under five years of age. This condition can be broadly categorized into community-acquired pneumonia (CAP) and hospital-acquired pneumonia (HAP). Globally, there are over 100 documented microbial causes of CAP, which include bacteria, fungi, viruses, and parasites. The five most common pathogens responsible for CAP are *Streptococcus pneumoniae*, *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, *Haemophilus influenza*, and various influenza viruses. Among these, *Streptococcus pneumoniae* is the most prevalent cause worldwide and specifically in Ethiopia, particularly in the Oromia region. In the United States, CAP affects approximately 5 to 10 million adults annually, leading to around 1 million hospitalizations (British Thoracic Society, 2002). According

to Caulfield, et al. [1], about 20% of CAP cases necessitate inpatient treatment. The highest risk groups include very young children and the elderly, with pneumonia rates being higher in males than females. CAP is recognized as the most lethal infectious disease globally, ranking as the sixth leading cause of death in the U.S. and the leading cause of mortality among children under five in developing countries.

The mortality rate for hospitalized pneumonia patients is around 12%, which can exceed 40% for those admitted to intensive care units (ICUs). A range of bacterial and viral pathogens have been identified as causes of pneumonia in children, with *Streptococcus pneumoniae* accounting for the majority of cases. In the context of Africa, and specifically in Fiche town, where the Fiche Comprehensive Specialized Hospital serves the local population, pneumonia remains a pressing public health challenge. Numerous determinants influence the incidence of pneumonia, including parental education levels, household

smoking habits, nutritional status, and the age and sex of the child. These factors vary significantly across different regions of the world, including Ethiopia. Pneumonia can be classified into five major types (Shann, et al. [2,3]): bacterial pneumonia, viral pneumonia, mycoplasma pneumonia, fungal pneumonia, and aspiration pneumonia. Bacterial pneumonia can affect individuals of any age and may develop independently or following a severe cold or flu.

The most common bacterial cause is *Streptococcus pneumoniae*, but it can also be caused by *Chlamydomphila pneumoniae* or *Legionella pneumophila*. *Pneumocystis jirovecii* pneumonia is often seen in individuals with weakened immune systems due to conditions such as AIDS or cancer (Ruuskanen, et al. [4,5]). Viral pneumonia is commonly caused by respiratory viruses, particularly in young children and the elderly. While most cases are mild and resolve quickly, the influenza virus can lead to severe or fatal pneumonia, especially in pregnant women or those with pre-existing heart or lung conditions. Complications can arise from secondary bacterial infections. *Mycoplasma pneumoniae*, which shares characteristics of both bacteria and viruses, typically causes mild pneumonia, primarily in older children and young adults. Fungal pneumonia can occur in individuals with compromised immune systems, such as those with AIDS. Aspiration pneumonia occurs when food, dust, liquid, or gas is inhaled into the lungs, leading to infection. In children, pneumonia often presents with high-grade fever and difficulty breathing, typically caused by bacterial pathogens, while viral pneumonia tends to develop more gradually. An integrated approach to child health is essential, focusing on common childhood illnesses such as pneumonia, diarrhea, malaria, and malnutrition, rather than treating single diseases in isolation (Jokinen, et al. [6]). Pneumonia is a major health issue that causes significant suffering and premature death, particularly in poorer regions of the world. Each year, this disease disproportionately affects populations in sub-Saharan countries, where the socioeconomic conditions exacerbate its impact. In Ethiopia, pneumonia contributes to numerous economic burdens and is a leading cause of mortality among children. This study aims to bridge the information gap regarding the prevalence of pneumonia in children under five years of age who visited Salale University Comprehensive Specialized Hospital in Fitcha, North Shewa, Oromia Region, Ethiopia, from 2022 to 2024. Pneumonia is reportedly one of the largest causes of outpatient visits and hospital admissions at this facility. To address this pressing health concern, the study focuses on four fundamental questions:

1. What is the prevalence of pneumonia among children visiting the hospital?
2. Which age groups are most affected by pneumonia?
3. What factors contribute to the assessment of pneumonia prevalence in children?
4. Which type of pneumonia is most prominent?

