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Meta-analysis

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Meta-Analysis: Effects of Exclusive Breastfeeding, Antenatal Care Visit, and Maternal Education on Stunting in Toddlers

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ABSTRACT

Background: Stunting is a condition in which toddlers have less height according to their age. WHO reports that there are around 149.2 million toddlers experiencing stunting worldwide. This study aims to analyze and estimate the magnitude of the effect of exclusive breastfeeding, antenatal care visits, and maternal education level on the incidence of stunting among toddlers based on the results of similar previous studies.
Subjects and Method: This study is a systematic review and meta-analysis using the PRISMA flow chart and the PICO model. Population: toddlers. Intervention: exclusive breastfeeding, the mother often visits antenatal care, and high maternal education. Comparison: not exclusive breastfeeding, mothers rarely visit antenatal care, and low maternal education. Outcome: stunting. The databases used were Google Scholar, PubMed, ScienceDirect, Elsevier, Scopus, SpringerLink, BioMed Central, PLOS ONE, and Emerald with the keywords ("Exclusive Breastfeeding" OR "Antenatal Care" OR "Mother's Education") AND "Stunting" AND "Children" AND "aOR". There were 15 cross-sectional studies published in 2013-2023 that met the inclusion criteria. Analysis data were RevMan 5.3.
Results: A meta-analysis of 15 articles with a cross-sectional study design was carried out from Ethiopia, India, Tanzania, Rwanda, Pakistan and Indonesia in under-fives with a sample size of 285,221. The results of the meta-analysis showed that toddlers who were exclusively breastfed experienced stunting by 0.54 times compared to toddlers who were not exclusively breastfed (aOR= 0.54; 95% CI= 0.35 to 0.85; p<0.001), toddlers born to mothers who had frequent antenatal visits care experienced stunting by 0.81 times compared to toddlers born to mothers who rarely visited antenatal care (aOR= 0.81; 95% CI= 0.72 to 0.90; p= 0.001), and toddlers born to mothers with higher education experienced stunting by 0.72 times compared to toddlers born to mothers with low education (aOR= 0.72; 95% CI=0.61 to 0.86; p=0.003).
Conclusion: Toddlers who get exclusive breastfeeding, mothers who often visit antenatal care, and a high level of maternal education can reduce the risk of stunting in toddlers.

Keywords: Exclusive breastfeeding, antenatal care, maternal education, stunting.

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BACKGROUND

Stunting is a condition in which toddlers have less height according to their age. Toddlers who experienced stunting can be identified through the standard World Health Organization-Multicentre Growth Reference Study (WHO-MGRS), if the z-score for height is less than -2 standard deviations (SD), then it is categorized as stunted (Regulation of the Minister of Health of the Republic of Indonesia , 2020).

WHO reports that in 2020, there are around 149.2 million children under the age of 5 years old experiencing stunting worldwide. According to the UNICEF report, in 2020 there are 3 regions that have the highest prevalence of stunting in the world, namely West Africa and Central Africa at 32.5%, East Africa and South Africa at 32.3%, and South Asia at 31.8% (United Nations International Children's Emergency Fund, 2020). Indonesia is the third country with the highest prevalence of stunting in the South-East Asian Region, which is 36.4%, after Timor Leste by 50.5%, and India by 38.4% (Teja, 2019).

Stunting is still a major problem of failure to thrive in toddlers. Stunting is caused by various factors such as children not getting exclusive breastfeeding for 6 months, mothers not having antenatal care (ANC) visits, and low maternal education level (Halim et al., 2018).

Based on research conducted by Tesfaye and Egata (2022), toddlers born to mothers with no formal education have a 3.39 times higher risk of experiencing stunting than toddlers born to mothers with formal education. Toddlers born to mothers who do not complete the fourth antenatal care visit are at risk of being stunted by 4.2 times higher than toddlers born to mothers who complete the fourth antenatal care visit. Toddlers who do not get exclusive breastfeeding have a 3.6 times higher risk of experiencing stunting than toddlers who get exclusive breastfeeding.

Research by Halli et al. (2022) showed different results, it showed that mothers who attended antenatal care visits more than 3 times had a lower chance of having a stunted child compared to mothers who did not attend antenatal care visits. Mothers with more than secondary school education have a lower chance of having stunted children compared to mothers who do not attend school. Toddlers who get exclusive breastfeeding ≤ 6 months have a lower chance of experiencing stunting than toddlers who get exclusive breastfeeding > 6 months.

Based on several research findings on the determinants of stunting in toddlers, it was found that there was a gap between the results of one study and another. There was a difference in the adjusted odds ratio (aOR) and p-value between the effect of exclusive breastfeeding, antenatal care visits, and maternal education level on stunting. Some of these studies were also conducted in different countries and in different years. Based on the existence of this Gap of Knowledge, the researcher conducted a study using a systematic review and meta-analysis of various results of previous primary studies.

The data obtained by the researchers were analyzed using a meta-analytic study design, which is an epidemiological study that provides the strongest evidence in terms of causality by combining and statistically unifying the results of a number of independent primary studies that can be combined (Murti, 2018). This study aimed to analyze and estimate the size of the Gap of Knowledge or the effect of exclusive breastfeeding, antenatal care visits, and maternal education level on the incidence of stunting in toddlers based on the results of similar previous studies.

