MEDIA PENELITIAN DAN
PENGEMBANGAN KESEHATAN
Vol 34 No 4, Desember 2024

e-ISSN: 2338-3445
p-ISSN: 0853-9987

# DETERMINANTS OF SHORT BIRTHS IN BLORA CITY, CENTRAL JAVA: A MULTILEVEL ANALYSIS

*Determinants of Short Birth Babies in Blora Regency, Central Java: A Multilevel Analysis*

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***ABSTRAK***

*Kabupaten Blora termasuk daerah yang menjadi fokus perhatian pemerintah pusat dalam program penanganan stunting dengan jumlah kasus lahir pendek sebesar 311 anak pada tahun 2022. Penelitian bertujuan untuk menganalisis faktor biologis, social ekonomi, dan geografi terhadap bayi lahir pendek. Penelitian ini dapat digunakan sebagai pengambilan kebijakan untuk mencegah stunting. Penelitian ini dilakukan di Kabupaten Blora pada bulan Maret hingga Mei 2024 dengan bayi yang lahir pada tahun 2023. Penelitian ini merupakan penelitian analitik kuantitatif menggunakan desain studi case control. Sampel diambil menggunakan rumus cluster sampling dan didapatkan sebanyak 100 kelompok kasus dan 200 kelompok kontrol yang dibedakan berdasarkan jumlah populasi kasus dan sampel pada tempat penelitian. Pengumpulan data menggunakan kuesioner. variabel bebas yaitu usia, tinggi badan, kekurangan energi kronik, anemia, kunjungan antenatal, paritas, usia kehamilan, pendapatan, anggota keluarga, paparan rokok, tempat tinggal, serta pengaruh kontekstual desa dan capaian kunjungan posyandu dan variabel terikat adalah bayi lahir pendek. Analisis menggunakan regresi logistik ganda multilevel. Terdapat pengaruh dari usia ibu hamil dibawah 19 tahun (aOR=6.89; p=0.002), tinggi badan (aOR=4.63; p=0.009), kekurangan energi kronik (aOR= 6.61; p=0.001), anemia (aOR=3.28; p=0.018), kunjungan antenatal (aOR=6.38; p=0.003), paritas (aOR=3.39; p=0.008), usia kehamilan (aOR=4.58; p=0.042), pendapatan (aOR=2.40; p=0.067), jumlah anggota keluarga (aOR=4.39; p=0.003), paparan asap rokok (aOR=2.88; p=0.017) dan tempat tinggal (aOR=3.45; p=0.012), serta terdapat pengaruh kontekstual posyandu dan desa terhadap kejadian stunting di Kabupaten Blora sebesar 12%.Terdapat pengaruh dari faktor biologis, sosial ekonomi, dan geofrafis terhadap bayi lahir pendek di Kabupaten Blora. Diharapkan pemerintah membuat kebijakan untuk menurunkan kekurangan energi kronik pada ibu hamil*

***Kata Kunci:*** *bayi, bayi lahir pendek, ibu hamil*

**ABSTRACT**

Blora is one of the districts that is focused on central government's attention in the stunting management program with cases of stunting 311 children in 2022. This research aimed to analyze biological, socioeconomic, and geographic factors in short-term babies. This study can be used as policy decision to prevent stunting. This research was conducted in Blora Regency from March to May 2024, with babies born in 2023. This is quantitative research using case-control study design. Samples were taken using cluster sampling, 100 cases, and 200 control groups were differentiated based on the number of cases and sample populations at the research. Data collection using a questionnaire. The independent variables were age, height, chronic energy deficiency, anemia, antenatal visits, parity, gestational age, income, family members,



