Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 9 (2025): September 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i9.2016
Original Article

Prevalence of anemia and its relation to outcome among children aged 1 month – 5 years hospitalized for pneumonia at a tertiary care hospital: A prospective cross-sectional study.

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Abstract

Background: Pneumonia remains a leading cause of morbidity and mortality in children under five years, particularly in low-resource settings. Anemia, a common comorbidity, exacerbates the severity and outcomes of pneumonia. Understanding the interplay between anemia and pneumonia-related outcomes is crucial for improving clinical management strategies.

Objective: To estimate the prevalence of anemia in children hospitalized with pneumonia and to assess its correlation with clinical severity, need for advanced respiratory support, blood transfusion, and outcomes.

Methods: A prospective cross-sectional study was conducted among 200 children aged 1 month to 5 years admitted with pneumonia at a tertiary care center. Clinical manifestations, hemoglobin levels, oxygen therapy requirements, need for blood transfusion, and outcomes were recorded. Anemia was classified based on WHO criteria. Data were analyzed using chi-square and Pearson correlation tests with significance set at $p<0.05$.

Results: Overall, anemia was observed in 68% of participants, with mild (40%), moderate (19.5%), and severe anemia (8.5%). Anemia was observed in 68% of participants, with mild (40%), moderate (19.5%), and severe anemia (8.5%). The need for advanced respiratory support increased with anemia severity; 39.1% of severely anemic children required mechanical ventilation ($p<0.001$). Blood transfusions were necessary in 30% of children with moderate anemia and 70% with severe anemia. Mortality was significantly higher among severely anemic children (50%) compared to non-anemic counterparts (14.3%) ($p<0.001$). Overall, 93% of children were discharged, while 7% succumbed to pneumonia, predominantly in the under-three age group.

Conclusion: Anemia significantly worsens clinical outcomes in pediatric pneumonia, increasing the need for intensive oxygen therapy, transfusions, and raising the risk of mortality. Early detection and aggressive management of anemia are pivotal to improving survival in pediatric pneumonia cases.

Recommendations: Routine anemia screening and prompt correction should be integrated into pediatric pneumonia management protocols to reduce respiratory complications and improve survival in resource-limited settings.

Keywords: *Anemia, Pneumonia, Children, Hemoglobin, Oxygen Therapy, Blood Transfusion, Mortality, Clinical Outcomes, Pediatric Intensive Care, Hypoxemia*
Submitted: *May 29, 2025* ***Accepted:*** *August 01, 2024* ***Published:*** *September 01, 2025*
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Introduction

Pneumonia continues to be the leading cause of morbidity and mortality among children under five years of age, particularly in low- and middle-income countries (LMICs) where healthcare resources are limited. Recent estimates from the Global Burden of Disease (GBD) project attribute

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approximately 15% of all under-five deaths globally to pneumonia, with the greatest burden observed in South Asia and Sub-Saharan Africa. In India, pneumonia accounts for an estimated 3.6 to 4 million cases annually, contributing to 0.35–0.37 million child deaths every year [1].

Despite notable advancements in antimicrobial therapies, immunization coverage, and supportive care strategies, pneumonia-related outcomes remain suboptimal due to persistent modifiable risk factors such as malnutrition, low birth weight, indoor air pollution, and anemia [2,3]. Among these, anemia is a particularly under-recognized yet significant determinant of pneumonia severity and outcome. Anemia, characterized by reduced hemoglobin concentration, impairs oxygen-carrying capacity and exacerbates tissue hypoxia, thereby compounding the clinical severity of pneumonia [1,4]. Moreover, anemia compromises host immune defenses, predisposing children to recurrent and severe infections, delayed recovery, and adverse clinical outcomes [2,3].