SUBJECTS AND METHOD

1. Study Design

This study was conducted by systematic review and meta-analysis using primary data, namely data from similar previous research results. Article search using several databases, namely: Google Scholar, PubMed, ScienceDirect, Elsevier, Scopus, Springer Link, BioMed Central, PLOS ONE, and Emerald. The keywords used are ("Exclusive Breastfeeding" OR "Antenatal Care" OR "Mother's Education") AND "Stunting" AND "Children" AND "aOR". There were 15 primary studies that met the inclusion criteria of this study.

2. Steps of Meta-Analysis

1) Formulate research questions through the PICO (Population, Intervention, Comparison, Outcome) format.
2) Search for primary study research articles from several databases namely Google Scholar, PubMed, ScienceDirect, Elsevier, Scopus, Springer Link, BioMed Central, PLOS ONE, and Emerald.
3) Conduct article selection by determining inclusion and exclusion criteria and conducting critical assessments.
4) Extract selected primary study data and synthesizing effect estimates using the RevMan 5.3 application.
5) Interpret the results and draw conclusions.

3. Inclusion Criteria

This full-text article used a cross-sectional study design, the subjects of the study were toddlers, the outcome of the study was stunting, and the results of the analysis used were multivariate analysis with adjusted odds ratio (aOR) to measure the estimated effect.

4. Exclusion Criteria

Articles published in languages other than English, articles before 2013, and outcome measures in research were incomplete or did not clearly describe results.

5. Definition of Operational Variable

Stunting is an event of failure to thrive in children which is characterized by a child having a Z-score TB/U of less than -2 SD.

Exclusive Breastfeeding is breastfeeding only without additional liquids or other solid foods such as formula milk, honey, oranges, water, papaya, bananas, milk porridge, and steam rice until the age of 6 months old.

Antenatal Care is a health service for pregnant women consisting of health promotion, screening, and diagnosis and prevention of co-morbidities.

Maternal Education is the stage of education that is determined based on the level of development, the goals to be achieved, and the will to be developed.

6. Instrument of the Study

The quality assessment of the main article in this study used the Primary Study Quality Assessment for Cross-Sectional Observational Study Design in Meta-Analytic Research sourced from the Master's Program of Public Health Sciences, Postgraduate School, Universitas Sebelas Maret.

7. Data Analysis

The articles in this study were collected using the PRISMA diagram and analyzed using the Review Manager 5.3 application (RevMan 5.3) by calculating the effect size and heterogeneity (I^2) to determine the combined research model and form the final results of the meta-analysis. The results of data analysis were presented in the form of forest plots and funnel plots.

RESULTS

The process of searching for primary articles related to the effect of exclusive breastfeeding, antenatal care visits, and maternal education level on the incidence of stunting in toddlers in this meta-analysis study was carried out in several databases and the results obtained were 15 articles which can be seen in Figure 1 PRISMA Flow Diagram. The

total number of articles in the initial search process was 3,738 articles. After the process of deleting published articles, 1,489 articles were found, with 168 of them meeting the requirements for a full text review. Furthermore, 15 articles that met the quality assessment were included in the quantitative synthesis using meta-analysis.

