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# Identification of Determining Factors of Stunting Prevalence

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**ABSTRACT**

Stunting is a chronic nutritional problem characterized by a toddler's height being below the standard for their age. This condition has long-term impacts on a child's physical and cognitive development, as well as future productivity. This study was conducted to identify the determinant factors of stunting prevalence in Gunung Lurah Village, Cilongok Subdistrict, Central Java Province, Indonesia. The study employed a case-control design with a descriptive-analytic approach. The instruments used included *the Kesehatan Ibu dan Anak* book and questionnaires. The population in this study consisted of all mothers with toddlers in Gunung Lurah Village, totaling 648 individuals. The sample included mothers with stunted toddlers, totaling 43 (case group), and mothers with non-stunted toddlers, also totaling 43 (control group), with a 1:1 matching ratio, meaning the number of samples in the control group was equal to that in the case group. Bivariate analysis was conducted using the Chi-Square test, while multivariate analysis employed multiple logistic regression. The Chi-Square test results indicated that five out of nine factors studied had a significant association with stunting ($p<0.05$), namely parental knowledge ($p=0.014$), parenting style ($p=0.004$), exclusive breastfeeding ($p=0.030$), low birth weight ($p=0.012$), and socio-economic factors ($p=0.001$). The multiple logistic regression analysis revealed that socio-economic factors were the most significant determinant of stunting ($p=0.001$). This study concludes that socio-economic status is the main factor influencing the incidence of stunting. These findings are expected to serve as a basis for designing more effective programs to prevent stunting at the village level.



## INTRODUCTION

The Sustainable Development Goals (SDGs), which build upon the vision of the Millennium Development Goals (MDGs), are one of the health initiatives that the Indonesian government is currently implementing. Generally speaking, the SDGs and the MDGs share similar goals: to improve people's standard of living and to eradicate hunger, poverty, and illiteracy. Together with other nations, Indonesia has participated in the Millennium Development Goals (MDG) program to build a more prosperous, equitable, and peaceful world. To realize this vision, one of the eight MDGs was to reduce hunger and poverty, especially stunting in children (Kirana et al., 2022).

Stunting is a condition in which a toddler has a shorter length or height compared to their age. This condition is measured by a length or height that is more than minus two standard deviations below the WHO Child Growth Standards median (de Onis & Branca, 2016). Stunting can be caused by a wide range of factors, including the condition of the mother or prospective mother, the fetal period, and infancy or toddlerhood, all of which occur during the first 1,000 days of life. This period is considered a golden window as well as a critical phase in a person's life (a window of opportunity). The health and nutritional status of the mother before and during pregnancy, maternal body posture, closely spaced pregnancies, adolescent mothers, and inadequate nutrient intake during pregnancy all affect fetal growth and increase the risk of stunting (Djauhari, 2017). One important metric for evaluating the caliber of future human capital is stunting in children. Early-life growth problems in children can cause irreversible harm (Rachim & Pratiwi, 2017).

Children who are stunted have poor brain function. This implies that one in three Indonesian children will miss out on greater educational and career prospects for the rest of their lives. The idea that stunting occurs in conjunction with decreased growth and development of other organs, including the brain, is more than just short physical stature (Achadi & Endang, 2016). Since the two primary causes of stunting are insufficient food intake and the body's reaction to a high prevalence of infectious diseases, stunting can also be characterized as a physiological or non-pathological growth adaptation (Sudiman, 2018). Direct and indirect variables are the two categories of influences that can affect stunting. Infectious disorders, low birth weight, genetics, toddler diet, and exclusive nursing are examples of direct factors. In the meantime, indirect determinants include family size, parenting styles, parental education, socio-economic level, and dietary understanding (Par'i et al., 2017).

