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# The Determinant Factors of Stunting Among Children in Urban Slums Area, Yogyakarta, Indonesia

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**Abstract**

**BACKGROUND:** In Indonesia, health indicators in urban areas are better than in rural areas. It is related to the health services' accessibility. However, in some regions, the stunting rate among children under five in urban areas is higher than in rural areas, including in Yogyakarta.

**AIM:** The research purpose was to analyze the determinant factor influencing the stunting incidence in children under five in urban slums areas.

**MATERIALS AND METHODS:** The study design employed a case control with a sample of mother and 29 children under five as a case group and 42 children under five as a control group in Yogyakarta District during the December–January 2020 period. The inclusion criteria were children aged 6–59 months living in the urban slum area, while the exclusion criteria were children who had physical and mental disabilities, suffering from illness or were hospitalized, and had congenital diseases. The data collection was conducted by questionnaire and anthropometric measurements. Data analysis used central tendency, Chi-square, and logistic regression.

**RESULTS:** The results showed that the majority of children were girls in the case group and boys in the control group with a history of non-exclusive breastfeeding. Most respondents have mothers with low levels of education and work as housewives. The results of the correlation test showed that of the seven variables studied as a risk factor, there are two factors which were birth weight and mother occupation which were related with stunting in children under five with p = 0.041 and 0.047, respectively.

**CONCLUSION:** This study concluded that birth weight (AOR = 3.49) and mother's occupation (AOR = 0.25) are the determinant cause of stunting in children under 5 years of age in urban slums areas. The pregnant women's health promotion needs to be improved because it will affect birth weight, a risk factor for stunting in children under five.

## Introduction

One of the problems faced by children in poor and developing countries regarding nutrition is stunting. Stunting shows children's nutritional status in the long term (chronic) [1], [2]. The World Health Organization in 2013 stated that around 161 million children under five experienced stunted growth, half of which were in Asia. A total of 171 million children (167 children under the age of five in developing countries) were estimated stunted in 2010. Worldwide, the incidence of stunting in children under the age of five continues to decrease and reach 21.8% or 142 million in 2020, whereas, in 2010, it reached 26.7–39.7% in 1990 [2], [3], [4]. Meanwhile, the stunting rate in children under five in Indonesia has increased. The national survey results in Indonesia revealed that the stunting prevalence in 2013 was 37.2% [5]. This percentage has increased compared to 2010–2007, namely, 35.6–36.8% [6]. Data from the Indonesian Health Profile in 2018 disclosed that short toddlers in DI Yogyakarta Province were 15.10%, and very short toddlers were 6.3%. This prevalence has increased from the previous year, as much as 0.4% of short children (14.70%) and 1.2% of very short children (5.1%) [7].

The stunting problem in children under five is influenced by various factors, both direct and indirect factors. The living environment is a risk factor for stunting. Toddlers who live in urban and rural areas are equally at risk of experiencing stunting. The urban population is increasing day by day with the facilities' and infrastructure's advancement in urban areas [8]. It has an impact, one of which is an increase in nutritional problems, including obesity and malnutrition problems [9]. Obesity and anemia in women of working age (15–49 years) are the nutritional issues in urban areas and malnutrition, especially stunted children aged 6–59 months [10]. Several studies have shown that children living in urban slum areas have 50% higher rate of stunting than in rural areas [11]. Factors influencing the high risk of stunting in urban areas included low

birth weight (LBW), male gender [11], [12], exclusive breastfeeding, complementary breastfeeding [11], health-care access and sanitation [13], [14], mother's occupation, and education level [15].

Aryastami *et al*. stated that there is a chance of stunting in LBW which had a risk of 1.74 times higher than normal birth weight babies [16]. The stunting prevalence was higher in men than in women [12]. This trend occurred globally not only in poor and developing countries [11]. Epidemiological research showed that the mortality and morbidity rates in boys were higher than in girls [11]. Exclusive breastfeeding could produce optimal height if given during the first 6 months of life, whereas children who were mostly stunted got exclusive breastfeeding only for the first 3–4 months of life, then, they were given complementary foods, such as porridge. This condition has the impact of not fulfilling children's nutrition and disrupting their growth in the future [17]. Another factor that also affected the stunting incidence in children under five was the mothers' role in childcare [17].

