



# Prevalence and Factors Associated Pneumonia among Children below Five Years Attending Paediatric Ward at Bushenyi Health Center IV, Bushenyi District

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## ABSTRACT

Pneumonia is a life-threatening lower respiratory tract infection caused by various microorganisms like viruses, bacteria, or fungi. In Uganda, pneumonia is a leading cause of death among children under five years old, along with malaria and diarrhea. This study aimed to determine the prevalence and factors associated with community-acquired pneumonia among children below five years attending the paediatric ward at Bushenyi Health Center IV in Bushenyi District, Uganda. A mixed cross-sectional hospital-based study was conducted from April to May 2017 using a prepared questionnaire to collect data on demographics, socioeconomic factors, and environmental risk factors. A total of 135 children below five years of age attending the paediatric ward were enrolled in the study. Out of the 135 participants, 27.4% had pneumonia, while 72.6% tested negative. The majority (78.5%) of the participants were from rural areas, and a significant proportion of mothers (34.1%) and fathers (31.1%) had not completed primary school education. Regarding environmental factors, 45% of mothers used both charcoal and wood as cooking fuel, 61.5% lived in non-cemented houses, and 23.7% of children stayed near or on their mothers' backs while cooking. Additionally, 6.7% of respondents were smokers, with 4.4% smoking inside the house. The study identified a comparatively high prevalence of pneumonia among children aged 0-5 years. Modifiable risk factors for pneumonia included low socioeconomic status and environmental factors such as indoor air pollution from the use of solid fuels for cooking. The study recommends implementing public health initiatives to improve socioeconomic conditions and promote the use of alternative cooking methods that produce less smoke.

**Keywords:** Pneumonia, children under five, prevalence, socioeconomic factors, environmental factors.

## INTRODUCTION

Pneumonia, an acute respiratory infection that inflames the lungs, remains a significant public health concern globally, especially among children under five years of age. The burden of childhood pneumonia is disproportionately represented in low- and middle-income countries, where it is a leading cause of morbidity and mortality [1]. Pneumonia can be caused by various microorganisms, including bacteria, respiratory viruses, and fungi, and is more common in susceptible individuals like children under 5 and older adults with prior chronic conditions [2]. According to the World Health Organization (WHO), pneumonia accounts for approximately 18% of all deaths among children under five years old worldwide, with an estimated 1.1 million children dying from the disease every year [3]. In sub-Saharan Africa, pneumonia is one of the leading killers of children under five, contributing to 17-26% of deaths in this age group [4, 5]. The burden of childhood pneumonia is exacerbated by malnutrition, which is associated with 53% of all childhood deaths in the region [5]. In Uganda, acute lower respiratory tract infections (ALRIs), including pneumonia, are the second major cause of morbidity after malaria and the leading cause of death among children under five years old [6]. Severe pneumonia accounts for 25-33% of admissions and contributes to up to 30% of deaths in the general paediatric wards at Mulago National Referral Hospital [6]. Despite the availability of effective interventions, such as antibiotics and vaccines, pneumonia remains a significant challenge in Uganda, partly due to the slow progress in expanding the coverage of these interventions [7]. The risk factors associated with pneumonia in children are multifaceted and can be broadly categorized into socioeconomic and environmental factors. Socioeconomic factors, such as poverty, low parental education levels, and poor living conditions, have been linked to an increased risk of pneumonia among children [8, 9]. For instance, a study in Bangladesh found that children from the poorest families and those whose mothers

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had lower education levels were more likely to die from pneumonia [10]. Environmental factors, such as indoor air pollution from the use of solid fuels for cooking, exposure to tobacco smoke, and overcrowding, have also been identified as significant risk factors for childhood pneumonia [11, 12, 13]. In developing countries, where a substantial proportion of the population relies on solid fuels like wood, charcoal, and crop waste for cooking, exposure to indoor air pollution poses a significant risk to children's respiratory health [14]. Additionally, passive smoking and overcrowded living conditions facilitate the transmission of respiratory pathogens, further increasing the risk of pneumonia [12, 13]. Despite the significant burden of childhood pneumonia in Uganda, there has been a lack of comprehensive research on the prevalence and associated risk factors, particularly in rural settings. Previous studies have primarily focused on vaccine trials and evaluating the impact of vaccines on pneumonia [7]. However, a thorough understanding of the local epidemiology and risk factors is crucial for developing effective prevention and control strategies tailored to specific regions and communities.

