

## Anemia of Pregnant Women and The Incidence of Stunting Among Children Aged 24-59 Months: A Case-Control Study in Indonesia

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### Abstract

**Background:** Stunting is a form of malnutrition that remains a global problem. Pregnant women require greater nutritional intake due to increased metabolic demands and fetal growth, including a higher requirement for iron. Poor maternal nutrition can lead to anemia, which disrupts the blood supply responsible for delivering nutrients and oxygen to the fetus, thereby causing developmental and growth impairments. This study aimed to analyze the relationship between maternal anemia during pregnancy and the incidence of stunting in children aged 24–59 months in families in Indonesia.

**Materials and Methods:** A case-control design with a retrospective approach was performed 144 cases (consisting of 72 in the case and 72 in the control group) employed stratified random sampling. Data on maternal anemia during pregnancy were obtained from the Maternal and Child Health (MCH) handbook. Meanwhile, anthropometric measurements of children were conducted using a digital scale and a digital microtoise. The data were analyzed using the Chi-square test to determine the relationship between variables.

**Results:** Mothers who experienced anemia in the case group were 43% more prevalent compared to the control group. The incidence of stunting was classified into two categories: 45.8% were categorized as stunted, and 52.2% as severely stunted. The results of the Chi-square analysis showed a significant relationship between maternal anemia during pregnancy and the incidence of stunting ( $p < 0.001$ ). In this study, mothers with a history of anemia during pregnancy were 4,7 times more likely to have stunted children (OR = 4.7; CI = 2.07–10.58).

**Conclusions:** This study indicated a relationship between maternal anemia during pregnancy and the incidence of stunting in children aged 24–59 months. Therefore, this study recommends that families be aware of the importance of maternal nutrition during pregnancy and the consumption of iron supplements in order to prevent stunting in children.

**Key Words:** Anemia; Family; Malnutrition; Pregnancy; Stunting.

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## 1- INTRODUCTION

Stunting is a condition of malnutrition that remains a global issue (1). According to the Conceptual Framework on the Determinants of Maternal and Child Nutrition, stunting in children is caused by both direct and indirect factors. Direct factors include maternal nutrition during pregnancy, feeding practices, and a history of infectious diseases, while indirect factors include Water, Sanitation, and Hygiene (WASH) (2). Factors that influence the nutrition and development of children include breastfeeding practices, complementary feeding (MP-ASI), employment, the mother's nutritional status during pregnancy, and the adequacy of maternal zinc and iron intake (3-5). According to the Indonesian Nutrition Status Survey, the prevalence of stunting in Indonesia reached 21.6% in 2022. At the provincial level, East Java recorded a prevalence of 19.2%. In Jember Regency, the prevalence of stunting reached 34.9%, indicating that the efforts are still not optimal in achieving the Sustainable Development Goals (SDGs) target to reduce malnutrition by 2030 (6-7).

Stunting can be effectively prevented starting from the prenatal period. Maternal nutrition during pregnancy serves as the primary source of nourishment for the growth and development of the embryo in early life (8). Inadequate maternal nutrition can result in anemia, which impairs the blood supply responsible for delivering essential nutrients and oxygen to the fetus, consequently disrupting fetal development and growth (9). According to data from the Ministry of Health, nearly half of pregnant women in Indonesia approximately 48.9% suffer from anemia, which adversely affects the growth and development of their children (10,11). Anemia during pregnancy is also associated with increased risks of maternal and infant mortality, low birth weight, preterm

delivery, and neurobehavioral deficits (12). The Maternal Role Attainment Theory by Ramona T. Mercer describes the process through which a woman transitions into the role of a mother. Within this framework, the mother acts as the primary caregiver responsible for meeting her child's nutritional needs (13-14). In addition, the family caregiving function reflects the family's role in maintaining the health of its members, including providing care for pregnant women experiencing anemia (15).

One of the primary approaches to addressing anemia in pregnant women is the provision of iron and folic acid (IFA) tablets. The government provides an iron supplementation program in which tablets are distributed for 90 days during pregnancy (16). According to preliminary data in Jember Regency, the number of pregnant women experiencing anemia during the fourth antenatal visit was 16 at Rambipuji, 103 at Ledokombo, and 115 at Sumberjambe. This indicates that many women still suffer from anemia during pregnancy, which can affect child growth. Accordingly, this study was conducted to analyze the relationship between maternal anemia during pregnancy and the incidence of stunting among children aged 24–59 months in Indonesia.