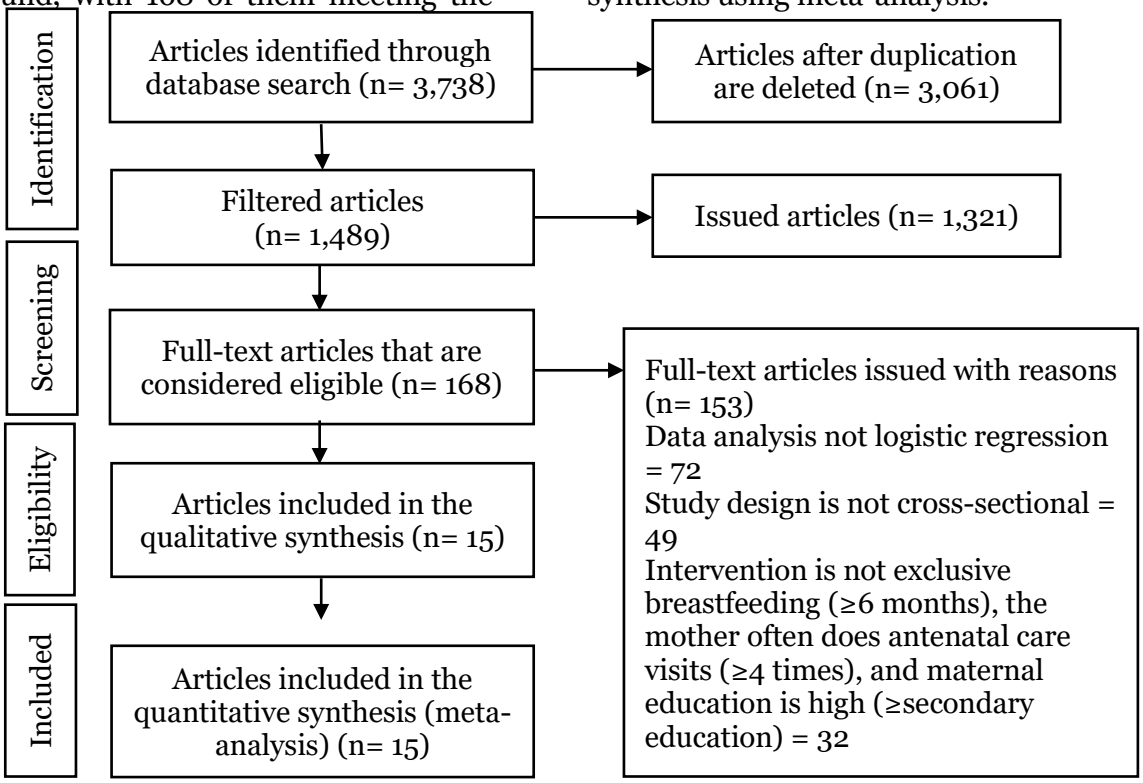

Figure 1. PRISMA 2020 flow diagram on the effect of exclusive breastfeeding, antenatal care visits, and maternal education level on the incidence of stunting in toddlers

Figure 2. Map of the research area on the effect of exclusive breastfeeding, antenatal care visits, and maternal education level on the incidence of stunting in toddlers

Figure 2 shows the distribution area of the 15 primary articles used in this study, namely from the continents of Africa and Asia. There are 12 research articles from the African continent and 3 research articles from the Asian continent.

Table 1 showed the results of the primary research quality assessment used for this study. The assessment of the quality of the primary studies in this study was carried out using the Assessment of Quality of Primary Studies for Observational Cross-Sectional Study Designs in Meta-Analytic Research sourced from the Public Health Sciences Masters Study Program, Post-graduate School, Universitas Sebelas Maret.

Based on the assessment of the quality of the studies, a total score of 14 answers was obtained, which indicated that each study has good quality so it was worthy of being included in the meta-analysis.

Table 1. Results of quality assessment of cross-sectional studies on the effects of exclusive breastfeeding, antenatal care visits, and maternal education on stunting in toddlers

Author (Year)	Criteria of Question							Total
	1	2	3	4	5	6	7	
Uwiringiyimana et al. (2019)	2	2	2	2	2	2	2	14
Tesfaye and Egata (2022)	2	2	2	2	2	2	2	14
Shilugu and Sunguya (2019)	2	2	2	2	2	2	2	14
Bogale et al. (2020)	2	2	2	2	2	2	2	14
Gebreayohanes and Dessie (2022)	2	2	2	2	2	2	2	14
Amaha and Woldeamanuel (2021)	2	2	2	2	2	2	2	14
Gebru et al. (2019)	2	2	2	2	2	2	2	14
Abera et al. (2018)	2	2	2	2	2	2	2	14
Mgongo et al. (2017)	2	2	2	2	2	2	2	14
Sema et al. (2021)	2	2	2	2	2	2	2	14
Chirande et al. (2015)	2	2	2	2	2	2	2	14
Abebe et al. (2017)	2	2	2	2	2	2	2	14
Khan et al. (2019)	2	2	2	2	2	2	2	14
Halli et al. (2022)	2	2	2	2	2	2	2	14
Titaley et al. (2019)	2	2	2	2	2	2	2	14

Descriptions of the question criteria:

1. Formulation of research questions in the PICO acronym

a. Is the population in the primary study the same as the population in the PICO meta-analysis?
b. Is the operational definition of exposure/ intervention in the primary study the same as the definition intended in the meta-analysis?
c. Is the comparison used in the primary study the same as that planned for the meta-analysis?
d. Are the outcome variables studied in the primary study the same as those planned in the meta-analysis?

2. Methods for selecting research subjects

a. Descriptive cross-sectional (prevalence) study: Is the sample randomly selected?
b. Analytic cross-sectional study: Is the sample chosen randomly or purposively?

3. Methods for measuring comparisons (intervention) and result variables (outcome)

a. Are exposure/ intervention and outcome variables measured by the same instrument (measuring instrument) in all primary studies?
b. If variables are measured on a categorical scale, are the cutoffs or categories used the same between the primary studies?

4. Design related bias

a. What is the Response Rate?
b. Is non-response related to outcome?

5. Methods to control the confounding

a. Is there any confusion in the results/ conclusions of the primary study?

b. Does the primary study investigator use appropriate methods to control for the effects of ambiguity?

6. Statistical analysis method

a. In cross-sectional study, is a multivariate analysis performed?
b. Does the primary study report effect sizes or relationships on multivariate analysis?

7. Conflict of Interest

Is there a conflict of interest with the research sponsor?

Scoring guide:

1. The total answer score for each question is "2".
2. If in one question all of the item's answer is "Yes", then give a score of "2" to that question.
3. If in one question there is one item whose answer is "No", then give a score of "1" to that question.
4. If the answer to one question is "No", then give a score of "0" to that question.