https://doi.org/10.34011/jmp2k.v34i4.2285

e-ISSN: 2338-3445
p-ISSN: 0853-9987

cigarette exposure, place of residence, and the contextual effect of village and posyandu visits. Multilevel logistic regression was used for analysis. There was a significant influence of pregnant women's age < 19 years (aOR=6.89; p=0.002), height (aOR=4.63; p=0.009), chronic energy deficiency (aOR= 6.61; p=0.001), anemia (aOR=3.28; p=0.018), antenatal visits (aOR=6.38; p=0.003), parity (aOR=3.39; p=0.008), gestational age (aOR=4.58; p=0.042), income (aOR=2.40; p=0.067), number of family members (aOR=4.39; p=0.003), exposure to cigarette smoke (aOR=2.88; p=0.017), and place of residence (aO=3.45; p=0.012), and the contextual effect posyandu and village on the incidence of stunting in Blora district by 12%. Biological, socioeconomic, and geographical factors influence short-birth babies in the Blora Regency. It is hoped that government will create a policy to reduce chronic energy deficiencies in pregnant women.

**Keywords:** babies, pregnant women, short-born babies

## INTRODUCTION

Stunting is a condition in which the growth of a child's height is inhibited, resulting in short stature. This condition is a chronic manifestation of prolonged malnutrition. The incidence of stunting or failure to grow and develop children in Indonesia remains one of the main problems that needs to be addressed by the Indonesian government. At the world level, the World Health Organization states that by 2022, 22.3% of children in the world will suffer from stunting [1]. At the Indonesian level, based on data presented by the Indonesian Health Survey in 2023, the stunting rate in Indonesia is 21.5% and for Blora Regency it is 21.2%[2]. Various efforts have been made by the government to reduce stunting rates, such as providing blood supplement tablets, antenatal checks, and others [2].

Blora Regency is one of the areas that the central government focuses on in its stunting handling program. At least ten villages in Blora Regency were included in the list of 100 national intervention areas for stunting prevention in 2018. According to the Blora Regency Health Office, in 2022, there were 311 cases of children born with short body length (at risk of stunting), consisting of 168 cases in boys and 143 cases in girls. Meanwhile, in 2023, there will be 212 babies born with short body lengths. Data from Riskesdas 2018 shows that the problem of short birth length is more common in rural areas than in urban areas, with Blora Regency having 271 villages and 24 sub-districts, most of which are classified as rural [3].

The length of a newborn baby is an indicator that affects the height of the baby in the future. Usually, newborns have a body length between 48 and 52 centimeters. In Indonesia, the proportion of children born with a body length of less than 48 cm increased from 20.2% in 2013 to 22.7% in 2018. In addition, about 20.2% of children who suffer from malnutrition have a history of being born with a short body length [4].

Mothers play an important role in the child's growth and development cycle. A malnourished mother can be considered one of the main factors causing growth retardation at birth. Babies born to mothers with chronic malnutrition and short stature are more likely to be stunted The mother's height reflects her previous nutritional and socioeconomic status, which can affect the likelihood of inheriting a tendency to be short in stature [5][6].

Nutritional status during pregnancy, such as iron deficiency anemia and chronic energy deficiency (CED), can also affect the incidence of stunting. Chronic energy deficiency during pregnancy results in insufficient fetal needs. In addition, the history of anemia in mothers also has an impact on stunting. Iron is one of the substances involved in bone formation, and the hemoglobin (Hb) levels of pregnant women are associated with the length of the baby at birth; the higher the Hb level, the longer the baby's length [7].


https://doi.org/10.34011/jmp2k.v34i4.2285

e-ISSN: 2338-3445
p-ISSN: 0853-9987

In addition, children born to mothers with high parity are more likely to receive poor parenting and inadequate nutritional needs during growth. Having multiple siblings can lead to growth delays due to competition for the limited sources of nutrients available at home. Low family incomes result in an inability to meet daily nutritional needs, contributing to an increase in stunting incidence [8].

Conducted in Blora Regency stated that birth length is a significant factor that affects the incidence of stunting in toddlers. Babies born with an abnormal body length or less than 48 centimeters have a 2.65 times higher risk of growth retardation compared to babies born with normal body length [8]. Children born with a birth length of at least 48 centimeters can also survive longer compared to those born under 48 centimeters. This condition emphasizes that adequate nutrition is very important for the fetus during pregnancy to give birth to a child with good nutritional status [9][10].

