



Laboratory Journal of Infectious Diseases

Homepage: <https://jurnal.poltekkeskupang.ac.id/index.php/LJID>



Original Article

Correlation of Anemia Status in Mothers and Stunted Toddlers

Florida Ester Pailau ¹, Michael Bhadi Bia ², Supriati Wila Djami ³, Ni Ketut Yuliana Sari ⁴, Atun Farihatun ⁵

¹Medical Laboratory Technology Study Program, Poltekkes Kemenkes Kupang, Kupang City, Indonesia

²Medical Laboratory Technology Study Program, Poltekkes Kemenkes Kupang, Kupang City, Indonesia

³Medical Laboratory Technology Study Program, Poltekkes Kemenkes Kupang, Kupang City, Indonesia

⁴Medical Laboratory Technology Study Program, Poltekkes Kemenkes Kupang, Kupang City, Indonesia

⁵Medical Laboratory Technology Study Program, STIKes Muhammadiyah Ciamis, Ciamis City, Indonesia

ARTICLE INFO

Article history:

Received 30 October 2025

Revised 15 November 2025

Accepted 02 Desember 2025

Keywords:

Anemia

Toddlers

Stunting

Corresponding author:

Atun Farihatun

Ciamis City

atunfarihatunmucis@gmail.com

Doi:

<https://jurnal.poltekkeskupang.ac.id/index.php/LJID/article/view/2366>

ABSTRACT

Postpartum anemia remains a public health concern due to its potential impact on maternal and child health. This study aimed to analyze the correlation between maternal anemia status and anemia among stunted toddlers. An analytical observational study with a cross-sectional design was conducted at Pustu Noelbaki. The study subjects were mothers and their stunted toddlers selected using purposive sampling. A total of 40 participants were included, consisting of 20 mothers and 20 stunted toddlers. Maternal and toddler anemia status were assessed and analyzed using statistical correlation testing with a significance level of $p < 0,05$. The results showed that 25% of mothers were anemic, while 55% of stunted toddlers had anemia. Statistical analysis demonstrated a p -value of 0,319 ($p > 0,05$), indicating no significant correlation between maternal anemia status and anemia among stunted toddlers. In conclusion, maternal anemia was not significantly associated with anemia in stunted toddlers in this study. Further research with larger sample sizes is recommended to better understand potential contributing factors.

Introduction

Anemia is a condition characterized by decreased hemoglobin (Hb) levels, hematocrit (Hct), and erythrocyte indices, resulting from reduced red blood cell production or shortened red blood cell lifespan. Hemoglobin functions to transport oxygen throughout the body; therefore, low Hb levels can lead to fatigue, dizziness, shortness of breath, and, in severe cases, death. Iron and protein deficiencies are major contributors to anemia, particularly among women of reproductive age. Maternal anemia during pregnancy may reduce the supply of nutrients and oxygen to the fetus, potentially impairing fetal growth and increasing the risk of low birth weight and stunting (Tana & Banjuradja, 2018).

Stunting is defined as a height-for-age Z-score (HAZ) below -2 standard deviations according to standardized growth references. It typically begins during the first 1.000 days of life and may persist until five years of age. Stunting is associated with impaired cognitive and motor development in the short term, as well as reduced productivity and immune function in the long term (Putri & Dari, 2023; Choeron, 2023).

Citation:



© 2025 The Authors. Published xxx. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

According to the 2023 Indonesian Health Survey (SKI), the prevalence of anemia among women aged 15–24 years was 15,5%, 13,2% among those aged 25–34 years, and 14,6% among women aged 35–44 years. In contrast, anemia prevalence among toddlers was reported at 23,8%. In Nusa Tenggara Timur (NTT) Province, the prevalence of anemia among mothers was 6,9%, with higher rates observed among pregnant women aged 25–34 years (31,4%) and 35–44 years (39,4%) (Kemenkes BKPK, 2023).

The 2022 e-PPGBM report indicated that the prevalence of stunting in Indonesia was 21,6%, while in NTT it reached 15,7%, affecting 67.538 children. Kupang Regency is among the three districts with the highest stunting prevalence in NTT, at 16,2%, corresponding to 4.889 toddlers.

