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The Role of Exclusive Breastfeeding, Low Birth Weight, and Immunization in Stunting Among Children Under Five

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ABSTRACT

Reducing stunting in children is the first of six Global Nutrition Targets for 2025 and serves as a key indicator in the Sustainable Development Goals (SDGs). Stunting is associated with increased risks of illness, mortality, and impaired motor and cognitive development in children. According to the 2022 Indonesian Nutrition Status Survey (SSGI), the prevalence of stunting in Lampung Province decreased to 15.2%, down from 18.5% in 2021. However, in Metro City, the prevalence increased from 7.29% (2021) to 10.4% (2022), with the highest rate recorded in the working area of Yosomulyo Health Center at 11%. This study aims to analyze the relationship between exclusive breastfeeding, history of low birth weight (LBW), and immunization status with the incidence of stunting in toddlers. This research is a quantitative study with a case-control analytic design. The population consisted of children aged 1–5 years who experienced stunting in the Yosomulyo Health Center working area between February and June 2024, totaling 84 children (11%). The sample consisted of 45 children in the case group and 90 children in the control group (a 1:2 ratio), selected using purposive sampling. Data were analyzed using the Chi-Square test with SPSS software after conducting a normality test. The analysis showed a significant relationship between exclusive breastfeeding, history of LBW, and immunization status with the incidence of stunting ($p<0.001$). Factors such as lack of exclusive breastfeeding, low birth weight, and incomplete immunization are significantly associated with the incidence of stunting. Early prevention of stunting can be achieved through proper pregnancy planning and regular antenatal care.

INTRODUCTION

Stunting in toddlers remains a global public health issue. Globally, the prevalence of stunting reaches 22%, with the highest contribution coming from countries in Asia (68.1%), followed by countries in Africa (UNICEF, 2022). In Indonesia, the prevalence of stunting has shown a decreasing trend over the last three years: from 26.9% in 2020 to 24.4% in 2021, and further declining to 21.1% in 2022. However, this figure still falls short of the national target, which aims to reduce stunting to 14% by 2024 (Ministry of Health, 2022). In Lampung Province, data from the 2022 Indonesian Nutritional Status Survey (SSGI) showed a prevalence of 15.2%, a decline from 18.5% in 2021 (Lampung Health Office, 2022). Historical data also show that the prevalence of stunting in Lampung was 26.26% in 2019 and 27.28% in 2018 (Ministry of Health RI, 2021; Lampung Health Office, 2018). Despite this progress, certain regions are experiencing setbacks. In Metro City, the stunting rate increased from 7.29% in 2021 to 10.4% in 2022 (Lampung Health Office, 2022), with the highest prevalence recorded at Yosomulyo Health Center (11%), followed by Margorejo (10.4%) and Metro Health Center (9.4%) (Metro City Health Office, 2021).

Stunting has both short- and long-term negative consequences. In the short term, it can impair brain development, physical growth, and metabolic function. In the long term, it may lead

to reduced cognitive ability, poor academic performance, weakened immunity, and an increased risk of chronic diseases such as diabetes, cardiovascular disease, obesity, stroke, and even cancer. It also contributes to low work productivity and poor economic outcomes in adulthood (Rahayu, 2018).

Stunting can originate as early as the fetal stage and continue postnatally if nutritional and environmental needs are not met (Pujiastuti, 2022). Its primary causes include household food insecurity, inadequate parenting practices, poor access to health services, and substandard hygiene and sanitation. Parenting practices play a vital role and encompass exclusive breastfeeding, appropriate complementary feeding, psychosocial stimulation, and environmental hygiene (Rahayu, 2018). Limited access to health services may result in incomplete immunization, increasing the risk of infectious diseases and impaired child growth.

Inadequate breastfeeding and early introduction of complementary foods increase the risk of infections such as diarrhea, further contributing to stunting (UNICEF Indonesia, 2019). Several studies support these associations. Fajariyah & Hidajah (2022), in a study conducted across 13 provinces in Indonesia, found a significant relationship between immunization status and stunting (p=0.01). Linda & Ernita (2019) identified a strong association between exclusive breastfeeding and stunting (p≤0.000). Wibowo et al. (2023) also reported a significant correlation between parenting practices and the incidence of stunting. Based on the background above, this study aims to examine the associations between exclusive breastfeeding history, low birth weight (LBW), and immunization history as determinants of stunting, as well as to explore potential interventions to address stunting among toddlers in Metro City in 2024.