The relationship between anemia and pneumonia is bidirectional. While anemia predisposes children to severe and complicated respiratory infections, the inflammatory response during infections can, in turn, exacerbate anemia through iron sequestration, reduced erythropoiesis, and nutritional depletion [4,5]. Studies from Brazil, Uganda, and Ethiopia have consistently demonstrated a high prevalence of anemia among children hospitalized for pneumonia, with a direct association between anemia severity and increased risk of mortality, transfusion requirement, and prolonged hospital stay [2-5].

However, in the Indian context, there is limited literature exploring the prevalence of anemia among children with pneumonia and its direct impact on clinical outcomes such as oxygen therapy needs, transfusion, and mortality. This study aims to bridge this gap by estimating the prevalence of anemia in children hospitalized with pneumonia and evaluating its association with oxygen therapy requirements, need for blood transfusions, and mortality outcomes. The findings are expected to highlight the clinical relevance of early anemia detection and its integrated management in pediatric pneumonia care strategies.

Materials and Methods

Study Design and Setting

This prospective cross-sectional study was conducted at the Department of Pediatrics, Osmania Medical College, Hyderabad, a tertiary care referral center in Telangana, India, over a period of 18 months from November 2021 to April 2023. Osmania Medical College and its affiliated tertiary care hospital serve as a major referral center for urban and rural populations across Hyderabad and neighboring districts of Telangana. The hospital caters to children from diverse socio-economic and nutritional backgrounds, with approximately 8,000–10,000 pediatric admissions annually. The Pediatric Department is equipped with pediatric intensive care and advanced diagnostic facilities, making it a representative center for studying pneumonia and associated comorbidities in this region.

Study Population

Children aged 1 month to 5 years, of either gender, admitted with a clinical diagnosis of pneumonia were enrolled. Pneumonia was diagnosed based on WHO IMNCI criteria, including symptoms of cough, difficulty breathing, tachypnea, chest indrawing, grunting, cyanosis, altered sensorium, or convulsions.

Inclusion Criteria

Children aged 1 month to 5 years hospitalized with pneumonia (as per WHO classification: Pneumonia/Severe Pneumonia).

Exclusion Criteria

Low birth weight infants.
Children with severe acute malnutrition (SAM).
Children with chronic systemic illnesses (e.g., congenital heart disease, tuberculosis, chronic lung disease).
Preterm babies (<37 weeks' gestational age).
Non-vaccinated children.
Children whose parents/guardians did not give consent.

Data Collection Procedure

Eligible participants were enrolled after obtaining informed written consent from parents or guardians. Detailed history and clinical examination were recorded using a structured proforma, focusing on respiratory signs, oxygen saturation, and systemic examination. Hemoglobin levels were estimated using an automated hematology analyzer. Anemia was classified per WHO criteria into mild (10–10.9 g/dL), moderate (7–9.9 g/dL), and severe (<7 g/dL).

Details regarding mode of oxygen delivery (Nasal Prongs, High-Flow Nasal Cannula [HFNC], Non-Invasive Ventilation [NIV], Mechanical Ventilation) were documented. Indications for blood transfusion were noted based on institutional protocols for pediatric anemia in respiratory distress.

Outcome Measures

Primary outcomes included:

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Prevalence of anemia in children with pneumonia.
Association of anemia severity with oxygen therapy modality.
Need for blood transfusion.
Clinical outcome (discharge or mortality).

Bias:

To minimize selection bias, consecutive eligible children meeting the inclusion criteria were enrolled to ensure representativeness. Information bias was reduced by using standardized WHO-IMNCI definitions for pneumonia and validated automated analyzers for hemoglobin estimation. Data collection was performed by trained pediatric residents under faculty supervision to ensure uniformity and accuracy. Potential confounders such as malnutrition and chronic illnesses were excluded through strict eligibility criteria.

Statistical Analysis

Data were entered into **SPSS version 20.0** for analysis. Categorical variables were expressed as frequencies and percentages. Associations between anemia severity and clinical outcomes were assessed using the Chi-square test. A p-value <0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee of Osmania Medical College, Hyderabad. Written informed consent was secured from parents or guardians, ensuring confidentiality, voluntary participation, and adherence to ethical standards throughout the study duration.