This research is supported by previous research conducted by Judiono, et al in 2023 who conducted research related to the determinants of stunting using cross-sectional studies sourced from SSGI 2022 secondary data [11]. Furthermore, research conducted by Lusiatun, et al in 2020 examined the influence of status. nutrition of pregnant women, and socio-economic status on birth length of babies and the incidence of stunting which is a case-control study [12]. Furthermore, research conducted by Fitrianiar in 2022 examined the determinants of stunting in babies aged 0-24 months using a case-control study [13]. From existing research, there has been no research that discusses the determinants of short birth length by adding community levels carried out at the village level and community participation in posyandu visits. Therefore, this research carried out a multilevel analysis. This variable is important for research because looking at differences in characteristics or life in villages can influence the incidence of short-term babies and visits to posyandu at the village level can also influence the incidence of short-term babies.

This study aimed to analyze the determinants of short birth length in Blora Regency, Central Java Province. Research on the determinants of short birth length, by including community-level factors conducted at the district level, especially village/city status, has not been widely conducted. Therefore, further analysis of the contextual influence of health centers and villages/sub-districts is needed to understand the determinants of short birth length in more detail.

## METHODS

This research was conducted in the Blora Regency from March to May 2024, with babies born in 2023. This study uses a questionnaire as an instrument for collecting data from the research sample Before conducting interviews and filling out questionnaires, informed consent was carried out to ask permission from the research subjects. The research method used in this study is an analytical observational study with a case-control design. The researchers chose this design because it is suitable for exploring a wide range of possible exposures and research problems. Data analysis in this study was carried out using the STATA 17 application. This study has a sample size of at least 243 respondents from nine clusters in this study which is obtained from the calculation of the cluster sampling formula. However, the researchers increased the sample size to 300 respondents. This technique is used to determine birth cases and choose villages. To select the case and control samples, the researchers used simple random sampling. The sample size in the case group is 100 control respondents, and the control group consists of 200 case respondents which were differentiated based on the number of case and sample populations at the research site. This research has passed the ethics test based on letter number 369/II/2024 from Dr. Moewardi General Hospital.


https://doi.org/10.34011/jmp2k.v34i4.2285

e-ISSN: 2338-3445
p-ISSN: 0853-9987

To select the case and control samples, the researchers used simple random sampling. The inclusion criteria for this study are babies born in 2023, both boys and girls, babies born with a body length of <48 centimeters (cases) and body lengths of ≥48 centimeters (control), babies born full-term or prematurely, babies with complete medical records along with their mother's medical records, and domiciled in Blora Regency. Exclusion criteria are infants and mothers with incomplete medical records.

The independent variables in this study were maternal age during pregnancy which is divided into normal (20-35 years), <20 years, and >35 years [3], maternal height which is divided into short (<150 cm) and normal (≥150 cm) [3], parity which is divided to normal (<2 parities) and 2 or more parities [3], gestational age which is divided to <37 weeks and ≥37 weeks, chronic energy deficiency (CED) which is divided to <23.5 cm and ≥23.5 cm in measurement of upper arm circumference [3], anemia which divided into <11 mm/Hg and ≥11 mm/Hg [3], antenatal care (ANC) which divided into <6 times and ≥6 times[3], tobacco exposure which divided into exposed and not exposed, number of family members which divided to <4 members and ≥4 members and family income which divided to <UMK and ≥UMK [14], village/city status, and community participation (D/S) which divided in to <90% and ≥90%. The dependent variable in this study is babies with short birth lengths [3].

Univariate analysis in this study was carried out by presenting the frequency and percentage of each variable. Bivariate analysis uses the Chi-square test because in this research, analysis of the dependent variable was carried out on the independent variable which is categorical data and in this research is presenting the odds ratio and p-value. Multivariate analysis was carried out using multilevel logistic regression to assess the contextual influence of villages and health centers at the second level.

## RESULT

In this study, univariate, bivariate, and multivariate multilevel analyses were carried out. The results of the analysis can be seen in Table 1.