The World Health Organization (WHO) identified five sub-regions with high stunting prevalence, including Indonesia, which is part of the Southeast Asia region with a prevalence rate of 36.4%. In the past five years, Africa has had the highest frequency of stunting (37.1%), followed by Asia (19%) and Latin America (10%). With 33% of the region's population, Laos was placed first, followed by Cambodia (32%), the Philippines (29%), Indonesia (28%), and Myanmar (27%) (United Nations Children's Fund (UNICEF), 2021)

The Ministry of Health's Indonesian Nutrition Status Survey (SSGI) 2021 reported that Indonesia's stunting prevalence rate was 24.4% in 2021, a decrease of 6.4% from 30.8% in 2018 (Wardani et al., 2021). In contrast, NTT had the highest stunting rate in Indonesia (43.8%), followed by Aceh (34.2%), Gorontalo (34.9%), West Sulawesi (40.4%), and NTB (37.3%). Central Java was ranked 18th out of 34 provinces, with a stunting rate of 27.7% (Fajar et al., 2022). According to the 2018 National Basic Health Research (Riskesdas), 32% of the population in Banyumas Regency was stunted (Pantiawati et al., 2023).

The impact of nutritional problems, particularly stunting in toddlers, can hinder a child's development, with negative effects that may persist throughout their life, such as reduced intellectual capacity, increased vulnerability to non-communicable diseases, decreased productivity, and even higher risk of poverty and giving birth to babies with low birth weight. The effects experienced by toddlers with stunting can be addressed through preventive efforts, one of which is health education. Prevention and health promotion efforts have been carried out to prevent and reduce the incidence of stunting. These efforts focus on addressing both the direct and indirect causes of stunting, one of which is through the use of health education media. One direct nutritional intervention for newborns is providing exclusive breastfeeding and ensuring optimal nutrition according to their needs (Pratama et al., 2019).

Based on a preliminary study, it was found that out of 100 priority regencies for stunting cases in Indonesia, 11 are located in Central Java Province, with Banyumas Regency ranking second among the 11 regencies with the highest stunting cases, following Cilacap Regency. Based on a report from the Banyumas Regency Health Service, in 2024, the number of toddlers weighed as many as 98,292, and the number of toddlers with short or very short (stunting) status was 14,270 or 14.52%. Meanwhile, based on the stunting focus villages in Banyumas Regency, 15 villages have been identified as priority stunting locations. The villages with the highest focus include Rancamaya, Gunung Lurah, Sokawera, Banjar Kidul, Buniayu, Karanglewas, Karangsari (Kebasen), Banjarsari (Ajibarang), Ketanda, Pandak (Sumpiuh), Randegan, Sawangan, Tumiyang, Purwodadi (Tambak), and Kranji (Purwokerto). Gunung Lurah Village has ranked second for three consecutive years among the stunting focus locations, with a total of 648 toddlers, and 43 of them identified as stunted.

This rationale encourages the researcher to choose and explore the topic "Determinant Factors of Stunting Prevalence in Gunung Lurah Village, Cilongok Subdistrict, Central Java Province, Indonesia," with a particular focus on the prevalence of stunted toddlers in Gunung Lurah, Cilongok Subdistrict. This study aims to analyze the factors associated with the prevalence of stunting in Gunung Lurah Village, Cilongok.

## METHOD

This study employs a quantitative research approach, presenting data in numerical form and analyzing it using descriptive statistical methods and a cross-sectional design, in which all variables are measured and observed simultaneously. The research method employed in this study is a descriptive correlational approach, a type of research designed to gather information about the current status of a phenomenon at the time of the research. The research design used in this study is a case-control design. A case-control design is an analytical research design that investigates the causes of events or incidents retrospectively.

The population in this study consisted of all mothers with toddlers in Gunung Lurah Village, totaling 648 individuals. The sample included mothers with stunted toddlers, totaling 43 (case group), and mothers with non-stunted toddlers, also totaling 43 (control group), with a 1:1 matching ratio, meaning the number of samples in the control group was equal to that in the case group. The inclusion criteria for toddlers, both in the case and control groups, were those aged less than 36 months. The sampling technique for the case group used the total sampling technique; namely, all toddlers (43 toddlers) aged less than 36 months who were stunted were used as research samples. The sampling technique for the control group used cluster random sampling. The clusters in this study used the Rukun Warga (RW). The researcher determined the number of samples for each cluster using the cluster formula so that all clusters were represented fairly. Furthermore, the determination of respondents was carried out randomly by lottery.