The Effect of Exclusive Breastfeeding on Stunting in Toddlers

Table 2 presented the descriptions of 7 observational cross-sectional study articles as a source of meta-analysis of the effect of exclusive breastfeeding on the incidence of stunting in toddlers.

Based on Table 2, the description of primary research on the effect of exclusive breastfeeding on the incidence of stunting in toddlers was conducted through a meta-analysis of 7 articles. The research locations varied, namely Ethiopia, India, Tanzania, and Rwanda. In this study, similarities were found, namely the study design used cross-sectional, the research subjects were toddlers, the intervention provided was exclusive breastfeeding (≥6 months) compared to non-exclusive breastfeeding (<6 months). In this study, there were differences in the number of samples used, the smallest was 138 and the largest sample was 225,002. The total number of samples included in the meta-analysis of the effect of exclusive breastfeeding on the incidence of stunting in toddlers were 229,027 toddlers.

Table 3 listed the results of a statistical summary of the estimated effect with the hight aOR value of 1.06 and the lowest aOR value of 0.22. 95% CI with the largest range of 0.60 to 1.87, while the smallest range is 0.81 to 0.87.

Table 2. Primary studies of exclusive breastfeeding included in the meta-analysis

Author (Year)	Country	Sample	Population	Inter-vention	Compa-rison	Outcome
Abebe et al. (2017)	Ethiopia	764	Children aged 6 to 59 months	EBF in the first 6 months	Not exclu-sively breast-fed for the first 6 months	Stunting
Bogale et al. (2020)	Ethiopia	656	Children aged 6 to 59 months	EBF	Not EBF	Stunting
Gebreayohanes and Dessie (2022)	Ethiopia	554	Children aged 6 to 59 months	EBF ≥6 months	EBF <6 months	Stunting
Halli et al. (2022)	India	225,002	Children aged 0 to 59 months	Duration of EBF ≥6 months	Duration of EBF <6 months	Stunting
Shilugu and Sunguya (2019)	Tanzania	358	Children aged under 5 years	EBF	Not EBF	Stunting
Tesfaye and Egata (2022)	Ethiopia	1,555	Children aged 6 to 59 months	EBF g	Not EBF	Stunting
Uwiringiyimana et al. (2019)	Rwanda	138	Children aged 5 to 30 months	EBF	Not EBF	Stunting

Table 3. Adjusted Odds Ratio (aOR) data and 95% Confidence Interval (95% CI) effect of exclusive breastfeeding on the incidence of stunting in toddlers

Author	Year	aOR	Lower Limit	Upper Limit
Abebe	2017	0.90	0.54	1.50
Bogale	2020	0.64	0.44	0.93
Gebreayohanes	2022	0.39	0.23	0.66
Halli	2022	0.84	0.81	0.87
Shilugu	2019	1.06	0.60	1.87
Tesfaye	2022	0.27	0.20	0.36
Uwiringiyimana	2019	0.22	0.10	0.48

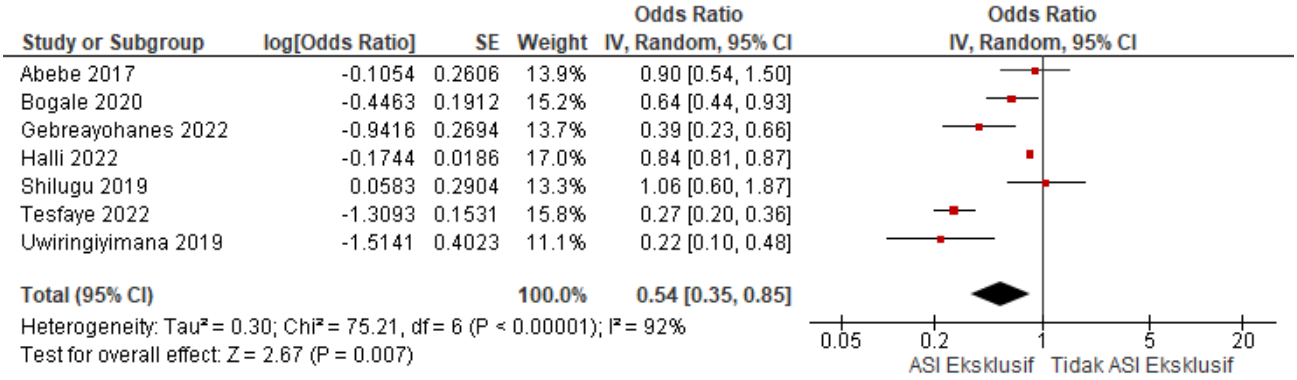

Figure 3. Forest plot of the effect of exclusive breastfeeding on the incidence of stunting in toddlers