## 2- MATERIALS AND METHODS

### 2-1. Design

This research was conducted using a correlational quantitative design with a case-control study using a retrospective approach. The location of this research is in the working areas of three of public health centres in Indonesia conducted from February to March 2025.

### 2-2. Participant

The population of this study consist of children aged 24-59 months, totalling 144 children. The sampling in this study used stratified random sampling. The

population consisted of 72 case group participants and 72 control group participants, selected using stratified random sampling. Stratification was conducted twice, namely village and posyandu stratification.

Inclusion criteria for the case group were: 1) stunted children aged 24–59 months registered at the posyandu in the working areas of Rambipuji, Sumberjambe, and Ledokombo Health Centers, 2) stunted children aged 24–59 months cared for by their families, 3) mothers of stunted children aged 24–59 months who underwent hemoglobin checks during pregnancy with results recorded in the Maternal and Child Health (MCH) handbook, and 4) mothers who lived with the children. Inclusion criteria for the control group were: 1) non-stunted children aged 24–59 months registered in the working areas of the same health centers, 2) non-stunted children aged 24–59 months cared for by their families, 3) mothers of non-stunted children aged 24–59 months who underwent Hb checks during pregnancy with results recorded in the MCH Handbook or the Maternal Cohort Book, and 4) mothers who lived with the children. Exclusion criteria for both groups included: 1) stunted or healthy children aged 24–59 months with lower extremity deformities, 2) stunted or non-stunted children aged 24–59 months who were ill and unable to provide accurate data (e.g., fever, diarrhea), 3) children who had relocated, and 4) mothers who declined to participate in the study.

### 2-3. Data Collection Procedures

Quantitative data was obtained questionnaire and use anthropometric measurements. Data collection was conducted using a participant's characteristics questionnaire (sociodemographic), consisting of mother characteristics (age, age during pregnancy,

family size, number of children, educational background, occupation, and income) and children's characteristics (age, gender, weight, height, edema status, and history of exclusive breastfeeding). Maternal anemia history for each trimester was obtained from the MCH handbook. Anemia in pregnancy is classified by trimester: <11 g/dL in trimester 1 (0–12 weeks), <10.5 g/dL in trimester 2 (13–28 weeks), and <11 g/dL in trimester 3 (29–40 weeks).

The next measurement tool to assess the independent variable of stunting using a digital scale and microtoise. The results were classified as stunted and severely stunted based on the Child Anthropometric Standards of the Indonesian Ministry of Health, calculated using the WHO Anthro software. In this study, nutritional status was assessed using Height-for-Age (HAZ), Weight-for-Age (WAZ), Weight-for-Height (WHZ), and Body Mass Index-for-Age (BAZ).

Data collection began by meeting with the nutrition officers of Public Health Center Rambipuji, Sumberjambe, and Ledokombo of Indonesia. The researcher then coordinated with cadres and conducted home visits to the participants. The researcher explained the purpose of the study and requested the participants consent by providing an informed consent form.

To ensure the validity of the findings and minimize potential biases, specific control measures were integrated into the study design. Selection bias was minimized by employing a two-stage stratified random sampling method across villages and posyandu, alongside strict selection criteria that excluded children with physical deformities or acute temporary illnesses like diarrhea and fever to prevent inaccurate anthropometric data.