The instrument used in this study was a questionnaire sheet and the Kesehatan Ibu dan Anak (KIA) book. The questionnaire is divided into three main parts. The first questionnaire contains data on maternal education, family socio-economic status (income), family history of stunting (genetic), maternal medical history during pregnancy, maternal nutritional status during pregnancy (as recorded by upper arm circumference), history of low birth weight (LBW), and exclusive breastfeeding. The second part of the questionnaire is a survey about parenting patterns, adapted from Suardianti's research (2019), which consists of 15 statements with 'yes' and 'no' answer choices. The third questionnaire is a survey about maternal knowledge of toddler nutrition, adapted from Wahyuni's research (2009), consisting of 25 questions related to toddler nutrition.

Validity test for the first questionnaire using content validity by three maternity nursing experts. Validity and reliability tests for the parenting pattern questionnaire and mothers' knowledge about toddler nutrition were conducted on 20 mothers of toddlers in Sokawera Village, Cilongok District. The results of the validity test of the parenting pattern questionnaire containing 15 question items showed that there was one invalid question item, namely question item number 10 with r count -0.287 (r count <r table), so that question item was not used and the number of questionnaires used was 14 questions. The results of the reliability test of the parenting pattern questionnaire obtained an r-Spearman Brown value of 0.864 (reliable). The results of the questionnaire validity test obtained r-product moment from all question items> 0.444 (valid). At the same time, the results of the reliability test obtained r-Alpha Cronbach results of 0.964 (reliable).

Univariate analysis in this study used descriptive statistics to describe the descriptive statistics of all variables. Bivariate analysis using the Chi-Square test was employed to examine the relationship between each determinant and the prevalence of stunting. To determine the most dominant factor related to the prevalence of stunting, a multiple logistic regression test was used. Before collecting the research data, the researcher ensures that the research ethics permit is in place, with Registration Number: KEPK/UMP/80/III/2023. Then, the questionnaire was given to the respondents, with an emphasis on ethical considerations, which included an informed consent form, assurances of anonymity and confidentiality, details of potential benefits and the balance of harms and benefits, and respect for persons.

## RESULTS

Based on Table 1, the average age of toddlers is 22.74 months, with the lowest age of 9 months and the highest age of 31 months. The education level of respondents is mostly secondary/middle education, with 46 respondents (53.5%). The majority of respondents had

socio-economic conditions more than the Regional Minimum Wage (RMW), 64 respondents (74.4%), almost all toddlers did not have genetic factors related to stunting, 79 respondents (91.9%), most respondents with no history of disease during pregnancy, 73 respondents (84.9%), maternal nutritional status mostly with good category, 72 respondents (83.7%), most respondents did not have a history of birth with low birth weight, 65 respondents (75.6%). The majority of respondents did not provide exclusive breastfeeding, 69 respondents (80.2%). Most of the respondents' level of knowledge about toddler nutrition falls into the sufficient category, with 54 respondents (62.8%). Half of the respondents apply democratic parenting in the provision of toddler food, and 43 respondents (50%).

**Table 1. Frequency distribution of factors related to the incidence of stunting**

| Factors related to the incidence of stunting | f | % |
|---|---|---|
| **Educational** | | |
| Basic | 23 | 26.7 |
| Middle | 46 | 53.5 |
| High | 17 | 19.8 |
| **Socio-economic** | | |
| <Regional Minimum Wage (RMW) | 22 | 25.6 |
| >Regional Minimum Wage (RMW) | 64 | 74.4 |
| **Genetics** | | |
| Have | 7 | 8.1 |
| No have | 79 | 91.9 |
| **Mother's medical history during pregnancy** | | |
| Own | 13 | 15.1 |
| No have | 73 | 84.9 |
| **Nutritional status** | | |
| Not enough | 14 | 16.3 |
| Good | 72 | 83.7 |
| **History of LBW** | | |
| Yes | 21 | 24.4 |
| No | 65 | 75.6 |
| **Exclusive breastfeeding** | | |
| No | 69 | 80.2 |
| Yes | 17 | 19.8 |
| **Mother's knowledge about nutritional status** | | |
| Good | 12 | 14 |
| Enough | 54 | 62.8 |
| Not enough | 20 | 23.2 |
| **Parenting style in providing food** | | |
| Authoritarian | 8 | 9.3 |
| Democratic | 43 | 50 |
| Permissive | 35 | 40.7 |
| **Age of toddler** | **Mean** | **Min-Max** |
| | 22.74 | 9-31 |

Source: Primary data processed in 2023

According to table 2, The socio-economic factors (p-value=0.001), LBW (p-value=0.012), exclusive breastfeeding (p-value = 0.030), mother's awareness regarding nutritional status (p-value=0.014), and parenting style in food supply (p-value=0.004) are the five factors with a p-value<0.05. This indicates that the incidence of stunting is significantly correlated with socio-economic characteristics, history of LBW, exclusive breastfeeding, mother's knowledge of nutritional status, and parenting style in terms of food provision. However, there is no significant correlation between the incidence of stunting in Gunung Lurah Village, Cilongok District, and the other four factors—maternal education, genetic history, history of disease during pregnancy, and nutritional status during pregnancy—all of which had p-values>0.05.

