The Relationship Between Nutritional Status and The Incidence of Pneumonia in Toddlers at RS Royal Prima

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Abstract.
Pneumonia is a type of infectious disease that attacks the lower part of the respiratory system and is one of the leading causes of death in children. One factor that increases the likelihood of children getting pneumonia is their nutritional status. The purpose of this study is to determine the relationship between nutritional status and the incidence of pneumonia in toddlers at RS Royal Prima Medan. The research design is Analytical Observational Quantitative with a Cross Sectional approach and uses the Chi-square statistical test. Data collection was carried out in October 2025 at the Medical Records of RS Royal Prima Medan. The total sample of this study was 167 toddlers who met the Inclusion and Exclusion criteria. The indicators used in this study were Age, Gender, and Nutritional Status. The study results show a p-value (0.020) <0.05, indicating a relationship between Age and the incidence of Pneumonia, and a p-value (0.000) <0.05, indicating a relationship between Gender and the incidence of Pneumonia. The p-value (0.016) <0.05 indicates a relationship between Nutritional Status and the occurrence of Pneumonia. The conclusion of this study is that there is a significant relationship between Age, Gender, and Nutritional Status and the occurrence of Pneumonia in toddlers at Royal Prima Hospital Medan.
Keywords: *Data Analysis; Descriptive Research; Population Sampling; Quantitative Method and Research Instrument.*

I. INTRODUCTION

Pneumonia remains a leading cause of morbidity and mortality among children under five globally, particularly affecting the lower respiratory tract and causing significant clinical burdens (Faisal et al., 2024; Liu et al., 2022). The syndrome results from bacterial, viral, or fungal infections filling the alveoli with fluid or pus, severely impacting breathing and oxygen exchange. According to the World Health Organization (2021), pneumonia accounted for approximately 15% of all deaths in children under five, emphasizing its critical public health impact especially in low and middle-income countries such as Indonesia, where nearly 19,000 children died from pneumonia in 2019 (WHO, 2021; Faisal et al., 2024). These alarming statistics highlight the urgent need for focused studies on the determinants influencing pediatric pneumonia occurrence.Multiple risk factors contribute to pneumonia vulnerability, including malnutrition, low birth weight, incomplete immunization, inadequate breastfeeding, and environmental exposures like air pollution and tobacco smoke (Suci, 2020; Smith et al., 2023).

Nutrition status plays a pivotal role by modulating immune defense capacity: undernourished children have compromised immunity, increasing risk and severity of respiratory infections (Subandi, 2020; Cahyanto et al., 2021). Conversely, good nutritional status supports optimal growth, cognitive development, and robust immune responses (Rusdiarti, 2019; Kinyoki et al., 2022). Despite recognition of nutrition as a determinant, prior studies in Indonesia focusing on nutrition status correlated with pneumonia incidence are limited and often methodologically varied, necessitating further rigorous analysis to inform clinical practice and public health interventions.This study aims to analyze the relationship between nutritional status and pneumonia incidence in children under five attending RS Royal Prima, Medan, using a cross-sectional analytic design. Understanding this association is vital to tailor nutritional and preventive strategies reducing pneumonia morbidity. The research addresses gaps in localized evidence, provides updated epidemiological data post-2020, and integrates demographic variables such as age and sex to enrich clinical insights, thus

offering valuable contributions to Indonesian pediatric respiratory health literature (Rajendra et al., 2025; Sangadji et al., 2022).

II. METHODS

The research titled Hubungan Status Gizi Dengan Kejadian Pneumonia Pada Anak Balita Di Rs Royal Prima examines the relationship between nutritional status and the incidence of pneumonia in young children at Royal Prima Hospital. Pneumonia, a serious infectious disease affecting the lower respiratory tract, is a leading cause of mortality among children under five globally (Faisal et al., 2024). Nutritional status, determined by the balance of nutrient intake and utilization, influences the immune system and susceptibility to infections like pneumonia (Cahyanto et al., 2021; Subandi, 2020). This necessitates a comprehensive study to explore the correlation between nutritional conditions and pneumonia incidence in this vulnerable population.This study employs a quantitative observational analytic design with a cross-sectional approach, following the methodology outlined by Adiputra et al. (2021) and supported by Sugiyono (2021) on research design frameworks. Data collection was performed through a retrospective review of medical records at Royal Prima Hospital in Medan during October 2025. The chosen sample comprised 167 children under five years, selected by total sampling technique, ensuring all subjects meeting inclusion criteria were analyzed (Sudaryono, 2022).