**Table-1.** Socio-demographic characteristics of participants, February–March 2025 (n = 144).

Variable	f (%)	Stunting				P-value
		Case (n=72)		Control (n=72)		
		n	f (%)	n	Total	
<b>MOTHER</b>						
Maternal Age at Pregnancy (f %)						
Hight Risk	16.7	12	22.2	16	28	0.400
Not Hight Risk	83.3	60	77.8	56	116	
Total	100	72	100	72	144	
Number of children (f %)						0.874
1	34.7	25	38.9	28	53	
2	45.8	33	43.1	31	64	
>2	19.4	14	18.1	13	27	
Total	100	72	100	72	144	
Education level (f %)						0.068
Elementary School	45.8	33	25.0	18	48	
Junior Hight School	22.2	16	26.4	19	35	
Senior Hight School	26.4	19	38.9	28	47	
Bachelor's	2.8	2	8.3	6	8	
No school	2.8	2	1.4	1	3	
Total	100	72	100	72	144	
Occupation (f %)						0.288
Housewife	94.4	68	87.5	63	131	
Labrorer	4.2	3	6.9	5	8	
Employe	1.4	1	5.6	4	5	
Total	100	72	100	72	141	
Marital status (f %)						0.649
Marry	95.8	69	97.2	70	139	
Divorce	4.2	3	2.8	2	5	
Total	100	72	100	72	144	
Family income (f %)						0.070
<regional minimum wage	95.8	69	87.5	63	132	
≥regional minimum wage	4.2	3	12.5	9	12	
Total	100	72	100	72	144	
Family size (f %)						0.005
> 4 members	63.9	46	40.3	29	75	
≤ 4 members	36.1	26	59.7	43	69	
Total	100	72	100	72	144	
<b>CHILDREN</b>						
Gender (f %)						0.739
Male	50.0	36	47.2	34	70	
Female	50.0	36	52.8	38	74	
Total	100	72	100	72	144	
Birth weight (f %)						0.014
Low birth weight	16.7	12	4.2	3	15	
Normal birth weight	83.3	60	95.8	69	129	
Total	100	72	100	72	144	
History of exclusive breastfeeding (f %)						0.000
No	38.9	28	9.7	7	35	
Yes	61.1	44	90.3	65	109	
Total	100	72	100	72	144	

**Note:** n: frequency; f(%): percentage, mean: average; **Regional Minimum Wage of Jember Regency 2025:** IDR 2.838.842

Information and recall bias regarding maternal anemia were controlled by retrieving objective records from the MCH handbook instead of relying on maternal memory. Furthermore, measurement bias was mitigated through the use of calibrated digital scales and a digital microtoise, with nutritional status automatically computed via the WHO Anthro software to maintain objective categorization.

#### 2-4. Data Analysis

The data analysis is carried out after all the data has been collected. The entire data obtained will go through the checking, coding, and inputting into the computer. Categorical data is presented in the form of percentages. In contrast, numerical data is presented in the form of mean, median, and standard deviation. The relationship of maternal anemia during pregnancy and the incidence of stunting in children was analyzed using the chi-square test and Odds Ratio.

#### 2-5. Research Ethics

This research has been approved by the Health Research Ethics Committee (KEPK) of the Faculty of Nursing, University of Jember, with approval number 032/UN25.1.14/KEPK/2025.

#### 3-RESULT

Table 1 shows the association between respondent characteristic variables and the stunting status of children. Variables found to have a significant relationship include family size (p-value = 0.05), Low Birth Weight (LBW) (p-value = 0.014), and exclusive breastfeeding (p-value = 0.000).

In Table 2, the majority of mothers in the case group had a history of anemia during the first trimester (20.8%), compared to only 6.9% in the control group. Meanwhile, the proportion of mothers without a history of anemia during pregnancy was lower in the case group (56.9%) than in the control group (86.1%).

**Table-2.** Indicators of anemia history during pregnancy by child stunting status in Jember Regency, February–March 2025 (n = 144).

Variable	Stunting					
	Case (n=72)		control (n=72)			
	n	f (%)	n	f (%)	Total	P-Value
<b>Maternal History of Anemia</b>						
<b>Trimester 1 (Anemia)</b>	15	20.8	5	6.9	20	0.000
<b>Trimester 2 (Anemia)</b>	7	9.7	3	4.2	10	
<b>Trimester 3 (Anemia)</b>	9	12.5	2	2.8	11	
<b>Trimester 1,2,3 (No Anemia)</b>	41	56.9	62	86.1	103	
<b>Total</b>	72	100	72	100	144	

Note: n: frequency, f(%): percentage, Source: Maternal and Child Health (MCH) Book

**Table-3.** Indicators of maternal anemia history by trimester in Jember Regency, February–March 2025 (n=144).

Variable	Mean (SD)	Md (P25-P75)	z-Score	p-value
<b>Trimester 1</b>	10.0 (0.166)	10.3 (10.0-10.5)	0.331	0.005
<b>Trimester 2</b>	10.0 (0.138)	10.2 (10.0-10.3)	0.325	0.007
<b>Trimester 3</b>	9.7 (0.300)	10.2 (9.1-10.6)	0.232	0.179
<b>Trimester1,2,3 (No anemia)</b>	11.6 (0.110)	11.5 (11.5-12.1)	0.245	0.128

Note: Mean: average; Md: Median, P25-75: Percentiles 25-75; Z: score of Kolmogorov-Smirnov Test; p-value: Significant of Kolmogorov-Smirnov Test

Based on Table 3, there was a significant difference in the history of anemia during the first trimester ( $Z = 0.331$ ;  $p$ -value = 0.005). A significant difference was also observed in the second trimester ( $Z = 0.325$ ;  $p$ -value = 0.007). However, no significant difference was found in the third trimester ( $Z = 0.245$ ;  $p$ -value = 0.179).