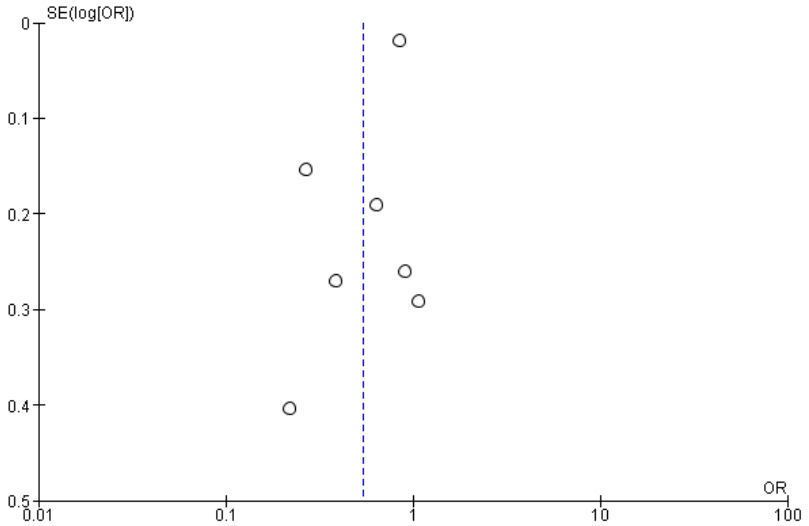

Figure 4. Funnel plot of the effect of exclusive breastfeeding on the incidence of stunting in toddlers

The forest plot in Figure 3 showed that exclusive breastfeeding was effective in reducing the incidence of stunting in toddlers. Toddlers who get exclusive breastfeeding experience stunting by 0.54 times compared to toddlers who do not get exclusive breastfeeding (aOR= 0.54; 95% CI= 0.35 to 0.85; p= 0.007). Estimation of effects between studies showed high heterogeneity (I^2= 92%; p <0.001), with the average calculation of effect estimates using the Random Effect Model (REM) approach).

The funnel plot in Figure 4 showed the

distribution of effect estimates between studies that were balanced to the right and left of the average vertical line of estimates. Figure 4 did not show any publication bias.

The Effect of Antenatal Care Visits on Stunting in Toddlers

Table 4 presented the descriptions of 7 observational cross-sectional study articles as a source of meta-analysis of the effect of antenatal care visits on the incidence of stunting in toddlers.

Based on Table 4, the description of primary research on the effect of antenatal care visits on the incidence of stunting in toddlers was conducted through a meta-analysis of 7 articles. The research locations varied, namely Ethiopia, Tanzania, India, Pakistan, and Indonesia. In this study, similarities were found, namely the study design used cross-sectional, the research subjects were toddlers, the intervention given was that mothers often visited antenatal care (≥4 times) compared to mothers who rarely visited antenatal care (<4 times). In this study, there were differences in the number of samples used, the smallest was 1.164 and the largest sample was 225.002.

Table 5 listed the results of a statistical summary of the estimated effect with the highest aOR value of 1.12 and the lowest aOR value of 0.38.

Table 4. Study descriptions of primary ANC visits included in the meta-analysis

Author (Year)	Country	Sample	Population	Intervention	Comparison	Outcome
Amaha and Woldeamanuel (2021)	Ethiopia	8,855	Children aged 6 to 59 months	Mother often visits antenatal care (at least 4 visits)	Mother rarely visits antenatal care (no antenatal care)	Stunting
Chirande et al. (2015)	Tanzania	7,324	Children aged 0 to 59 months	Mother often visits antenatal care (4+ visits)	Mother rarely visits antenatal care (no visit)	Stunting
Gebru et al. (2019)	Ethiopia	8,855	Children under the age of 5 years old (toddlers)	Mother often visits antenatal care (4-20 visits)	Mother rarely visits antenatal care (no visit)	Stunting
Halli et al. (2022)	India	225,002	Children aged 0 to 59 months	Mother often visits antenatal care (>3 visits)	Mother rarely visits antenatal care (0 visit)	Stunting
Khan et al. (2019)	Pakistan	3,071	Children aged 0 to 59 months	Mother often visits antenatal care (>3 visits)	Mother rarely visits antenatal care (no visit)	Stunting
Sema et al. (2021)	Ethiopia	1,164	Children aged 6 to 59 months	Mother often visits antenatal care (>3 visits)	Mother rarely visits antenatal care (no visit)	Stunting
Titaley et al. (2019)	Indonesia	24,657	Children aged 0 to 2 years old	Mother often visits antenatal care (4 or more visits)	Mother rarely visits antenatal care (no visit)	Stunting

Table 5. Adjusted Odds Ratio (aOR) data and 95% Confidence Interval (95% CI) effect of antenatal care visits on the incidence of stunting in toddlers

Author	Year	aOR	Lower Limit	Upper Limit
Amaha	2021	0.76	0.66	0.88
Chirande	2015	0.78	0.65	0.94
Gebru	2019	0.83	0.68	1.01
Halli	2022	0.81	0.77	0.85
Khan	2019	0.61	0.38	0.98
Sema	2021	0.38	0.19	0.76
Titaley	2019	1.12	0.89	1.41

The forest plot in Figure 5 showed that mothers who frequently make antenatal care visits were

effective in reducing the incidence of stunting in toddlers. Toddlers born to mothers who often make antenatal care visits during pregnancy experience stunting by 0.81 times compared to toddlers born to mothers who rarely make antenatal care visits during pregnancy, and these results were statistically significant (aOR= 0.81; 95% CI= 0.72 up to 0.90; p=0.001). Estimation of the effect between studies showed high heterogeneity (I^2 = 59%; p= 0.020), with the calculation of the average effect estimate using the Random Effect Model (REM) approach.

