

Meta Analysis

Meta Analysis: The Relationship Between Exclusive Breast Milk and Low Birth Weight and Stunting in Toddlers

ABSTRACT

Stunting is a health problem that is the focus of the government's health development program for 2015-2019 in addition to reducing maternal and infant mortality, controlling communicable diseases and controlling non-communicable diseases. This study aims to knowing the relationship between exclusive breastfeeding and low birth weight with stunting in toddlers. This study used a meta-analytic research design with a sample of 1,162. Dependent variable of this study is stunting, and the independent variables are exclusive breastfeeding and birth weight. The test used is the Effect Size test using Revman version 5.4. The results of a meta-analysis of 10 studies regarding the relationship between exclusive breastfeeding and stunting were analyzed using a random effect model. The results of the analysis showed exclusive breastfeeding is associated with an increased risk of 4.75 times more likely to experience stunting than babies who are exclusively breastfed. birth weight Low birth weight is associated with a 2.37-fold increased risk of experiencing stunting compared to normal birth weight There is a relationship between exclusive breastfeeding and stunting in toddlers and there is no relationship between low birth weight and stunting in toddlers.

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INTRODUCTION

Stunt (dwarf) is a condition where a child experiences growth disorders so that he has a height that is not in accordance with his age. This occurs due to lack of nutrition in the long term¹. Stunting is a health problem that is the focus of the government's health development program for 2015-2019 in addition to reducing maternal and infant mortality, controlling communicable diseases and controlling non-communicable diseases.² Data on the world prevalence of stunting in 2020 according to WHO globally is 22.0% or around 149.2 million people. The data shows that 53% or around 79.0 million people are in the Asian continent and 41% or around 61.4 million people are in the African continent.² The prevalence of stunting in Indonesia based on the results of the 2021 Indonesian Nutrition Status Study (SSGI) shows a decrease from 27.7% in 2019 to 24.4% in 2021³. This figure is still far from being compared with the WHO determination, namely the prevalence of stunting by 20% in 2025 and 0% stunting in 2030 according to the target in the SDGs.

Stunting is a nutritional problem that is of concern to WHO where there are several "frameworks for action" that can be taken based on WHO recommendations to prevent stunting by focusing first on the age of 1000 days from a woman's pregnancy to the second birthday of the child. One of the

targets of the Sustainable Development Goals (SDGs), which includes the 2nd sustainable development goal, namely eliminating hunger and all forms of malnutrition by 2030 and food security.

The short-term effects of stunting include increased incidence of morbidity and mortality, decreased cognitive and motor development abilities and increased health costs². *stunthas* a negative effect on children's cognitive abilities, namely lower IQ and less academic achievement results. Stunting has biological implications for brain and neurological development which can be seen from a decrease in cognitive scores that results in a lack of learning achievement. Stunting is a long process that starts from the preconception period where the mother's health greatly influences the health of the child she is born with.⁴

The long-term impact is not optimal body posture as an adult (shorter than normal body posture), increased risk of obesity and other degenerative diseases such as hypertension, heart disease and diabetes mellitus, decreased reproductive health, learning capacity and performance that is not optimal and productivity and capacity suboptimal work². Exclusive breastfeeding is one of the things that influences the incidence of stunting. Exclusive breastfeeding is giving only breast milk to babies from birth to 6 months of age. The magnitude of the influence of exclusive breastfeeding on the nutritional status of children has led WHO to recommend implementing interventions to increase breastfeeding for the first 6 months as one of the steps to achieve the WHO Global Nutrition Targets 2025.

Research by Rahayu et al (2018) shows that toddlers who are not exclusively breastfed have a greater risk of stunting than children who are exclusively breastfed.⁵ Research from Yuniarti (2019) shows that there is a relationship between exclusive breastfeeding and stunting. Most children in the stunting group are not exclusively breastfed. Children who are not given exclusive breastfeeding are at risk of 19.5 times to become stunted.⁶ The results of a different study were put forward by Sawitri (2020) The results of the analysis of the relationship between exclusive breastfeeding did not show a significant relationship with the incidence of stunting in children aged 0-36 months in the Work Area of the Health Center I Sumbang, Banyumas Regency.⁷ Factors related to the incidence of stunting are birth length where mothers who give birth to children with PB born less than 50 cm increase the risk of stunting at the age of 12-24 months. Identification of the child's body length at birth and at the age of the first year of birth is needed to intervene in stunting at a later age

Birth weight is a risk factor for stunting. Research of Meikawati shows that children with low birth weight (LBW) are 1.7 times more likely to be stunted than children with normal birth weight at the same age. Nutrients in the body are used to meet needs. If this situation lasts a long time, the stores of nutrients will be depleted and finally there will be tissue deterioration, low levels of hemoglobin, serum vitamin A and carotene, increased lactic acid and pyruvate. At this time people can be said to be stunted.⁸

The results of a different study were shown by Anggraeni's research (2020) which showed that there was no relationship between birth weight and the incidence of stunting⁹. In Anggraeni's study (2020) the factors associated with the incidence of stunting are toddler sanitation living in poor environmental sanitation has a higher risk of stunting compared to toddlers living in good environmental sanitation. Families who do not have clean water facilities and good latrines have a higher risk of stunting compared to families who have clean water facilities and good latrines.