Economic and social developments in urban areas have increased women's engagement in work outside the home. The population density in the urban area of Yogyakarta city always increases every year. In 2016, the population density reached 12,853.66 people/KM$^2$, and in 2020, it reached 13,413.42 people/KM$^2$. It increases women's participation in the world of work, which indirectly affects children's growth and development. Based on the residence area, women who worked in urban areas mostly worked as laborers/employees/staff, which was 50.88% [18]. The working status of the mother plays a crucial role in the incidence of stunting related to exclusive breastfeeding and complementary feeding [19]. From these factors, the researcher wants to know the determinants of the incidence of stunting in children under the age of five in the urban slum region of Yogyakarta city.

## Materials and Methods

This study used a case–control research design. The case group was mothers who had stunting children under five, while the control group was mothers without stunting children. This research was conducted in urban slum area, district of Yogyakarta, in December 2019–January 2020. The overall sample consisted of 71 children aged 6–59 months, calculated using the estimation formula for a single population's proportion. The sampling technique employed a cluster random sampling. The inclusion criteria for this research were children aged 6–59 months, who were lived in the urban slum area, Yogyakarta district. The exclusion criteria in this study were children who had physical and mental disabilities, suffering from illness or were hospitalized, and had congenital diseases.

The variables in this research were the determinants of stunting in children under five. This study's primary instrument was a questionnaire to determine the stunting determinants in children under five in urban areas. Stunting in this research was a children under 5 years old who has an anthropometry index height per age (HAZ) more than -2SD. Microtoise and length measuring boards were utilized to screen children with stunting and calibrations for this tools have been carried out at metrology agency. The research procedure was started by distributing informed consent, then respondents (mothers) were asked to fill out a questionnaire, and researcher measured height of children using a Microtoise. Data processing used the SPSS application. The univariate data analysis for respondent characteristics employed frequency distribution, anthropometric data used central tendency, and logistic regression was utilized to determine predictor factors affecting stunting in urban children. Ethics of this research has been approved by the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences UMY No.036/EC-KEPK FKIK UMY/XII/2019.

## Results

Respondents in this study were 71 mother and children aged 6–59 months. Data on the respondents' characteristics in the study are shown in Table 1.

Table 1 shows that in the case group, the majority of girls with normal birth weight, the babies were given colostrum but were not given exclusive breastfeeding so that weaning was not appropriate. The majority of mothers' education level was low, and their occupation was housewives. Meanwhile, in the control group, most boys with normal birth weight were given colostrum but were not given exclusive breastfeeding, and the weaning age was appropriate, mothers' education level was low, and their occupation was housewives. The difference test showed that there was no difference in the characteristics of the respondent between two groups.

Table 2 shows no difference between the case group and the control group in children under the age of five, while for the variable height and z-score, there was a difference between the case group and the control group.

The logistic (Table 3) regression test results revealed that LBW and maternal occupation variables were the variables that most influenced the stunting incidence among children under five in urban slum areas.

**Table 1: Frequency distribution of respondents based on the characteristics of children and mothers (n = 71)**

| Variables | Cases (stunted children) n=29, F (%) | Controls (not stunted children) n=42, F (%) | p* |
|---|---|---|---|
| Gender | | | |
| Male | 13 (44.8) | 22 (52.4) | 0.124 |
| Female | 16 (55.2) | 20 (47.6) | |
| Birth weight | | | |
| Low | 10 (34.5) | 6 (14.3) | 0.067 |
| Normal | 19 (65.5) | 36 (85.7) | |
| Colostrum is taken | | | |
| Yes | 25 (86.2) | 38 (90.5) | 0.226 |
| No | 4 (13.8) | 4 (9.5) | |
| Exclusive breastfeeding | | | |
| Yes | 13 (44.8) | 17 (18.7) | 0.712 |
| No | 16 (55.2) | 74 (81.3) | |
| Weaned ≥1 year old | | | |
| Appropriate | 13 (44.8) | 25 (59.5) | 0.223 |
| Inappropriate | 16 (55.2) | 17 (40.5) | |
| Mother's standard of education | | | |
| Low (under secondary school) | 23 (79.3) | 32 (76.2) | 0.307 |
| High (senior high school and above) | 6 (20.7) | 10 (23.8) | |
| Mother's occupation | | | |
| Employed mother | 7 (24.1) | 16 (38.1) | 0.852 |
| Housewife | 22 (75.9) | 26 (61.9) | |

*p<0.05 based on Chi-square test.

**Table 2: Anthropometry data description on children in urban area (n=71)**

| Variables | Cases (stunted children) n = 29 Mean ± SD | Controls (not stunted children) n = 42 Mean ± SD | p* |
|---|---|---|---|
| Age (months) | 32.38 ± 6.75 | 32.38 ± 14.58 | 0.862 |
| Height (cm) | 85.31 ± 7.57 | 91.90 ± 11.50 | 0.004* |
| HAZ | –2.19 ± 0.56 | -0.64 ± 0.94 | 0,001* |

*p<0.05 based on independent t-test; HAZ: Height for age Z-score.