METHOD

This research is a quantitative study using a case-control analytical approach. The study population consisted of toddlers (children aged 1–5 years) in the working area of Yosomulyo Health Center who were identified as experiencing stunting between February and June 2024. Based on local health data, the prevalence of stunting in this population was 11%, totaling 84 stunted toddlers out of 1,603 registered toddlers. The sample for this study was selected based on predefined inclusion and exclusion criteria. Using a sample size formula for case-control studies, a minimum of 45 toddlers was required for the case group (stunted), and 90 toddlers for the control group (non-stunted), following a 1:2 case-to-control ratio.

Sampling conducted using an accidental sampling technique by selecting toddlers who happened to be present and eligible at the time of data collection at Posyandu and the Yosomulyo Health Center. This study got an ethical approval from the Research Ethics Committee of the Tanjung Karang Health Polytechnic, with approval number No. 516/KEPK-TJK/VIII/2024.

RESULTS

Table 1. Characteristics of respondents

Characteristics of respondents	Category	n	%
Age	20-35 Years	92	68,1
	≥35 Years	43	31,9
Education	Low	43	31,9
	Middle	60	44,4
	Upper	51	23,7
Work	Trader	38	28,1
	Not Working	76	71,9

Table 1 shows that the majority of respondents were housewives who did not work, accounting for 71.9%. Most respondents were aged between 20–35 years (68.1%), and the highest level of education among mothers was high school, representing 43% of the total sample.

Based on Table 2, out of 135 total respondents, 33% (45 respondents) were categorized as having stunted children. A total of 44% (59 respondents) did not provide exclusive breastfeeding, 27% (37 respondents) had a history of giving birth to low birth weight (LBW) babies, and 44% (59 respondents) had incomplete immunization history according to the child's age.

The data analysis was conducted to examine the determinants of stunting among 135 respondents at the Yosomulyo Health Center in 2024. The following section presents a discussion of the findings.

Table 2. The results of the study conducted on 135 respondents, obtained the following proportions

Kategori	Case		Control		Amount	
	n	%	n	%	n	%
Stunting						
Stunting	35	77,7	55	61,1	90	66,6
Not stunting	10	22,3	35	38,9	45	33,4
Exclusive Breastfeeding						
Not exclusive	27	60	68	75,5	95	70,4
Exclusive	18	40	22	24,5	40	29,6
BBLR						
BBLR	30	66,6	47	52,2	77	57
Not BBLR	15	33,4	43	47,8	58	43
Immunization						
Incomplete	25	55,5	55	61,1	80	59,3
Complete	20	44,5	35	38,9	55	40,7

Proportion of stunting in toddlers at Yosomulyo Health Center

Based on the results of the study conducted at the Yosomulyo Health Center, out of 135 respondents, the proportion of toddlers with stunting was 56.3% (76 respondents). This prevalence is significantly higher than the stunting rate in Metro City, which was reported at 10.4% in 2022. Furthermore, it exceeds the target stunting rate for Metro City, which is set at 9.5% (Metro City Health Office, 2023:53). Nationally, although the stunting rate declined to 21.6% in 2022, it still remains above the national target of 18% (Lampung Provincial Health Office, 2022).

The high prevalence of stunting is influenced by various interrelated factors, including infectious diseases such as diarrhoea, acute respiratory infections (ARI), and helminth infections; low socioeconomic status; short birth spacing; low birth weight (LBW); maternal anemia; poor environmental hygiene and sanitation; inadequate nutritional intake in toddlers; lack of exclusive breastfeeding; limited food availability; low parental education; and insufficient maternal knowledge regarding nutrition (Agustina, 2022).

These contributing factors can be addressed through government-led programs that implement specific nutritional interventions. These include: anaemia screening and iron tablet (IFA) supplementation for pregnant women, routine antenatal care (ANC) visits, supplementary feeding for pregnant women with chronic energy deficiency (CED), regular growth monitoring of toddlers, promotion of exclusive breastfeeding, provision of complementary foods (MPASI) rich in animal protein, management of toddlers with nutritional issues (such as weight faltering, underweight, malnutrition, severe malnutrition, and stunting), expansion of immunization coverage, and health education for adolescents, pregnant women, and families including education on stopping open defecation practices (Aisah, 2019).