## General Objective

To assess the prevalence of pneumonia among children under five years who visited at Salale University Comprehensive Specialized Hospital over the past three years.

## Specific Objectives

- To describe the prevalence of pneumonia among children under five years at the hospital.
- To determine the predominant type of pneumonia.
- To evaluate the severity of pneumonia infections by age and gender.
- To identify risk factors associated with pneumonia.

This research aims to generate current data on the prevalence of pneumonia, providing valuable insights for government agencies, healthcare organizations, and researchers interested in addressing this public health challenge. The results of this study will:

- Enhance understanding of pneumonia prevalence among children under five who visited the hospital.
- Provide comprehensive information regarding prevalence trends, transmission, infection, and treatment of pneumonia, serving as a baseline for further research.
- Offer foundational data for related studies in similar contexts.

The study faced several limitations, including time and financial constraints, which prevented the inclusion of all pneumonia cases among children under five across all government health centres in the town. Additionally, limited internet access, a skills gap, and insufficient reference materials posed challenges during the research process. The quality of recorded data in the hospital may also have impacted the reliability and validity of the findings. This study was confined to Salale University Comprehensive Specialized Hospital in the North Shewa zone of Oromia Regional State. It specifically focused on assessing the prevalence of pneumonia among children under five years who visited the hospital from 2022 to 2024. The core objective was to disclose the prevalence of pneumonia in this age group. Furthermore, due to a lack of time in processing large data samples using computer applications, the study's scope was limited to this particular hospital. The assessment of pneumonia prevalence among children under five at Salale University Comprehensive Specialized Hospital provides critical insights into the burden of this disease in the Oromia Region. By understanding the epidemiology, risk factors, and types of pneumonia affecting young children, stakeholders can better address this public health issue and implement effective prevention and treatment strategies.

Materials and Methods

Description of the Study Area

The study was conducted at Salale University Comprehensive Specialized Hospital, located in Fiche town, 114 kilometres from Addis Ababa, along the Addis Ababa-Debra Markos main road. The climate in this region is classified as Woyna Dega. This research specifically focused on assessing the prevalence of pneumonia among children under five years of age who visited the hospital for treatment over the past three years.

Study Design and Population

A retrospective study design was employed, utilizing secondary data and questionnaires to evaluate the prevalence of pneumonia in children under five years who attended Salale University Comprehensive Specialized Hospital during the specified period. The study included children with properly documented cases of pneumonia recorded from September 2022 to August 2024. This data was gathered from hospital records to ensure a comprehensive understanding of pneumonia cases in the target population.

Sample Size Determination and Sampling Techniques

The study encompassed all cases of pneumonia among children under five years at the hospital during the last three years. Data were collected from documented files (secondary source) and through

interviews with healthcare providers and parents of selected children affected by pneumonia. Random sampling techniques were employed, with the sample size determined to be 45 respondents, calculated using Morgan’s sampling formula. This approach ensured that the study captured a representative sample of the population under investigation.

$$n = \frac{n_o}{1 + (n0 - 1)N}$$

Where,

- n= sample size
- $n_o = Z^2 pq / e^2$
- Z²= is the abscissa of the normal curve
- p= estimated population
- q= 1-p, = is the level of precision
- N= total population.

At 95% level of confidence and ±5% precision, the value of no = 81 from Table 1 of statistical table that contain the area under normal curve.