**Table 1. Univariate Analysis Results Determinant of Short Birth Length Babies in Blora Regency**

| Variable | Baby length | | | | Entire | |
|---|---|---|---|---|---|---|
| | Normal | | Short | | | |
| | n | % | n | % | n | % |
| **Posyandu Visit** | | | | | | |
| < 90% | 85 | 62.96 | 50 | 37.04 | 135 | 45.0 |
| ≥90% | 115 | 69.70 | 50 | 30.30 | 165 | 55.0 |
| **Maternal age during pregnancy** | | | | | | |
| <20 Years | 10 | 23.81 | 32 | 76.19 | 42 | 14.00 |
| 20-35 Years | 174 | 77.68 | 50 | 22.32 | 224 | 74.67 |
| >35 Years | 16 | 47.06 | 18 | 52.94 | 34 | 11.33 |
| **Maternal height during pregnancy** | | | | | | |
| <150 cm | 24 | 37.50 | 40 | 62.50 | 64 | 21.33 |
| ≥150 cm | 176 | 74.58 | 60 | 25.42 | 236 | 78.67 |
| **Upper mid-arm circumference** | | | | | | |
| <23.5 cm | 19 | 23.46 | 62 | 76.54 | 81 | 27.0 |
| ≥23.5 cm | 181 | 82.65 | 38 | 17.35 | 219 | 73.0 |
| **Up to hemoglobin** | | | | | | |


https://doi.org/10.34011/jmp2k.v34i4.2285

e-ISSN: 2338-3445
p-ISSN: 0853-9987

| Variable | Baby length | | | | Entire | |
|---|---|---|---|---|---|---|
| | Normal | | Short | | | |
| | n | % | n | % | n | % |
| <11mm/Hg | 29 | 34.52 | 55 | 65.48 | 84 | 28.0 |
| ≥11 mm/Hg | 171 | 79.17 | 45 | 20.83 | 216 | 72.0 |
| **Antenatal visit** | | | | | | |
| <6 times | 15 | 35.71 | 27 | 64.29 | 42 | 14.0 |
| ≥ 6 times | 185 | 71.71 | 73 | 28.29 | 258 | 86.0 |
| **Maternal parity** | | | | | | |
| <2 times | 115 | 78.77 | 31 | 21.23 | 146 | 48.67 |
| ≥2 times | 85 | 55.19 | 69 | 44.81 | 154 | 51.33 |
| **Gestational age** | | | | | | |
| <37 weeks | 6 | 13.64 | 38 | 86.36 | 44 | 85.33 |
| ≥37 weeks | 194 | 75.78 | 62 | 24.22 | 256 | 14.67 |
| **Family income** | | | | | | |
| <2.040.080 | 104 | 59.43 | 71 | 40.57 | 175 | 58.33 |
| ≥2.040.080 | 96 | 76.80 | 29 | 23.20 | 125 | 41.67 |
| **Number of family members** | | | | | | |
| ≤4 orang | 140 | 81.87 | 31 | 18.13 | 171 | 57.0 |
| >4 people | 60 | 46.51 | 69 | 53.49 | 129 | 43.0 |
| **Exposure to tobacco smoke** | | | | | | |
| Already | 81 | 51.92 | 75 | 48.08 | 156 | 52.0 |
| No | 119 | 82.64 | 25 | 17.36 | 144 | 48.0 |
| **Residency status** | | | | | | |
| City | 147 | 78.61 | 40 | 21.39 | 187 | 62.33 |
| Rural | 53 | 46.90 | 60 | 53.10 | 113 | 37.67 |

Bivariate analysis in this study was carried out to determine the influence of maternal age, height, chronic energy deficiency, anemia, antenatal visits, parity, gestational age, income, number of family members, exposure to tobacco smoke, residence status, and coverage of Posyandu visits on short birth length. The results of the bivariate analysis are presented in Table 2.