The funnel plot in Figure 6 showed the unequal distribution of effect estimates between studies to the right and left of the estimated mean vertical line. Figure 6 showed that there was publication bias (underestimate).

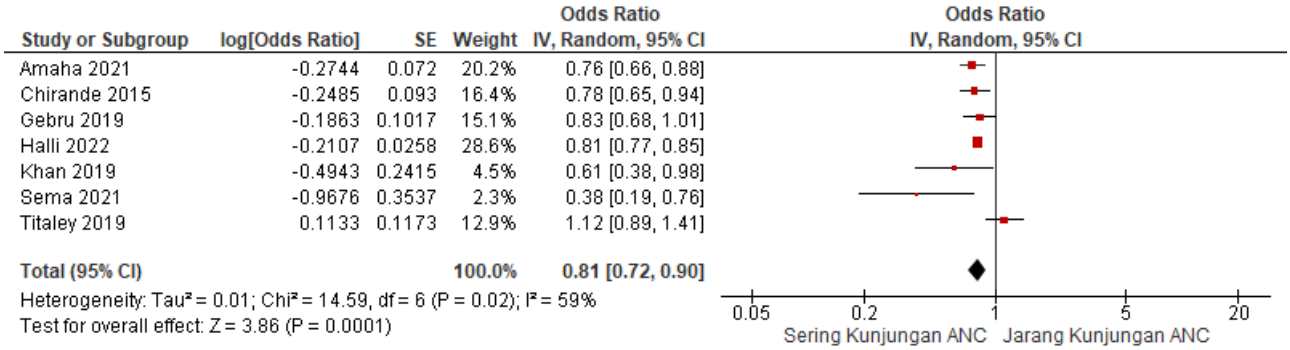

Figure 5. Forest plot of the effect of antenatal care visits on the incidence of stunting in toddlers

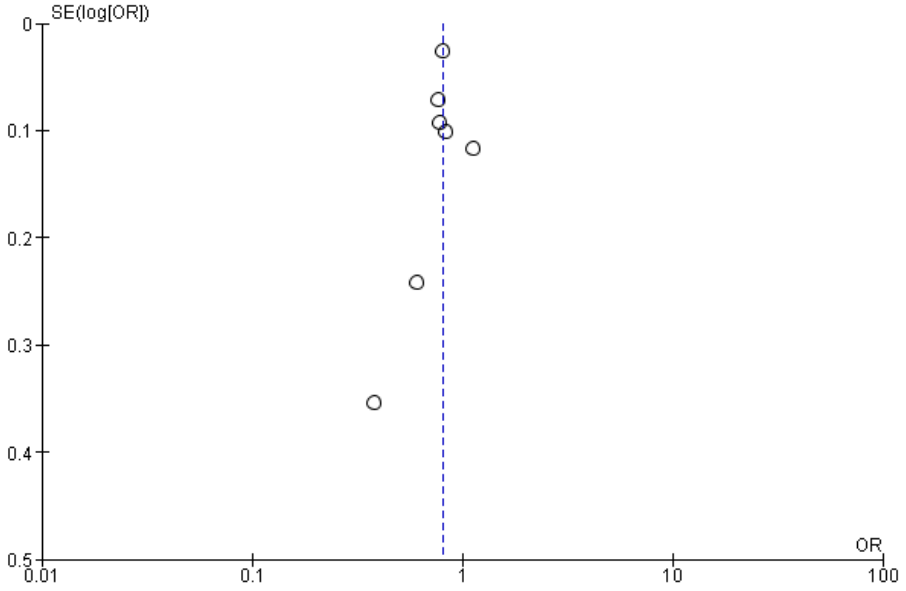

Figure 6. Funnel plot of the effect of antenatal care visits on the incidence of stunting in toddlers

The Effect of Maternal Education Level on Stunting in Toddlers

Table 6 presented the descriptions of 7 observational cross-sectional study articles as a source of meta-analysis of the effect of mother's education level on the incidence of stunting in toddlers.

Based on table 6, the description of the primary research on the effect of the maternal education level on the incidence of stunting in toddlers was conducted through a meta-analysis of 7 articles. The research locations varied, namely Ethiopia and Tanzania. In this

study, similarities were found, the research design used cross-sectional, the research subjects were toddlers, the intervention given was high maternal education (≥ secondary education) with low maternal education in comparison (<secondary education). In this study, there were differences in the number of samples used, the smallest was 358 and the largest sample was 8,855.

Table 7 listed the results of a statistical summary of the estimated effect with the highest aOR value of 0.96 and the lowest aOR value of 0.32.