**Table 2. Related factors to stunting incidence**

| Factors related to stunting incidence | Nutritional status | | | | Total | | p-value |
|---|---|---|---|---|---|---|---|
| | Stunting | | No stunting | | | | |
| | f | % | f | % | f | % | |
| **Educational** | | | | | | | |
| Basic | 15 | 17.4 | 8 | 9.3 | 23 | 26.7 | |
| Middle | 22 | 25.6 | 24 | 27.9 | 46 | 53.5 | 0.158 |
| High | 6 | 7 | 11 | 12.8 | 17 | 19.8 | |
| **Socio-Economic** | | | | | | | |
| <RMW | 18 | 20.9 | 4 | 4.7 | 22 | 25.6 | |
| >RMW | 25 | 29.1 | 39 | 45.3 | 64 | 74.4 | 0.001 |
| **Genetic** | | | | | | | |
| Have | 4 | 4.7 | 3 | 3.5 | 7 | 8.1 | |
| No have | 39 | 45.3 | 40 | 46.5 | 79 | 91.9 | 1.000 |
| **Mother's medical history during pregnancy** | | | | | | | |
| Have | 9 | 10.5 | 4 | 4.7 | 13 | 15.1 | |
| No have | 34 | 39.5 | 39 | 45.3 | 73 | 84.9 | 0.229 |
| **Nutritional Status** | | | | | | | |
| Not enough | 10 | 11.6 | 4 | 4.7 | 14 | 16.3 | |
| Good | 33 | 38.4 | 39 | 45.3 | 72 | 83.7 | 0.144 |
| **History of LBW** | | | | | | | |
| Yes | 16 | 18.6 | 5 | 5.8 | 21 | 24.4 | |
| No | 27 | 31.4 | 38 | 44.2 | 65 | 75.6 | 0.012 |
| **Exclusive Breastfeeding** | | | | | | | |
| Yes | 39 | 45.3 | 30 | 34.9 | 69 | 80.2 | |
| No | 4 | 4.7 | 13 | 15.1 | 17 | 19.8 | 0.030 |
| **Mother's knowledge about nutritional status** | | | | | | | |
| Good | 10 | 11.6 | 2 | 2,3 | 12 | 14 | |
| Enough | 27 | 31.4 | 27 | 31,4 | 54 | 62.8 | 0.014 |
| Not enough | 6 | 7 | 14 | 16,3 | 20 | 23.3 | |
| **Parenting style in providing food** | | | | | | | |
| Authoritarian | 3 | 3.5 | 5 | 5.8 | 8 | 9.3 | |
| Democratic | 15 | 17.4 | 28 | 32.6 | 43 | 50 | 0.004 |
| Permissive | 25 | 29.1 | 10 | 11.6 | 35 | 40.7 | |

Source: Primary data processed in 2023

Researchers employed a Multiple Logistic Regression Analysis of the Risk Factor Model using the Backward Method to identify the most dominant factors associated with the incidence of stunting in Gunung Lurah Village, Cilongok District. In this multivariate model analysis, the condition for including sub-variables is that the bivariate selection results have a p-value≤0.25. The results of the bivariate selection to become a candidate for multivariate modeling show that of the nine sub-variables/factors that are thought to be related to the incidence of stunting in Gunung Lurah Village, Cilongok District, there was one sub-variable that has a p-value>0.25, genetic history, so this sub-variable was not included in the multivariate test model in this study.