**Table 2. Bivariate Analysis of Determinants of Short Birth Length in Blora Regency**

| Variable | Odds Ratio | CI 95% | | *p-value* |
|---|---|---|---|---|
| | | *Lower Limit* | *Upper Limit* | |
| **Biology Factors** | | | | |
| Mother's age <20 years | 11.14 | 5.12 | 24.21 | <0.001 |
| Mother's age >35 years old | 3.92 | 1.86 | 8.23 | <0.001 |
| Mother height <150 cm | 4.89 | 2.72 | 8.77 | <0.001 |
| **Pregnancy Factors** | | | | |
| Chronic energy deficiency (MUAC <23.5 cm) | 15.54 | 8.35 | 28.94 | <0.001 |
| Anemia (Hb <11 mg/dl) | 7.21 | 4.13 | 12.58 | <0.001 |
| Antenatal visits <6 times | 4.56 | 2.29 | 9.07 | <0.001 |
| Parity ≥2 births | 3.01 | 1.81 | 5.01 | <0.001 |



https://doi.org/10.34011/jmp2k.v34i4.2285

e-ISSN: 2338-3445
p-ISSN: 0853-9987

| Variable | Odds Ratio | CI 95% | | *p-value* |
|---|---|---|---|---|
| | | *Lower Limit* | *Upper Limit* | |
| Gestational age <37 weeks | 19.82 | 8.00 | 49.10 | <0.001 |
| **Socio-economy Factors** | | | | |
| Income <Rp 2,080,040 | 2.26 | 1.35 | 3.78 | 0.002 |
| Number of family members >4 | 5.19 | 3.09 | 8.74 | <0.001 |
| Exposure to tobacco smoke | 4.41 | 2.59 | 7.51 | <0.001 |
| Living in a rural area | 4.16 | 2.50 | 6.92 | <0.001 |
| Posyandu visit coverage <90% | 1.35 | 0.84 | 2.19 | 0.219 |

**Note: p-value using chi-square analysis, p<0.05 was statistically significant**

Bivariate analysis a chi-square test was carried out to see the effect of each variable age, height, chronic energy deficiency, anemia, antenatal visits, parity, gestational age, income, family members, cigarette exposure, place of residence, and posyandu visit courage on short baby born. Table 2, It was found that all variables of maternal age during pregnancy, maternal height, chronic energy deficiency, anemia, antenatal visits, parity, gestational age, income, number of family members, tobacco smoke exposure, and residence status were statistically significant to infants with short birth length in Blora Regency. However, In bivariate analysis, it was found that the variables of maternal age <20 years and chronic energy deficiency, and gestational age <37 weeks were the variables with the highest increased risk of having a short-term baby. Pregnant women aged less than 20 years were 11.45 times more likely to give birth to a short-term baby than pregnant women aged 20-35 years and this was statistically significant. Pregnant women with a gestational age of less than 37 weeks are 19.82 times more likely to give birth to a short baby than pregnant women with a gestational age of more than 37 weeks and this is statistically significant.

The results of the multivariate analysis in Table 3 showed that the variables that had the greatest possible influence on short-term babies were the maternal age <20 years, chronic energy deficiency in pregnant women, and antenatal visits <6 times. Pregnant women aged <20 years have a risk of giving birth to a short baby 6.89 times more than pregnant women aged 20-35 years and this is statistically significant. Furthermore, in chronic energy deficiency, pregnant women with LiLA <23.5 have a risk of giving birth to a short-term baby 8.51 times compared to normal pregnant women and this is statistically significant. Furthermore, regarding the variable of antenatal visits, pregnant women with <6 antenatal visits have a risk of giving birth to a short baby 6.48 times compared to pregnant women with ≥6 antenatal visits and this is statistically significant.