Table 1: Respondents’ Awareness of Pneumonia Prevalence.

| Characteristics                                          | Yes | %  | No | %  |
|----------------------------------------------------------|-----|----|----|----|
| Is the prevalence of pneumonia disease increasing today? | 21  | 60 | 14 | 40 |

Data Collection Method

Data for this study were collected from secondary sources at Salale University Comprehensive Specialized Hospital in Fiche. Patient case records and hospital files served as the primary sources of information. The data collected included various socio-demographic variables, vital signs at the time of presentation, the presence of comorbidities, retroviral infection status, and duration of hospital stay, antibiotic usage, discharge status, and other relevant variables. This comprehensive data collection approach aimed to ensure a thorough understanding of pneumonia prevalence among the target population.

Data Analysis

The data obtained from the records were analysed and presented using descriptive statistics, including means and standard deviations (SD). Microsoft Office Excel was utilized for data management and visualization. The results were illustrated through tables and figures, with percentages calculated to provide clear interpretations of the findings.

Ethical Considerations

The study received approval from the ethics committee of Salale University Comprehensive Specialized Hospital. The medical director’s office, the card registry office, and the head nurses of the medical wards were informed about the study’s objectives, purpose, and significance. To ensure confidentiality, patient identification was anonymized by using card numbers instead of names, and all patient-related information was securely maintained to protect privacy.

Results

Socio-Demographic Characteristics of Respondents

As indicated in the following Table 2, a total of 1,834 children under five years of age were diagnosed with pneumonia and visited at Salale University Comprehensive Specialized Hospital from 2022 to 2024. The most affected age group was those younger than three years, accounting for 1,340 cases (73.06%). The prevalence of pneumonia was notably higher in males compared to females during this period, with 1,002 (54.6%) male cases and 832 (45.4%) female cases. Analysing the data by year, the highest prevalence was observed in

2023, with 750 cases, while the lowest occurred in 2024, with 542 cases. This trend underscores the significant burden of pneumonia in young children, particularly among males and those under three years of age. The following graphs illustrate these findings more clearly. The results of this study highlight the critical public health challenge posed by pneumonia in children under five years in the Salale University Comprehensive Specialized Hospital. The higher prevalence in younger children emphasizes the need for targeted interventions aimed at this vulnerable age group.

**Table 2:** Distribution of Children Under Five Infected with Pneumonia at Salale University Comprehensive Specialized Hospital (2022-2024) by Age and Sex.

| Year      | Sex    | Age group |      |     |      |       |      |
|-----------|--------|-----------|------|-----|------|-------|------|
|           |        | < 3       |      | 3-5 |      | Total |      |
|           |        | No        | %    | No  | %    | No    | %    |
| 2022      | Male   | 216       | 56.3 | 71  | 44.9 | 287   | 53.8 |
|           | Female | 168       | 43.7 | 87  | 55.1 | 255   | 46.2 |
|           | Total  | 384       | 100  | 158 | 100  | 533   | 100  |
| 2023      | Male   | 289       | 56.2 | 104 | 44.1 | 393   | 52.4 |
|           | Female | 225       | 43.8 | 132 | 55.9 | 357   | 47.6 |
|           | Total  | 514       | 100  | 236 | 100  | 750   | 100  |
| 2024      | Male   | 270       | 61.1 | 52  | 52   | 322   | 59.4 |
|           | Female | 172       | 38.9 | 48  | 48   | 220   | 40.6 |
|           | Total  | 442       | 100  | 100 | 100  | 542   | 100  |
| Sub total | Male   | 775       | 53.8 | 227 | 45.9 | 1002  | 54.6 |
|           | Female | 565       | 46.2 | 267 | 54.1 | 832   | 45.4 |
|           | Total  | 1340      | 100  | 494 | 100  | 1834  | 100  |

Additionally, the consistent gender disparity observed may warrant further investigation into underlying factors contributing to increased susceptibility in males. Understanding the epidemiological patterns of pneumonia can inform health policy and resource allocation, ultimately guiding effective prevention and treatment strategies for this life-threatening condition. Further research may be necessary to explore the risk factors associated with pneumonia in this demographic and to assess the effectiveness of current interventions.