RESULTS

During the study period, 245 children aged 1 month to 5 years with a clinical diagnosis of pneumonia were screened for eligibility. Of these, 32 were excluded (12 with severe acute malnutrition, 8 with congenital heart disease, 5 preterm babies, 4 with chronic systemic illnesses, and 3 whose parents did not provide consent). A total of 213 were eligible, of which 13 parents declined participation after counseling. Finally, 200 children were enrolled and analyzed in the study. No dropouts occurred after enrollment.

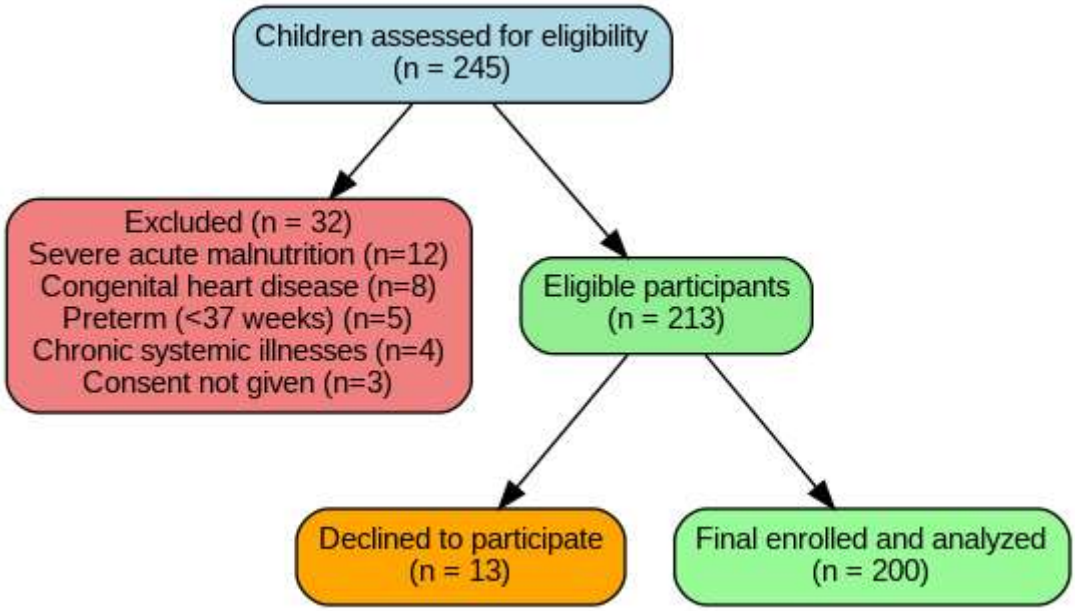

Figure 1. Flow diagram of study participants.

A total of 200 children aged between 1 month to 5 years, diagnosed with pneumonia, were enrolled in the study. The mean age was 15.77 ± 10.05 months, with a predominance in the 1–3 years age group (51.5%), followed by infants (<1 year) (44.5%). The gender distribution revealed a male

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predominance (63%), with a male-to-female ratio of approximately 1.7:1 (Table 1).

Table 1: Age and Gender Distribution of Study Participants (N = 200)

Age Group	Male (n)	Female (n)	Total (n)
<1 year	58	31	89
1–3 years	64	39	103
>3 years	4	4	8
Total	**126**	**74**	**200**

Clinical Manifestations

The most common presenting symptom was tachypnea with SpO_2 <90%, observed in 55.5% of participants. Retractions were seen in 23.5%, while grunting with cyanosis and altered sensorium with convulsions were noted in 9.5% and 11.5% of cases, respectively. Notably, infants under 1 year exhibited a higher prevalence of severe hypoxemia compared to older children, though no statistically significant difference was observed across age groups (Table 2).