Apart from having a large influence, in the multivariate analysis, there are variables that do not have a statistically significant effect on the birth of short babies, namely the variables of the pregnant mother's age >35 years and income <UMK. In the variable of pregnant mother's age, pregnant women aged >35 years have a risk of 1.61 times compared to pregnant women aged 20-35 years. In the income variable, pregnant women with income <UMK have a risk of giving birth to a short baby 2.48 times compared to mothers with income ≥UMK. Furthermore, in the multilevel analysis, it was found that there was a contextual influence of the village and the achievement of community participation on short birth babies in Blora Regency of 12% (ICC=0.12).



https://doi.org/10.34011/jmp2k.v34i4.2285

e-ISSN: 2338-3445
p-ISSN: 0853-9987

**Table 3. Logistic Regression Analysis of Determinants of Short Born Long Babies in Blora Regency**

| Variable | Odds Ratio | CI 95% | | *p-value* |
|---|---|---|---|---|
| | | *Lower Limit* | *Upper Limit* | |
| **Biology Factors** | | | | |
| Mother's age <20 years | 6.89 | 2.00 | 23.69 | 0.002 |
| Mother's age >35 years old | 1.61 | 0.39 | 6.47 | 0.505 |
| Mother height <150 cm | 4.63 | 1.47 | 14.53 | 0.009 |
| **Pregnancy Factors** | | | | |
| Chronic energy deficiency (MUAC <23.5 cm) | 6.61 | 2.25 | 19.42 | 0.001 |
| Anemia (Hb <11 mg/dl) | 3.28 | 1.23 | 8.81 | 0.018 |
| Antenatal care visits <6 times | 6.38 | 1.85 | 22.07 | 0.003 |
| Parity ≥2 births | 3.39 | 1.38 | 8.34 | 0.008 |
| Gestational age <37 weeks | 4.58 | 1.06 | 19.88 | 0.042 |
| **Socio-economy Factors** | | | | |
| Income <Rp 2,080,040 | 2.40 | 0.94 | 6.12 | 0.067 |
| Number of family members >4 | 4.39 | 1.66 | 11.66 | 0.003 |
| Exposure to tobacco smoke | 2.88 | 1.21 | 6.83 | 0.017 |
| Living in a rural area | 3.45 | 1.31 | 9.06 | 0.012 |
| **Random Effects** | | | | |
| **Village/Sub-district** | | | | |
| Var (coverage of Posyandu visits) | 0.28 | | | |
| ICC (Intracluster Correlation Coefficient) | 0.12 | | | |

## DISCUSSION

In reviewing the research results in the reference, regarding biological factors, namely the age of the pregnant mother, pregnant women aged less than 20 years are 6.89 times more likely to give birth to a short baby compared to pregnant women aged 20-351 years and this is statistically significant (aOR=6.89; 95% CI=2.00 to 23.69; p=0.002). This research is in line with research conducted by Laksono et al, which states that age groups have a partial effect on the incidence of short-term babies born to mothers in Indonesia. Mothers aged ≤19 years are 1.461 times more likely to experience stunting under five (aOR: 1.461; 95% CI: 1.140 to 1.872) [15]. The mother's age when first married and the mother's age at birth are determinants of the occurrence of short births. The younger the mother's age when she marries, the greater the risk of having a child with a short birth [15].

Furthermore, regarding the height of pregnant women, pregnant women with a height of less than 150 cm are 4.63 times more likely to give birth to a short baby than pregnant women with a height of more than 150 cm and this is statistically significant (aOR=4.63; 95% CI= 1.47 to 14.53; p=0.009). This research is in line with research conducted by Widayati et al., (2021) which states that pregnant women with a height <150 cm have a 3.43 times chance of giving birth to a short baby compared to mothers with a normal height (aOR= 3.43; 95% CI= 1.48 to 7.53) [16]. According to Rahmawati et al, maternal height increases the likelihood that the mother's birth weight will be passed on directly to her child Those with tall bodies will most likely have tall children and conversely, mothers with short bodies will most likely have short children. However, children's growth is also influenced by external factors such as inadequate nutritional intake for children The results of other studies also show the same thing, that



https://doi.org/10.34011/jmp2k.v34i4.2285

e-ISSN: 2338-3445
p-ISSN: 0853-9987

there is a correlation between the mother's height and the length of the baby's born [17]. An indirect factor that increases the possibility of stunting is the mother's height below 150 cm, which increases the possibility of birth body length below 48 cm [18].