**Table 3. The most dominant factor is related to the incidence of Stunting**

| Step | B | S.E. | P value | Exp(B) / OR | 95% C.I. | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| **Step 1** | | | | | | |
| Socio-economic | 1.872 | 0.775 | 0.016 | 6.500 | 1.424 | 29.674 |
| Education | 0.165 | 0.432 | 0.702 | 1.180 | 0.506 | 2.748 |
| Medical history | -0.411 | 1.023 | 0.688 | 0.663 | 0.089 | 4.924 |
| Nutritional status | -0.077 | 1.087 | 0.944 | 0.926 | 0.110 | 7.800 |
| History of LBW | 1.439 | 0.865 | 0.096 | 4.217 | 0.775 | 22.953 |
| Exclusive breastfeeding | 0.821 | 0.818 | 0.315 | 2.274 | 0.457 | 11.304 |
| Mother's knowledge | 0.421 | 0.569 | 0.459 | 1.524 | 0.500 | 4.645 |
| Parenting style | -1.116 | 0.459 | 0.015 | 0.328 | 0.133 | 0.805 |
| Constant | -4.508 | 2.450 | 0.066 | 0.011 | | |

| Step | B | S.E. | P value | Exp(B) / OR | 95% C.I. | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| **Step 2** | | | | | | |
| Socio-economic | 1.866 | 0.772 | 0.016 | 6.466 | 1.424 | 29.346 |
| Education | 0.160 | 0.424 | 0.707 | 1.173 | 0.511 | 2.692 |
| Medical history | -0.443 | 0.911 | 0.627 | 0.642 | 0.108 | 3.831 |
| History of LBW | 1.413 | 0.783 | 0.071 | 4.110 | 0.885 | 19.082 |
| Exclusive breastfeeding | 0.811 | 0.804 | 0.314 | 2.250 | 0.465 | 10.886 |
| Mother's knowledge | 0.431 | 0.553 | 0.436 | 1.539 | 0.521 | 4.549 |
| Parenting style | -1.117 | 0.459 | 0.015 | 0.327 | 0.133 | 0.805 |
| Constant | -4.529 | 2.432 | 0.063 | 0.011 | | |
| **Step 3** | | | | | | |
| Socio-economic | 1.971 | 0.726 | 0.007 | 7.176 | 1.729 | 29.780 |
| Medical history | -0.475 | 0.908 | 0.601 | .622 | 0.105 | 3.685 |
| History of LBW | 1.417 | 0.784 | 0.071 | 4.124 | 0.887 | 19.181 |
| Exclusive breastfeeding | 0.793 | 0.801 | 0.322 | 2.209 | 0.460 | 10.608 |
| Mother's knowledge | 0.454 | 0.549 | 0.409 | 1.574 | 0.537 | 4.617 |
| Parenting style | -1.116 | 0.458 | 0.015 | .328 | 0.133 | 0.804 |
| Constant | -4.379 | 2.390 | 0.067 | .013 | | |
| **Step 4** | | | | | | |
| Socio-economic | 1.982 | 0.726 | 0.006 | 7.254 | 1.748 | 30.109 |
| History of LBW | 1.199 | 0.651 | 0.065 | 3.317 | 0.926 | 11.880 |
| Exclusive breastfeeding | 0.762 | 0.797 | 0.339 | 2.142 | 0.450 | 10.206 |
| Mother's knowledge | 0.424 | 0.544 | 0.436 | 1.529 | 0.526 | 4.442 |
| Parenting style | -1.096 | 0.456 | 0.016 | 0.334 | 0.137 | 0.817 |
| Constant | -4.842 | 2.229 | 0.030 | 0.008 | | |
| **Step 5** | | | | | | |
| Socio-economic | 2.207 | 0.678 | 0.001 | 9.091 | 2.407 | 34.333 |
| History of LBW | 1.136 | 0.640 | 0.076 | 3.113 | 0.888 | 10.914 |
| Exclusive breastfeeding | 0.987 | 0.727 | 0.174 | 2.683 | 0.646 | 11.146 |
| Parenting style | -1.131 | 0.458 | 0.014 | 0.323 | 0.131 | 0.792 |
| Constant | -4.424 | 2.121 | 0.037 | 0.012 | | |
| **Step 6** | | | | | | |
| Socio-economic | 2.234 | 0.674 | 0.001 | 9.334 | 2.491 | 34.980 |
| History of LBW | 1.255 | 0.626 | 0.045 | 3.509 | 1.029 | 11.962 |
| Parenting style | -1.239 | 0.459 | 0.007 | 0.290 | 0.118 | 0.712 |
| Constant | -3.265 | 1.893 | 0.085 | 0.038 | | |
| **Step 7** | | | | | | |
| Socio-economic | 2.283 | 0.663 | 0.001 | 9.806 | 2.676 | 35.936 |
| Parenting style | -1.361 | 0.446 | 0.002 | 0.256 | 0.107 | 0.614 |
| Constant | -0.851 | 1.387 | 0.540 | 0.427 | | |