## **METHODOLOGY**

### **Study area**

This study was conducted at Bushenyi Health Center IV found in Bushenyi town, Bushenyi Ishaka Municipality, Bushenyi District, Southwestern Uganda. Bushenyi Health Center IV is located along Mbarara-Kasese road about 55 km from Mbarara which is the largest town in the region and about 360KM from Kampala the capital city of Uganda. It borders the districts of Sheema in the east, Mitooma in the south, Rubirizi to the northwest, Rukungiri to the west, and Buhweju to the northeast. It has approximately 251,400 [14].

### **Study design**

A qualitative cross-sectional hospital-based study was carried out to determine the cases of pneumonia among children below 5 years attending the pediatrics ward at Bushenyi Health Center IV, Bushenyi District.

### **Target population**

The study targeted all children below 5 years who attended the pediatrics ward at Bushenyi Health Center IV during the study time.

### **Inclusion criteria**

The children of all mothers or caretakers in the pediatric ward at Bushenyi Health Center IV who consented during the study period were part of the research.

### **Exclusion criteria**

All children above 5 years old and also children and mothers or caretakers who were severely ill or have hearing impairments or talking problems will not consent. Mothers who refused to consent to take part in the study. Children who had just finished the dose and got re-infected were not included in this study.

### **Sample size**

The sample size of this study was calculated using the statistical formula below

$$N = \frac{Z^2 Pq}{d^2}$$

N=Desired Sample size.

Z=the standard deviation at the desired degree of accuracy of 95% which is 1.96.

P= estimated proportion of the target population with pneumonia which is 22.9% [15].

d= standard error of deviation = 0.05

$$N = \frac{1.96^2 \times 0.229(1-0.229)}{0.05^2}$$

N= 135.65

Therefore, a minimum of 135 participants was sampled.

### **Sampling criteria**

Children below five years of age attending the pediatrics ward at Bushenyi Health Center IV were simply randomly selected and an explanation about the study was given to them. Those who consented provided their demographics which were recorded.

### **Data collection**

Data collection commenced from April to May 2017 using questionnaire forms for demographic, socioeconomic, and environmental information from the participants and the patient files were used for their diagnosis.

### **Pilot study**

A brief study was done before the research which helped to evaluate the working conditions and methods. This helped to eliminate possible errors during the research time.

### **Data analysis and presentation**

The collected data will then be analyzed using a scientific calculator presented in form of tables for easy interpretation.

### **Ethical consideration**

With ethical considerations strict confidentiality was followed, using peoples' initials and not names and asking for consent from the participants before being part of the study and the results were delivered individually through the Pediatric department of Bushenyi Health Center IV.

### **Quality assurance and quality control**

Quality control involved the use of textbooks and a pretested questionnaire. Qualified staff were available for consultation when the need arose.

### **Limitations of the study**

1. A tight schedule since the researcher had to balance between the research study and other important demanding class work and a language barrier since many languages exist among participants however this was overcome by doing my study outside of my class time, and translators assisted to overcome the problem of language barrier.
2. Uncooperative clients who were not willing to take part in the study. I overcame this by giving them more explanations concerning my study, after this, some accepted and about 5 completely refused to consent and were then left out of this study.

## **RESULTS**

### **Prevalence of pneumonia.**

A total of 135 children participated in the study. 27.4% were found to have pneumonia whereas, 72.6% tested negative for pneumonia.

