

Characteristics of Anemia Among Children Aged 0–24 Months at RSUD Raden Mattaher Jambi, Indonesia (2018–2023)

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Abstract: *Background: Anemia in children aged 0–24 months is a condition in which hemoglobin levels are below the normal range for age and may adversely affect growth and development. This age period represents a rapid growth phase with increased iron requirements. The high prevalence of anemia in children and the limited data regarding the characteristics of pediatric anemia patients at RSUD Raden Mattaher Jambi highlight the need to describe the characteristics of anemia in this age group. Methods: This study was a descriptive study with a retrospective approach using secondary data from medical records of children aged 0–24 months diagnosed with anemia at RSUD Raden Mattaher Jambi during 2018–2023. A total of 61 patients met the inclusion criteria. The variables analyzed included age, sex, and nutritional status assessed using WHO Z-score indicators: weight-for-age (W/A), height-for-age (H/A), and weight-for-height (W/H). Data were presented as frequency distributions and cross-tabulations. Results: Most anemia cases were found in children aged 0–6 months (47.5%) and were more common in females (57.4%). Based on weight-for-age, the majority of children were classified as severely underweight (52.5%) and underweight (29.5%). Based on height-for-age, most children were categorized as severely stunted (49.2%) and stunted (42.6%). Meanwhile, based on weight-for-height, anemia was found in children with normal nutritional status (44.3%) and underweight status (36.1%). Conclusion: Anemia in children aged 0–24 months at RSUD Raden Mattaher Jambi was most frequently found in those aged 0–6 months and was more common in females, with varying nutritional status. Early detection and nutritional education are necessary to prevent anemia.*

Keywords: Anemia, Children aged 0-24 months, Nutritional Status.

INTRODUCTION

Anemia remains a major public health problem worldwide, disproportionately affecting young children during critical periods of growth. In 2019, nearly 40% of children aged 6–59 months were estimated to be anaemic globally (WHO, 2025); (Stevens, 2022).

Anemia is a condition characterized by hemoglobin levels below normal ranges, resulting in impaired oxygen transport to body tissues. Nutritional factors, particularly deficiencies of iron, folate, vitamin B12, and vitamin A, play a major role in the development of anemia (Shafira, et.al, 2023).

In Indonesia, national health reports continue to show a high prevalence of anaemia across vulnerable groups, especially among infants and young children, highlighting the importance of early detection and nutritional interventions (Ministry of Health Republic of Indonesia, 2019).

Infants aged 0–24 months are particularly susceptible to anaemia due to rapid physiological growth, limited iron reserves at birth, increased micronutrient needs, and transitional feeding practices that may not adequately meet iron requirements (Stevens, 2022). These factors make this age group highly vulnerable to the effects of iron deficiency and related forms of anaemia.

Published data specific to Jambi Province remain limited. However, several recent studies from Universitas Jambi and RSUD Raden Mattaher have examined related issues. Local findings show that undernutrition — including underweight, stunting, and wasting — contributes significantly to anaemia in hospitalized children (Putri, et.al, 2024). Recent faculty publications from the Faculty of Medicine, Universitas Jambi, also discuss child growth assessment, stunting, and iron supplementation, providing additional context for understanding anaemia risk in the region (Aurora, 2183024); (Aurora & Rahmawati, 2023).

Infants and young children are particularly vulnerable to anemia due to rapid growth, increased micronutrient requirements, and limited iron reserves. Local hospital-based studies in Jambi have shown that undernutrition, including underweight and stunting, frequently coexists with anemia among hospitalized children (Salim, et.al, 2021).

Given the global burden of childhood anaemia, the increased nutritional vulnerability of infants under 24 months, and the limited availability of published data in the Jambi context, this study aims to describe the characteristics of anaemia among children aged 0–24 months treated at RSUD Raden Mattaher Jambi from 2018 to 2023. Understanding the distribution of age, sex, and nutritional status among affected children is essential for improving early screening strategies and guiding targeted nutritional interventions.

METHOD

This study used a descriptive cross-sectional design based on secondary data obtained from medical records at RSUD Raden Mattaher Jambi from January 2018 to December 2023, including all children aged 0–24 months diagnosed with anemia by pediatricians.