Based on the description above, it can be seen that there are still few meta-analytic studies related to the relationship between exclusive breastfeeding and low birth weight and stunting in toddlers in Indonesia. Thus, researchers are interested in mapping research results related to the relationship between exclusive breastfeeding and low birth weight with stunting in toddlers, then quantitatively analyze all these results through a meta-analysis.⁹

METHODS

In this study, the research design is a meta-analysis. The quantitative testing method is based on research articles that have been published in reputable and accredited international and national scientific journals. The search engines used for the literature search were PubMed, Google Scholar, ResearchGate, and ScienceDirect. This literature review utilizes full-text articles published between 2018 and 2023, with a sample of 1,162. Dependent variable: Stunting, independent variable: exclusive breastfeeding and birth weight.

A qualitative analysis was conducted on the articles obtained from the literature review. The analysis was descriptive in nature and presented in tabular form, containing the extracted data, such as author names, year of publication, study design, variables studied, study subjects and sample size, research findings, and an assessment of study quality. The question analysis technique used in this article employs the SPIDER method, which focuses on research design and the sample rather than the population.

Quantitative analysis was performed using meta-analysis with RevMan 5.4 software. A fixed-effects model was used when studies showed low heterogeneity, and a random-effects model was used when heterogeneity was present, based on the I^2 statistic and the p-value from the Cochrane Q test. Meta-analysis results were presented as pooled odds ratios (ORs) with 95% confidence intervals. When substantial heterogeneity was present, exploratory analyses were performed to identify the sources of heterogeneity, such as through subgroup analysis. Publication bias was assessed visually using funnel plots.

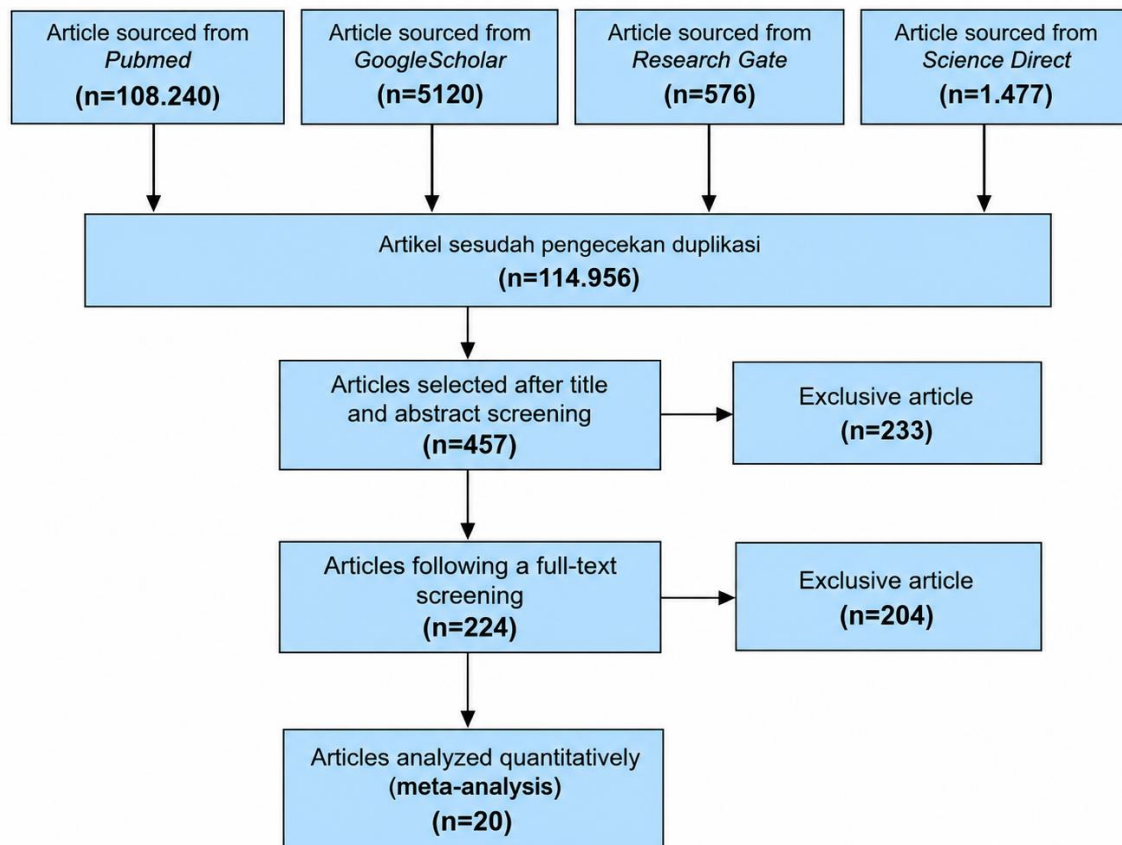


Figure 1. Prima Flow Chart

Table 1. Study Characteristics use SPIDER (Sample, Phenomenom of Interest, Design, Evaluasi, ResearchType)