## Discussion

The analysis showed that birth weight and mother occupation were predictors of the incidence of stunting among children under the age of five in urban areas. LBW may be due to a mother's nutritional condition during pregnancy. Pregnant women with poor nutrition may give birth to LBW infants. Previous research found that babies with LBW had a risk of stunting 1.7 times higher than normal birth weight [16], [20], [21]. Giao *et al*. research uncovered that babies with LBW had a risk 1.5 times higher than those with normal birth weight [10].

The stunting incidence began with the baby's growth process in the uterus, and it would tend to continue until the child was born. Birth weight was a strong predictor of body size later in life since most infants with LBW did not exceed average heights during childhood [11]. The LBW had a significant adverse effect on the health and growth of the neonate. The key growth hormone in children with LBW, such as insulin-like growth factor-1, has decreased, resulting in lower linear growth thyroid hormone. Besides, there was a reduction in the anabolic incidence of insulin-dependent tissue synthesis, resulting in lower lean body mass and impaired bone growth [22].

The low anthropometric indicator in newborns is influenced by many factors, ranging from social and environmental factors. These factors are divided into three: Proximal factors (exclusive breastfeeding, complementary feeding, newborn, and health status), intermediate factors (environmental status and maternal health status), and distal factors (mother's education and socioeconomic status) [11]. Birth weight, as a stunting predictor in children under five, can be controlled with nutritional management at 12–24 months.

Less optimal child growth during the prenatal period is often triggered by malnutrition in the mother. However, during the postnatal period, optimal feeding practices can reduce the effects of low intrauterine development [23], [24]. Thus, after the baby is born, if the food intake is insufficient and exacerbated by unhealthy environmental conditions, the children will be susceptible to infections, which leads to inadequate nutrients absorption and ultimately result in low growth. However, if the child gets adequate food intake and is always in good health, the condition can be pursued as the child gets older [23].

In this study, the stunting prevalence among children under five also increased in families with working mothers. It was considered that mothers who worked were no longer able to give their children full attention because of their busy lives. Before the 21$^{st}$ century, women typically worked only at home, but today women have entered the world of work for a variety of reasons, including personal accomplishment or the achievement of the family economy [25]. Working mothers can actually improve their abilities in terms of fulfilling children's nutrition better, but on the other hand, the mother's employment status provides limitations in terms of fulfilling nutrition directly for children. Several studies demonstrate that women in developing countries have many roles: As wives, mothers, children, extended family members, and working women. It affects the mother's prominent role in caring for children [25]. Research by Giao *et al*. discovered that working mothers had a 0.29 times higher risk of having a stunted toddler than homemakers [10]. It was related to the time given to caring for children. Zarate *et al*. revealed that although there was no correlation between the mother's occupation and stunting incidence, the stunting prevalence significantly increased among working mothers (12.4%) [15].

**Table 3: Logistic regression test of factors affecting stunting incidence in children (n = 71)**

| Variables | AOR | p* |
|---|---|---|
| Gender | | |
| Male | 0.733 | 0.579 |
| Female | | |
| Birth weight | | |
| Low | 3.495 | 0.041* |
| Normal | | |
| Colostrum is taken | | |
| Yes | 2.880 | 0.249 |
| No | | |
| Exclusive breastfeeding | | |
| Yes | 1.862 | 0.276 |
| No | | |
| Weaned ≥1 year old | | |
| Appropriate | 1.164 | 0.790 |
| Inappropriate | | |
| Mother's standard of education | | |
| Low (under secondary school) | 0.786 | 0.716 |
| High (senior high school and above) | | |
| Mother's job | | |
| Employed mother | 0.256 | 0.047* |
| Housewife | | |

*p<0.05 based on logistic regression test

The limitation in this study is that no screening of nutritional status for all children under five in the city of Yogyakarta. The nutritional status was obtained from children under five who came to children integrated health service.

## Conclusion

Based on the findings and discussion in this report, the researchers concluded that LBW and maternal occupation were found to be major determinants of stunting in urban slum areas. Understanding the risk factors for stunting in urban children under five are essential to guide the Indonesian government's public health planners in developing nutrition programs and stunting interventions. In urban areas, it is necessary to increase the nutrition improvement program for pregnant women so that children born does not experience LBW and pay attention to working mothers to get optimal education regarding the good nutrition fulfillment for children under five when the mother is working.

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