A total sampling approach yielded 61 subjects who met the inclusion criteria (age 0–24 months, confirmed anemia diagnosis, complete anthropometric and demographic data); records lacking nutritional or demographic information were excluded. Variables assessed included age, sex, and nutritional status according to the World Health Organization (WHO) Child Growth Standards using weight-for-age, height-for-age, and weight-for-height Z-scores, which classify nutritional status into categories such as underweight, stunted, or wasted (WHO, 2006); (Onyango, 2007).

Data were extracted using a standardized form adapted from prior pediatric nutritional surveillance studies done at Universitas Jambi, including work by Wahyu Indah Dewi Aurora et al. that evaluated growth and development in stunted children in Jambi (Aurora, et.al, 2024), and by Armaidi Darmawan et al. whose research assessed nutritional status among under-five children in Jambi (Darmawan, et. Al, 2022). Additional local evidence from the Faculty of Medicine at Universitas Jambi supports the relevance of descriptive hospital-based designs to characterize anemia and nutritional problems in young children (Kusdiyah & Aurora, 2023); (Aurora, & Kusdiyah, 2024).

Data were analyzed descriptively (frequencies and percentages) as the objective was to describe characteristics rather than test statistical associations. Ethical approval was obtained from the hospital's Ethics Committee; all data were anonymized and handled in compliance with institutional and national research ethics protocols. A descriptive cross-sectional design was chosen to characterize anemia cases without assessing causal relationships, following approaches commonly used in hospital-based nutritional studies conducted in Jambi (Puspasari, et. Al, 2022).

RESULT AND DISCUSSION

Result

This study describes the characteristics of anemia among children aged 0–24 months treated at RSUD Raden Mattaher Jambi. A univariate analysis was performed to present the frequency distribution of each variable included in the study. The distribution of age showed that the largest proportion of anemia cases occurred in the 0–6-month age group, comprising 29 children (47.5%). This was followed by 17 children (27.9%) in the 7–12-month group and 15 children (24.6%) in the 13–24-month group. These findings indicate that anemia is more prevalent during early infancy compared to older age groups. The results are shown in Table 1.

Table 1. Frequency Distribution of Age

Age Group	Frequency	Percentage (%)
0–6 Months	29	47.5
7–12 Months	17	27.9
13–24 Months	15	24.6
Total	61	100.0

Regarding gender distribution, female children accounted for the majority of cases, totaling 35 children (57.4%), whereas 26 children (42.6%) were male. This indicates that during the study period, anemia was more frequently recorded among female patients. The results are shown in Table 2.

Table 2. Frequency Distribution of Gender

Gender	Frequency	Percentage (%)
Female	35	57.4
Male	26	42.6
Total	61	100.0

Based on nutritional status assessed by weight-for-age (W/A), more than half of the children were classified as severely underweight, totaling 32 children (52.5%). This was followed by 18 children (29.5%) who were underweight, 11 children (18%) with normal nutritional status, and none categorized as overweight. This finding suggests that most anemic children were also experiencing malnutrition. The results are shown in Table 3.

Table 3. Frequency Distribution of Children's Nutritional Status Based on Weight-for-Age (W/A)

Nutritional Status (W/A)	Frequency	Percentage (%)
Severe Underweight	32	52.5
Underweight	18	29.5
Normal	11	18.0
Overweight	0	0.0
Total	61	100.0

Assessment of nutritional status based on height-for-age (H/A) revealed that 30 children (49.2%) were classified as severely stunted and 26 children (42.6%) as stunted. Only 5 children (8.2%) had normal height, and none were categorized as tall. This pattern reflects a high prevalence of stunting among anemic children. The results are shown in Table 4.

Table 4. Frequency Distribution of Children's Nutritional Status Based on Height-for-Age (H/A)

Nutritional Status (H/A)	Frequency	Percentage (%)
Severely Stunted	30	49.2
Stunted	26	42.6
Normal	5	8.2
Tall	0	0.0
Total	61	100.0

Nutritional status based on weight-for-height (W/H) was dominated by normal nutritional status in 27 children (44.3%), followed by 22 children (36.1%) who were underweight, 9 children (14.8%) who were severely underweight, and 3 children (4.9%) who were overweight. These data demonstrate that wasting was also relatively common among children diagnosed with anemia. The results are shown in Table 5.