The study focuses on key variables including age, sex, and nutritional status, consistent with previous research parameters (Rajendra et al., 2025; Sangadji et al., 2022).For data analysis, demographic and clinical variables were presented using descriptive statistics such as frequency distributions for age, sex, and nutritional status categories. Bivariate analysis employed Chi-square testing to identify significant associations between nutritional status and pneumonia incidence, supplementing with Fisher's Exact Test where appropriate for small sample sizes (Cresswell, 2022). The statistical significance threshold was set at $p < 0.05$, based on standards in epidemiological studies (Faisal et al., 2024).The procedure involved systematic extraction of relevant variables from patient medical records, followed by tabulation and statistical testing using standard software tools. This approach aligns with best practices in health research data management as discussed in Emzir (2023) and Sugiyono (2021), supporting validity and reliability in observational study contexts.Previous research substantiates the significant impact of nutritional status on pneumonia risk, emphasizing early identification and intervention to improve child health outcomes (Subandi, 2020; Cahyanto et al., 2021). The current study contributes additional empirical evidence within the Indonesian healthcare setting, reinforcing the need for integrated nutritional screening in pediatric pneumonia management. These findings extend the body of knowledge supported by Rajendra et al. (2025) and Sangadji et al. (2022) and align with global health priorities underscored by WHO reports.

III. RESULT AND DISCUSSION

Univariate Analysis

Table 1. Frequency Distribution Based on Age

Age group	Amount	Persentage
0 – 2 years	88	52.7%
2 – 3 years	30	18.0%
3 – 5 years	49	29.3%
Total	167	100%

Table 1 shows that the age group 0–2 years has 88 patients with a percentage of 52.7%, the age group 2–3 years has 30 patients with a percentage of 18.0%, and the age group 3–5 years has 49 patients with a percentage of 29.3%.

Table 2. Frequency Distribution Based on Gender

gender	Amount	Persentage
Male	94	56.3%
Famale	73	43.7%
Total	167	100%

Table 2 shows that for the male gender group there are 94 patients with a percentage of 56.3%, and for the female gender group there are 73 patients with a percentage of 43.7%.

Table 3. Frequency Distribution Based on Nutritional Status

Nutritional Status	Amount	Persentage
Severely Malnourished	22	13.2%
Malnutrition	21	12.6%
Normal nutrition	82	49.1%
Risk of Overnutrition	42	25.1%
Total	167	100%

Table 3 shows that for the Very Poor Nutritional Status there were 22 patients with a percentage of 13.2%, for Poor Nutritional Status there were 21 patients with a percentage of 12.6%, for Normal Nutritional Status there were 82 patients with a percentage of 49.1%, and for At Risk of Overnutrition Status there were 42 patients with a percentage of 25.1%.

Bivariate Analysis

Table 4 . Relationship Between Age and Incidence of Pneumonia

Age	Diagnosis		Total	P-*value*
	Pneu	Non Pneu		
0 – 2 Years	78 (88.6%)	10 (11.4%)	88 (100.0%)	0.020
2 – 3 Years	20 (66.7%)	10 (33.3%)	30 (100.0%)	
3 – 5 Years	38 (77.6%)	11 (22.4%)	49 (100.0%)	
Total	136 (81.4)	31 (18.6%)	167 (100.0%)	

There were pediatric patients diagnosed with pneumonia in the age group 0–2 years totaling 78 patients with a percentage of 88.6%, ages 2–3 years totaling 20 patients with a percentage of 66.7%, and ages 3–5 years totaling 38 patients with a percentage of 77.6%. The analysis using the Chi-Square test obtained a p-value of 0.020, indicating a significant relationship between age and the incidence of pneumonia in children at Royal Prima Ayahanda Hospital. This finding is consistent with the study by Andi Hafiz Rajendra, Muhammad Buchori, Abdillah Iskandar (2025) regarding the Relationship Between Age, Gender, Nutritional Status, and Immunization Status with Pneumonia Incidence in Children at RSUD Inche Abdoel Moeis Samarinda (Rajendra et al., 2025), which, based on a cross-sectional method, showed a significant relationship between age with p-value = 0.022 ($p < 0.05$) and pneumonia incidence in children, with 23 children aged 0–12 months (25.3%) and 23 children aged 12–60 months (25.3%).

