



## Early marriage is a risk factor for stunting in children in Gunungkidul Regency

Angelia Anisa Amelia Tengjaya, Hildagardis Meliyani Erista Nai\*, Hiasinta Anatasia Purnawijayanti

Department of Nutrition, Sekolah Tinggi Ilmu Kesehatan Panti Rapih Yogyakarta, Jalan Tantular No.401  
Pringwulung, Condongcatu, Depok, Sleman, Yogyakarta, Indonesia

\*Correspondence: [hildagardis\\_meliyani@stikespantirapih.ac.id](mailto:hildagardis_meliyani@stikespantirapih.ac.id)

### ABSTRAK

**Latar Belakang:** Prevalensi stunting pada tahun 2022 di Indonesia masih tinggi, yaitu 21,6%. Stunting pada anak balita dapat disebabkan karena adanya masalah gizi selama periode 8000 Hari Pertama Kehidupan. Faktor usia ibu saat menikah juga dapat menyebabkan stunting pada anak balita. Masih ada kejadian pernikahan usia dini (menikah pada usia <19 tahun) di Kabupaten Gunungkidul. Ada 312 kasus pernikahan dini (menikah pada usia <19 tahun) di Kabupaten Gunungkidul pada periode tahun 2017 - 2022.

**Tujuan:** Untuk menganalisis hubungan antara pernikahan usia dini dengan kejadian stunting pada anak usia 0-59 bulan di Kabupaten Gunungkidul.

**Metode:** Penelitian menggunakan desain kohort retrospektif dengan kelompok sampel terpapar dan tidak terpapar sebesar masing-masing 65 orang. Teknik pengambilan sampel menggunakan simple random sampling. Data usia pernikahan dini diperoleh dari catatan yang ada di Kantor Urusan Agama Kabupaten Gunungkidul. Pengumpulan data karakteristik sampel, usia ibu saat menikah, status pemberian ASI, dan penyakit infeksi anak dilakukan dengan teknik wawancara menggunakan kuesioner. Kejadian stunting dinilai dengan melakukan pengukuran panjang badan atau tinggi badan.

**Hasil:** Hasil analisis bivariat menunjukkan bahwa ada hubungan yang signifikan antara usia ibu menikah ( $RR=25,4$ ;  $IK=5,72-112,62$ ;  $p=0,000$ ), jenis kelamin anak ( $RR=2,37$ ;  $IK=1,02-5,4$ ;  $p=0,040$ ), riwayat penyakit infeksi saluran pernafasan akut ( $RR=4,80$ ;  $IK=2,03-11,34$ ;  $p=0,000$ ), dan riwayat penyakit diare ( $RR=5,1$ ;  $IK=2,16-12,08$ ;  $p=0,000$ ) dengan kejadian stunting pada anak usia 0-59 bulan. Analisis multivariat menunjukkan bahwa usia ibu menikah, ( $OR=36,5$ ;  $IK=6,82-195,52$ ;  $p=0,000$ ), riwayat penyakit infeksi saluran pernafasan akut ( $OR=3,32$ ;  $IK=1,09-1,09$ ;  $p=0,035$ ), dan riwayat penyakit diare ( $OR=6,9$ ;  $IK=2,19-22,15$ ;  $p=0,001$ ) berpengaruh terhadap kejadian stunting.

**Kesimpulan:** Pernikahan usia dini, riwayat penyakit infeksi saluran akut, dan riwayat penyakit diare merupakan faktor risiko kejadian stunting pada anak balita usia 0-59 bulan di Kabupaten Gunungkidul.

**KATA KUNCI:** stunting; pernikahan, usia dini; anak balita; gunungkidul

## ABSTRACT

**Background:** The prevalence of stunting in 2022 in Indonesia is still high, namely 21.6%. Stunting in children under five can be caused by nutritional problems during the first 8000 days of life. The mother's age at marriage can also cause stunting in children under five. There are 312 incidents of early marriage (married at <19 years of age) in Gunungkidul Regency in the period 2017-2022.

**Objectives:** to analyze the relationship between early marriage and the incidence of stunting in children aged 0-59 months in Gunungkidul Regency.

**Methods:** The study used a retrospective cohort design with exposed and unexposed sample groups of 65 people each. The sampling technique uses simple random sampling. Data on the age of early marriage was obtained from records at the Gunungkidul Regency Religious Affairs Office. Data were collected on sample characteristics, breastfeeding status, and child infectious diseases using interview techniques using a questionnaire. The incidence of stunting is assessed by measuring body length or height.

**Results:** Result of the bivariate analysis showed that there was a significant relationship between the mother's age at marriage ( $RR=25.4$ ;  $CI=5.72-112.62$ ;  $p=0.000$ ), gender of the child ( $RR=2.37$ ;  $CI=1.02-5.4$ ;  $p=0.040$ ), history of acute respiratory infections ( $RR=4.80$ ;  $CI=2.03-11.34$ ;  $p=0.000$ ), and history of diarrhea ( $RR=5.1$ ;  $CI=2.16-12.08$ ;  $p=0.000$ ) with the incidence of stunting in children aged 0-59 months. Multivariate analysis showed that maternal age at marriage, ( $OR=36.5$ ;  $CI=6.82-195.52$ ;  $p=0.000$ ), history of acute respiratory infections ( $OR=3.32$ ;  $CI=1.09-1.09$ ;  $p=0.035$ ), and a history of diarrhea ( $OR=6.9$ ;  $CI=2.19-22.15$ ;  $p=0.001$ ) influence the incidence of stunting.

**Conclusions:** Early marriage, history of acute tract infections, and history of diarrhea are risk factors for stunting in children aged 0-59 months in Gunungkidul Regency..

**KEYWORD:** stunting; marriage; early age; children under five; gunungkidul

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## INTRODUCTION

Stunting is a condition of chronic malnutrition that is characterized by a child's length or height being less than minus two standard deviations (<-2SD) (1). The condition of stunting in children has an impact on disrupting brain development and intelligence, impaired physical growth, metabolic disorders in the body (2), decreased immune system, and high risk of developing degenerative diseases in old age such as diabetes, obesity, and cancer, as well as decreased productivity and work capacity, causing low economic productivity (3).