No	Journal Bibliography	Sample	Phenomenom of Interest	Design and Research Type	Evaluation
1.	Carolin (2021) (10) Title: Analysis of Stunting among Toddlers at the Mauk Health Center, Tangerang Regency, Journal: Nursing and Health Sciences	The sample consisted of 66 participants in the case group and 66 in the control group, bringing the total sample size of this study to 132 participants.	The dependent variable is the incidence of stunting among toddlers, while the independent variables are knowledge, height, history of exclusive breastfeeding, history of low birth weight, number of family members, and family income	Case control & Quantitative	The results showed that bivariate analysis revealed that knowledge (p = 0.000), history of exclusive breastfeeding (p = 0.000), number of family members (p = 0.000), family income (p = 0.029), and history of low birth weight (p = 0.079). The variable most strongly associated

No	Journal Bibliography	Sample	Phenomenom of Interest	Design and Research Type	Evaluation
					with stunting in children among toddlers was maternal height (OR = 6.00).
2.	Dahliawati (2023) (11) Title: Analysis Of Risk Factors For Stunting In Toddlers Age 12- 59 Months In The Working AreaThe Cabangbungin Bekasi District Health Center Year 2022 Journal: International Journal Of Health Science	The case group consists of toddlers aged 12–59 months who are stunted (short and very short) and the control group, which consists of toddlers aged 12–59 months who are not short (normal)	The dependent variable is the incidence of stunting among toddlers, while the independent variables are history of exclusive breastfeeding, history of low birth weight, dietary patterns, and infectious diseases	Case-control & Quantitative	Birth weight has a significant impact on the incidence of stunting; toddlers with stunting and low birth weight have a 6.1 times higher risk factor compared to toddlers without stunting. Exclusive breastfeeding has a significant impact on the incidence of stunting; toddlers with stunting who were not exclusively breastfed have a 4.1 times higher risk factor compared to toddlers without stunting.
3.	Fikri. (2023) (12) Title: Risk Factors Affecting the Incidence of Stunting Journal: Media Gizi Indonesia (National Nutrition Journal)	This study involved 20 mothers of toddlers aged 12–59 months with stunting and 20 mothers of toddlers aged 12–59 months without stunting	The independent variables in this study included the mother's KEK status during pregnancy, the toddler's height and birth weight, the number of iron tablets taken by the mother during pregnancy, breastfeeding status, routine immunization status, history of diarrhea, and history of acute respiratory infections. The dependent variable in this study was the toddler's height category	Case-control & Quantitative	The risk factors influencing the occurrence of stunting among children aged 12–59 months in Murtajih Village, Pamekasan Regency, are birth length, substandard consumption of iron supplements during pregnancy, breastfeeding status, basic immunization status, history of diarrhea, and history of acute respiratory infections. The risk factor most strongly associated with stunting is substandard consumption of iron supplements.
4.	Fufa, D. A. (2022) (13) Title: Determinants of stunting in children under five years of age in Dibate District, Ethiopia: A case-control study. Journal: Human Nutrition & Metabolism	566 study participants - (188 cases and 378 controls)		Case-Control & Quantitative	Exclusive breastfeeding is associated with the incidence of stunting

No	Journal Bibliography	Sample	Phenomenom of Interest	Design and Research Type	Evaluation
5.	Hidayati (2022) (14) Title: Relationship Between Birth Weight and Birth Length and the Incidence of Stunting in Children Aged 0–59 Months in Cinangka, Depok. Journal: Poltekita: Jurnal IlmuKesehatan	56 children aged 0–59 months with stunting were assessed via anthropometric measurements and interviews using a questionnaire.	Dependent variable: stunting Independent variables: birth weight and birth length	Cross sectional & Quantitative	This study found no association between birth weight and birth length and the prevalence of stunting among children aged 0 to 59 months at the Cinangka Community Health Center in Depok.
6.	Indrianti. (2019) (15) Title: Birth Weight And Breastfeeding Practice Related Journal: Jurnal Gizi Dan Pangan	A total of 229 infants and toddlers met the criteria, specifically all children aged 24–59 months, comprising 124 cases and 105 controls.	Dependent variable: stunting Independent variables: birth weight, breastfeeding, knowledge of breastfeeding, birth length.	Case-control & Quantitative	Factors with a significant association were birth weight ($p = 0.001$), breastfeeding ($p = 0.028$), and knowledge of complementary feeding ($p = 0.018$), whereas there was no significant association between birth length, complementary feeding, and mothers' knowledge of breastfeeding and the incidence of stunting.
7.	Lahdji (2022) (16) Journal: Jurnal Kedokteran Dan Kesehatan Indonesia	The study sample consisted of 40 respondents, comprising 20 diagnosed stunting and 20 control respondents	The independent variables in this study were pregnancy history, exclusive breastfeeding, and immunization status. The dependent variable was the incidence of stunting.	Case-control & Quantitative	This study revealed an association between a history of low birth weight ($p=0.028$), introduction of complementary foods too early ($p=0.011$), lack of antenatal care (ANC) visits ($p=0.000$), and exclusive breastfeeding ($p=0.028$). However, these factors did not show a significant difference with regard to immunization status ($p=0.548$).
8.	Lukman (2021) (17) Birth Weight and Length Associated with Stunting among Children Under-Five in Indonesia Journal: Jurnal Gizi Pangan,	A sample of 90 children aged 12–59 months.	Dependent variable: stunting. Independent variables: socioeconomic status, birth weight, and birth length	Cross-sectional & Quantitative	Birth weight, birth length, and age are significantly associated with stunting.