Table 2: Clinical Manifestations Distribution among Participants by Age Group

Clinical Manifestations	<1 year (%)	1–3 years (%)	>3 years (%)	Total (%)
Tachypnea with SpO_2 <90%	60.3	52.6	50.0	55.5
1+ Retractions	21.8	24.6	25.0	23.5
2+ Grunting + Cyanosis	9.0	9.6	12.5	9.5
3+ Head Nodding + Altered Sensorium + Convulsions	9.0	13.2	12.5	11.5

Hemoglobin Levels and Oxygen Delivery

Among the participants, 68% were anemic (hemoglobin <11 g/dL), with 40% exhibiting mild anemia, 19.5% moderate anemia, and 8.5% severe anemia. The mode of oxygen delivery varied significantly with anemia severity. Children with no anemia predominantly required nasal prongs (37.8%) or HFNC (29.8%), while those with moderate anemia required non-invasive ventilation (47.4%). Notably, 39.1% of children with severe anemia required invasive mechanical ventilation, underscoring the correlation between anemia severity and advanced respiratory support needs (Table 3).

Table 3: Association between Hemoglobin Levels and Mode of Oxygen Delivery

Hemoglobin Level	O_2 with NP (%)	HFNC (%)	NIV (%)	Ventilator (%)
No Anemia (>11 g/dL)	37.8	29.8	15.8	21.7
Mild (10–10.9 g/dL)	42.3	53.2	15.8	21.7
Moderate (9.9–7 g/dL)	18.0	12.8	47.4	17.4
Severe (<7 g/dL)	1.8	4.3	21.1	39.1

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Age-Wise Distribution of Anemia

Anemia was prevalent across all age groups, with infants (<1 year) and 1–3 year groups showing a similar distribution of mild and moderate anemia. However, a notable 25% of children aged >3 years had severe anemia, which was disproportionately higher compared to younger cohorts (Table 4).

Table 4: Distribution of Hemoglobin Levels among Study Participants by Age Group

Hemoglobin Level	<1 year (%)	1–3 years (%)	>3 years (%)
No Anemia (>11 g/dL)	32.1	31.6	37.5
Mild (10–10.9 g/dL)	35.9	43.0	37.5
Moderate (9.9–7 g/dL)	23.1	18.4	0.0
Severe (<7 g/dL)	9.0	7.0	25.0

Blood Transfusion and Clinical Outcomes

The requirement for blood transfusion was significantly associated with anemia severity. While none of the children with mild or no anemia required transfusion, 30% of those with moderate anemia and 70% of those with severe anemia necessitated transfusion. Mortality also showed a stepwise increase with anemia severity, with 50% of children with severe anemia succumbing to the illness, compared to 28.6% in moderate anemia, 7.1% in mild anemia, and 14.3% in non-anemic participants (Table 5).

Table 5: Blood Transfusion Requirement and Outcome Based on Hemoglobin Severity

Hemoglobin Level	Blood Transfusion Required (%)	Discharged (%)	Death (%)
No Anemia (>11 g/dL)	0	33.3	14.3
Mild (10–10.9 g/dL)	0	42.5	7.1
Moderate (9.9–7 g/dL)	30	18.8	28.6
Severe (<7 g/dL)	70	5.4	50.0

Overall Outcomes

Out of 200 participants, 186 (93%) were discharged, and 14 (7%) succumbed to the illness. Mortality was highest in infants (<1 year; 7.7%) and in the 1–3 years age group (7%), with no deaths reported among children older than 3 years. Gender-wise, mortality was slightly higher in males (10 deaths) compared to females (4 deaths), although the difference was not statistically significant (Table 6).