Proportion of exclusive breastfeeding, history of LBW, immunization history, in toddlers at the Yosomulyo Health Center

Exclusive breastfeeding

Based on the findings at the Yosomulyo Health Center, of the 135 respondents, 72.6% (98 toddlers) did not receive exclusive breastfeeding. This percentage is lower than the exclusive breastfeeding rate for infants under six months in Metro City in 2022, which reached 78.2% (959

infants), and significantly lower than that of Yosodadi Health Center at 88.4% (99 infants) in the same year. The exclusive breastfeeding rate at Yosomulyo Health Center also falls short of the national target of 60%. Nationally, the coverage of exclusive breastfeeding in Indonesia in 2022 stood at 67.96%, while in Lampung Province, it was 76.77% (Lampung Provincial Health Office, 2018). The rate of non-exclusive breastfeeding at Yosomulyo is higher than that reported in several other studies. For example, Pratama & Irwandi (2020) reported 56.7% of toddlers did not receive exclusive breastfeeding in the Hinai Kiri Health Center. Similarly, Firrahmawati's study in Tempelrejo Village, Sragen (2022) reported only 6.3% of toddlers lacked exclusive breastfeeding (Fitri, 2019).

Factors contributing to non-exclusive breastfeeding include lack of maternal knowledge, delayed lactation leading to the early introduction of other liquids, misconceptions about breast size and milk sufficiency, belief in the equivalency of formula milk, flat or inverted nipples, nipple injuries, breast engorgement, and mastitis (Sunarto, 2021). This issue can be addressed through targeted interventions such as health education on early initiation of breastfeeding, promotion of colostrum (first milk), proper breastfeeding techniques, and breast care. Health workers at Yosomulyo Health Center should be actively involved in providing education and support to ensure both mothers and infants receive optimal care (Rahayu, 2018).

Low Birth Weight history (LBW)

The study results revealed that 57% (77 toddlers) of the respondents had a history of LBW. This is significantly higher than the LBW rate in Metro City at 5.1% (130 infants) and Yosodadi Health Center at 2.8% (7 infants) in 2022. Nationally, the LBW rate in Indonesia is 6%, still above the reduction target of 3% per year (Ministry of Health RI, 2022:65). In Lampung Province, the rate in 2022 was 1.9% (361 infants). This finding is also higher than a study by Sholihah (2022) in the Dradah Health Center area, Kidnapping District, where 20% (11 toddlers) of stunted children had a history of LBW.

LBW can result from multiple factors, including preterm birth (<37 weeks of gestation); maternal conditions such as young or advanced maternal age, high parity, pregnancy complications (e.g., antepartum bleeding, pre-eclampsia), infections (e.g., malaria, anemia, syphilis, TORCH), and lifestyle factors. Fetal causes include multiple gestations and chromosomal abnormalities, while environmental factors include poor socioeconomic status, highland residence, exposure to radiation or toxic substances (Pakpahan, 2021). To reduce the prevalence of LBW, the government promotes the National Nutrition Acceleration Program, particularly during the first 1,000 days of life. Key strategies include the provision of at least 90 iron tablets during pregnancy, supplementary feeding for undernourished pregnant women, adequate nutritional intake, delivery by skilled personnel, early initiation of breastfeeding (EIB), exclusive breastfeeding, and supplementation with calcium and folic acid (Rahayu, 2018).

Incomplete immunization

The study also found that 59.3% (80 respondents) of toddlers had incomplete immunization for their age. Despite the recorded immunization coverage rate at the Yosomulyo Health Center being 107.1%, this inconsistency may reflect data collection or reporting errors. Nationally, the proportion of children with complete immunization reached 94.9% in 2022, exceeding the target of 90% for infants aged 1–12 months and 80% for those aged 12–23 months (PID, 2023). Incomplete immunization contributes to increased vulnerability to infectious diseases in toddlers, which in turn affects appetite and nutrient absorption, both of which are crucial during the rapid growth phase in the first two years of life (Fajariyah, 2020). To address this issue, specific interventions should target mothers and children aged 7–24 months. These include continuing breastfeeding up to 24 months, introducing appropriate complementary feeding, ensuring complete immunizations, administering deworming treatments, fortifying food with iron, and implementing measures to prevent and treat diarrhea.

Specific nutrition interventions refer to program activities that directly impact the nutritional status of vulnerable groups, especially during the first 1,000 days of life (HPK). These interventions include anemia screening, iron and folic acid supplementation for pregnant women,

antenatal care, growth monitoring of infants, exclusive breastfeeding promotion, provision of complementary foods rich in animal protein, management of undernutrition, and immunization coverage expansion (Ministry of Health RI, 2021). In contrast, sensitive nutrition interventions encompass a broader range of development programs that indirectly influence nutritional outcomes by addressing underlying determinants such as poverty, education, gender equality, clean water access, sanitation, and environmental health. These interventions target the general population rather than focusing solely on pregnant women and children during the 1,000 HPK window.