No	Journal Bibliography	Sample	Phenomenom of Interest	Design and Research Type	Evaluation
9.	Marume (2023) (18) Tittle : Predictors of stunting among children aged 6 – 59 months , Zimbabwe. Journal: Public Health Nutrition	Data were collected from caregivers of 150 children aged between 6 and 59 months with stunting and from caregivers of 300 children without stunting.	Dependent variable: stunting Independent variables: Household category and family factors, complementary feeding, breastfeeding, infections, and community and social factors were considered in the analysis	Case-control & Quantitative	Child's age, birth length, birth weight, and weight-for-age (child-related factors), caregiver's age, mother's HIV status, occupation, and education (parent factors), breastfeeding status, number of meals, and diet quality (dietary factors), child's appetite, diarrhea, and worm infections (childhood illnesses), income status, access to clean water, access to toilets, health clubs, and maternal support for infant feeding (household and sociocultural factors) were all found to be significant predictors of childhood stunting
10.	Mulyanti (2021) (19) Tittle : Faktor- Faktor Yang Berhubungan Dengan Terjadinya Stunting Pada Balita Usia 24-59 Bulan Di Kelurahan Setiawargi Kota Tasikmalaya Tahun 2020. Journal: Jurnal Ilmiah KesehatanPencerah	The population for this study consisted of all mothers with toddlers aged 24–59 months, with a sample of 160 participants divided into two groups: the first group of 80 participants was the case group, comprising mothers with toddlers aged 24–59 months who were stunted; the second group of 80 participants was the control group, comprising mothers with toddlers aged 24–59 months who were not stunted.	The independent variables in this study were low birth weight (LBW), exclusive breastfeeding, immunization status, parental education, and family economic status. The dependent variable was toddlers aged 24–59 months with stunting.	Case-control & Quantitative	The study results indicated that the variables associated with stunting were LBW (p-value 0.000, 95% CI 105.584–2252.415), exclusive breastfeeding p-value 0.000 (95% CI 16.997 – 136.450), immunization status p-value 0.000 (95% CI 18.704 – 129.228), parental education p-value 0.011 (95% CI 1.297 – 5.221), family economic status p-value 0.008 (95% CI 1.416 – 8.230)
11.	Noor (2022) (20) Tittle : Services , and Toddler ' s Characteristics as Stunting Risk Factors. Journal: Nutrient	The number of toddlers obtained from the 2018 South Kalimantan Basic Health Research data was 1,218 toddlers, and all of them were included in the sample.	The dependent variable of this study was the prevalence of stunting, defined as height-for-age below -2 SD from the WHO child growth standards. The independent variables of this study were classified into sociodemographic characteristics, utilization of maternal health services, and	Cross-sectional & Quantitative	There was an association between maternal education level (p = 0.001), paternal education (p = 0.002), toddler age (p < 0.001), low birth weight (p = 0.05), exclusive breastfeeding (p = 0.008), and underweight status (p = 0.000) with stunting. The data were analyzed using logistic

No	Journal Bibliography	Sample	Phenomenom of Interest	Design and Research Type	Evaluation
			toddler characteristics		regression analysis, and the dominant variables associated with stunting were being underweight ($p < 0.001$ with an OR of 18.241), toddler age ($p < 0.001$, with an OR of 9.511 for ages 24–35 months), and preterm birth ($p = 0.027$ with an OR of 2.187).
12.	Ramli (2023) (21) Tittle : Hubungan Berat Badan Lahir , Status Imunisasi , dan Riwayat Penyakit Infeksi dengan Kejadian Stunting pada Balita di Puskesmas Kassi-Kassi Kota Makassar. Journal: Alami Journal : Alauddin Islamic Medical Journal	The study population consisted of toddlers within the service area of the Kassi-Kassi Community Health Center, totaling 1,433 toddlers. Using purposive sampling in accordance with the inclusion criteria, a sample of 251 toddlers was obtained.	Dependent variable: stunting; independent variables: birth weight, immunization status, history of infectious diarrhea, and history of acute respiratory infections.	Cross-sectional & Quantitative	There was an association between birth weight (p -value 0.000), immunization status (p -value 0.000), and history of infectious diarrhea with the incidence of stunting (p -value 0.023), and no association was found between history of ARI and the incidence of stunting (p -value 0.551) among toddlers at the KassiKassi Community Health Center.
13.	Sari (2020) (22) Tittle : Berat bayi lahir dan kejadian stunting pada anak usia 6-59 bulan di Kecamatan Seberang Ulu I Palembang. Journal: Jurnal Gizi Indonesia (The Indonesian Journal of Nutrition)	The sample in this study consisted of mothers with children aged 6–59 months	Dependent variable: stunting Independent variable: birth weight	Cross-sectional & Quantitative	Low birth weight is associated with the incidence of stunting in children aged 6–59 months in Seberang Ulu I District, Palembang, with confounding factors including child age, maternal age at delivery, access to a toilet, and monthly household income; whereas birth length, sex, maternal handwashing behavior, and source of drinking water were not associated with the incidence of stunting in the results of this study.