Table 6: Overall Study Outcomes by Age Group and Gender

Variable	Discharged (n)	Death (n)
<1 year	72	6
1–3 years	106	8
>3 years	8	0
Male	116	10
Female	70	4
Total	**186 (93%)**	**14 (7%)**

Discussion

Pneumonia remains a major contributor to under-five mortality, with anemia being a significant yet often overlooked comorbidity that exacerbates disease severity and adversely affects clinical outcomes [6]. This study assessed the prevalence of anemia among children hospitalized with pneumonia and its impact on disease progression, respiratory support requirements, transfusion needs, and mortality.

In the present study, **68% of children were anemic**, which is consistent with observations from studies conducted in Tanzania and Nepal, where anemia prevalence among

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pediatric pneumonia admissions ranged between **60–70%** [6,7]. The predominance of **mild anemia (40%)** aligns with existing literature; however, the higher proportion of **severe anemia (8.5%)** observed in our study could be attributed to delayed hospital presentation and prevalent nutritional deficiencies in the community [7,8].

A significant association was noted between anemia severity and the **mode of oxygen delivery**. Children with no anemia predominantly required **nasal prongs (37.8%)** or **HFNC (29.8%)**, whereas those with **moderate anemia necessitated non-invasive ventilation (47.4%)**. Critically, **39.1% of severely anemic children required mechanical ventilation**, highlighting the compounding effect of anemia on respiratory compromise. Similar findings were reported by Zhang et al., where anemia was a major determinant of ICU admissions and need for ventilatory support in severe community-acquired pneumonia [8].

The requirement for **blood transfusion increased proportionally with anemia severity**, with **70% of severe anemia cases necessitating transfusions**, consistent with previous studies that emphasized transfusion as a lifesaving intervention in anemic children with respiratory distress [9,10]. Importantly, none of the children with mild or no anemia required transfusions, underscoring the necessity of hemoglobin-based risk stratification.

Mortality rates were significantly higher among children with severe anemia (**50% mortality**), which corroborates findings from the PERCH study and other regional reports, where anemia was identified as a strong predictor of pneumonia-related deaths [11,12]. The synergistic effect of hypoxemia, immune suppression, and delayed intervention likely contributes to this high fatality rate.

Furthermore, infants and children aged **1–3 years** accounted for the majority of pneumonia admissions and deaths, reflecting their inherent physiological vulnerability as emphasized in global epidemiological studies [6,9]. Although a male predominance was observed in admissions, mortality rates did not differ significantly between genders, indicating that anemia severity rather than gender was the critical determinant of outcomes.

Generalizability:

As this was a single-center hospital-based study, external validity is limited. However, the findings likely reflect similar trends in resource-limited pediatric populations, especially in South Asia, where anemia and pneumonia remain prevalent comorbidities influencing childhood morbidity and mortality.

Conclusion

This study highlights a high prevalence of anemia among children hospitalized with pneumonia, with anemia severity significantly influencing clinical outcomes. Children with moderate to severe anemia exhibited increased requirements for advanced respiratory support and blood transfusions, along with a markedly higher risk of mortality. Early identification and management of anemia, particularly in resource-limited settings, are crucial in reducing pneumonia-related complications and improving survival rates. An integrated approach that combines prompt pneumonia treatment with proactive anemia correction strategies is essential for optimizing clinical outcomes. Strengthening screening programs and addressing nutritional deficiencies at the community level may significantly reduce pediatric pneumonia morbidity and mortality.

Limitations

The study was conducted at a single tertiary care center with a relatively small sample size, which may limit the generalizability of the findings to broader populations. Additionally, the cross-sectional design restricted assessment of long-term outcomes and causal relationships. Factors such as nutritional status, iron indices, and socio-economic determinants influencing anemia were not extensively evaluated. Multicenter studies with larger cohorts are needed to validate these findings and explore underlying contributory factors comprehensively.