The prevalence of stunting in Indonesia in 2022 is still high, namely 21.6%. The provinces with the highest prevalence of stunting are East Nusa Tenggara, namely 35.3%, West Sulawesi at 35.0%, Papua at 34.6%, and the Special Region of Yogyakarta at 16.4%. In the Special Region of Yogyakarta, the highest prevalence of stunting is in Gunungkidul Regency at 23.5% (4). The

Indonesian government targets reducing the stunting rate by 14% in 2024 (5).

Adequate nutrition during the first 1,000 days of life, pregnancy, and the early years of life is critical to a child's future health (6). A newborn's healthy development and longevity depend on optimal nutrition over the first 1000 days (from conception to the child's second birthday). Physiological changes, elevated energy demands, and shifting dietary requirements—all essential for the best possible growth and development—come with pregnancy and the postpartum phase (7). However, previous research states that intervention is needed for the first 8,000 days of life starting from the time of conception until the child is 19 years old. Intervention at the first 1,000 days of life is a priority but is not sufficient so intervention is still needed for the next 7000 days. The two most important packages identified during the first 7,000 days of life development

intervention period were paying attention to needs in childhood and adolescence and interventions focused on ages 15-19 years by involving the community, media, and health systems (8).

Two factors cause stunting, namely direct causes and indirect causes. Direct causal factors include lack of nutritional intake and infectious diseases. Indirect causal factors include poor food security, sanitation, and environmental health (9). The mother's age at marriage can also cause stunting in children due to the mother's psychological factors such as not being ready for her pregnancy and not knowing how to maintain and care for her pregnancy (10). This is closely related to the mother's low education so knowledge about stunting and the nutritional needs of her child is also low(11).

The Indonesian government has regulations regarding the age limit for women and men who are permitted to marry, namely if both have reached the age of 19 years(12). However, there are still many cases of marriage of children under the age of 19, or what is called early marriage. Early marriage is defined as a marriage that takes place between a couple under the age of 19 with or without consent (13). Early marriage is not only seen in terms of age but also a person's physical, and psychological maturity and responsibility. Children born to couples who marry at an early age can experience poor physical health and nutrition as well as high infant mortality rates due to the mother's poor skills in caring for children and problems with reproductive health (14,15).

In general, economic factors, educational factors, and knowledge of teenagers and their parents influence the incidence of early marriage (16). When the pandemic occurred in 2020, economic factors and public health levels decreased (17). Low economic factors cause families to be unable to pay education costs and tend to see their daughters as a burden on the family's economy so they tend to marry off their children as early as possible (18). This causes the number of early marriages to increase every year during the COVID-19 pandemic, as happened in Gunungkidul Regency (19). In this study, data on mother's marriages collected were marriages in the 2017 - 2022 period.

The prevalence of women in Indonesia who married before the age of 18 in 2018 reached 1.2

million with a percentage of 11.2% and placed Indonesia in the 10 countries with the highest absolute number of child marriages in the world (20). The percentage of early marriages in the Special Region of Yogyakarta Province in 2020 was 6.2% with the highest cases of applications for marriage dispensation being in Gunungkidul Regency with 218 cases (21). In Gunungkidul Regency, there are 4 sub-districts where the incidence of early marriage increased every year from 2017 to 2022, namely Gedangsari District (75 incidents), Saptosari District (67 incidents), Karangmojo District (115 incidents), and Wonosari District (55 incidents) (22).

Several previous studies have shown that there is a relationship between the mother's age at marriage and the incidence of stunting in children under five (23). On the other hand, there is also previous research that shows that there was no relationship between early marriage age and the incidence of stunting in children under five. However, in this research, there is a trend that showed that the earlier the age at which mothers marry, the higher the percentage of stunted and malnourished children (24,25). Previous research used a cross-sectional design to analyze the relationship between early marriage and the incidence of stunting (23,26), while this study used a retrospective cohort design which can examine the causal relationship between the mother's early marriage age and the incidence of stunting in children under five aged 0-59 months. The research was conducted in four sub-districts that have a high prevalence of stunting, namely Karangmojo District (37.04%), Gedangsari District (30.23%), Wonosari District (22.23%), and Saptosari District (18.26%).

## **MATERIALS AND METHODS**

This research was an observational study using a retrospective cohort research design. This research was conducted using maternal marriage age records obtained from the Office of Religious Affairs (Kantor Urusan Agama) Gunungkidul Regency. From these records, an exposed group was formed, namely mothers who married at an early age (<19 years), and a non-exposed group, namely mothers who did not marry at an early age (≥19 years). Each group of mothers assessed the nutritional status of their children to determine the

incidence of stunting in children. The research was carried out in four sub-districts in Gunungkidul Regency which have a high prevalence of stunting, namely, Karangmojo District, Gedangsari District, Wonosari District, and Saptosari District. The research was conducted in March-July 2023. The variables in this research consist of independent variables, dependent variables, intermediate variables, and confounding variables. The independent variable in this study was the mother's age at marriage. The dependent variable was the incidence of stunting. Intermediate variables were breastfeeding status and childhood infectious diseases. Confounding variables were maternal education and maternal employment.

The research population was women who were married between 2017-2022 in Karangmojo District, Gedangsari District, Wonosari District, and Saptosari District according to data from the Office of Religious Affairs (Kantor Urusan Agama) Gunungkidul Regency. The number of women who married at the age of <19 years in the 2017-2022 period was 312 cases. The research sample consisted of an exposed group (mothers who married at the age of <19 years) and an unexposed group (mothers who married at the age of ≥19 years) in the period 2017-2022 in Karangmojo District, Gedangsari District, Wonosari District, and Saptosari District who met the study inclusion criteria. Research inclusion criteria included mothers who had children aged 0-5 years and still living at the research site at the time of data collection. For mothers who had more than one child under five, the children selected as research subjects are older.