Table 6. Primary study descriptions of maternal education included in the meta-analysis

Author (Year)	Country	Sample	Population	Intervention	Comparison	Outcome
Abebe et al. (2017)	Ethiopia	764	Children aged 6 to 59 months	High maternal education (secondary education and above)	Low maternal education (illiteracy)	Stunting
Abera et al. (2018)	Ethiopia	398	Children aged 6 to 59 months	High maternal education (secondary education and above)	Low maternal education (illiteracy)	Stunting
Bogale et al. (2020)	Ethiopia	656	Children aged 6 to 59 months	High maternal education (secondary education and above)	Low maternal education (no formal education)	Stunting
Chirande et al. (2015)	Tanzania	7,324	Children aged 0 to 59 months	High maternal education (secondary education and above)	Low maternal education (no formal education)	Stunting
Gebru et al. (2019)	Ethiopia	8,855	Children under 5 years old (toddlers)	High maternal education (secondary education and above)	Low maternal education (no formal education)	Stunting
Mgongo et al. (2017)	Tanzania	1,870	Children aged 0 to 24 months	High maternal education (secondary education and above)	Low maternal education (no education/no primary education)	Stunting
Shilugu and Sunguya (2019)	Tanzania	358	Toddlers	High caregiver education (post-primary)	Low caregiver education (no education)	Stunting

Table 7. Adjusted Odds Ratio (aOR) data and 95% Confidence Interval (95% CI) effect of mother's education level on the incidence of stunting in toddlers

Author	Year	aOR	Lower Limit	Upper Limit
Abebe	2017	0.96	0.60	1.54
Abera	2018	0.32	0.06	1.71
Bogale	2020	0.88	0.47	1.65
Chirande	2015	0.62	0.41	0.94
Gebru	2019	0.73	0.57	0.93
Mgongo	2017	0.60	0.30	1.20
Shilugu	2019	0.53	0.19	1.48

The forest plot in Figure 7 showed that mothers with higher education were effective in reducing the incidence of stunting in toddlers. Toddlers born to mothers with high education experience stunting by 0.72 times compared to toddlers born to mothers with low education, and these results were statistically significant (aOR= 0.72; 95% CI= 0.61 to 0.86; p= 0.003). The estimated effect between studies showed low heterogeneity (I^2= 0%; p= 0.700), with the calculation of the average effect estimate using the Fixed Effect Model (FEM) approach.

The funnel plot in Figure 8 showed the unequal distribution of effect estimates between studies to the right and left of the estimated mean vertical line. Figure 8 showed that there was a publication bias (overestimate).

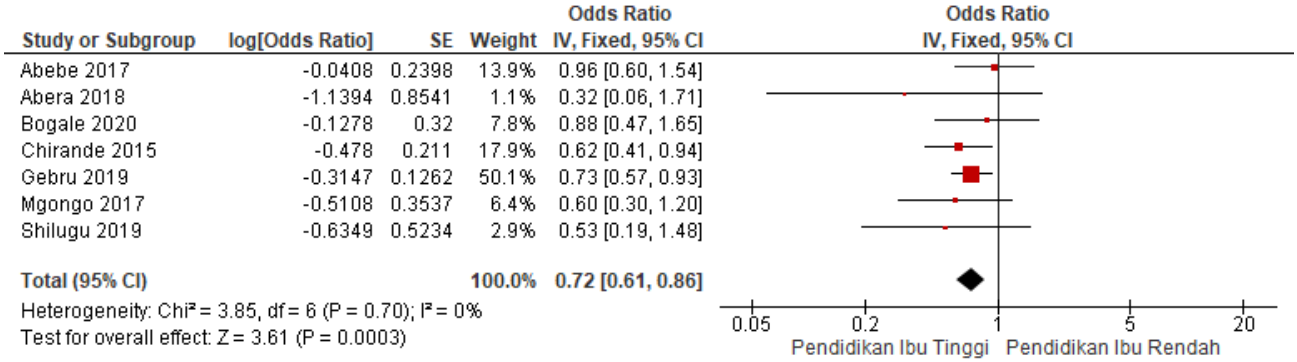

Figure 7. Forest plot of the effect of the maternal education level on the incidence of stunting in toddlers

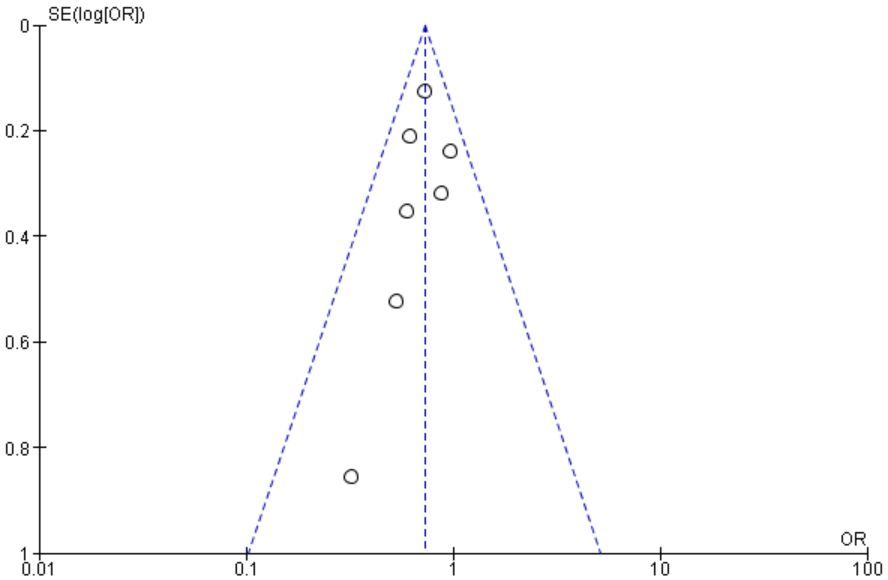

Figure 8. Funnel plot of the effect of the maternal education level on the incidence of stunting in toddlers