Recommendations

Routine screening for anemia should be incorporated into the clinical assessment of all children hospitalized with pneumonia, particularly in high-burden settings. Early identification and timely correction of anemia through nutritional interventions and, when necessary, blood transfusions can significantly improve respiratory outcomes and reduce mortality. Strengthening primary healthcare programs focusing on maternal and child nutrition, iron supplementation, and health education is essential to prevent anemia from an early age. Moreover, integrating anemia management protocols within existing pneumonia treatment guidelines will optimize resource utilization and enhance patient outcomes in resource-limited healthcare systems.

Acknowledgements

The authors express their sincere gratitude to the Department of Pediatrics, Osmania Medical College, Hyderabad, for their constant support and guidance

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https://doi.org/10.51168/sjhrafrica.v6i9.2016
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throughout the study. We extend our heartfelt thanks to all the participating children and their families for their cooperation. Special appreciation goes to the clinical and laboratory staff for their invaluable assistance in data collection and patient care. We also acknowledge the Institutional Ethics Committee for their approval and ethical oversight during the research.

Abbreviations

GBD – Global Burden of Disease
WHO – World Health Organization
IMNCI – Integrated Management of Neonatal and Childhood Illness
HFNC – High Flow Nasal Cannula
NIV – Non-Invasive Ventilation
PICU – Pediatric Intensive Care Unit
SAM – Severe Acute Malnutrition
Hb – Hemoglobin
IDA – Iron Deficiency Anemia
CRP – C-Reactive Protein
IL-6 – Interleukin-6
NP – Nasal Prongs
Do2 – Oxygen Delivery
SPSS – Statistical Package for the Social Sciences
RBC – Red Blood Cells

Source of funding

The study had no funding.

Conflict of interest

The authors declare no conflict of interest.

Author contributions

TH-Concept and design of the study, results interpretation, review of literature, and preparation of the first draft of the manuscript. Statistical analysis and interpretation, revision of manuscript. **CS**-Concept and design of the study, results interpretation, review of literature, preparing the first draft of the manuscript, and revision of the manuscript.**RCJ**-Review of literature and preparing the first draft of the manuscript. Statistical analysis and interpretation. **ABS**-Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript. Statistical analysis and interpretation, revision of manuscript. **ES**-Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript.

Data availability:

Data is available on request

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References

1. Chisti MJ, Kawser CA, Rahman ASMMH, Shahid ASMSB, Afroze F, Shahunja KM, et al. Prevalence and outcome of anemia among children hospitalized for pneumonia and their risk

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Vol.6 No. 9 (2025): September 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i9.2016
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of mortality in a developing country. Sci Rep. 2022 Jun 24;12(1):10741. doi: 10.1038/s41598-022-14818-2. PMID: 35750716; PMCID: PMC9232587. https://doi.org/10.1038/s41598-022-14818-2