As shown in Table 3, 21 respondents (60%) indicated that they believe the prevalence of pneumonia is increasing, while 14 respondents (40%) disagreed. According to Table 4, 20 respondents (57.1%) felt that pneumonia can be controlled and prevented, whereas 15 respondents (42.9%) believed it cannot. Table 5 indicates that 31 respondents (88.5%) were aware that pneumonia prevalence varies by age, while 4 respondents (11.5%) were not aware of this fact. It is well-documented that pneumonia is most common among infants and children under five years of age (Chase et al., 2015).

**Table 3:** Respondents' Views on Control and Prevention of Pneumonia.

| Characteristics                                                          | Yes | %    | No | %  |
|--------------------------------------------------------------------------|-----|------|----|----|
| In your view, is that possible to control and prevent pneumonia disease? | 20  | 57.1 | 15 | 42 |

**Table 4:** Awareness of Age Variation in Pneumonia Distribution.

| Characteristics                                                          | Yes | %    | No | %  |
|--------------------------------------------------------------------------|-----|------|----|----|
| In your view, is that possible to control and prevent pneumonia disease? | 20  | 57.1 | 15 | 42 |

**Table 5:** General Awareness about Pneumonia Disease.

| Characteristics                                | Yes | %    | No | %    |
|------------------------------------------------|-----|------|----|------|
| Do you have awareness about pneumonia disease? | 19  | 54.3 | 16 | 45.7 |

As noted in Table 6, 19 respondents (54.3%) reported having awareness about pneumonia, while 16 respondents (45.7%) indicated a lack of awareness. This suggests that while a majority have some awareness, there remains a significant gap in knowledge that needs

addressing. According to Table 7, only 13 respondents (37.1%) had received health-related training from professionals, while 22 respondents (62.9%) had not. This indicates a need for more educational initiatives in the community.

Table 6: Health Training Related to Pneumonia Disease.

| Characteristics                                                       | Yes | %    | No | %    |
|-----------------------------------------------------------------------|-----|------|----|------|
| Have you taken any health related training with health professionals? | 13  | 37.1 | 22 | 62.9 |

Table 7: Knowledge of Symptoms and Signs of Pneumonia.

| Characteristics                                    | Yes | %  | No | %  |
|----------------------------------------------------|-----|----|----|----|
| Have you know the symptoms and signs of pneumonia? | 14  | 40 | 21 | 60 |

Awareness and Perceptions of Pneumonia Prevalence

In the study area at Salale University Comprehensive Specialized Hospital, the responses from participants regarding their awareness of pneumonia prevalence and related strategies are summarized below. As indicated in Table 7, only 14 respondents (40%) were aware of

the symptoms and signs of pneumonia, while 21 respondents (60%) were not. This highlights a critical gap in knowledge that could affect early diagnosis and treatment. The responses summarized in Table 2 through 7 complement the findings presented in Table 1 & Figure 1, providing a comprehensive assessment of the awareness and perceptions surrounding pneumonia prevalence in the study area.