No	Journal Bibliography	Sample	Phenomenom of Interest	Design and Research Type	Evaluation
14.	Sutarto. (2021) (23) Tittle: Analisa Riwayat Pemberian ASI Eksklusif dengan Stunting pada Balita Usia 24-59 Bulan di Wilayah Kerja Puskesmas Way Urang Kabupaten Lampung Selatan Journal: Jurnal kesehatan masyarakat indonesia.	The study sample consisted of 43 toddlers aged 24–59 months, including both cases (stunted) and controls (non-stunted toddlers) in the service area of the Way Urang Community Health Center, South Lampung Regency, in 2019.	Dependent variable: stunting. Independent variable: exclusive breastfeeding	Case-control & Quantitative	Toddlers with a history of non-exclusive breastfeeding have an 8.2-fold higher risk of becoming stunted compared to toddlers with a history of exclusive breastfeeding
15.	Tang (2022) (24) Tittle : The Effect of Risk Accumulation on Childhood Stunting : A Matched Case-Control Study in China. Journal: Frontier in Pediatric	173 non-stunted children under 7 years of age	Dependent variable: stunting. Independent variables: genetic factors, maternal conditions, family socioeconomic status, perinatal conditions, and feeding practices	Case-control & Quantitative	The risk of stunting increases by a factor of 1.199 if the cumulative risk score for perinatal conditions increases by one, and the probability of stunting is 75.8% if the cumulative risk score for perinatal conditions is ≥ 1.
16.	Taswin. (2023) (25) Tittle : Pemberian Asi Eksklusif Dan Imunisasi Dasar Dengan Kejadian Stunting Pada Balita Journal: Jurnal Kebidanan Malakbi	The study population in this research consisted of 325 toddlers, with the toddlers' mothers serving as respondents in the Pasarwajo subdistrict. The sample size to be studied was 78 respondents, determined using the Slovin formula.	The dependent variable was the incidence of stunting among toddlers, while the independent variables were exclusive breastfeeding and routine immunizations	Cross-sectional & Quantitative	There is a relationship between exclusive breastfeeding and basic immunization and the incidence of stunting in toddlers aged 9–59 months in Pasarwajo Subdistrict, Buton Regency
17.	Wulandiana (2021) (26) Tittle : Faktor yang Berhubungan dengan Kejadian Stunting pada Baduta di Wilayah Kerja Puskesmas Wonokusumo Journal: Media Gizi Kesmas	The sample in this study consisted of 60 participants.	The variables used were the independent variable (incidence of stunting) and the dependent variables (number of children, maternal education, maternal employment, exclusive breastfeeding status, basic immunization status, history of infectious diseases, and active attendance at integrated health	Cross-sectional & Quantitative	There is a significant association between not actively attending Posyandu and the incidence of stunting ($p=0.03$; $OR=0.21$). Meanwhile, there is no significant association between the number of children, maternal knowledge level, maternal employment status, exclusive breastfeeding status, basic immunization completion status, and history of infectious diseases ($p>0.05$) and

No	Journal Bibliography	Sample	Phenomenom of Interest	Design and Research Type	Evaluation
			service posts).		the incidence of stunting.
18.	Amalia (2023) (27) Tittle : Analisis Determinan Kejadian Stunting di Wilayah Pesisir Danau Limboto Journal: Muhammadiyah Journal of Nutrition and Food Science (MJNF)	Accidental sampling was used to select 225 toddlers	Determinants of stunting include socioeconomic characteristics, environmental sanitation, health history, and feeding practices among toddlers	Cross-sectional & quantitative	There is an association between birth weight and length, history of illness, and nutritional status monitoring and the incidence of stunting.
19.	Tatu (2021) (28) Tittle : Faktor-Faktor Resiko Yang Berhubungan Dengan Kejadian Stunting Pada Balita Di Desa Kabuna Kecamatan Kakuluk Mesak Kabupaten Belu Journal: Jurnal sahabat keperawatan, 3(1), pp. 13–17.	The population in this study consisted of mothers of stunted toddlers and the stunted toddlers themselves, with a total sample size of 62 mothers.	Factors associated with the incidence of stunting among toddlers in Kabuna Village, Kakuluk Mesak Subdistrict, Belu Regency	Cross-sectional & Quantitative	There is a significant association between family socioeconomic characteristics, parenting practices, low birth weight, and environmental sanitation and the prevalence of stunting among toddlers in Kabuna Village, Kakuluk Mesak Subdistrict, Belu Regency.

Stunting in young children is influenced by various interrelated key factors, particularly biological, behavioral, and socioeconomic factors. Biological factors such as low birth weight, the child's health status, and the mother's nutritional status during pregnancy have been shown to have a strong association with the occurrence of stunting. In addition, feeding practices such as exclusive breastfeeding and the child's dietary patterns are also important determinants.

On the other hand, socioeconomic factors such as parental education, family income, and environmental and sanitation conditions also increase the risk of stunting. This indicates that stunting is a complex problem requiring a comprehensive approach addressing health, behavioral, and environmental aspects.