**Table 1: Prevalence of pneumonia. Bushenyi District, Uganda May 2017. (n=135 mothers/fathers and children's pair).**

<b>Total participants</b>	<b>Pneumonia Positive</b>	<b>Percentage</b>	<b>Pneumonia Negative</b>	<b>Percentage</b>
135	37	27.4%	98	72.6%

**Socio-economic characteristics of the respondents**

The various socio-economic statuses of the participants are represented in Table 2.

**Table 2: Socio-economic characteristics of respondents. Bushenyi District, Uganda May2017. (n=135 mothers/fathers and children's pair).**

Category	Yes	Percentage (%)
<b>Residence</b>		
Rural	106	78.5
Urban	29	21.5
<b>Education status of the mother</b>		
Primary school	46	34.1
Secondary School	27	20
Tertiary School	24	17.8
Higher level	8	5.9
None	30	22.2
<b>Education status of the father</b>		
Primary school	42	31.1
Secondary School	27	20
Tertiary School	7	5.2
Higher level	32	23.7
None	27	20
<b>Mother's occupation</b>		
Housewife	66	48.9
Teacher	2	1.5
Students	3	2.2
Business	17	12.6
Other	22	16.3
Unemployed	23	17.0
Other	2	1.5
<b>Fathers occupation</b>		
Government employee	32	23.7
Student	8	5.9
Business	33	24.4
Farmer	38	28.1
Unemployed	6	4.4
<b>Sex of the Child</b>		
Male	75	55.6
Female	60	44.4
<b>Household belongings</b>		
TV	77	57.0
Bicycle	97	71.9
Radio	102	75.6
Cattle	66	48.9
Poultry	98	72.6

**Environmental characteristics of the respondents.**

**Table 3: Environmental characteristics of respondents. Bushenyi District, Uganda May2017. (n=135 mothers/fathers and children's pair).**

Variables	Yes	Percentage (%)
<b>Type of cooking fuel</b>		
Charcoal	22	16.3
Firewood	14	10.4
Electric power	9	6.7
Charcoal and wood	60	44.4
Charcoal and electric power	27	20
Crops	1	0.7
Gas	2	1.5
<b>Place of food preparation</b>		
Main house	23	17.0
Kitchen	80	59.3
Outdoors	32	23.7
<b>Number of windows in the household</b>		
One	72	53.3
Two	49	36.3
Three or more	13	9.6
None	1	0.7
<b>Children sleeping in the same house used for cooking</b>		
Yes	108	80
No	27	20
<b>The usual location of the child during cooking</b>		
On cooking mothers back or besides the mother	32	23.7
Outside of the cooking house	103	76.3
<b>Cigarette smokers among family</b>		
Yes	9	6.7
No	126	93.3
<b>Area of Smoking</b>		
Inside the house	6	4.4
Outside the house	129	95.6
<b>Type of Floor</b>		
Cemented	52	38.5
Mud	83	61.5

**DISCUSSION**

**Prevalence of Pneumonia**

According to Table 1, 27.4% of the participants were diagnosed with pneumonia, while 72.6% tested negative for the condition. This prevalence rate is slightly higher than the 25% reported in a study conducted by Yorita [15]. The increased prevalence in my study can be attributed to its location in a rural area, where pneumonia cases tend to be more prevalent compared to urban areas. This difference may be due to several factors, including the higher concentration of children from low-income families in rural settings, where access to healthcare and preventive measures may be limited.