The sample size used the Lemeshow formula for retrospective cohort studies and was calculated using the sample size application as follows:

$$n = \frac{(Z_{1-\alpha/2} \sqrt{2P(1-P)} + Z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)})^2}{(P_1 + P_2)^2}$$

$$n = \frac{1.96 \sqrt{2 \cdot 0.43(1-0.43)} + 0.842 \sqrt{0.467(1-0.467) + 0.533(1-0.533)^2}}{(0.467 - 0.533)^2} \quad (1)$$

$$n = 58$$

Where n is minimum sample size,  $Z_{1-\alpha/2}$  (1,96) value on a standard normal distribution that is equal to the level of significance  $\alpha$  (for  $\alpha$  5% is 1,96),  $Z_{1-\beta}$  value on the standard normal

distribution which is equal to the (power) (for  $\beta = 20\%$  is 0,842),  $P_1$  is proportion of exposure in the exposed group 46,7% (Zulhakim et.al., 2022) and  $P_2$  proportion of exposure in the unexposed group 53,3%. Based on the results of the sample size calculation, the minimum sample size was 58 people. To anticipate incomplete data, the sample size was increased by 10%, so the sample size was 63.8 rounded up to 65. The sample size for this study was 130 people, consisting of 65 people in the exposed group and 65 people in the unexposed group. The sampling technique used simple random sampling. The sample was selected proportionally based on the total cases in each sub-district. The number of samples selected from each sub-district is based on the following calculations:

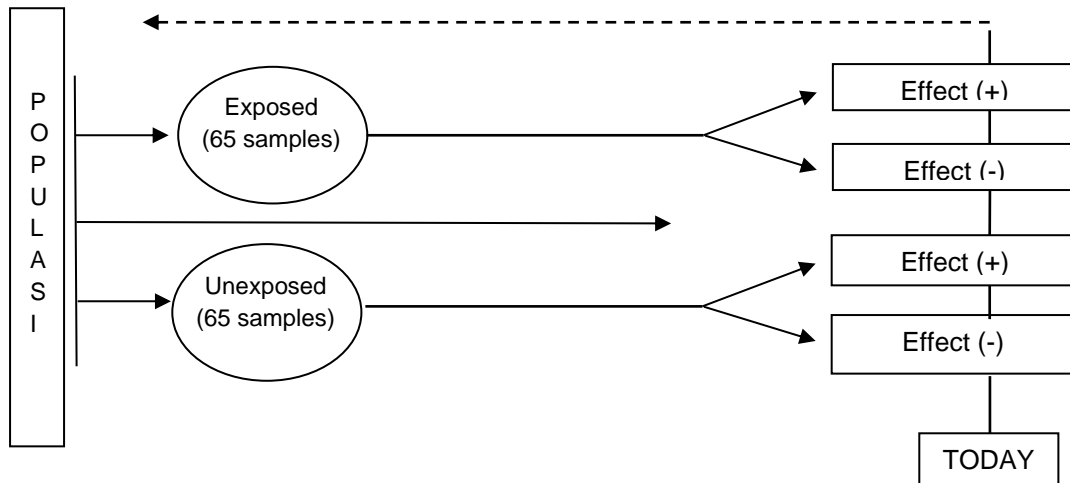
$$n_i = \frac{N_i}{N} \times n \quad (2)$$

Where  $n_i$  is opulation size by stratum, N total population,  $N_i$  is number of samples by stratum and n total sample size. The number of samples in the exposed group and the non-exposed group in each sub-district was taken proportionally. No samples were lost to follow up or drop out from the study. Early marriage was categorized into mothers who married at an early age (<19 years) and mothers who did not marry at an early age (≥19 years). The mother's age at marriage was obtained from records at the Office of Religious Affairs (Kantor Urusan Agama) Gunungkidul Regency.

The incidence of stunting was assessed using indicators of length-for-age or height-for-age. The infantometer was used to collect body length data for children aged 12-23 months, while the microtoise was used to collect height data for children aged 24-59 months. For children aged <2 years whose body length was measured using a microtoise, the measurement result was added by 0.7 cm, whereas for children aged >2 years whose height was measured using an infantometer, the measurement result was reduced by 0.7 cm. Measurement of body length and height according to body length/height measurements (27). The incidence of stunting was categorized into not stunting (z-score length-for-age or height for age  $\geq -2$  SD) and stunting (z-score length-for-age or height for age <-2 SD) (1). The incidence of stunting is assessed by measuring the child's

length or height. Data on children's body length or height was obtained from integrated health post (Posyandu) activities carried out during the research period. For a child's body length or height obtained during a period outside the research period, the child's body length or height was measured directly using a body length measuring instrument (infantometer) or a height measuring instrument (microtoise). Data collection was

carried out by the researcher dan 4 enumerators. Enumerators had received training from the researcher to measure body length/height and perception similarities using research questionnaires. The length/height data collected at the Posyandu were based on the distribution of maternal marriage data so that the children involved in this study were not taken from all Posyandu at the research location.



**Figure 1. Diagram of cohort retrospective study**

Infectious diseases were infectious diseases that have been suffered by children under five within one year of data collection. Children were categorized as having an infectious disease if they had experienced one or more infectious diseases such as Acute Respiratory Infection (ARI), pneumonia, and/or diarrhea (28). Children were categorized as not having an infectious disease if they did not suffer from one of the infectious diseases such as ARI, pneumonia, and/or diarrhea. Acute Respiratory Infection (ARI) was characterized by fever, cough for less than 2 weeks, runny nose/stuffy nose, and sore throat. Pneumonia is characterized by high fever, cough, and difficulty breathing. Diarrhea was characterized by defecating 3-6 times a day, defecating > 6 times a day, and soft or liquid faeces (28).