RESULT AND DISCUSSION

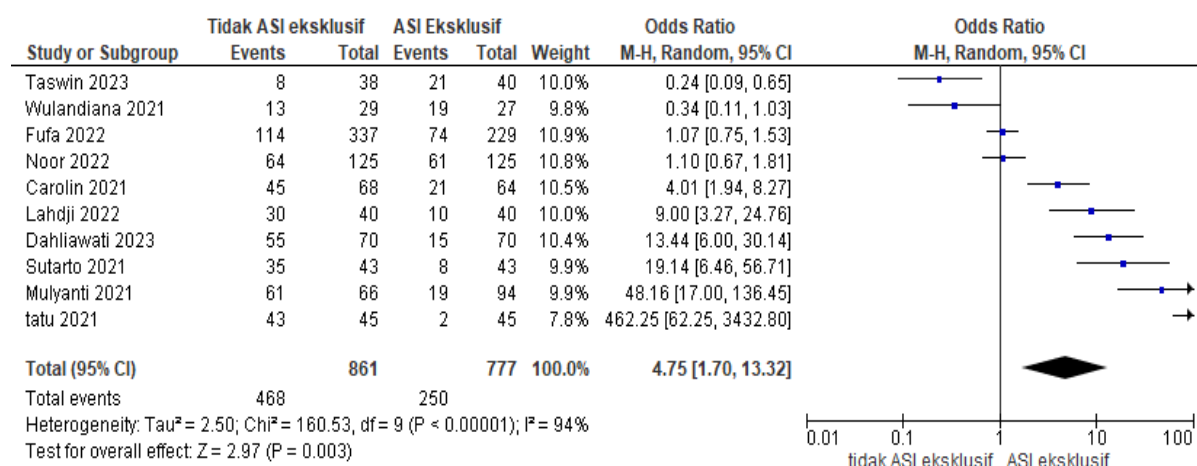
Table 1. Characteristics of the Relationship between Exclusive Breastfeeding and Stunting

No	Author (year)	Number of samples	Not exclusive breastfeeding		exclusive breastfeeding	
			Events	Total	Events	Total
1.	Tawin (2023)	78	8	38	21	40
2.	Wulandiana (2021)	56	13	29	19	27
3.	Fufa (2022)	566	114	337	74	229
4.	Noor (2022)	250	64	125	61	125
5.	Carolina (2021)	132	45	68	21	64
6.	Lahji (2022)	80	30	40	10	40
7.	Dahliawati (2023)	140	55	70	15	70
8.	Sutarto (2021)	86	35	43	8	43
9.	Mulyanti (2021)	160	61	66	19	94
10.	Tattoos (2021)	90	43	45	2	45

Table 2. Characteristics of the Relationship between Birth Weight and Stunting

No	Author (year)	Number of samples	Low birth weight babies		Normal birth weight babies	
			Events	Total	Events	Total
1.	Lukman (2021)	90	10	50	37	40
2.	Fikri (2023)	40	9	21	11	19
3.	Hidayati (2022)	56	11	14	34	42
4.	Marume (2023)	450	51	92	99	358
5.	Sari (2020)	188	11	16	63	172
6.	Amalia (2023)	225	22	28	92	197
7.	Tang (2022)	346	41	52	132	294
8.	Indrianti (2019)	229	19	22	105	207
9.	Ramli (2023)	251	34	38	80	213
10.	Dahliawati (2023)	140	29	32	41	108

Both tables indicate that exclusive breastfeeding and birth weight are significantly associated with the occurrence of stunting among children under five. In general, children who did not receive exclusive breastfeeding tended to have a higher proportion of stunting compared with those who received exclusive breastfeeding. In addition, infants with low birth weight (LBW) also showed a greater tendency to experience stunting compared with infants with normal birth weight. These findings reinforce that exclusive breastfeeding practices and birth weight status are important risk factors that need to be considered in efforts to prevent stunting.



Note: tidak ASI eksklusif (in english: not exclusively breastfed)
ASI eksklusif (in english: exclusively breastfed)

Figure 1. Results of a meta-analysis of studies assessing the relationship between exclusive breastfeeding and stunting

Figure 1 shows the results of a meta-analysis of 10 studies regarding the relationship between exclusive breastfeeding and stunting and were analyzed using a random effect model. The results of the analysis showed that the variation in the study had high heterogeneity ($I^2=94\%$, p for heterogeneity <0.00001). The results of data analysis on the forest plot show that there is a significant relationship between exclusive breastfeeding and stunting ($POR = 4.75$, $95\% CI 1.70-13.32$, $p < 0.003$) so that it can be concluded that exclusive breastfeeding is associated with an increased risk of 4.75 times more likely to experience stunting than babies who are exclusively breastfed.