**Socioeconomic Characteristics of the Respondents**

Table 2 presents the socioeconomic profile of the participants. The majority (78.5%) of the respondents hailed from rural areas, with only 21.5% residing in urban areas. This distribution mirrors findings from a research study conducted in Bangladesh [10], which also observed a higher proportion of participants from rural backgrounds (22.3%) compared to urban areas (16.8%). Regarding education levels, a significant portion of both mothers (34.1%) and fathers (31.1%) had not completed primary school. In contrast, a smaller percentage of fathers (23.7%)

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and mothers (5.9%) had either completed or were still pursuing higher education. This disparity in educational attainment aligns with findings from a study by Hassan *et al.* [8], which linked low maternal education levels to increased rates of pneumonia hospitalizations and mortality. It's worth noting that the higher proportion of uneducated mothers in my study may be influenced by its rural setting, as indicated by Hassan's study conducted in an urban area. Occupationally, the largest percentage of fathers (28.1%) were engaged in farming, while 13.3% pursued other occupations such as daily laborers, fishermen, carpenters, and drivers. This distribution is consistent with findings from Houweling's study [16], which highlighted the prevalence of subsistence agriculture and informal labor in similar populations. Ownership of household assets such as TVs (57%), radios (75.6%), cattle (48.9%), poultry (72.6%), and bicycles (71.9%) was also assessed. The study revealed a correlation between low socioeconomic status and childhood pneumonia, with better income levels associated with improved living conditions, access to media, and health-seeking behavior. Poor housing conditions, characterized by dampness, inadequate ventilation, and temperature fluctuations, were identified as risk factors for pneumonia among children. In developing countries, rapid urbanization has led to a significant portion of the population living in substandard housing, posing health risks to low-income groups due to overcrowding and inadequate living conditions [13].

#### **Environmental Characteristics of the Respondents**

Examining Table III sheds light on the environmental attributes of the respondents. Charcoal and wood emerge as the primary cooking fuels, utilized by 45% of mothers collectively, while a mere 0.7% resort to crop wastes for this purpose. Additionally, a substantial 61.5% of participants inhabit non-cemented houses, indicating prevalent traditional housing structures. Notably, nearly all living rooms (99.2%) boast at least one window, facilitating ventilation, and 80% of kitchens are segregated from the living areas. However, concerning observations include 23.7% of children remaining in close proximity to their mothers during cooking, potentially exposing them to airborne pollutants. Furthermore, 6.7% of respondents are smokers, with 4.4% of them indulging indoors, exacerbating indoor air pollution. The dearth of adequate ventilation in traditional dwellings contributes to indoor pollution, subjecting children to respiratory hazards. Compared to the study by Lewis *et al.* [17], where electricity and biogas predominated as cooking fuels and kitchens were typically integrated into living spaces, our findings underscore a higher reliance on charcoal and firewood. This inclination may stem from the prohibitive costs of gas and electricity, rendering them inaccessible to many, thus heightening the risk of pneumonia due to pollution. Regarding cigarette smoking as a risk factor for childhood community-acquired pneumonia, our study does not establish a statistically significant association. Only one mother in the study cohort reported smoking, while most smoking fathers were geographically separated from their families, minimizing direct exposure to children. However, it's noteworthy that the apparent protective effect of fathers' smoking history might be influenced more by socioeconomic factors, such as their ability to afford cigarettes, rather than solely environmental considerations. These observations align with existing literature on cigarette smoking and its implications for childhood pneumonia risk [9].

#### **CONCLUSION**

This study has highlighted a relatively high prevalence of pneumonia among children aged 0 to 5 years. Furthermore, it has identified modifiable risk factors associated with pneumonia, notably the socio-economic status of the population. To mitigate the burden of pneumonia, it is imperative to implement public health interventions, such as the adoption of improved stoves for cooking. By addressing these modifiable risk factors and promoting preventive measures, we can potentially reduce the incidence and severity of pneumonia among children.

#### **Recommendations**

The study suggests that while efforts to enhance the socio-economic status of the population through poverty eradication programs are valuable, the outcomes may take considerable time to materialize. In the interim, it is crucial to discourage the use of firewood for cooking due to its association with indoor air pollution. Instead, alternative and affordable cooking methods that produce minimal smoke should be promoted. By advocating for these measures, we can proactively address the health risks associated with indoor pollution and contribute to improving respiratory health outcomes, particularly among vulnerable populations.

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