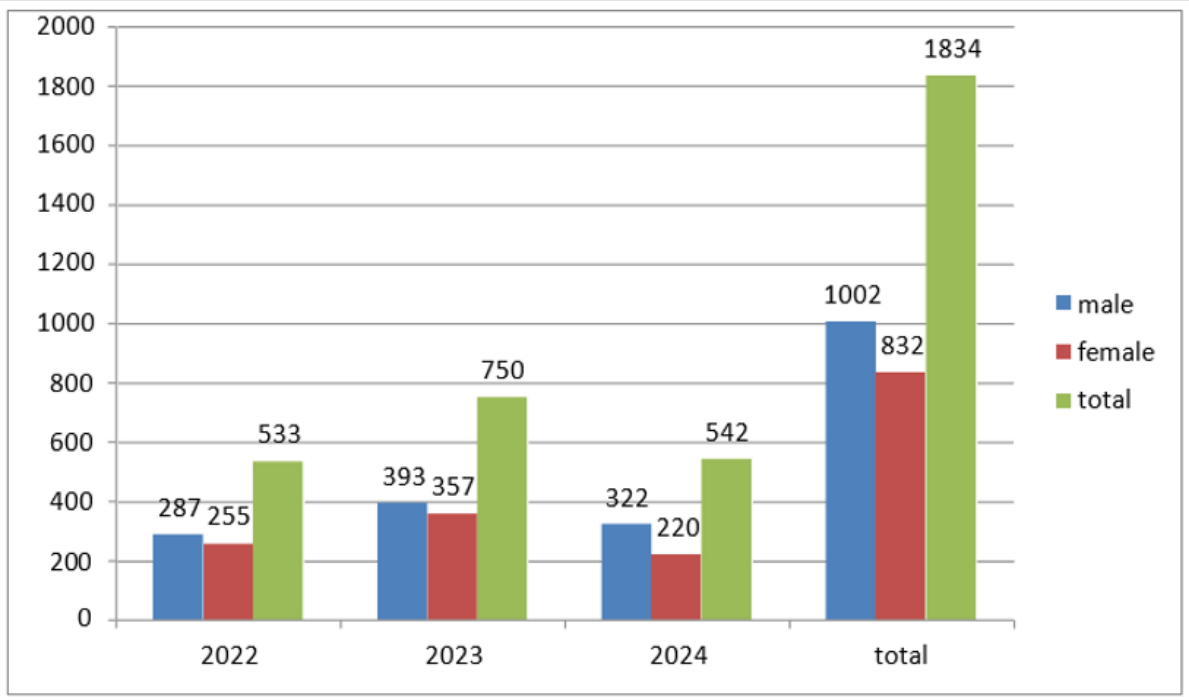


Figure 1: Children’s under five years who infected with pneumonia and all visited at the Salale University Comprehensive Specialized Hospital (2022-2024) by Age and Sex in graph.



## Responses from Face-to-Face Interviews with Families

In addition to the closed-ended questionnaires, face-to-face interview questions were conducted with families of children from both urban and rural areas. This aimed to supplement the responses gathered through the questionnaires. Participants were asked to discuss their overall awareness of pneumonia, environmental pollution, strategies for managing pneumonia prevalence, as well as issues such as inadequate nutrition, lack of clean water, and economic challenges affecting care for children under five years. These qualitative insights from the interviews provided a deeper understanding of the community's perceptions and challenges regarding pneumonia, emphasizing the need for targeted interventions and educational programs to improve health outcomes for young children.

## Discussion

This study highlights the significant impact of pneumonia on children under five years of age, identifying various contributing factors. Key findings indicate that the prevalence of pneumonia is influenced by environmental and socio-economic conditions, as well as child-rearing practices. Notably, several factors were found to be significantly associated with the presence of pneumonia, including the absence of separate kitchens and windows in cooking areas, the use of charcoal for cooking, carrying children on the back while cooking, living in crowded households and thatched-roof houses, and keeping livestock inside the main living area. These findings align with previous research that emphasizes the role of environmental conditions in the prevalence of pneumonia among young children. For instance, a study by Jokinen, et al. [7] indicated that children under three years are particularly vulnerable to pneumonia due to their developing immune systems, which makes them more susceptible to infections compared to older children. In this study, the prevalence of pneumonia was notably higher in the under-three age group, with a total of 1,340 cases (73.06%), compared to 494 cases (26.94%) in the three to five age group. This trend is consistent with findings from other studies that report higher pneumonia rates in younger children, attributed to their immature immune systems and increased exposure to indoor pollutants, particularly when cooking occurs in shared living spaces. The analysis also revealed a gender disparity in pneumonia prevalence, with males accounting for 54.6% of cases compared to 45.4% for females.