Table 5. Relationship Between Gender and the Incidence of Pneumonia

Age	Diagnosis		Total	P-*value*
	Pneu	Non Pneu		
Male	86 (91.5%)	8 (8.5%)	94 (100.0%)	0.000
Famale	50 (68.5%)	23 (31.5%)	73 (100.0%)	
Total	136 (81.4%)	31 (18.6%)	167 (100.0%)	

There were male pediatric patients diagnosed with pneumonia totaling 86 patients with a percentage of 91.5%, and female pediatric patients totaling 50 patients with a percentage of 68.5%. Pediatric patients diagnosed as non-pneumonia by gender included 8 male patients with a percentage of 8.5%, and 23 female patients with a percentage of 31.5%.The analysis using the Chi-Square test yielded a p-value of 0.000, indicating a significant relationship between gender and the incidence of pneumonia in children at Royal Prima Ayahanda Hospital.This finding is consistent with the study by Namira Wadjir Sangadji, Vernanda, Keumala, and Erna (2022) regarding the Relationship Between Gender, Immunization Status, and Nutritional Status with Pneumonia Incidence in Children (0–59 months) at Puskesmas Cibodasari in 2021 (Sangadji et al., 2022). The bivariate statistical test using Chi-Square showed a significant association between gender with a p-value of 0.027 ($p < 0.05$) and pneumonia incidence in children, with 14 male children (56%) and 11 female children (44%) diagnosed with pneumonia.

Table 6. Relationship Between Nutritional Status and Incidence of Pneumonia

Nutritional Status	Diagnosis		Total	P-*value*
	Pneu	Non Pneu		

Severely Malnourished	22 (16.2%)	0 (0.0%)	22 (100.0%)	
Malnutrition	20 (14.7%)	1 (3.2%)	21 (100.0%)	
Normal nutrition	62 (45.6%)	20 (64.5%)	82 (100.0%)	0.016
Risk of Overnutrition	32 (23.5%)	10 (32.3%)	42 (100.0%)	
	136 (81.4%)	31 (18.6%)	167 (100.0%)	

There were pediatric patients diagnosed with pneumonia who had a Very Poor Nutritional Status totaling 22 patients with a percentage of 16.2%, Poor Nutritional Status totaling 20 patients with a percentage of 14.7%, Normal Nutritional Status totaling 62 patients with a percentage of 45.6%, and Risk of Overnutrition totaling 32 patients with a percentage of 23.5%. Pediatric patients diagnosed as Non-Pneumonia with Very Poor Nutritional Status amounted to 0 patients (0.0%), Poor Nutritional Status to 1 patient (3.2%), Normal Nutritional Status to 20 patients (64.5%), and Risk of Overnutrition to 10 patients (32.3%). The analysis using the Chi-Square test yielded a p-value of 0.016, indicating a significant relationship between Nutritional Status and the incidence of pneumonia in children at Royal Prima Ayahanda Hospital.This finding aligns with the study by Andi Hafiz Rajendra, Muhammad Buchori, Abdillah Iskandar (2025) concerning the Relationship Between Age, Gender, Nutritional Status, and Immunization Status With Pneumonia Incidence in Children at RSUD Inche Abdoel Moeis Samarinda (Rajendra et al., 2025), which, based on a cross-sectional method, showed a significant relationship between Nutritional Status with a p-value of 0.042 and pneumonia incidence in children. The number of children with Poor Nutritional Status was 24 (26.4%) and those with Good Nutritional Status were 22 (24.2%).

IV. CONCLUSION

This study found significant associations between nutritional status, age, gender, and the incidence of pneumonia in children under five at Royal Prima Ayahanda Hospital. Children aged 0–2 years showed the highest pneumonia prevalence, emphasizing the vulnerability of infants and toddlers to respiratory infections. Male children exhibited a higher incidence of pneumonia than females, suggesting possible biological or environmental factors influencing susceptibility. Nutritional status also played a critical role; children with severe or moderate malnutrition were more likely to develop pneumonia compared to those with normal or overnutrition status. These findings align with previous research in Indonesian and global contexts, reinforcing the importance of integrating nutritional assessment and targeted interventions into pediatric pneumonia prevention programs. The statistically significant p-values from Chi-Square analyses confirm the robustness of these associations and support public health strategies to mitigate pneumonia burden through early nutritional support and gender-specific health education.

Despite these valuable insights, the study has limitations that should be addressed in future research. The retrospective cross-sectional design restricts causal inference, and reliance on medical records may introduce data completeness and accuracy issues. The sample size, though sufficient for statistical analysis, was limited to patients in a single hospital, which may affect the generalizability of the results to wider populations. Future studies could adopt prospective longitudinal designs with larger, diverse cohorts to better elucidate temporal relationships and explore additional factors such as immunization status, environmental exposures, and socioeconomic determinants. Practically, this research underscores the need for healthcare providers to prioritize early nutritional screening and intervention in pediatric care, particularly for high-risk groups identified by age and gender. Implementing comprehensive nutrition and immunization programs, complemented by community education, can contribute to reducing pneumonia incidence and improving child health outcomes in Indonesia and similar settings.

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