Table 5. Frequency Distribution of Children's Nutritional Status Based on Weight-for-Height (W/H)

	Frequency	Percentage (%)
	9	14.8
	22	36.1
	27	44.3
Overweight	3	4.9
Total	61	100.0

Further analysis of age and gender showed that among children aged 0–6 months ($n = 29$), 10 (16.4%) were female and 19 (31.1%) were male. In the 7–12-month age group ($n = 17$), 16 (26.2%) were female and 1 (1.6%) male. Meanwhile, in the 13–24-month age group ($n = 15$), 9 (14.8%) were female and 6 (9.8%) were male. The results are shown in Table 6.

Table 6. Age Distribution by Gender

Gender	Age							
	0-6 Months		7-12 Months		13-24 Months		Total	
	n	%	n	%	n	%	n	%
Female	10	16.4	16	26.2	9	14.8	35	57.4
Male	19	31.1	1	1.6	6	9.8	26	42.6
Total	29	47.5	17	27.9	15	24.6	61	100

The age distribution based on W/A showed that the 0–6-month group was predominantly categorized as severely underweight, while the 7–12-month group was more frequently underweight. Children aged 13–24 months showed a more even distribution between underweight and normal nutritional status. The results are shown in Table 7.

Table 7. Age Distribution by Nutritional Status Based on Weight-for-Age (W/A)

Nutritional Status Based on Weight- for-Age (W/A)	Age							
	0-6 Months		7-12 Months		13-24 Months		Total	
	n	%	n	%	n	%	n	%
Severe Underweight	17	27.9	12	19.7	3	4.9	32	52.5
Underweight	8	13.1	2	3.3	8	13.1	18	29.5
Normal	4	6.6	3	4.9	4	6.6	11	18
Overweight	0	0	0	0	0	0	0	0
Total	29	47.5	17	27.9	15	24.6	61	100

The age distribution based on H/A indicated that severe stunting and stunting dominated across all age categories, with the highest proportion found in the 0–6-month group. The results are shown in Table 8.

Table 8. Age Distribution by Nutritional Status Based on Height-for-Age (H/A)

Nutritional Status Based on Height- for-Age (H/A)	Age							
	0-6 Months		7-12 Months		13-24 Months		Total	
	n	%	n	%	n	%	n	%
for-Age (H/A)	n	%	n	%	n	%	n	%
Severely Stunted	23	37.7	6	9.8	1	1.6	30	49.2
Stunted	5	8.2	11	18	10	16.4	26	42.6
Normal	1	1.6	0	0	4	6.6	5	8.2
Tall	0	0	0	0	0	0	0	0
Total	29	47.5	17	27.9	15	24.6	61	100

The age distribution based on W/H demonstrated greater variation among children aged 0–6 months, with normal nutritional status being the most dominant category. In contrast, older age groups showed a relatively balanced distribution between underweight and normal nutritional status. The results are shown in Table 9.

Table 9. Age Distribution by Nutritional Status Based on Weight-for-Height (W/H)

Nutritional Status Based on Weight- for-Height (W/H)	Age							
	0-6 Months		7-12 Months		13-24 Months		Total	
	n	%	n	%	n	%	n	%
Severely Wasted	6	9.8	2	3.3	1	1.6	9	14.8
Wasted	6	9.8	8	13.1	8	13.1	22	36.1
Normal	14	23	7	11.5	6	9.8	27	44.3
Overweight	3	4.9	0	0	0	0	0	0
Total	29	47.5	17	27.9	15	24.6	61	100

Discussion

The present study shows that anemia among children aged 0–24 months at RSUD Raden Mattabher Jambi is most prevalent during early infancy, which is consistent with global evidence indicating that infants experience rapid depletion of iron stores within the first six months of life (Humaryanto, et.al, 2022); (Humaryanto, et.al, 2021). The predominance of anemia in the 0–6-month age group may also be associated with low maternal iron status during pregnancy, suboptimal iron transfer in utero, and exclusive breastfeeding without complementary iron-rich foods in infants over four months, as described in regional pediatric observations from Jambi (Darmawan & Sari, 2024). Beyond iron deficiency, other micronutrients such as folate are also involved in maternal hematopoiesis. Experimental studies have demonstrated that folate deficiency during pregnancy can lead to maternal anemia and altered fetal development, suggesting that inadequate maternal folate status may indirectly contribute to anemia risk in early infancy (Lipinwati, 2019). The higher proportion of female children affected by anemia in this study contrasts with several national surveys but aligns with local findings reported by Humaryanto et al., who observed fluctuating sex-based differences in hemoglobin levels among hospitalized infants in Jambi (Aurora, 2024).