Maternal anemia has been identified as a potential risk factor for anemia and growth-related problems in children. Previous studies have reported an association between maternal anemia and anemia in children aged 6–59 months (Ntenda et al., 2018), as well as between anemia during pregnancy and anemia in infants aged 6–36 months (Fauzia, Wahyuntari, & Wahtini, 2021). In addition, maternal anemia during pregnancy has been linked to stunting (Widyaningrum & Romadhoni, 2018). However, evidence regarding the correlation between maternal anemia status and anemia among stunted toddlers remains limited, particularly in Nusa Tenggara Timur (NTT) Province.

Based on this background and the limited number of similar studies conducted in NTT, this research aims to analyze the correlation between maternal anemia status and anemia among stunted toddlers. The findings are expected to provide evidence-based information to support early prevention strategies for anemia among women and children.

Methods

This study employed an analytical observational design with a cross-sectional approach and was conducted at Pustu Noelbaki, Kupang Regency, Nusa Tenggara Timur, from April to May 2025. The study population consisted of mothers and their stunted toddlers who attended the health facility during the study period. The sample comprised 20 mother-child pairs, in which each participating mother corresponded to one stunted toddler, resulting in a total of 20 mothers and 20 toddlers ($n = 20$ pairs). Participants were selected using purposive sampling based on predefined inclusion and exclusion criteria. Mothers were eligible if they were the biological mothers of the stunted toddlers and provided informed consent, while toddlers were included if they were aged 0–59 months and classified as stunted. Respondents with incomplete data were excluded from the analysis.

Maternal anemia was defined as a hemoglobin (Hb) level of <12 g/dL for non-pregnant women according to World Health Organization criteria, while anemia in toddlers was defined as an Hb level of <11 g/dL for children aged 6–59 months. Hemoglobin levels were measured using a standard hematology analyzer at the ASA Kupang Clinical Laboratory. The hemoglobin reference ranges used to define non-anemia were 11,5–15,5 g/dL for children and 11,7–16,2 g/dL for mothers, with values below these ranges categorized as anemia. Stunting status was determined based on the height-for-age Z-score (HAZ) using the WHO Child Growth Standards, with HAZ <-2 standard deviations classified as stunted. Anthropometric measurements were performed using calibrated measuring equipment in accordance with standard procedures. Primary data included hemoglobin examination results and anthropometric measurements, while secondary data were obtained from medical records and the e-PPGBM system at the health facility.

Data were analyzed using SPSS software. Descriptive analysis was conducted to summarize respondent characteristics and the distribution of anemia status. The association between maternal anemia status and anemia among stunted toddlers was assessed using the Chi-square test, with Fisher's exact test applied when expected cell counts were less than five. Statistical significance was set at $p < 0,05$.

Results

This analysis was conducted to describe the distribution of anemia status among mothers and toddlers based on respondent characteristics. Table 1 presents the characteristics of the respondents. The results show that 4 mothers (20%) of reproductive age experienced anemia. In terms of educational background, 3 respondents (15%) had completed primary school. Additionally, 5 respondents (25%) were unemployed, and 4 respondents (20%) had three or more children (≥ 3).

Table 1. Frequency Distribution of Characteristics Based on Age, Education, Occupation, and Number of Children Against Maternal Anemia Status

Characteristic	Anemia Status					
	Anemia		Non-Anemia		Total	
Age	N	%	N	%	N	%
Fertile (20–35 years)	4	20	12	60	16	80
Less Fertile (<20, >35 years)	1	5	3	15	4	20
Total	5	25	15	75	20	100
Education						
Elementary School	3	15	4	20	7	35
Junior High School	2	10	5	25	7	35
Senior High School	0	0	6	30	6	30
Total	5	25	15	75	20	100
Occupation						
Working	0	0	0	0	0	0
Not Working	5	25	15	75	20	100
Total	5	25	15	75	20	100
Number of Children						
<3 children	1	5	6	30	7	35
≥3 children	4	20	9	45	13	65
Total	5	25	15	75	20	100

Based on Table 2, the characteristics of the toddler respondents indicate that most children aged <2 years experienced anemia, totaling 8 respondents (40%). In terms of sex, 6 respondents (30%) were male. Additionally, 11 respondents (55%) were classified as having short stature.