Based on Table 4, there was no significant difference in the height of stunted children ( $Z = 0.144$ ;  $p$ -value = 0.200). However, a significant difference was found in body weight ( $Z = 0.062$ ;  $p$ -value = 0.001). A significant difference was also observed in children's nutritional status based on HAZ ( $Z = 0.111$ ;  $p$ -value = 0.029). In contrast, there were no significant differences in nutritional status based on WAZ ( $Z = 0.073$ ;  $p$ -value = 0.200), WHZ ( $Z = 0.067$ ;  $p$ -value = 0.200), and BAZ ( $Z = 0.101$ ;  $p$ -value = 0.065).

According to Table 5, there was a significant difference in the height of stunted children ( $Z = 0.136$ ;  $p$ -value = 0.002), but no significant difference in weight ( $Z = 0.057$ ;  $p$ -value = 0.200). Regarding nutritional status, significant differences were observed in HAZ ( $Z = 0.156$ ;  $p$ -value = 0.000), WHZ ( $Z = 0.128$ ;  $p$ -value = 0.005), and BMI-for-age ( $Z = 0.122$ ;  $p$ -value = 0.009). However, there was no significant difference in WAZ ( $Z = 0.097$ ;  $p$ -value = 0.088). The results, as shown in Table 6, indicate a significant relationship between maternal anemia during pregnancy and the incidence of stunting in children aged 24–59 months in families in Jember Regency ( $p$ -value < 0.001). The table also shows that children whose mothers had a history of anemia were 4.7 times more likely to experience stunting ( $OR > 1$ ; 95%  $CI = 2.076$ – $10.587$ ).

**Table-4.** Indicators of nutritional status among stunted children aged 24–59 months in Jember Regency, February–March 2025 (n = 144).

Variable	Mean (SD)	Md (P25-P75)	z-Score	p-value
Height	85.48 (6.091)	85.45(80.32-89.45)	0.144	0.200
Weight	10.42 (1.402)	10.10 (9.3-11.4)	0.062	0.001
<b>Nutritional status</b>				
HAZ	-2.8860	-3.07 (-3.53 - -2.16)	0.111	0.029
WAZ	-2.6433	-2.66 (-3.11 - -2.23)	0.073	0.200
WHZ	-1.4075	-1.25 (-2.26 - -0.47)	0.067	0.200
BAZ	-1.0640	-0.85 (-2.08 - 0.47)	0.101	0.065

**Note:** Mean: average; Md: Median, **P25-75:** Percentiles 25-75; **Z:** score of Kolmogorov-Smirnov Test; **p-value:** Significant of Kolmogorov-Smirnov Test

**Table-5.** Indicators of nutritional status among non-stunted children aged 24–59 months in Jember Regency, February–March 2025 (n = 144).

Variable	Mean (SD)	Md (P25-P75)	z-Score	p-value
Height	94.51 (6.561)	95.80 (90.9-100.1)	0.136	0.002
Weight	13.49 (1.963)	13.45 (12.1-15.1)	0.057	0.200
<b>Nutritional status</b>				
HAZ	-0.8683	-1.22 (-1.50 - -0.48)	0.156	0.001
WAZ	-1.0653	-1.10 (-1.59 - -0.49)	0.097	0.088
WHZ	-0.7903	-0.83 (-1.29 - 0.17)	0.128	0.005
BAZ	-0.8176	-0.81 (-1.32 - -0.05)	0.122	0.009

**Note:** Mean: average; Md: Median, **P25-75:** Percentiles 25-75; **Z:** score of Kolmogorov-Smirnov Test; **p-value:** Significant of Kolmogorov-Smirnov Test