Source: Primary data processed in 2023 * *p value* < 0,05

Based on Table 4, the socio-economic sub-variable has the most significant Coefficient B value (2.283) and odds ratio (OR) (33.260) when compared to the parenting style sub-variable, as indicated by the values of Coefficient B and OR. This suggests that in Gunung Lurah Village, Cilongok District, the socio-economic sub-variable is the most important factor associated with stunting. According to the OR value for parental socio-economic status, parents in Gunung Lurah Village, Cilongok District, who have a socio-economic status below RMW, are 33.260 times more likely to suffer from stunting than parents whose socio-economic position is higher than RMW.

The analysis yielded a G value (chi-square) of 23.970, and the model significance figure was 0.001 (<0.05), indicating that the socio-economic sub-variables could explain the stunting incidence variable at an alpha level of 5%. From the results of the coefficient of determination, it can be seen that the Nagelkerke value is 0.324, indicating that parents' socio-economic status can influence the prevalence of stunting in Gunung Lurah Cilongok Village by 18.3%. In comparison, other variables explain the remaining 81.7%.

The final multivariate analysis model resulted in the regression equation:

Y = a + b1 X1 + b2 X2

Prevalence Stunting (Y)= -0.851+(2.283*socioeconomic)+(-1.116*childcare pattern).

From the risk factor regression equation, it is noted that the regression coefficient value for the socio-economic sub-variable (2.283) is positive, indicating a direct relationship between parental socio-economic status and stunting in Gunung Lurah Village, Cilongok District. Conversely, the parenting style sub-variable (-1.361) shows an inverse relationship with stunting occurrence. The constant value (-0.851) indicates that without intervention on socio-economic status, the occurrence of stunting would increase by 0.851 times.

**Table 4. The final model of multiple logistic regression analysis**

| Variable | Unstandardized Coefficients | | Wald | OR | p-value | OR 95% Cl |
|---|---|---|---|---|---|---|
| | B | Std. Error | | | | |
| Socio-economic | 2.283 | 0.663 | 11.869 | 33.260 | 0.001 | 2.676-35.936 |
| Parenting style | -1.361 | 0.446 | 9.324 | 0.507 | 0.002 | 0.107-0.614 |
| Constant | -0.851 | | | | | |

*-2 Log Likelihood* = 95,252 *G* = 23,970 *Sig. (p-value)* = 0,001 *Nagelkerke* = 0,324

## DISCUSSION

Since the two primary causes of stunting are insufficient food intake and the body's reaction to excessive levels of infectious illness, it can also be considered a non-pathological or physiological adaptation to growth. Stunting is a chronic nutritional problem caused by multifactorial and occurs across generations. Most Indonesians often consider their short or tall stature to be hereditary. Research indicates that hereditary factors contribute only 15%, while the primary factors are related to nutrition, growth hormones, and recurrent infections (Apriani et al., 2022).

The research results showed that socio-economic factors, low birth weight, exclusive breastfeeding, mother's awareness regarding nutritional status, and parenting style in the food supply are the five factors with a p-value<0.05. This indicates that the socio-economic characteristics, history of low birth weight, exclusive breastfeeding, mother's knowledge of nutritional status, and parenting style in terms of food provision are significantly correlated with the prevalence of stunting. However, there is no significant correlation between maternal education, genetic history, history of disease, nutritional status during pregnancy, and the prevalence of stunting. Among these various factors, the economic factor is considered to have the most significant influence on the occurrence of stunting, as parents with sufficient income are more capable of meeting the primary and secondary needs of both mother and child. Families with good economic status also have better access to health services.