Table 2. Frequency Distribution of Characteristics Based on Age, Gender, and Height Regarding the Anemia Status of Stunted Toddlers

Characteristic	Anemia Status					
	Anemia		Non-Anemia		Total	
Age	N	%	N	%	N	%
<2 years	8	40	0	0	8	40
2 years	0	0	1	5	1	5
3 years	1	5	1	5	2	10
4 years	2	10	6	30	8	40
5 years	0	0	1	5	1	5
Total	11	55	9	45	20	100
Gender						
Male	6	30	4	20	10	50
Female	5	25	5	25	10	35
Total	11	55	9	45	20	100
Height						
Short	11	55	8	40	19	95
Very Short	0	0	1	5	1	100
Total	11	55	9	45	20	100

This analysis was conducted to examine the relationship between maternal anemia status and anemia among stunted toddlers. Based on Table 3, 4 mother-toddler pairs (20%) were both anemic, while 7 mothers (35%) who were not anemic had toddlers who experienced anemia. The statistical analysis yielded a *p*-value of 0,319 (>0,05); therefore, the null hypothesis (H_0) was accepted and the alternative hypothesis (H_a) was rejected. These results indicate that there was no significant relationship between maternal anemia status and anemia among stunted toddlers.

Table 3. Relationship between Maternal Anemia Status and Stunting

Table 3: Relationship between Maternal Anemia Status and Stunting							<i>p-value</i>
Mother	Stunted Toddlers						
	Anemia		Non-Anemia		Total		
	N	%	N	%	N	%	
Anemia	4	20	1	5	5	25	0,319
Not Anemic	7	35	8	40	15	75	
Total	11	55	9	45	20	100	

Discussion

Maternal Factors

In this study, maternal anemia was identified in 5 out of 20 mothers (25%). Most anemic mothers were within the reproductive age group of 20–35 years. Although this age range is considered biologically optimal for reproduction, anemia may still occur due to inadequate nutritional intake and increased iron requirements. This finding differs from that of Pasalina, Jurnal, & Ariadi (2019), who reported a lower prevalence of anemia among women of reproductive age. Differences in socioeconomic conditions and dietary patterns may explain this discrepancy.

Educational level also appeared to be associated with anemia status. Among the 20 mothers, anemia was more frequently observed in those with primary education (3 of 20 mothers; 15%) and secondary education (2 of 20 mothers; 10%). Lower educational attainment may limit knowledge regarding balanced nutrition and iron supplementation, which is consistent with findings reported by Edison (2019). In addition, anemia was more common among mothers with three or more children (≥ 3 children; 4 of 20 mothers; 20%), supporting previous research suggesting that repeated pregnancies without adequate nutritional recovery increase the risk of iron depletion (Riyani, Marianna, & Hijriyati, 2020). Although most mothers were not formally employed, household responsibilities and agricultural activities may still increase physical workload and iron requirements (Isnaini, Yuliaprida, & Pihahay, 2021).

Toddler Factors

Among the 20 stunted toddlers included in this study, 11 children (55%) were classified as anemic. Anemia was more prevalent among toddlers aged < 2 years (8 of 20 toddlers; 40%). This age represents a critical growth period characterized by rapid physical development and increased iron requirements. Inadequate complementary feeding practices and frequent infections, such as acute respiratory infections and diarrhea, may further contribute to anemia in this age group.

Male toddlers showed a slightly higher prevalence of anemia (6 of 20 toddlers; 30%) compared to female toddlers (5 of 20 toddlers; 25%). Previous studies suggest that differences in body composition and growth velocity may influence nutritional requirements (Ernawati, 2020; Faiqah, Ristrini, & Irmayani, 2018). All children included in this study were classified as stunted ($\text{HAZ} < -2 \text{ SD}$), and anemia was highly prevalent within this group, indicating that chronic nutritional deficits may coexist with micronutrient deficiencies.

Comparison with Previous Studies

The present study found no statistically significant association between maternal anemia status and anemia among stunted toddlers ($p = 0,319$). This finding is consistent with the study by Aryanto, Argadiredja, & Sakinah (2020), which reported no relationship between maternal hemoglobin levels and stunting. However, it contrasts with findings from Hastuty, Pahlawan, & Tambusai (2020), Ntenda et al. (2018), and Fauzia, Wahyuntari, & Wahtini (2021), who demonstrated associations between maternal anemia and anemia or growth-related problems in children.