In chronic energy deficiency, Pregnant women with an upper arm circumference of less than 23.5 cm are 6.61 times more likely to give birth to a short baby than pregnant women with an upper arm circumference of more than 23.5 cm and this is statistically significant (aOR=6.61; 95% CI= 2.25 to 19.42; p=0.001). This research is in line with research conducted by Pratiwi et al., (2023) which states that the diagnosis of malnutrition during pregnancy can be done by having an upper arms size (LiLA) of 23 cm, body mass index (BMI) of 18.5 kg/ m2, and/or gestational weight gain of 2301 grams per week. Adequate maternal nutritional intake is important for healthy fetal development and positive outcomes for mother and child. Low hemoglobin levels during pregnancy can cause premature birth, low birth weight, and fetal growth retardation [19].

In the results of anemia research, pregnant women with hemoglobin levels of less than 11 mg/dl are 3.28 times more likely to give birth to premature babies than pregnant women with normal hemoglobin levels and this is statistically significant (aOR=3.28; 95% CI= 1.23 to 8.81; p=0.018). This research is in line with research by Santosa, et al which states that anemia begins with socio-economic factors. Socioeconomic factors have an indirect influence on the occurrence of stunting through other indicators that shape maternal and child factors, such as nutritional status, anemia during pregnancy, birth weight, and dosage of formula milk consumption. Families with low socioeconomic status are more likely to experience malnutrition and anemia during pregnancy. Mothers whose nutritional status is poor during pregnancy will have babies with low birth weight. Apart from that, families with low socio-economic levels tend not to pay attention to adequate nutrition and milk consumption for their children, thereby hampering children's growth and development [20].

In the results of research on pregnancy factors according to references, on the variable of antenatal visits, pregnant women with less than 6 antenatal visits have a 6.38 times chance of giving birth to a short term baby compared to pregnant women with more than 6 antenatal visits and this is statistically significant (aOR=6.38; 95% CI= 1.85 to 22.07; p=0.003). This research is in line with research conducted by Amaha and Woldeamanuel which states that pregnant women who make more than four antenatal visits can reduce the number of short-term babies and is statistically significant (aOR= 0.763; 95% CI=0.668 to 0.870; Antenatal visits made by pregnant women are closely related to knowledge, residence in urban areas, and access to close health facilities. Antenatal visits allow pregnant women to know the condition of the fetus and receive education during pregnancy so that the process of preventing short-term babies can be carried out [21].

Regarding parity of pregnant women, pregnant women with more than 2 births are 3.39 times more likely to give birth to a short baby compared to pregnant women with less than 2 births and this is statistically significant (aOR=3.39; 95%CI=1.38 to 8.34; p=0.008). This research is in line with research conducted by Putri et al which states that maternal parity is associated with stunting in children under five years. The results of the study found that mothers with parity were >31 times more likely to have stunted children under five than children under five who were not stunted. In this study, maternal parity in the poor category (>3 times) was higher in the case group than in the control group [22].

Regarding the gestational age variable, Pregnant women with a gestational age of less than 37 weeks are 4.58 times more likely to give birth to a short-term baby than pregnant women with a gestational age of more than 37 weeks and this is statistically significant (aOR=4.58; 95% CI=1.06 to 19.88; p=0.042). This research is in line with


https://doi.org/10.34011/jmp2k.v34i4.2285

e-ISSN: 2338-3445
p-ISSN: 0853-9987

research conducted by Manggala et al., (2018) which states that pregnant women who give birth at a gestational age of <37 weeks are 4.24 times more likely to give birth to a short-term baby compared to pregnant women who give birth at a gestational age of more than 37 weeks. weeks and was statistically significant (aOR=4.239; 95% CI=1.56 to 11.49; p=0.005) [23].

In the results of research on socio-economic factors according to references, on the income variable, pregnant women with an income of less than the minimum wage are 2.40 times more likely to give birth to a short baby than pregnant women with an income of more than the minimum wage, but this is statistically less significant (aOR= 2.40; 95% CI=0.94 to 6.12; p=0.067). This research is in line with research conducted by Utami et al which states that pregnant women with low incomes are 6.63 times more likely to give birth to short babies than pregnant women with high incomes. Low income is related to low education and low economic conditions, making it difficult to meet the nutritional needs of pregnant women [10].