Continued breastfeeding status(yes/no) was the status of a child who is or is not being breastfed from birth to 24 months(29), adjusted to the child's age. If the age of the child was ≤ 24 months, then the continued breastfeeding status was

determined according to the conditions at the time of collection. If the age of the child is > 24 months, then the continued breastfeeding status is determined from the child's birth to 24 months of age.

Maternal age was categorized into <20 years old, 21-24 years old, 25-29 years old, 30-34 years old, and ≥35 years old(30). The mother's education level was the last formal education completed by the mother until she received a graduation certificate which was assessed from the time of marriage until the time of data collection. The mother's education level was categorized into low/medium education level (not completed elementary school, completed elementary school/middle school/high school/equivalent) and high education level (graduated college/equivalent)(31). Maternal employment was the mother's last job since marriage until the time of data collection. It was categorized into unemployed and employed(32).

Data collection was carried out using interview techniques and direct measurement.

Interviews using a structured questionnaire were conducted to collect data on maternal characteristics mother's age at marriage, mother's age (mother's age at the time of interview), mother's education, and mother's employment, child's characteristics (age, gender), breastfeeding status, and child infectious diseases. Questions about childhood infectious diseases were used in the list of questions in the Basic Health Research (2018) questionnaire (28). This research received an ethical letter from the Health Research Ethics Committee Universitas 'Aisyiyah Yogyakarta (Number. 2973/KEP-UNISA/VI/2023). Each research subject was explained in the research. Research subjects who were willing to be involved in the research were asked to sign an informed consent form.

Data analysis was carried out in three stages. In the first stage, univariate analysis was carried out to describe the research variables in mean value (standard deviation), frequencies, and percentages. Bivariate analysis was carried out to analyze the relationship between independent variables, intermediate variables, and confounding variables with the dependent variable. Bivariate analysis used the Chi-Square Test. Multivariate analysis was carried out to analyze the relationship between independent variables, intermediate variables, and

confounding variables with dependent variables that had a p-value <0.25 in bivariate analysis. Multivariate analysis used a logistic regression test. This study uses a 95% confidence interval, a significance level ( $\alpha$ ) of 5%, and a two-way hypothesis test. Data analysis used the SPSS version 25.

## RESULTS AND DISCUSSIONS

In this study, the exposed and unexposed groups each consisted of 65 people. The total sample involved in this research was 130 mothers and 130 children. The presentation of univariate analysis is differentiated according to the scale of the variable data. Univariate analysis presents the variables of mother's age at marriage, age of children under five, age of mother, and z-score length/height-for-age with a numerical data scale in the form of mean value ( $\pm$  standard deviation), minimum value and maximum value.

Variables with a categorical data scale, namely mother's education level, mother's employment level, child's gender, child's breast milk status, ARI, pneumonia, and diarrhea are presented in frequency and percentage values. Normality test showed that data of mother's age at marriage, age of mother, and z-score length/height-for-age of children under five. Based on **Table 1**,

**Table 1. Description of the characteristics of subjects**

Characteristics	Mean ( $\pm$ SD)	n	%
Sex of children			
Girl		67	51.5
Boy		63	48.5
Age of children (mo)	28.89 (13.480)		
24 – 59		85	65.4
0 – 23		45	34.6
Age of mother (yo)	24.52		
<20		33	25.3
20 – 24		47	36.2
25 – 29		23	17.7
30 – 34		21	16.2
$\geq$ 35		6	4.6
Education level of mother			
Low		127	97.7
High		3	2.3
Employment status of mother			
Unemployed		102	78.5
Employed		28	21.5

the majority of children were girls (51.5%) with the large stage categories in the 24-59 month age group (65.4%). Most of the mothers were 20-24 years old (63.8%), had a low level of education (97.7%), and did not work (78.5%). Based on **Table 2**, the average age at which mothers marry was 19.2 years. The average length-for-age/height-for-age z-score was -1.11. The majority of children did not experience stunting (76.2%), were not breastfed (60.0%), did not experience Acute Respiratory Infection (71.5%), did not experience pneumonia (99.2%), and did not experience diarrhea (64.6%).

Children who have experienced diarrhea are 6.9 times more likely to experience stunting compared to children who have never experienced diarrhea. In the multivariate analysis, the results of the analysis showed that the variables that influenced the incidence of stunting in children under five were the mother's age at marriage, history of acute respiratory infections, and diarrhea. The strength of the relationship from the largest to the smallest is the mother's age at marriage (OR=32.69), diarrhea (OR=5.58), and acute respiratory tract infections (OR=3.49).

**Table 2. Description of maternal age at marriage, z score length-for-age/height-for-age, breastfeeding status, and infectious disease**

Variables	Mean (SD)	n	%
Mother's age at marriage (yo)	19.22 (2.8)		
<19 tahun		65	50.0
≥ 19 tahun		65	50.0
Z-Score length-for-age / height-for age	-1.11 (0.8)		
Stunted		31	23.8
Non stunted		99	76.2
Continued breast feeding			
No		78	60.0
Yes		52	40.0
Acute Respiratory Infection			
Yes		37	28.5
No		93	71.5
Pneumonia			
Yes		1	0.8
No		129	99.2
Diarrhea			
Yes		46	35.4
No		84	64.6
Total		130	100.0

This study found that there was a relationship between the mother's age at marriage and the incidence of stunting in children under five. The results of this study support previous research which stated that there is a relationship between the age of the mother at marriage and the incidence of stunting in children under five (33). However, the results of this study are not in line with previous research which stated that there was no relationship between the mother's age at marriage and the incidence of stunting in children

under five (34). The younger a woman gets married, the higher the risk of her child experiencing stunting because she is not ready to give birth to a child. The mother's age at marriage affects early pregnancy which can cause health problems, especially reproductive health, namely the risk of developing uterine cancer is greater because cervical cells are immature (35). Early pregnancy can also result in energy and protein deficiencies because in general teenagers need maximum nutrition until the age of 21 years.