This observation is supported by a report from The Lancet [8], which noted a higher incidence of pneumonia in boys than girls, with a median odds ratio of 1.3. The discrepancy in findings may stem from methodological differences or changing societal attitudes towards gender roles in child care. In contrast, a study by Victora et al. [9] reported a higher prevalence of pneumonia in females, suggesting that gender-related factors in health-seeking behavior and care practices may influence these outcomes. The study observed fluctuations in pneumonia prevalence over the past three years, with an increase from 533 cases in 2022 to 750 cases in 2023. This rise may

be attributed to a lack of awareness regarding pneumonia prevention among local populations and increased indoor air pollution during the rainy season when households rely more on wood for heating. Conversely, the prevalence decreased in 2024 to 542 cases, potentially reflecting improved access to clean water and sanitation, as well as heightened community awareness about pneumonia control measures. Furthermore, the study identified severe pneumonia as a prominent concern, significantly associated with poorer health outcomes and higher treatment failure rates.

This aligns with findings from Ruskanen, et al. [10,11], which indicated that severe pneumonia cases are often linked to greater risks of complications and mortality. The severity of pneumonia in children under five underscores the need for effective interventions and healthcare strategies to manage and prevent this condition. Generally, the assessment of pneumonia prevalence in children under five at Salale University Comprehensive Specialized Hospital reveals critical insights into the factors influencing pneumonia rates. Environmental conditions, age, gender, and temporal trends play significant roles in shaping the prevalence and severity of pneumonia among young children. Addressing these factors through targeted public health interventions is essential for reducing the burden of pneumonia in this vulnerable population.

## Conclusions

Pneumonia is a highly infectious disease that poses significant public health challenges, particularly among children under five years of age. This study has demonstrated that pneumonia predominantly affects males more than females, with variations in infection rates observed over the past three years among children registered at Fitch Hospital. Effective prevention and control strategies are essential. These should include community mobilization to promote the health benefits of improved housing conditions and ventilation. Increasing awareness among families about the importance of separate kitchens, balanced diets, access to clean water, and maintaining an environment free from pollutants is crucial. Additionally, housing should incorporate features such as windows and chimneys or hoods to minimize risk factors associated with pneumonia, including poor socioeconomic status, overcrowding, low birth weight, attendance at day-care centres, and the significance of breastfeeding in preventing pneumonia in children.

## Recommendations

Based on the findings of this study, the following recommendations are proposed:

- **Food and Water Safety:** The community should avoid the use of contaminated food and water to prevent infections.
- **Cooking Practices:** Mothers without separate kitchens should ensure proper ventilation when cooking indoors, allowing smoke from charcoal to dissipate effectively.

- **Awareness Campaigns:** Government and health experts should engage in awareness campaigns focusing on pneumonia prevention and control strategies within the community.
- **Nutritional Improvement:** The North Shoa Zone Health Office, in collaboration with families, should work to enhance the nutritional status of children in the area.
- **Hygiene Practices:** Emphasis should be placed on maintaining cleanliness, especially hand hygiene, among children.
- **Health Education for Caregivers:** The North Shoa Zone Health Office should provide health education to caregivers regarding the benefits of ventilated housing, the necessity of using separate kitchens, and the importance of not carrying children on the back while cooking, as well as keeping livestock separate from living areas.
- **Minimizing Risk Factors:** Efforts should be made to address and minimize risk factors associated with pneumonia, such as poor socioeconomic conditions, overcrowding, low birth weight, and young maternal age.
- **Education for Senior Household Members:** The Health Education Bureau should implement programs targeting senior household members to educate them about potential pneumonia risk factors.
- **Training for Health Extension Workers:** Ongoing training programs, both long-term and short-term, should be established for health extension workers to keep them updated and prepared to address pneumonia-related issues effectively.

- Implementing these recommendations, it is anticipated that the burden of pneumonia among children under five can be significantly reduced, leading to improved health outcomes in the community.

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