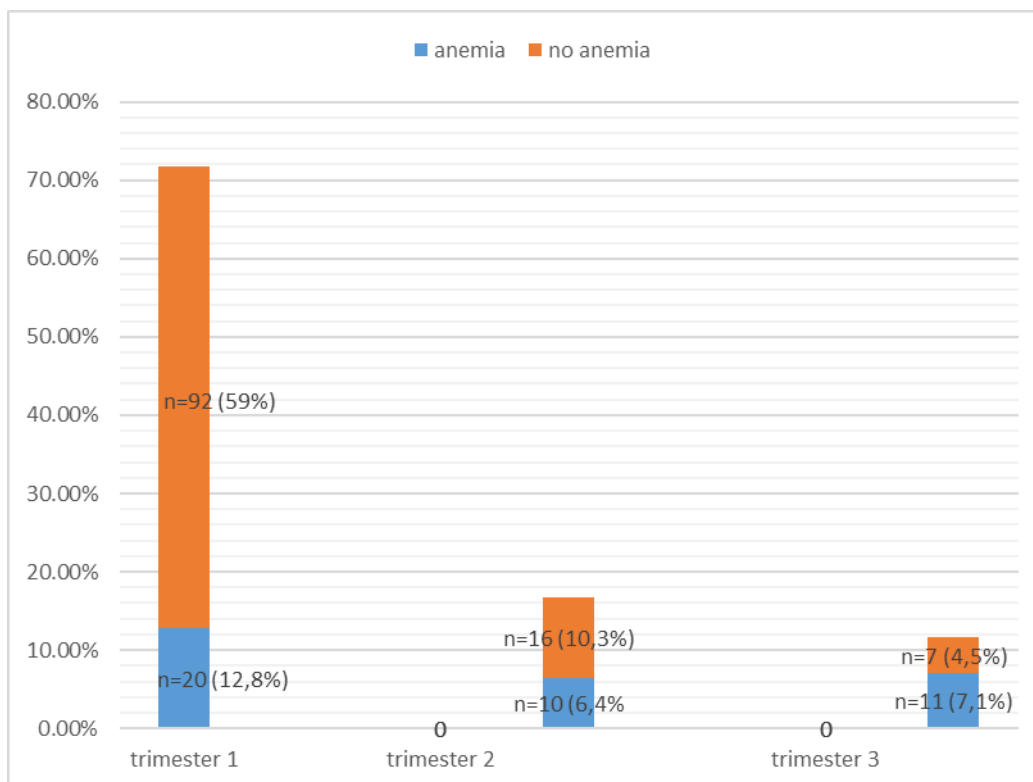


Figure-1: Maternal anemia history by trimester.



Figure-2: Nutrition status of stunted children 24-59 months in Jember district.

#### 4- DISCUSSION

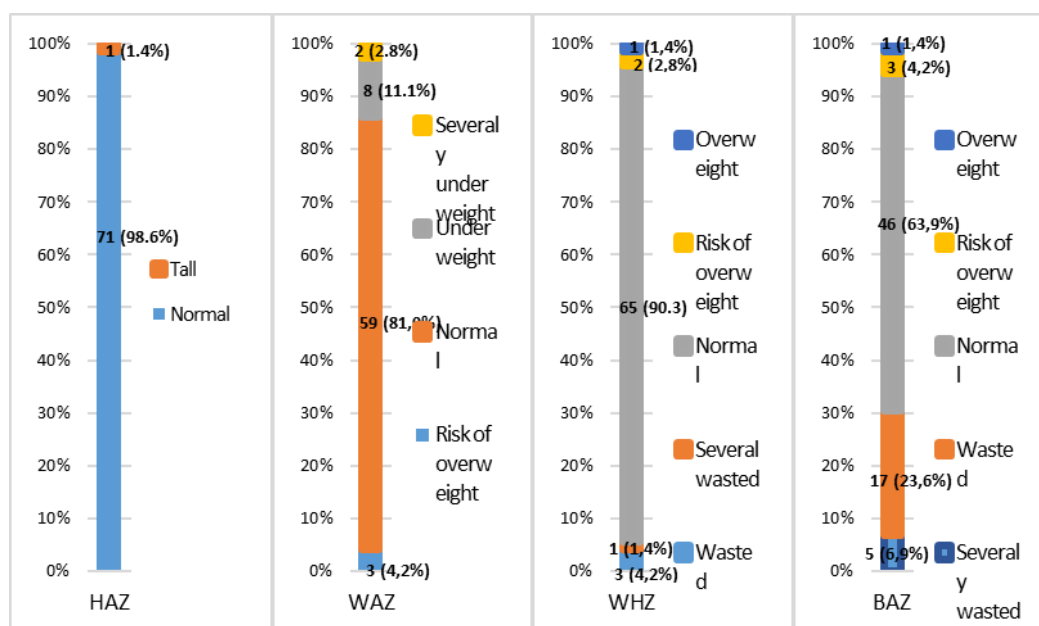
Maternal anemia during pregnancy is associated with the incidence of stunting among children aged 24-59 months in Jember Regency. nutritional intake plays an important role in brain development, particularly in the intake of protein,