**Table 3. Results of bivariate and multivariate analysis**

Variable	Stunting				Analysis of Bivariate		Analysis of Multivariate	
	Stunted (n=31)		Non-stunted (n=99)		RR (CI95%)	P-value	OR (CI 95%)	P-value
	f	%	f	%				
Sex of children								
Boy	20	31.7	43	68.3	2.37 (1.02-5.46)	0.040		
Girl	11	16.4	56	83.6				
Age of children (mo)								
24 – 59	22	25.9	63	74.1	1.39 (0.58-3.36)	0.454		
0 – 23	9	20.0	36	80.0				
Mother's age at marriage (years)								
<19 years	29	44.6	36	55.4	25.4 (5.72-112.62)	0.000*	36.50 (6.82-195.52)	0.000*
≥19 years	2	3.1	63	96.9				
Education level of the mother								
Low	31	24.4	96	75.6	0.76 (0.69-0.83)	0.327		
High	0	0.0	3	100.0				
Employment status of the mother								
Unemployed	22	21.6	80	78.4	0.58 (0.23-1.46)	0.245		
Employed	9	32.1	19	67.9				
Continued breastfeeding								
No	20	25.6	58	74.4	1.29 (0.56-2.97)	0.556		
Yes	11	21.2	41	78.8				
Acute Respiratory Infection								
Yes	17	45.9	20	54.1	4.80 (2.03-11.34)	0.000*	3.32 (1.09-10.09)	0.035
No	14	15.1	79	84.9				
<i>Pneumonia</i>								
Yes	1	100.0	0	0.0	4.30 (3.14-5.88)	0.238		
No	30	23.3	99	76.7				
Diarrhea								
Yes	20	43.5	26	56.5	5.11 (2.16-12.08)	0.000*	6.97 (2.19-22.15)	0.001*
No	11	13.1	73	86.9				

Mothers who are pregnant at the age of <20 years experience a concurrency of nutrients with their fetus because the mother is still in the period of growth and development. Therefore, if the mother's nutrition during pregnancy is inadequate, the risk of the child's growth and development is hampered (36). Mothers who marry at an early age are also at risk of increasing infant and maternal mortality rates, and the risk of complications in pregnancy, childbirth, and postpartum (37). Mothers who marry at an early age have poor parenting patterns for their children which are influenced by economic factors, education, and local environmental factors. Mothers' parenting patterns related to food intake in the first 1000 days of life influence nutritional intake and have a direct impact on the incidence of stunting in their children (38). In addition, parenting patterns related to maternal hygiene

and sanitation can also influence the incidence of stunting (39). The frequency of stunting in children was impacted by mothers' hand-washing habits. During the cooking process, cross-contamination of food could occur due to dirty hands. Eating food that has been produced using unhygienic methods may result in food poisoning, which manifests as diarrhea, vomiting, and decreased appetite. The symptoms may cause the kids to eat less, which would leave their nutritional needs unmet and result in growth disorders (40). Children under five who live in homes with adequate sanitation facilities are less likely to suffer from stunting than children in homes with inadequate sanitation (41). Fecal waste disposal into a water stream is considered an unimproved sanitation facility since it has the potential to contaminate the environment. Children under five love to engage in exploratory play outside, using their hands to



touch the ground, water, and nearby animals. The children's mouthing activity during play may be a direct source of helminth and microbial transfer (42).

This study found that there was a relationship between the sex of children and the incidence of stunting in children under five. Boys are more likely than girls to be severely stunted. The results of this study support previous research (43). However, multivariate analysis in this study showed that there was no significant relationship between the child's sex and the incidence of stunting. The reason for the disparity in nutritional status between the sexes during infancy is that boys are introduced to complementary food earlier than girls, and they are also given more of them. Boys may therefore be more susceptible to growth retardation than girls since they are more likely to be exposed to complementary foods at an early age and/or maybe more vulnerable to this early introduction because of their lower prior nutritional status. Boys typically don't grow as fast as girls. In contrast to infancy, there are more sex-based disparities in height status during the second and third years of life (44).

This study found that there is a relationship between a history of Acute Respiratory Infection and the incidence of stunting in children under five. The results of this study support previous research which stated that there is a relationship between a history of Acute Respiratory Infection and the incidence of stunting in children under five (45,46). However, the results of this study are not in line with previous research which stated that there was no relationship between a history of Acute Respiratory Infection and the incidence of stunting in children under five (47).

Infectious diseases in children cause disturbances in the body's metabolism and immune system due to inflammation. Acute respiratory infections cause a child's immune system to decrease and stress the antibody system which affects the child's reduced appetite, resulting in inadequate nutritional intake. This situation affects children's growth (45,46). Children who suffer from acute respiratory infections usually experience symptoms of coughs and colds accompanied by an increase in body temperature, so the need for nutrients also increases. If this is not balanced with adequate

nutritional intake, it can cause malnutrition in children (48).

Generally, Acute Respiratory Infection is caused by 3 factors, namely environmental factors, child factors, and mother behavioral factors. Environmental factors include air pollution such as cigarette smoke, vehicle fumes, smoke from the kitchen due to cooking using firewood, or smoke from mosquito coils. Individual child factors include the child's immunization status, child's vitamin A status, child's nutritional status, child's age, and birth weight. Behavioural factors include the behaviour of mothers and other family members in efforts to prevent Acute Respiratory Infection (49). Therefore, paying attention to food intake that is appropriate to children's needs, maintaining the quality of a clean living environment and healthy behaviour as well as fulfilling immunizations for children can help improve nutrition and prevent Acute Respiratory Infection (50).

This study found that there was a relationship between the history of diarrhea and the incidence of stunting in children under five. The results of this study support previous research which states that there is a relationship between a history of diarrhea and the incidence of stunting in children under five (45,48). However, the results of this study are not in line with previous research which stated that there was no relationship between a history of diarrheal disease and the incidence of stunting in children under five (47,51). Children under five experience diarrhea more often because their intestines are more sensitive to substances that enter their food. Diarrhea is an infectious disease characterized by a change in the shape of the stool to become soft, the frequency of defecation increases, and is accompanied by vomiting (52). Infectious diseases accompanied by diarrhea and vomiting can cause children to lose fluids or what is usually called dehydration (53).