The study's results showed no significant relationship between education and the prevalence of stunting. According to a survey conducted by Musheiguza et al. (2021), differences in wealth index distribution (average contribution>84.7%) and maternal education length (average contribution>22.4%) have a positive impact on stunting rates. The disparities in wealth index and maternal education have contributed to increased stunting rates, and to reduce stunting among low-income communities, initiatives must begin with improving the distribution of social services, including maternal education and reproductive health for women of childbearing age, as well as access to clean water and health services in remote areas. The results of this study were not in line with those of Ngaisyah (2015), which showed a correlation between the father's level of education and the incidence of stunting.

Pathogenic microbes cause infectious diseases and exhibit considerable dynamicity. Infectious diseases are one of the direct causes of stunting. The link between infectious diseases and fulfilling nutritional intake cannot be separated. The presence of infectious diseases during pregnancy will make the situation worse if there is a lack of nutritional intake. The results of this study showed that there was no significant relationship between a history of disease, nutritional status, and the prevalence of stunting. The result was not in line with the findings of previous studies conducted by Putri et al. (2024), which suggested a moderate relationship between infectious diseases and the incidence of stunting in children, with a p-value of < 0.001 and an R-value of 0.547.

One of the indirect causes of stunting is the family's socio-economic status. Among these various factors, the economic factor is considered to have the most significant influence on the occurrence of stunting, as parents with sufficient income are more capable of meeting the primary and secondary needs of both mother and child. Families with good economic status also have better access to health services. Additionally, a 2017 study by Rajoo et al. found that low household income (<RM500/month) had an impact on the incidence of stunting among toddlers in Malaysia (p = 0.001), with toddlers from low-income households having a 2.1-fold increased risk of stunting (OR=2.1; 95%CI=9.8–22.2)(Rajoo et al., 2017). Using the Chi-Square test with α=0.05, a p-value of 0.036 was obtained. Furthermore, regarding family income, a Chi-Square test at α=0.05 yielded a p-value of 0.036. This suggests a significant relationship between family income level and the incidence of stunting.

The result of this study aligns with a study by Setiawan et al. (2018), which found that the family income level variable had a significance value of p = 0.018 (OR = 5.6), indicating that family income is associated with the incidence of stunting in children aged 24–59 months. Based on research by Wahyuni & Fithriyana (2020), most parents of stunted toddlers were part of the workforce (70 respondents or 67.87%), had only primary education (102 respondents or 92.86%), and had an income roughly equivalent to the regional minimum wage (UMR). Bivariate analysis revealed that two factors—income and education—were substantially correlated with stunting (p-value < 0.05).

The results of this study also concluded that there is a significant relationship between socio-economic status and the prevalence of stunting. This indicates that socio-economic status is significantly associated with stunting cases in Gunung Lurah Village, Cilongok. This finding is further supported by the Coefficient B and Odds Ratio (OR), in which the socio-economic sub-variable had the highest values—Coef.B=2.283 and OR=33.260—compared to other sub-variables. This shows that the most dominant or strongly associated factor with stunting in Gunung Lurah Village, Cilongok, is the socio-economic factor.

The OR value of 33.260 indicates that parents with income below the regional minimum wage are 33.260 times more likely to have stunted children than parents with income above the minimum wage. The analysis also yielded a G (chi-square) value of 23.970 and a model significance level of 0.001 (p<0.05), meaning that the socio-economic sub-variable can explain the incidence of stunting at a 5% significance level. From the coefficient of determination, it was found that the Nagelkerke value was 0.324, indicating that parental socio-economic status accounts for 18.3% of the stunting cases in Gunung Lurah Village, Cilongok. Other variables outside the scope of this study explain the remaining 81.7%.

## CONCLUSION

Based on the results of the study, it can be concluded that of the nine determinant factors studied, it shows that there were five factors related to the prevalence of stunting, namely: the socio-economic factors, low birth weight, exclusive breastfeeding, mother's awareness regarding nutritional status, and parenting style in supplying food. Economic factors have been proven to be the most dominant factor influencing stunting prevalence. Therefore, one of the important efforts that must be made to reduce stunting prevalence should focus on socio-economic aspects.

## AUTHOR'S DECLARATION

### Authors' contributions and responsibilities

**EMK:** Writing original draft, visualization, funding acquisition, conceptualization; **YY:** Translating, and writing final manuscript.

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All data are available from the authors.

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The authors declare no competing interest.

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The data presented in the publication is free of conflicts of interest, according to the author. The author bears full responsibility for it if it is discovered later.

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