Regarding the variable number of family members, Pregnant women with more than 4 family members are 4.39 times more likely to give birth to a short-term baby than pregnant women with less than 4 family members and this is statistically significant (aOR=4.39; 95% CI=1.66 to 11.66; p=0.003). This research is in line with Abri who states that the number of family members will directly and indirectly also influence children's nutritional needs. A smaller number of family members has a greater ability to provide a variety of foods because it does not require greater costs to buy a variety of foods compared to members of a larger or medium family. However, if the larger number of family members is not balanced with equal distribution of food, the children in the family will suffer from malnutrition. Children from small families are not necessarily free from short-term babies [24].

Regarding the cigarette smoke exposure variable, pregnant women who are exposed to cigarette smoke are 2.88 times more likely to give birth to a premature baby than pregnant women who are not exposed to cigarette smoke and this is statistically significant (aOR=2.88; 95% CI=1.21 to 6.83; p=0.017). This research is in line with research conducted by D.D. Astuti et al stated that pregnant women who were exposed to smoking were 10.32 times more likely to give birth to short babies compared to pregnant women who were not exposed to smoking and this was statistically significant. Exposure to cigarette smoke by pregnant women can cause disease in pregnant women and can also affect the health of the fetus. The poor health of pregnant women means that the nutrition obtained by the fetus is hampered so there is a high possibility of giving birth to a short-term baby. Health policymakers in Indonesia are expected to pay attention to family members who smoke alongside education, health services, and social protection in their efforts to combat stunting. There is a need for educational campaigns among the community and families about how exposure to cigarette smoke increases the risk of stunted growth in children [8].

At level 2 multilevel analysis, according to references, this research is in line with research conducted by Laksono et al, which states that the rural health service system in Indonesia is associated with food poverty and low levels of health, literacy among the elderly, power mothers in making decisions in the household, and the consequences of the high use of TBAs among ethnic minorities. In addition, rural subgroups are disadvantaged due to socio-economic disparities in terms of maternal, newborn, and child health in Indonesia [15]. According to Widyaningsih et al, several factors influence the incidence of short-birth babies in rural areas, including the low economy and the lack of education felt by pregnant women in rural areas. Poor sanitation and access to health facilities are also one of the causes of the high number of short-birth babies in rural areas [25].


https://doi.org/10.34011/jmp2k.v34i4.2285

e-ISSN: 2338-3445
p-ISSN: 0853-9987

Regarding the posyandu visit variable at level 2, this research is in line with research conducted by Indriani, et al, which states that there is a contextual influence from posyandu on stunting of 63.39%. Posyandu is a place that has the main function of providing health services for pregnant women, including weighing and administering blood supplement tablets, pregnancy checks, and immunizations, as well as health education. With the presence of posyandu, the community, especially pregnant women, receives more attention and good knowledge during pregnancy so that short birth babies can be prevented [18].

Community participation in the posyandu program is the first step that can be taken to involve community members to take part in the community empowerment process in the health sector with the aim of supporting and improving the level of community health. Without community participation, health efforts are not public health.

This research has the advantage that there are many variables studied so that there are fewer confounding factors that can bias the research results. Furthermore, this research is an efficient case-control research based on case variables and control variables. However, this research has limitations, including the possibility of bias in answering the questionnaire because you have to remember past events and are also required to remember many variables at the same time because this research is a quantitative research using a case-control study design. This implies research that uses questionnaires and interviews so that there is no bias when filling out the questionnaire.

## CONCLUSION

Short births are caused by the age of the pregnant mother, height, chronic energy deficiency, anemia, antenatal visits, parity, gestational age, income, family members, exposure to smoking, place of residence, as well as contextual influences from the village and the achievement of posyandu visits

It is hoped that the government will prioritize the problem of chronic energy deficiency in pregnant women and provide a policy in the form of a ban on marriage under the age of 20 to prevent the birth of short babies.

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