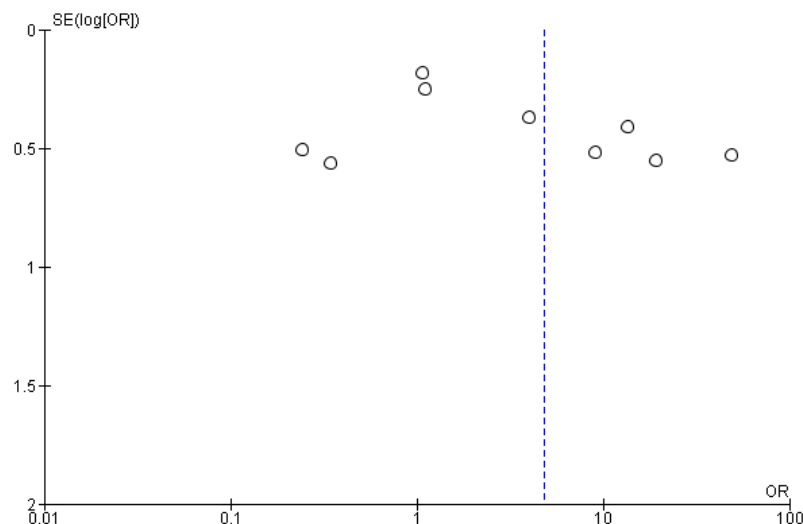


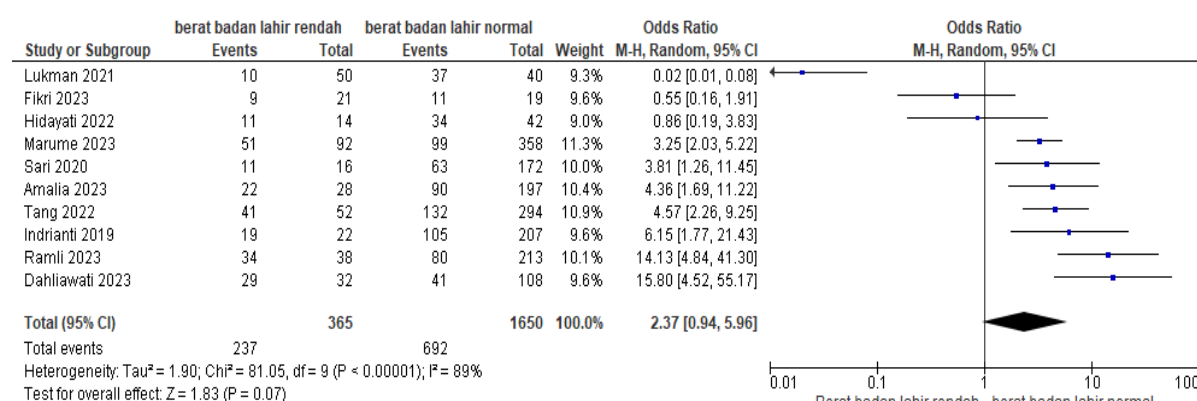
Figure 2. Funnel Plots assessing the relationship between exclusive breastfeeding and stunting

Figure 2 shows the funnel plot of the relationship between exclusive breastfeeding and stunting. The funnel plot above shows a symmetric research distribution, where the distribution is unequal to the left and right of the center line, meaning there is no publication bias. The results of a meta-analysis of 10 studies regarding the relationship between exclusive breastfeeding and stunting were analyzed using a random effect model. The results of the analysis showed that the variation in the study had high heterogeneity ($I^2=94\%$, p for heterogeneity <0.00001). The results of data analysis on the forest plot showed that there was a significant relationship between exclusive breastfeeding and stunting ($POR = 4.75$, $95\% CI 1.70-13.32$, $p < 0.003$) so that it can be concluded that exclusive breastfeeding is associated with increased 4.75 times the risk of experiencing stunting compared to babies who are exclusively breastfed. This is in line with a study by Rusmiyati showed there is a relationship between exclusive breastfeeding and the incidence of stunting in toddlers with OR value of 1.657.²⁹

Exclusive breastfeeding is one of the things that influences the incidence of stunting. Exclusive breastfeeding is giving only breast milk to babies from birth to 6 months of age. The magnitude of the effect of exclusive breastfeeding on the nutritional status of children makes WHO recommend implementing interventions to increase breastfeeding for the first 6 months as one of the steps to achieve the WHO Global Nutrition Targets 2025³⁰

Breastfeeding has many advantages for infants, namely obtaining optimal nutritional status, increasing cognitive abilities, reducing the risk of obesity, preventing infection, reducing the risk of allergies, and reducing the risk of morbidity in children.³¹ Breast milk is natural food, high energy, easy to digest and contains a balanced and perfect nutritional composition for the growth and development of babies which is available at any time, and is free from contamination. Breast milk contains a variety of nutrients that can meet the needs of infants in their growth and development. Breast milk also contains various specific and non-specific protections that can protect babies from various infections such as Ig A, Ig G, Ig M, Lysosine and lactoferrin which are not found in cow's milk. Exclusive breastfeeding will provide immunity to toddlers so they are not susceptible to various infections. The nutrition provided is very complete and in accordance with the needs of toddlers. This of course will maximize the growth and development of toddlers and will not experience stunting.³³

Follow-up from the government to increase coverage of exclusive breastfeeding by issuing Government Regulation (PP) number 33 of 2012 regarding exclusive breastfeeding, contained in article 6 which reads that "Every mother giving birth is obliged to use exclusive breastfeeding for 6 (six) months" (Government Regulation 33, 2012).



Note: low birth weight
normal birth weight

Figure 3. Results of a meta-analysis for studies assessing the association of low birth weight with stunting

Figure 3 presents the results of a meta-analysis of 10 studies examining the relationship between birth weight and stunting using a random-effects model. The analysis showed substantial heterogeneity among the included studies ($I^2 = 89\%$, p for heterogeneity < 0.00001). The forest plot showed that there was no statistically significant association between birth weight and stunting ($\text{POR} = 2.37$, 95% CI: 0.94–5.96, $p = 0.07$). Although the pooled estimate indicated a tendency toward higher odds of stunting among children with low birth weight compared with those with normal birth weight, the association did not reach statistical significance.