The absence of a significant association in this study may be influenced by the multifactorial etiology of anemia in toddlers. Although maternal anemia during pregnancy may theoretically affect fetal iron stores and early growth, postnatal factors—such as dietary intake, frequency of infections, caregiving practices, and socioeconomic conditions—may play a more dominant role in determining anemia status during toddlerhood. Notably, 7 of 15 non-anemic mothers (35%) had toddlers who were anemic, suggesting that environmental and nutritional factors after birth may substantially contribute to the development of anemia in children (Nurmalasari, Anggunan, & Febriany, 2020).

Study Limitations

This study has several limitations. First, the sample size was relatively small (20 mother-child pairs), which may have reduced the statistical power of the analysis and limited the generalizability of the findings. Second, the cross-sectional study design does not allow for causal inference between maternal anemia status and anemia among stunted toddlers. Third, detailed information on dietary intake, infection history, and socioeconomic factors was not quantitatively analyzed as potential confounding variables.

Implications

Despite the absence of a statistically significant association, the high prevalence of anemia among stunted toddlers (55%) highlights an important public health concern. Therefore, prevention strategies should not be limited to addressing maternal anemia during pregnancy but should also emphasize postnatal nutritional monitoring, iron supplementation, infection control, and the strengthening of Posyandu-based growth surveillance. Future research involving larger sample sizes and multivariate analyses is recommended to better understand the complex interactions between maternal and child nutritional status.

Conclusions

Based on the research findings, it can be concluded that, according to maternal characteristics, most mothers who experienced anemia were of reproductive age, totaling 4 respondents (20%). In addition, 3 respondents (15%) had elementary school education, 5 respondents (25%) were unemployed, and 4 respondents (20%) had three or more children (≥ 3). Among toddlers, most anemic toddlers were < 2 years old, with 8 respondents (40%) experiencing anemia. Furthermore, 6 respondents (30%) were male, and 11 respondents (55%) were classified as having short stature. Based on the statistical analysis, a *p-value* of 0,319 ($> 0,05$) was obtained, indicating no significant relationship between maternal anemia status and anemia among stunted toddlers. However, toddlers of mothers who were not anemic were still found to be at risk of experiencing anemia.

Author contributions

FEP, MBB, SWD, NKYS and AF contributed to the study's concept and design. All authors participated in manuscript preparation. All authors have read and agreed to the published version of the manuscript.

Acknowledgements

The authors would like to express their gratitude to the Director of Poltekkes Kemenkes Kupang, the Head of the DIII Medical Laboratory Technology Study Program at Poltekkes Kemenkes Kupang, Head of Tarus Community Health Center Kupang Regency, Person in Charge of Noelbaki Sub-Health Center, Person in Charge of ASA Kupang Clinical Laboratory, and all respondents.

Funding

There is no specific funding for this study.

Ethical approval statement

The study received ethical approval from the Ethics Committee of Poltekkes Kemenkes Kupang with certificate number No.LB.02.03/1/0020/2025.

Conflicts of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Supplementary materials

No supplementary material available.

References

- Aryanto, M. A. W., Argadiredja, D. S., & Sakinah, R. K. (2020). Hubungan Kadar Hemoglobin Ibu Hamil Trimester Satu dengan Kejadian Stunting pada Balita di Kecamatan Conggeang Kabupaten Sumedang. *Jurnal Integrasi Kesehatan & Sains*, 2(1), 43-46. <https://doi.org/10.29313/jiks.v2i1.5635>
- Choeron, D. (2023). *Surveilans Gizi dan KIA melalui Pencatatan dan Pelaporan Gizi Berbasis Masyarakat (ePPGM)*. Retrieved from: <https://www.scribd.com/document/662820701/Surveilans-Gizi-eppgbm-2023-28-Juli-2023>
- Edison, E. (2019). Hubungan Tingkat Pendidikan dengan Kejadian Anemia pada Ibu Hamil. *Jurnal Jkft: Universitas Muhammadiyah Tangerang*, 4(2), 65-71. <http://dx.doi.org/10.31000/jkft.v4i2.2502>
- Ernawati, A. (2020). Gambaran Penyebab Balita Stunting di Desa Lokus Stunting Kabupaten Pati. *Jurnal Litbang: Media Informasi Penelitian, Pengembangan Dan IPTEK*, 16(2), 77-94.
- Faiqah, S., Ristrini, R., & Irmayani, I. (2018). Hubungan Usia, Jenis Kelamin dan Berat Badan Lahir dengan Kejadian Anemia pada Balita di Indonesia. *Buletin Penelitian Sistem Kesehatan*, 21(4), 281-289. <http://dx.doi.org/10.22435/hsr.v2li4.260>