energy, and iron (17). The findings of this study are consistent with previous research, which showed that inadequate nutritional intake during pregnancy hinders the growth and development of infants and young children in the early stages of life (18).

**Table-6.** The relationship between maternal anemia during pregnancy and stunting in children aged 24–59 months in Jember Regency, February–March 2025 (n = 144).

Maternal Anemia Status	Stunting				P-value	OR 95 % CI (min-max)
	Case		Control			
	n	f (%)	n	f (%)		
Anemia	31	43%	10	14%	<0.001	4.688
No Anemia	41	57%	62	86%		(2.076-10.587)
Total	72	100%	72	100%		

**Note:** p-value: significant of chi-square; f(%): frequency (percentage); **OR:** Odds Ratio; 95% **CI:** 95 Confidence Interval



**Figure-3:** Nutrition status of non-stunted children aged 24–59 months in Jember district.

#### 4-1. Anemia During Pregnancy

This study found that 28.4% of pregnant women in Jember Regency experienced anemia, with the majority occurring in the first trimester (20.4%). Most cases of anemia during the first trimester are generally caused by physiological changes in pregnancy, such as increased plasma volume leading to hemodilution (19). The variation in anemia occurrence across trimesters may be due to improvements in maternal nutritional status over time, either through nutritional interventions or routine health monitoring (20). Moreover, the implementation of anemia screening programs during early pregnancy plays a vital role in supporting antenatal care (21).

Early detection of anemia status allows mothers and families to respond appropriately from the beginning, including improving dietary intake and timely iron supplementation. This is supported by the Maternal Role Attainment theory becoming a Mother by Ramona T. Mercer, which explains that the process of becoming an effective mother begins during pregnancy (13). Anemia during pregnancy can hinder this adaptive process, both physically and psychosocially. Mothers with anemia often experience undernutrition, low energy, and difficulty caring for themselves, which ultimately affects their ability to provide adequate care and nutrition for their children. In addition, the way families

perceive health and illness influences their health care practices (15). Therefore, early screening contributes to the prevention of persistent anemia and helps improve maternal nutritional status throughout pregnancy.

#### 4-2. Incidence of Stunting in Children

This study found no significant difference in height between the case groups; however, a significant difference was observed in body weight ( $p < 0.001$ ). This condition likely reflects a long-standing growth disturbance, typically beginning in the prenatal period and continuing until the age of two years (22). The similar height observed in the stunted group may indicate intrauterine growth retardation. Therefore, further assessment is needed to explore the risk factors contributing to nutritional status problems through public health research.

The study showed that the majority of children aged 24–59 months in the case group had not received exclusive breastfeeding (38.9%), compared to only 9.7% in the control group in Jember Regency. Breastfeeding for less than six months increases the risk of impaired child growth (23). Children who do not receive exclusive breastfeeding are more likely to experience inadequate nutrient intake during the first 1,000 days of life, which prevents the achievement of the "golden period" between ages 0–24 months (24). Optimal child growth can be supported through exclusive breastfeeding for the first six months of life. Therefore, the lack of exclusive breastfeeding is considered one of the main contributing factors to childhood stunting.

Nutrition support programs for children, such as supplementary feeding initiatives that have not yet achieved their target coverage, may negatively impact the nutritional needs of children and potentially hinder their growth and development. The macronutrients

(carbohydrates, proteins, and fats) and micronutrients provided through these programs play a crucial role in supporting physical growth, brain development, cellular metabolism, and immune system function (25). Supplementary feeding is considered one of the key interventions in preventing and reducing the incidence of stunting. Therefore, it is necessary to reinforce the implementation and effectiveness of such programs in Jember Regency.