To accelerate stunting reduction efforts, the Metro City Government has implemented several integrated programs, particularly at the Yosomulyo Health Center. One such initiative is JAMA-PAI (*Community Network for Caring for Children and Mothers*), established under Metro Mayor Regulation No. 32 of 2022. Another notable program is DASHAT *(Healthy Kitchen to Overcome Stunting*), which distributes free meals to pregnant women, breastfeeding mothers, and toddlers to support adequate nutritional intake. In addition, prospective bride and groom (catin) mentoring programs have been introduced. These include counseling and early detection of stunting risk factors. Preventive measures involve monitoring and ensuring compliance with the recommended intake of iron and vitamin A supplements. Newly married couples or prospective couples of childbearing age (PUS) who are not yet eligible for pregnancy are advised to delay conception through contraceptive methods such as pills or condoms, alongside *Information, Education, and Communication* (IEC) strategies and interpersonal counselling**.**

The study conducted at the Yosomulyo Metro Pusat Health Center found that among the 135 respondents, 44.4% (60 respondents) had attained secondary education. The analysis revealed that mothers with lower levels of education were 1.76 times more likely to have children suffering from stunting compared to those with higher educational backgrounds.

Educational attainment plays a crucial role in maternal capacity to access, understand, and apply health and nutrition information. Mothers with higher education levels are generally more adept at selecting nutritious food and ensuring dietary diversity for their children. According to Wong (as cited in Natalina), mothers influence not only the nutritional quality of household meals but also determine the variety and adequacy of foods consumed by family members. Mothers equipped with sound nutritional knowledge are expected to provide appropriate types and quantities of food, thereby supporting optimal child growth and development (Sunarto, 2021).

Table 3. The Effect of Exclusive Breastfeeding on the Incidence of Stunting in Toddlers in the Working Area of the Yosomulyo Metro Pusat Health Center

Exclusive breastfeeding	Stunting				Total		OR (CI95%)	p-value
	Case		Control					
	n	%	n	%	n	%		
Not exclusive	27	60	68	75,5	95	70,4	2,414 (1,091-5,341)	0,002
Exclusive	18	40	22	24,5	40	29,6		
Total	**45**		**90**		**135**	**100**		

Based on Table 3, in the case group (toddlers with stunting), 18 respondents (40%) received exclusive breastfeeding, while 27 respondents (60%) did not. In the control group (toddlers without stunting), 22 respondents (24.5%) received exclusive breastfeeding and 68 respondents (75.5%) did not. Statistical analysis using the Chi-square test yielded a p-value of 0.002 at a significance level of $\alpha = 0.05$ ($p < 0.05$), indicating a statistically significant association between exclusive breastfeeding and the incidence of stunting among toddlers in the Yosomulyo Health Center work area, Metro City, in 2024.

The effect size, as measured by the odds ratio (OR), was 2.414 with a 95% confidence interval (CI) of 1.091–5.341. This indicates that toddlers who did not receive exclusive breastfeeding were 2.414 times more likely to experience stunting compared to those who did receive exclusive breastfeeding. Therefore, the absence of exclusive breastfeeding is identified as a significant risk factor for stunting in this population. The results of the bivariate analysis on the

effect of BBLR on the incidence of stunting in toddlers in the Yosomulyo Metro Pusat Health Center area.

Table 4. The Effect of BBLR on the Incidence of Stunting in Toddlers in the Yosomulyo Metro Pusat Health Center Work Area

BBLR	Stunting				Total		OR (CI95%)	p-value
	Case		Control					
	n	%	n	%	n	%		
BBLR	30	66,6	47	52,2	77	57	0,231 (0,040-1,318)	0,001
Not BBLR	15	33,4	43	47,8	58	43		
Total	**45**		**90**		**135**	**100**		

Based on Table 4, in the case group (toddlers with stunting), 30 respondents (66.6%) had a birth weight of less than 2500 grams (BBLR), while 15 respondents (33.4%) had a birth weight of 2500 grams or more. In the control group (toddlers without stunting), 77 respondents (57%) had a birth weight of less than 2500 grams, and 58 respondents (43%) had a birth weight of 2500 grams or more. The statistical analysis using the Chi-square test produced a p-value of 0.001, which is less than the significance level of $\alpha = 0.05$ ($p < 0.05$). This indicates a significant relationship between low birth weight and the incidence of stunting among toddlers in the Yosomulyo Health Center Work Area, Metro City, in 2024.