2. Yusuf MU, Abdurahman N, Asmerom H, Atsbaha T, Alemu A, Weldegebreal F. Prevalence and Associated Factors of Anemia Among Hospital Admitted Patients in Eastern Ethiopia. J Blood Med. 2023 Nov 15;14:575-588. Doi: 10.2147/JBM.S431047. PMID: 38023805; PMCID: PMC10657767. https://doi.org/10.2147/JBM.S431047
3. 3.Dos Santos RF, Gonzalez ES, de Albuquerque EC, de Arruda IK, Diniz Ada S, Figueroa JN, et al. Prevalence of anemia in under-five-year-old children in a children's hospital in Recife, Brazil. Rev Bras Hematol Hemoter. 2011;33(2):100-4. doi: 10.5581/1516-8484.20110028. PMID: 23284255; PMCID: PMC3520632. https://doi.org/10.5581/1516-8484.20110028
4. Kajoba D, Egesa WI, Muyombya S, Ortiz YA, Nduwimana M, Ndeezi G. Prevalence and Factors Associated with Iron Deficiency Anaemia among Children Aged 6-23 Months in Southwestern Uganda. Int J Pediatr. 2024 Mar 4;2024:6663774. Doi: 10.1155/2024/6663774. PMID: 38469566; PMCID: PMC10927344. https://doi.org/10.1155/2024/6663774
5. Tsegaw H, Yimam M, Nureye D, Woldeselassie W, Hambisa S. Predictors of Treatment Outcomes among Pediatric Patients Hospitalized with Pneumonia in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. Adv Pharmacol Pharm Sci. 2021 Apr 20;2021:6690622. Doi: 10.1155/2021/6690622. PMID: 33987540; PMCID: PMC8079214. https://doi.org/10.1155/2021/6690622
6. Bhurtel R, Pokhrel RP, Kalakheti B. Acute Respiratory Infections among Under-five Children Admitted in a Tertiary Hospital of Nepal: A Descriptive Cross-sectional Study. JNMA J Nepal Med Assoc. 2022 Jan 15;60(245):17-21. doi: 10.31729/jnma.6889. PMID: 35199677; PMCID: PMC9157669. https://doi.org/10.31729/jnma.6889
7. Mghanga FP, Genge CM, Yeyeye L, Twalib Z, Kibopile W, Rutalemba FJ, et al. Magnitude, Severity, and Morphological Types of Anemia in Hospitalized Children Under the Age of Five in Southern Tanzania. Cureus. 2017 Jul 21;9(7):e1499. doi: 10.7759/cureus 1499. PMID: 28948119; PMCID: PMC5608490. https://doi.org/10.7759/cureus.1499
8. Zhang Q, Guo Z, Bai Z, MacDonald NE. A 4-year prospective study to determine risk factors for severe community-acquired pneumonia in children in southern China. Pediatr Pulmonol. 2013 Apr;48(4):390-7. doi: 10.1002/ppul.22608. Epub 2012 Jul 6. PMID: 22778084; PMCID: PMC7168025. https://doi.org/10.1002/ppul.22608
9. B K RK, Shrestha S, Adhikari S, Maharjan S. Pneumonia among Children Admitted to the Department of Medicine in a Tertiary Care Centre: A Descriptive Cross-sectional Study. JNMA J Nepal Med Assoc. 2022 Sep 1;60(253):785-788. doi: 10.31729/jnma.7859. PMID: 36705121; PMCID: PMC9794941. https://doi.org/10.31729/jnma.7859
10. Dinku H, Amare D, Mulatu S, Abate MD. Predictors of prolonged hospitalization among children aged 2-59 months with severe community-acquired pneumonia in public hospitals of Benishangul-Gumuz Region, Ethiopia: a multicenter retrospective follow-up study. Front Pediatr. 2023 Jul 6;11:1189155. Doi: 10.3389/fped 2023.1189155. PMID: 37484762; PMCID: PMC10357288. https://doi.org/10.3389/fped.2023.1189155
11. Mwananyanda L, Thea DM, Chipeta J, Kwenda G, Mulindwa JM, Mwenechanya M, et al. The Etiology of Pneumonia in Zambian Children: Findings From the Pneumonia Etiology Research for Child Health (PERCH) Study. Pediatr Infect Dis J. 2021 Sep 1;40(9S): S40-S49. doi: 10.1097/INF.0000000000002652. PMID: 34448743; PMCID: PMC8448410. https://doi.org/10.1097/INF.0000000000002652
12. Dinakara N, Deshapande VB, Kartheeka MG, Revanna R, Meda P, Reddy ARS, et al. Relationship between the severity of pneumonia with anemia and its outcome in children younger than 10 years who were admitted to the PICU in a tertiary care centre. International Journal of Pediatrics and Neonatology. 2024;6(2):88-91. https://doi.org/10.33545/26648350.2024.v6.i2b.87

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 9 (2025): September 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i9.2016
Original Article

PUBLISHER DETAILS.

Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
(ISSN 3006-1059) Print
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256 775 434 261
Location: Scholar's Summit Nakigalala, P. O. Box 701432, Entebbe Uganda, East Africa