A child who has diarrhea experiences malabsorption of nutrients which is caused by an imbalance in the intake of food coming in and going out (54). If diarrhea occurs repeatedly over a long period, it can disrupt the height growth of children under five, because children under five generally need adequate nutritional intake for their growth and development (55). One of the factors

causing diarrhea is poor hygiene and sanitation practices of parents, especially mothers (56,57). Poor maternal sanitation practices such as not washing hands properly with soap, especially after defecating and after disposing of baby faeces, using refillable drinking water that is no longer boiled for daily consumption, and indirect waste management burning or throwing away in rubbish dumps (58,59)

This research has advantages in terms of research design, namely a retrospective cohort which can study the cause-and-effect relationship of the independent variable (mother's early marriage) with the dependent variable (stunting). However, the weakness of the retrospective cohort research design is that there is recall bias to remember the child's history of infectious diseases in the last year.

### CONCLUSIONS AND RECOMMENDATIONS

There is a significant relationship between the mother's age at marriage, history of ARI, and history of diarrhea with the incidence of stunting in children under five aged 0-59 months in Gunungkidul Regency. The mother's age at marriage, history of ARI, and history of diarrhea were risk factors for stunting in children under five. The results of this research can be used as a basis for consideration in formulating efforts to prevent early marriage and infectious diseases because they have an impact on the incidence of stunting in children aged 0-59 months. The public needs to receive health education regarding the negative impacts of early marriage on mothers and children.

### REFERENCES

1. Kementerian Kesehatan RI. Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2020 Tentang Standar Antropometri Anak. 2020; Available from: <http://190.119.145.154/handle/20.500.12773/11756> Pratiwi WS, Yulianto A, Widayati W.
2. Pengetahuan Orang Tua Dan Perilaku Picky Eating Terhadap Kejadian Stunting Pada Balita. *Jurnal Ilmu Kedokteran Dan Kesehatan*. 2022;8(4):389–97.
3. Soliman A, De Sanctis V, Alaraj N, Ahmed S, Alyafei F, Hamed N, et al. Early and long-term consequences of nutritional stunting: From childhood to adulthood. *Acta Biomed*. 2021;92(1):1–12.
4. Kementerian Kesehatan RI. Hasil Survei Status Gizi Indonesia. Kementerian Kesehatan Republik Indonesia [Internet]. 2023;77–77. Available from: <https://promkes.kemkes.go.id/materi-hasil-survei-status-gizi-indonesia-ssgi-2022>
5. Presiden Republik Indonesia. Peraturan Presiden Republik Indonesia Nomor 72 Tahun 2021 Tentang Percepatan Penurunan Stunting.
6. Likhar A, Patil MS. Importance of Maternal Nutrition in the First 1,000 Days of Life and Its Effects on Child Development: A Narrative Review. *Cureus*. 2022;14(10):8–13.
7. Beluska-Turkan K, Korczak R, Hartell B, Moskal K, Maukonen J, Alexander DE, et al. Nutritional gaps and supplementation in the first 1000 days. *Nutrients*. 2019;11(12):1–50.
8. Bundy DAP, de Silva N, Horton S, Patton GC, Schultz L, Jamison DT, et al. Investment in child and adolescent health and development: key messages from Disease Control Priorities, 3rd Edition. *Lancet*. 2018;391(10121):687–99.
9. Rosha BC, Susilowati A, Amaliah N, Permanasari Y. Penyebab Langsung dan Tidak Langsung Stunting di Lima Kelurahan di Kecamatan Bogor Tengah, Kota Bogor (Study Kualitatif Kohor Tumbuh Kembang Anak Tahun 2019). *Buletin Penelitian Kesehatan*. 2020;48(3):169–82.
10. Fitriahadi E. Hubungan tinggi badan ibu dengan kejadian stunting pada balita usia 24 -59 bulan. *Jurnal Kebidanan dan Keperawatan Aisyiyah*. 2018;14(1):15–24.
11. Ramdhani A, Handayani H, Setiawan A. Hubungan Pengetahuan Ibu Dengan Kejadian Stunting. *Seminar Nasional LPPM Universitas Muhammadiyah Purwokerto*. 2020;ISBN: 978-:28–35.
12. Kementrian Sekretariat Negara RI. Undang-undang Republik Indonesia No 16 Tahun 2019 Tentang Perubahan Undang-Undang Nomor 1 Tahun 1974 Tentang Perkawinan. Undang Republik Indonesia [Internet]. 2019;(006265):2–6. Available from: <https://peraturan.bpk.go.id/Home/Details/122740/uu-no-16-tahun-2019>