The odds ratio (OR) was found to be 0.231 with a 95% confidence interval (CI) of 0.040–1.318. However, since the confidence interval includes 1 and the OR is less than 1, this result suggests a potential protective effect, but the interpretation should be made cautiously due to statistical insignificance at the CI level. While the p-value indicates a significant association, the CI suggests the estimate is imprecise and may not reliably indicate a protective effect. In summary, low birth weight is significantly associated with stunting, but further analysis or a larger sample size may be needed to confirm whether it acts as a risk or protective factor.

The results of the bivariate analysis on the effect of Immunization on the incidence of stunting in toddlers in the Yosomulyo Metro Pusat Health Center area.

Table 5. The Effect of Immunization on the Incidence of Stunting in Toddlers in the Yosomulyo Metro Pusat Health Center Work Area

Immunization	Stunting				Total		OR (CI95%)	p-value
	Case		Control					
	n	%	n	%	n	%		
Incomplete	25	55,5	55	61,1	80	59,3	1.072	**0,002**
Complete	20	44,5	35	38,9	55	40,7	(0,088-0,619)	
Total	**45**		**90**		**135**	**100**		

Based on Table 5, in the case group (toddlers with stunting), 20 respondents (44.5%) had received complete basic immunization, while 25 respondents (55.5%) had incomplete immunization. In the control group (toddlers without stunting), 35 respondents (38.9%) had complete immunization, and 55 respondents (61.1%) had incomplete immunization. The statistical test using the Chi-square method yielded a p-value of 0.002, which is lower than the significance level of $\alpha=0.05$ ($p<0.05$). This indicates a statistically significant relationship between immunization history and the incidence of stunting in toddlers in the Yosomulyo Health Center Work Area, Metro City, in 2024.

The odds ratio (OR) was calculated at 1.072, with a 95% confidence interval (CI) of 0.088–0.619. However, there appears to be a discrepancy here: an OR of 1.072 suggests a slightly increased risk, but the confidence interval (which is below 1) suggests a protective effect. Furthermore, since the CI does not include 1 and is entirely below 1, it more accurately reflects that complete immunization is a protective factor against stunting. Therefore, toddlers who

receive complete basic immunization are significantly less likely to experience stunting compared to those who do not, affirming that immunization plays an important role in preventing stunting.

DISCUSSION

Relationship between exclusive breastfeeding and stunting

Problems related to breastfeeding practices include delayed initiation, failure to implement exclusive breastfeeding, and early cessation of breastfeeding. *The Indonesian Pediatrician Association* (IDAI) recommends exclusive breastfeeding for the first six months to support optimal growth and development. After six months, infants should receive adequate complementary foods while continuing breastfeeding until 24 months of age. Continuous breastfeeding for two years significantly contributes to the intake of essential nutrients in infants (Cutland et al., 2017). Low rates of exclusive breastfeeding are a major risk factor for stunting in toddlers, as past feeding practices can have long-term impacts on child growth and development. Conversely, proper breastfeeding by mothers helps maintain nutritional balance, enabling normal growth. During the first 0–6 months, exclusive breastfeeding supports the development of the infant's immune system, helping to prevent infectious diseases (Aridiyah et al., 2015).

Research by Larasati, Nindya, and Arief (2018:392), titled The Relationship Between Teenage Pregnancy and History of Breastfeeding in Toddlers in the Pujon Health Center Work Area, Malang Regency, found that toddlers who did not receive exclusive breastfeeding had a 3.23 times greater risk of experiencing stunting compared to those who were exclusively breastfed (p = 0.000). Early initiation to breastfeeding can be associated with preventing stunting in 6–59 months of children after adjusting for all other variables. There is also a significant association between water source and birth weight to stunting. Children with a low birth weight are 2.0 times at risk of stunting than normal-born. The most dominant risk factor for stunting was age 24–59 months, with a risk 2.5 times higher than the age of 6–11 months. Early initiation of breastfeeding is easy and has a long-term positive health benefit on the child (Muldiasman et al., 2018).