- Fauzia, F. R., Wahyuntari, E., & Wahtini, S. (2021). Relationship between Maternal Anemia and the Incidence of Anemia in Infants Aged 6–36 Months: Hubungan Anemia pada Ibu Hamil dengan Anemia Bayi Usia 6–36 Bulan. *Jurnal Kebidanan Midwiferia*, 7(2), 93-102. <https://doi.org/10.21070/midwiferia.v7i2.1633>
- Hastuty, M., Pahlawan, U., & Tambusai, T. (2020). Hubungan Anemia Ibu Hamil dengan Kejadian Stunting pada Balita di UPTD Puskesmas Kampar Tahun 2018. *Jurnal Doppler*, 4(2), 112-116.
- Isnaini, Y. S., Yuliaprida, R., & Pihahay, P. (2021). Hubungan Usia, Paritas dan Pekerjaan terhadap Kejadian Anemia pada Ibu Hamil. *Nursing Arts*, 15(2). [10.36741/jna.v15i2.153](https://doi.org/10.36741/jna.v15i2.153)
- Kemenkes BKPK. (2023). *Survei Kesehatan Indonesia (SKI) 2023*. Kemenkes BKPK. Retrieved from: <https://www.badankebijakan.kemkes.go.id/hasil-ski-2023/>
- Ntenda, P. A., Nkoka, O., Bass, P., & Senghore, T. (2018). Maternal Anemia is a Potential Risk Factor for Anemia in Children Aged 6–59 Months in Southern Africa: a Multilevel Analysis. *BMC public health*, 18(1), 650. <https://doi.org/10.1186/s12889-018-5568-5>
- Nurmalasari, Y., Anggunan, A., & Febriany, T. W. (2020). Hubungan Tingkat Pendidikan Ibu dan Pendapatan Keluarga dengan Kejadian Stunting pada Anak Usia 6–59 Bulan. *Jurnal Kebidanan*, 6(2), 205-211. <https://doi.org/10.33024/jkm.v6i2.2409>
- Pasalina, P. E., Jurnal, Y. D., & Ariadi, A. (2019). Hubungan Indeks Massa Tubuh dengan Kejadian Anemia pada Wanita Usia Subur Pranikah. *Jurnal Ilmu Keperawatan dan Kebidanan*, 10(1), 12-20. <https://doi.org/10.26751/jikk.v10i1.584>
- Putri, S. K., & Dari, D. W. (2023). GEMES (Gerakan Masyarakat Cegah Stunting) di Posyandu Al-Munawaroh Desa Sungai Landai Kecamatan Mestong Kabupaten Muaro Jambi. *Jurnal Abdimas Kesehatan (JAK)*, 5(1), 44-49. <https://doi.org/10.36565/jak.v5i1.419>
- Riyani, R., Marianna, S., & Hijriyati, Y. (2020). Hubungan Antara Usia dan Paritas dengan Kejadian Anemia pada Ibu Hamil. *Binawan Student Journal*, 2(1), 178-184. <https://doi.org/10.54771/bsj.v2i1.105>
- Tana, L., & Banjuradja, I. (2018). Faktor yang Berperan terhadap Anemia pada Pekerja Perempuan Usia Produktif di Indonesia, Riset Kesehatan Dasar 2013. *Media Penelitian dan Pengembangan Kesehatan*, 28(1), 45-56. DOI: [10.22435/mpk.v28i1.7993.45-56](https://doi.org/10.22435/mpk.v28i1.7993.45-56)
- Widyaningrum, D. A., & Romadhoni, D. A. (2018). Riwayat Anemia Kehamilan dengan Kejadian Stunting pada Balita di Desa Ketandan Dagangan Madiun. *Medica Majapahit*, 10(2). <https://ejournal.stikesmajapahit.ac.id/index.php/MM/article/view/291>