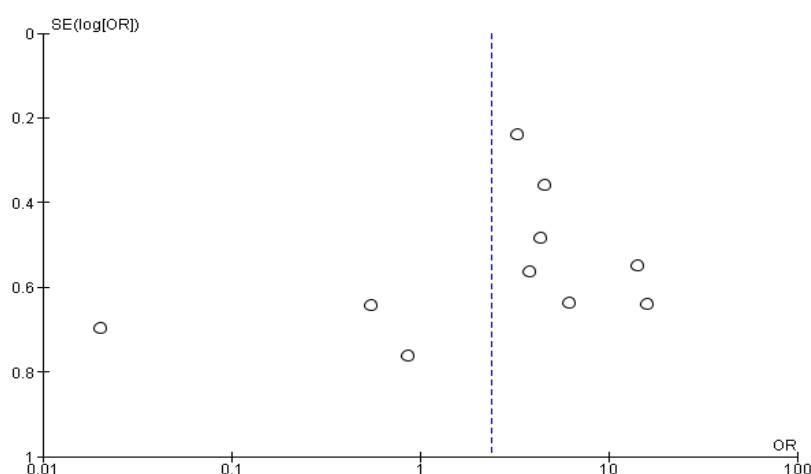


Figure 4. Funnel plot for studies assessing the relationship between birth weight and stunting

Based on Figure 4, it shows the funnel plot of the relationship between birth weight and stunting. The funnel plot above shows that the research distribution is not symmetrical, where the distribution is balanced left and right of the center line, meaning there is have publication bias. This suggests the potential for publication bias or the small-study effect, in which studies with certain results (e.g., significant findings) are reported more frequently than those with non-significant results. Therefore, the results of meta-analyses examining the relationship between birth weight and stunting should be interpreted with caution due to the possibility of such bias.

The results of a meta-analysis of 10 studies regarding the relationship between birth weight and stunting were analyzed using a random effect model. The results of the analysis showed that the study variations had high heterogeneity ($I^2=89\%$, p for heterogeneity <0.00001). The results of data analysis on the forest plot showed that there was no significant relationship between low birth weight and stunting ($\text{POR} = 2.37$), 95% CI 0.94-5.96, $p < 0.07$) so it can be concluded that low birth weight is associated with a 2.37-fold increased risk of experiencing stunting compared to normal birth weight

Birth weight is the weight of the baby weighed within the first hour after birth. The relationship between birth weight and gestational age, birth weight can be grouped into: preterm infants (BKB), namely babies born with a gestational age <37 weeks (259 days). Full-term babies (BCB), babies born with a gestation period between 37-42 weeks (259 - 293 days), and Over-term babies (BLB), babies born with a gestation period of > 42 weeks (294 days).³⁴

Low birth weight babies are an important problem in their management because they have a tendency towards increasing the occurrence of infections, difficulty controlling the body's breath so that they are easy to suffer from hypothermia. In addition, babies with Low Birth Weight (LBW) are susceptible to certain complications such as jaundice, hypoglycemia which can cause death. The group of low birth weight babies which can be termed as a high risk group, because low birth weight babies show higher mortality and health rates with sufficient birth weight babies.³⁵

LBW babies will grow and develop more slowly because babies with LBW have experienced intrauterine growth retardation since birth and will continue until the next age after birth, namely experiencing growth and development that is slower than babies who are born normally, and often fail to catch up with the growth rate. that should have been achieved at the age after birth. LBW also experience digestive disorders, because the digestive tract is not yet functioning, such as being unable to absorb fat and digest protein, resulting in a lack of reserves of nutrients in the body. As a result, the growth of LBW babies will be disrupted, if this situation continues with insufficient feeding, frequent infections and poor health care will cause stunting.³⁶

Birth weight is one of the problems of child nutrition, the child's health condition at the beginning of life. This condition is in line with several studies conducted by Birth weight in which the results of this study did not show a relationship with the incidence of stunting in toddlers. the largest body is at the age of the first 6 months. If in the first 6 months a toddler can improve his nutritional status, then there is a possibility that the toddler's height can grow normally and prevent stunting at a later age.³⁷

CONCLUSION

Based on a meta-analytic study entitled the relationship between exclusive breastfeeding and birth weight with stunting in toddlers, the following conclusions can be drawn so it can be concluded that exclusive breastfeeding is related with a 4.75-fold increased risk of experiencing stunting compared to babies who are not exclusively breastfed and low birth weight is associated with a 2.37-fold increased risk of experiencing stunting compared to normal birth weight

AUTHOR'S CONTRIBUTION STATEMENT

The contributions of the authors are as follows: SHZ conceptualized the study and wrote the entire original draft; NSS and FH contributed to the methodology design and data analysis; WN and FDP provided data for discussion and contributed to data analysis; and WS contributed to manuscript editing and supervision.

CONFLICTS OF INTEREST

No author of this paper has a conflict of interest, including specific financial interests, relationships, and/or affiliations relevant to the subject matter or materials included in this manuscript.

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