13. Rumble L, Peterman A, Irdiana N, Triyana M, Minnick E. An empirical exploration of female child marriage determinants in Indonesia. *BMC Public Health*. 2018;18(1):1–13.
14. Hardianti R, Nurwati N. Faktor Penyebab Terjadinya Pernikahan Dini Pada Perempuan. *Focus Jurnal Pekerjaan Sosial*. 2021;3(2):111.
15. Nabila R, Roswiyani R, Satyadi H. A Literature Review of Factors Influencing Early Marriage Decisions in Indonesia. *Proc 3rd Tarumanagara Int Conf Appl Soc Sci Humanit (TICASH 2021)*. 2022;655(Ticash 2021):1392–402.
16. Tunas U, Surakarta P, Karakter P, Anak P, Dasar S, Era DI, et al. Fenomena Pernikahan Dini di Masa Pandemi COVID-19. *Seminar Nasional Dies Natalis Ke-41*. 2017;85–92.
17. Siswati T, Widyawati HE, Khoirunissa S, Kasjono HS. Literasi Stunting pada Masa Pandemi Covid-19 untuk Ibu Balita dan Kader Posyandu Desa Umbulrejo Kapanewon Ponjong Kabupaten Gunung Kidul. *J ABDINUS Jurnal Pengabdian Nusantara*. 2021;4(2):407–16.
18. Alghifari A. Efektivitas Undang-Undang Nomor 16 Tahun 2019 Tentang Perkawinan Dalam Menurunkan Angka Pernikahan Usia Dini Di Kabupaten Polewali Mandar. *QISTHOSIA Jurnal Syariah dan Hukum*. 2021;2(2):121–40.
19. Bumaeri ADA, Ahyani H, Kusnandar H. Fenomena Pernikahan dibawah Umur oleh Masyarakat 5.0. *Jurnal Mabahits [Internet]*. 2021;1:1–1373. Available from: <https://ejournal.uas.ac.id/index.php/Mabahits/article/view/534/378>
20. Badan Pusat Statistik. Pencegahan Perkawinan Anak Percepatan yang Tidak Bisa Ditunda. *Badan Pusat Statistik*. 2020;6–10.
21. Penduduk DPPADP. Sosialisasi Anti Pernikahan Dini Digalakkan. *Dinas Pemberdayaan Perempuan Perlindungan Anak Dan Pengendalian Penduduk Yogyakarta (DP3AP2 DIY)*. 2022.
22. Kantor Urusan Agama Kabupaten Gunungkidul. Data Pernikahan Dini Anak Dibawah 19 Tahun. 2022.
23. Yulius, Abidin UW, Liliandriani A. Hubungan Pernikahan Dini terhadap Kejadian Stunting pada Balita di Wilayah Kerja Puskesmas Tawalian Kecamatan Tawalian Kabupaten Mamasa. *Journal Pegguruang: Conference Series*. 2020;1(Mei).
24. Claudia P. Pernikahan Usia Dini dan Risiko Terhadap Kejadian Stunting pada Baduta di Puskesmas Kertek 2, Kabupaten Wonosobo. *Higeia Journal of Public Health Research and Development*. 2022;2(2):227–38.
25. Zuhakim, S. Ediyono HK. Hubungan Pernikahan Usia Dini dan Pola Asuh Baduta (0-23 Bulan) terhadap Kejadian Stunting. *Jurnal Kesehatan Kusuma Husada*. 2022;13(1):84–92.
26. Afriani, Wusqa Abidin U. Hubungan Pernikahan Usia Dini Terhadap Kejadian Stunting di Kecamatan Anreapi. *Jurnal Ilmu Manusia Dan Kesehatan*. 2022;5(3):291–7.
27. Kemenkes RI. Kemenkes RI no HK.01.07/MENKES/1928/2022 Tentang Pedoman Nasional Pelayanan Kedokteran Tata Laksana Stunting. *Kementerian Kesehatan Republik Indones*. 2022;1–52.
28. Kementerian Kesehatan RI. Laporan Nasional Riskesdas 2018 [Internet]. *Badan Penelitian dan Pengembangan Kesehatan*. Jakarta; 2019. Available from: [http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan\\_Nasional\\_RKD2018\\_FINAL.pdf](http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf)
29. Doma H, Tran TD, Tran T, Hanieh S, Tran H, Nguyen T, et al. Continuing breastfeeding for at least two years after birth in rural Vietnam: prevalence and psychosocial characteristics. *International Breastfeeding Journal*. 2021;16(1):1–10.
30. Paramashanti BA, Hadi H, Alit Gunawan IM. Timely initiation of breastfeeding is associated with the practice of exclusive breastfeeding in Indonesia. *Asia Pacific Journal of Clinical Nutrition*. 2016;25(December):S52–6.
31. Husnaniyah D, Yulyanti D, Rudiansyah R. Hubungan Tingkat Pendidikan Ibu dengan Kejadian Stunting. *Indonesian Journal Health Science*. 2020;12(1):57–64.
32. Lindawati, Harahap A, Anto. Hubungan Pekerjaan Orang Tua dan Asi Eksklusif