#### 4-3. Anemia During Pregnancy and the Incidence of Stunting

The results of this study indicate a significant association between maternal anemia during pregnancy and the incidence of stunting among children aged 24 to 59 months in Jember Regency ( $p < 0.001$ ). Furthermore, the study found that mothers with a history of anemia were 4.7 times more likely to have stunted children. Anemia, or iron deficiency during pregnancy, impairs fetal metabolism and disrupts intrauterine development, increasing the risk of stunting (26). Based on previous research, iron plays a critical role not only in oxygen transport but also in bone formation (27). When tissue oxygenation, including that of bone tissue, is compromised due to anemia, fetal bone growth cannot proceed optimally. Iron deficiency affects bone mineral density, bone mineral content, and bone strength such as that of the femur, which collectively may contribute to the development of stunting.

In addition to anemia, another factor contributing to the incidence of stunting is the provision of exclusive breastfeeding, with a  $p$ -value of  $< 0.001$ . This study showed that children in the case group were less likely to have received exclusive breastfeeding (61.1%) compared to those in the control group (90.3%). Exclusive breastfeeding and adequate energy intake are significantly associated with stunting prevention in children aged 6 to 24 months

(28). Providing exclusive breastfeeding during the first six months of life is a critical component of fulfilling a child's nutritional needs; thus, its absence can worsen nutritional status and increase the risk of stunting (29). Therefore, it can be concluded that exclusive breastfeeding has a significant impact on fetal and early childhood growth and contributes to the incidence of stunting. Optimizing exclusive breastfeeding practices is an essential step in reducing stunting rates.

Most families in the case group in this study lived in extended family households with more than four members (63.9%), while in the control group, children who were not stunted primarily lived in nuclear families with four or fewer members (59.7%). The family plays an essential role in providing appropriate caregiving practices during the child's developmental period—mentally, psychologically, and physically (30). Larger household sizes may limit the ability to allocate resources for healthy and diverse food options, causing families with limited economic means to opt for cheaper and more accessible foods. Maternal caregiving patterns in managing a child's dietary intake have been identified as a determining factor in stunting (31). Therefore, family support and guidance from health professionals are necessary to promote adequate nutrition and affordable healthy food options, as well as to ensure the continuation of iron supplementation programs during pregnancy to prevent maternal anemia.

These findings emphasize that the nutritional challenges among children in this region are driven by a complex interplay of both maternal biological factors and postnatal household lifestyles. While maternal anemia during pregnancy sets a precarious foundation by impairing intrauterine development and fetal bone growth, socioeconomic and lifestyle factors further exacerbate this vulnerability

after birth. Larger family sizes limit resource allocation for diverse food options, which, combined with suboptimal caregiving practices like the lack of exclusive breastfeeding, directly restrain the child's growth. Therefore, stunting in this population is not solely caused by lifestyle or maternal anemia in isolation, but rather reflects a cumulative effect of prenatal iron deficiency compounded by challenging postnatal socio-economic and dietary conditions.

#### **4-4. Limitations of the Study**

This study acknowledges certain limitations regarding anthropometric measurements. The evaluation of child growth was focused entirely on identifying chronic linear malnutrition (stunting) using standard WHO global benchmarks, specifically HAZ, WAZ, WHZ, and BAZ. Consequently, the waist-to-height ratio (WHtR), which serves as a highly sensitive index for central adiposity and early cardiometabolic risks, was not utilized because waist circumference data were not collected during the fieldwork. While indices like HAZ effectively captured the structural stunting status in this cohort, omitting WHtR limits the ability to provide a broader metabolic profile. Future research should consider incorporating waist circumference measurements to expand the evaluation of long-term health and growth dynamics in children within agricultural communities.

#### **5- CONCLUSION**

This study can be concluded that the majority of mothers who experienced anemia were in the case group 43% with stunted children exhibiting very short stature (52%) and short stature (45.8%). There was a significant association between maternal anemia during pregnancy and stunting in children aged 24–59 months in Jember Regency ( $p < 0.001$ ). Maternal anemia during pregnancy was identified as a risk factor that

increased the likelihood of stunting by 4.7 times (OR > 1; 95% CI = 2.07–10.56).

## 6- ACKNOWLEDGMENTS

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## 7- AVAILABILITY OF DATA AND MATERIALS

The dataset generated and analyzed during the current study is available from the corresponding author upon reasonable request.

## 8- COMPETING INTERESTS

The authors declare that they have no conflicts of interest related to the research and publication of this article.

## 9- FUNDING

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