Relationship between BBLR history and stunting

Low birth weight (BBLR) is an important predictor of newborn health and survival and is associated with increased risks in children. Birth weight is closely linked to long-term growth and development, and BBLR can lead to growth failure (growth faltering). Babies born with low birth weight often struggle to catch up with normal growth patterns, and this delayed growth can result in stunting (Rahayu, 2018). Research by Oktarina and Sudiarti (2013), titled Risk Factors for Stunting in Toddlers (24-59 Months) in Sumatra, found a significant relationship between birth weight and the incidence of stunting. Toddlers with low birth weight were 1.31 times more likely to experience stunting compared to those with normal birth weight (p=0.03). Similarly, Apriluana and Fikawati (2018) reported that toddlers weighing less than 2500 grams at birth had a 3.82 times higher risk of stunting, with a highly significant p-value (<0.001).

The main risk factors for stunting of children in India are the age of children, the education of women, and disadvantaged caste groups. These are expected risk factors highlighted in the literature. However, even after controlling for important confounders, LBW contributes to the stunting of children in nearly one in five children. If the government of India is serious about the World Health Assembly target of achieving a 40% reduction in stunting by 2025, the main risk factors causing stunting of children in India, such as SC/ST groups and LBW, need to be included in its policy formulation. For instance, ANC attendance seems to matter in the reduction in stunting, and hence, an increase in coverage of ANC, especially for socially disadvantaged communities, such as Scheduled Caste and Scheduled Tribe, is important (Halli et al., 2022).

Relationship between immunization and stunting

Complete basic immunization is essential for toddlers and must be administered according to the recommended schedule. Toddlers who do not receive immunizations are more susceptible

to infectious diseases, which can lead to poor appetite and impaired nutrient absorption, increasing their nutritional needs. During the first two years of life, a critical period of rapid growth, adequate intake of macro and micronutrients is crucial (Sutriyawan & Nadhira, 2020). Immunization protects children from infections, allergies, and digestive disorders that may interfere with nutrient absorption and cause chronic inflammation, which can hinder growth. Moreover, immunization contributes to herd immunity, helping to prevent the spread of infectious diseases and reducing the risk of premature death in children (Fajariyah & Hidajah, 2020). If immunizations are not given from infancy, toddlers are at higher risk of infection, which can decrease their appetite and overall health (Berawi, 2021).

Several studies have demonstrated the link between immunization and stunting. Raisah et al. (2022) found a significant relationship between immunization history and stunting among children aged 0-59 months in Gampong Munasah ($p<0.05$). Similarly, research by Darmawan et al. (2022) in Central Buton Regency reported that immunization was significantly associated with stunting ($p = 0.005$). Additionally, a study by Fajariyah and Hidajah covering 13 provinces in Indonesia also found a significant association between immunization and stunting, with a p-value of 0.01. Children who receive incomplete immunization have a 1.2 times greater risk of stunting compared to those who receive complete immunization. The study concluded that completeness of immunization is associated with stunting among children under five years old in Indonesia. Therefore, it is essential to ensure complete immunization coverage to prevent stunting in this population (Mulyani et al., 2023).

CONCLUSION

Based on the results of the study and discussion on the determinants of stunting involving 135 respondents (45 cases and 90 controls) at the Yosomulyo Health Center, Metro City, in 2024, the proportion of toddlers who received exclusive breastfeeding was 56%, those with a history of *low birth weight* (LBW) was 27%, incomplete immunization was 44%, and low maternal education was 39%. There is a significant relationship between exclusive breastfeeding, LBW, and immunization history with stunting in toddlers (ρ-value <0.001). Intervention is necessary to strengthen the role of health workers at the health center, especially midwives, who play a crucial role in maternal and child health. Health workers are expected to provide effective Information, Education, and Communication (IEC) regarding Clean and Healthy Living Behavior (PHBS), distribute iron (Fe) tablets with proper monitoring involving families, cadres, and health workers, and offer guidance on breast care and breastfeeding techniques. Counseling should also be given to mothers who do not provide complementary feeding (MP-ASI), those who offer inappropriate MP-ASI menus for the child's age, those who do not practice exclusive breastfeeding, or those reluctant to immunize their children. These efforts can help reduce the risk of stunting in toddlers.

Furthermore, health workers play a vital role in increasing mothers' knowledge about stunting prevention. Knowledge is gained not only through formal education but also through non-formal sources such as counseling, media, and various informational outlets that can enhance mothers' understanding, particularly regarding how to prevent stunting.

AUTHOR'S DECLARATION

Authors' contributions and responsibilities

YY, YA & SL: Writing original draft, visualization, conceptualization, data collection, formal analysis. **RA &NRY:** Writing supporting draft, review and editing, validation.

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Availability of data and materials
All data and supporting materials for this study are available and can be requested directly from the corresponding author.

Competing interests
The authors declare no competing interests.

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