- dengan Kejadian Stunting di Menawi Kabupaten Kepulauan Yapen. *Journal of Pharmaceutical and Health Research*. 2023;4(1):147–51.
33. Mardiaty M, Aja Nurul Huzaifah C, Sawitri H. Hubungan Pernikahan Usia Dini Dan Kadar Hb Pada Masa Hamil Dengan Kejadian Stunting Pada Balita Usia 24-59 Bulan Di Puskesmas Banda Sakti Kota Lhokseumawe Tahun 2022. *Jurnal Ilmu Manusia Dan Kesehatan*. 2023;6(2):224–34.
  34. Niswah H, Apriani G, Syakurah RA. Pernikahan Dini dan Kejadian Stunting di Desa Harimau Tandang. *Jurnal Kesehatan [Internet]*. 2020;11(1):14–9. Available from: <https://jurkes.polije.ac.id/index.php/journal/article/download/388/162/3142>
  35. Ti S, Tutik Nurfia Y, Hadi S. Realitas Dinamika Psikologi Remaja Dan Permasalahannya Persepektif Al-Qur'an. *SINDA Compr Journal of Islamic and Social Studies*. 2022;2(3):71–83.
  36. Septimar ZM, Rustami M, Wibisono AY. *Jurnal Menara Medika* <https://jurnal.umsb.ac.id/index.php/menaramedika/index> JMM 2020 p-ISSN 2622-657X, e-ISSN 2723-6862. *Jurnal Menara Medika [Internet]*. 2020;3(1):66–73.
  37. Ningrum RWK, Anjarwati. Dampak pernikahan dini pada remaja putri (Impact of early marriage on adolescent women). *Journal Midwifery Reproduction*. 2021;5(1):37–45.
  38. Dayuningsih, Permatasari Endah Astika Tria SN. Pengaruh Pola Asuh Pemberian Makan Terhadap Kejadian Stunting Pada Balita 0-59 Bulan. *Jurnal Kesehatan Masyarakat Andalas [Internet]*. 2020;14(2):3–11. Available from: <http://jurnal.fkm.unand.ac.id/index.php/jkma/>
  39. Riani EN, Margiana W. Hubungan Pola Asuh dengan Kejadian Stunting pada Balita. *Jurnal Kebidanan Harapan Ibu Pekalongan*. 2022;9(1):48–53.
  40. Desyanti C, Nindya TS. Hubungan Riwayat Penyakit Diare dan Praktik Higiene dengan Kejadian Stunting pada Balita Usia 24-59 Bulan di Wilayah Kerja Puskesmas Simolawang, Surabaya. *Amerta Nutrition*. 2017;1(3):243.
  41. Nizaruddin N, Ilham MI. The Effect of Sanitation on Stunting Prevalence in Indonesia. *Populasi*. 2022;30(2):34.
  42. Nurhidayati VA, Riyadi H. Quality of Water Sources, Sanitation, and Hygiene in Households with Stunted Children in Rural and Urban Areas in West Java. *Amerta Nutrition*. 2022;6(1SP):13–8.
  43. Thurstans S, Opondo C, Seal A, Wells J, Khara T, Dolan C, et al. Boys are more likely to be undernourished than girls: A systematic review and meta-analysis of sex differences in undernutrition. *BMJ Global Health*. 2020;5(12):1–17.
  44. Bork KA, Diallo A. Boys are more stunted than girls from early infancy to 3 years of age in rural senegal. *Journal Nutrient [Internet]*. 2017;147(5):940–7. Available from: <https://doi.org/10.3945/jn.116.243246>
  45. Eldrian F, Karinda M, Setianto R, Dewi BA, Guzmira YH. Hubungan Riwayat Penyakit Infeksi Dengan Kejadian Stunting Pada Balita di Puskesmas Cipadung Kota Bandung. *Jurnal Manajemen Kesehatan*. 2023;9(1):80–9.
  46. Himawati EH, Fitria L. Hubungan Infeksi Saluran Pernapasan Atas dengan Kejadian Stunting pada Anak Usia di Fakultas Kesehatan Masyarakat , Universitas Indonesia. *Jurnal Kesehatan Masyarakat Indonesia*. 2020;15:1–5.
  47. Sahitarani AS, Paramashanti BA, Sulistiyawati S. Kaitan Stunting Dengan Frekuensi Dan Durasi Penyakit Infeksi Pada Anak Usia 24-59 Bulan Di Kecamatan Sedayu, Kabupaten Bantul. *Journal of Nutrition College*. 2020;9(3):202–7.
  48. Lusiani VH, Anggraeni AD. Hubungan Frekuensi Dan Durasi Penyakit Infeksi Dengan Kejadian Stunting Di Wilayah Kerja Puskesmas Kebasen Kabupaten Banyumas. *Journal of Nursing Practice and Education*. 2021;2(1):1–13.
  49. Zolanda A, Raharjo M, Setiani O. Faktor Risiko Kejadian Infeksi Saluran Pernafasan Akut Pada Balita Di Indonesia. *Link*. 2021;17(1):73–80.
  50. Nugraheni ANS, Nugraheni SA, Lisnawati N. Hubungan Asupan Zat Gizi Makro dan Mineral dengan Kejadian Balita Stunting di Indonesia: Kajian Pustaka. *Media*

- Kesehatan Masyarakat Indonesia. 2020;19(5):322–30.
51. Amelia Halim L, Warouw SM, Ch Manoppo JI, Kesehatan Anak Fakultas Kedokteran Universitas Sam Ratulangi I. Hubungan Faktor-Faktor Risiko Dengan Stunting Pada Anak Usia 3-5 Tahun Di TK/Paud Kecamatan Tuminting. *Jurnal Medis Dan Rehabilitasi* [Internet]. 2021;1(2):1–8. Available from: <https://ejournal.unsrat.ac.id/index.php/jmr/article/view/22164>
  52. Mashar SA, Suhartono S, Budiono B. Faktor-Faktor yang Mempengaruhi Kejadian Stunting pada Anak: Studi Literatur. *Jurnal Serambi Engineering*. 2021;6(3):2076–84.
  53. Usman S, Salma WO, Asriati. Evaluasi Kejadian Stunting pada Balita yang Memiliki Riwayat Penyakit Infeksi di Puskesmas Rumbia. *Jurnal Ilmu Ilmu Kebidanan dan Kandungan* [Internet]. 2021;13(3):11–9.
  54. Indriyani R, Dewi Puspita Sari R, Surya J, Zakiah Oktarlina R. The relationship between personal hygiene, sanitation, and a history of gastrointestinal infections (diarrhea) with the incidence of stunting in infants aged 24-60 months. *Jurnal Dunia Kesehatan Masyarakat* [Internet]. 2021;10(1):56–65.
  55. Azizi SD, Nizami NH, Fajri N. Gambaran Pengelolaan Limbah Terdapat Terjadinya Penyakit Infeksi Menular Pada Balita Stunting. *Jurnal Ilmiah Mahasiswa Fakultas Keperawatan*. 2023;VII(2):168–72.
  56. Diaz AR, Ramadhani F. Hubungan Sanitasi Dasar Dan Riwayat Penyakit Infeksi Diare Penyebab Stunting Di Wilayah Kerja Puskesmas Jerusu Desa Jerusu Kecamatan Kepulauan Romang Kabupaten Maluku Barat Daya. *Molucca Medica*. 2022;15(2):90–9
  57. Falmuariat Q, Febrianti T, Mustakim M. Risk Factors for Stunting in Toddlers in Developing Countries. *Jurnal Ilmu Kesehatan Sandi Husada*. 2022;11:308–15.
  58. Adriany F, Hayana H, Nurhapipa N, Septiani W, Sari NP. Hubungan Sanitasi Lingkungan dan Pengetahuan dengan Kejadian Stunting pada Balita di Wilayah Puskesmas Rambah. *Jurnal Kesehatan Global*. 2021;4(1):17–25.
  59. Ahyanti M, Rosita Y. Determinan Diare Berdasarkan Pilar Sanitasi Total Berbasis Masyarakat. *Jurnal Kesehatan Lingkungan Indonesia*. 2022;21(1):1–8.