DISCUSSION

The Effect of Exclusive Breastfeeding on Stunting in Toddlers

The problem of stunting indicates insufficient long-term nutritional intake in children due to a lack of energy, protein, and several other micronutrients. For this reason, it is very important to emphasize balanced nutritional intake during the toddler age,

especially fulfilling nutrition in children aged 0 to 6 months. One of the foods that contain protein which is ideal and appropriate for the physical and psychological health of babies is breastfeeding (Anissa and Dewi, 2021).

Based on the results of a meta-analysis of 7 primary studies in this study, it shows that exclusive breastfeeding is effective in reducing the incidence of stunting in toddlers. Toddlers who get exclusive breastfeeding experience stunting by 0.54 times compared to toddlers who do not get exclusive breastfeeding, and these results are statistically significant (aOR= 0.54; 95% CI= 0.35 to 0.85; p= 0.007).

The results of this study are in line with research by Lestari et al. (2018) which showed that exclusive breastfeeding can reduce the incidence of stunting which has a probability of 0.23 times compared to toddlers who are not exclusively breastfed (aOR= 0.234; 95% CI= 0.061 to 0.894; p= 0.034). Another similar study conducted by Anindya et al. (2020) shows that there is a direct relationship between exclusive breastfeeding and the incidence of stunting. Infants with exclusive breastfeeding will have a 0.6 times lower risk of experiencing stunting compared to babies who are not exclusively breastfed.

The Effect of Antenatal Care Visits on Stunting in Toddlers

A history of antenatal care visits is a risk factor for stunting in toddlers. Antenatal care visits made by mothers regularly during pregnancy can reduce the risk of pregnancy complications. Pregnancy checks need to be done to optimize the mental and physical condition of the mother and baby. An incomplete history of antenatal care visits can increase the risk of stunting (Hutasoit et al., 2020).

Based on the results of a meta-analysis of 7 primary studies in this study, it shows that mothers who frequently make antenatal care visits are effective in reducing the incidence of stunting in toddlers. Toddlers born to mothers who often make antenatal care visits during pregnancy experience stunting by 0.81 times lower compared to toddlers born to mothers who rarely make antenatal care visits during pregnancy, and these results are statistically significant (aOR= 0.81; 95% CI= 0.72 up to 0.90; p= 0.001).

The results of this study are in line with research by Halli et al. (2022) which stated that mothers who attended antenatal care visits more than 3 times during pregnancy had a 0.81 times lower chance of having a stunted child compared to mothers who did not attend antenatal care visits (aOR= 0.81; 95% CI= 0.77 to 0.84; p<0.001). Another similar study conducted by Eka et al. (2020), shows that mothers with a history of frequency of antenatal care visits that are not as recommended are 0.19 times more likely to have stunted toddlers compared to mothers with a history of frequency of antenatal care visits as recommended (aOR= 0.194; CI 95%= 0.056 to 0.670; p= 0.010).

The Effect of Maternal Education on Stunting Incidents in Toddlers

Low maternal education level affects the health status of her child, the lower the mother's education level, the more difficult it is for the mother to obtain and receive health information and treat health problems that are not appropriate. This is what increases the risk of children experiencing stunting (Setiawan et al., 2018).

Based on the results of a meta-analysis of 7 primary studies in this study, it shows that mothers with higher education are effective in reducing the incidence of stunting in toddlers. Toddlers born to mothers with high education experience stunting by 0.72 times lower compared to toddlers born to mothers with low education, and these

results are statistically significant (aOR= 0.72; 95% CI= 0.61 to 0.86; p= 0.003).

This research is in line with the research of Habimana and Biracyaza (2019) which stated that mothers who do not have a formal education level influence the incidence of stunting in children. Children born to mothers who do not have formal education have a higher risk of stunting than mothers with primary school education level (aOR= 0.362; 95% CI= 0.376 to 1.033; p= 0.369), high school level (aOR= 0.337; 95% CI= 0.413 to 1.039; p= 0.375), and university level (aOR= 0.340; 95% CI= 0.409 to 1.077; p= 0.374). Another similar study was conducted by Zakaria and Suma (2020) which showed that a high level of maternal education reduces the risk of stunting in children aged 24 to 59 months. Mothers with higher education had a 0.81 times lower chance of having stunted children than mothers with low education (aOR= 0.81; 95% CI= 0.03 to 1.21; p= 0.077).

AUTHORS CONTRIBUTION

Putri Inrian Tari as a researcher who selected topics, searched for and collected research data. Setyo Sri Rahardjo and Noor Alis Setiyadi analyzed the data and reviewed research documents.

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CONFLICT OF INTEREST

There was no conflict of interest in this study.

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