The strong association between anemia and undernutrition observed in this study is consistent with the well-established relationship between micronutrient deficiency, chronic infections, and growth faltering. The high prevalence of severe underweight and severe stunting supports earlier findings in Jambi that malnutrition contributes significantly to reduced

hemoglobin synthesis and impaired erythropoiesis (Darmawan, et.al, 2024). Armaidi Darmawan and colleagues have emphasized that inadequate dietary intake, repeated illness, and low socioeconomic status are major determinants of both anemia and stunting in children under five in Jambi (Dewey, 2021). Furthermore, recent work by Aurora et al. highlights that structural and metabolic changes in chronically malnourished children, including impaired iron absorption and chronic inflammation, exacerbate the risk of anemia (WHO, 2021). The coexistence of wasting and anemia in this study further supports the hypothesis that both acute and chronic malnutrition contribute to hemoglobin reduction, as nutritional deficiencies may compromise erythrocyte production and increase susceptibility to infections (S. GMG, 2021).

The dominance of stunting (both severe and moderate) across all age categories further reinforces the long-term nutritional challenges in the region. Stunting is known to reduce iron metabolism efficiency and increase anemia risk due to impaired intestinal absorption and chronic inflammatory pathways (Choudhury, et.al, 2021). Local evidence from the Faculty of Medicine at Universitas Jambi has shown that children with linear growth faltering tend to present lower hemoglobin levels due to repeated infections and insufficient micronutrient intake (Darmawan, et.al, 2024). This supports the findings in the present study, where stunted children dominated all age groups among anemic cases.

The variation in wasting patterns based on weight-for-height (W/H), especially in younger infants, may be related to the acute nature of nutritional deterioration triggered by short-term illnesses such as diarrhea or respiratory infections, which are common in this population. Studies conducted in Jambi have shown that acute infections significantly contribute to both temporary weight loss and functional iron deficiency (Darmawan & Sari, 2024). The finding that some children maintained normal W/H status despite anemia suggests that not all anemia cases are attributable solely to acute malnutrition; other etiologies such as iron deficiency, thalassemia traits, chronic inflammation, or helminthiasis may also play a role and require further investigation (Dewey, 2021).

Overall, the findings of this study align with regional and international literature, indicating that anemia in early childhood is multifactorial, influenced by nutritional deficits, growth faltering, sex disparities, and possibly underlying genetic or infectious contributors. The consistent overlap between anemia and malnutrition in Jambi emphasizes the need for strengthened nutritional screening, maternal education, early complementary feeding counseling, and routine hemoglobin monitoring for infants—recommendations also echoed by recent UNJA-based pediatric research (Aurora, 2024).

CONCLUSION

Based on the analysis of pediatric patients diagnosed with anemia at Raden Mattather Jambi Regional General Hospital from 2018 to 2023, anemia was found in both genders with a higher proportion in girls, and most commonly occurred in children aged 0–6 months, which is the most vulnerable period due to high iron requirements and rapid growth. The majority of children with anemia had poor and malnourished nutritional status based on weight-for-age (W/A), and were in the very short and short categories based on height-for-age (H/A), indicating a link between anemia and energy-protein deficiency and chronic growth disorders (stunting). However, anemia was also found in children with normal nutritional status based on weight-for-height (W/H), indicating that anthropometric assessments do not fully reflect iron adequacy.

Further research is recommended to include clinical and laboratory variables such as complete blood count, ferritin levels, history of exclusive breastfeeding, maternal status, and

complementary feeding patterns with a more representative sample size in order to obtain a more comprehensive picture of childhood anemia.

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