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# Maternal social determinants of stunting events in Kulon Progo, Yogyakarta

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## ABSTRACT

**Background and purpose:** Kulon Progo District is one of the 100 priority districts in Indonesia for stunting program with a prevalence of 22.65%. The purpose of this research is to identify association between mother's education, family income and exclusive breastfeeding history with stunting events in Kulon Progo District, Yogyakarta.

**Methods:** This research used a cross sectional design which conducted in Kulon Progo District, Yogyakarta. There were 729 children aged 0-59 months recorded in the integrated service post *(posyandu)* who met the inclusion criteria. Data collection was conducted using a questionnaire for children and mothers' characteristics, while stunting status was retrieved from the growth monitoring card. Data analysis was conducted using Chi-Square test.

**Results:** Children in the survey were 53.77% boys and around a quarter (24.69%) were at 25-36 months old. The majority of the mothers (72.98%) were between the ages of 26 and 35 years with high school education (67.35%) and most of them did not work (82.17%). Children with lower maternal education are less likely to experience stunting (PR=0.751; 95%CI: 0.593-0.952; p=0.013), and those from lower income family have almost five fold increased chance of stunting (PR=4.562; 95%CI: 2.643-7.874; p<0.001). Whilst for history of exclusive breastfeeding, the association was not statistically significant with stunting (PR=0.795; 95%CI: 0.529-1.196; p=0.239)

**Conclusion:** There is a relationship between maternal and family education with the probability of stunting, while there is 20% reduced chance of stunting if children were breast fed although it was not statistically significant. Improving maternal awareness on stunting is essential for stunting management programs.

**Keywords:** stunting, maternal education, family income, exclusive breastfeeding, children under five

## INTRODUCTION

The growth process experienced by toddlers is a cumulative result of growth since the time they were born. Good and healthy nutrition in children under five years old is an important foundation for their health in the future. Conditions that potentially interfere with the fulfilment of nutrients, especially energy and protein in children will cause growth problems.[1]

Malnutrition in children has both acute and chronic impacts. Children who experience acute malnutrition will look physically weak, while those who experience malnutrition in the long term or chronic, especially when it occurs before the age of two years, will showed delayed physical growth, resulting them to become short or stunted.[2] Stunting is a condition when a toddler's length or height is not proportional to their age. Based on World Health Organization (WHO) guidelines, stunting defined as the length or stature of a child under five that less than two standard deviation (SD) from the median value.[3] The indicator for identifying stunted children according to WHO child growth standards is the index of height-for-age z score (HAZ) with the criteria for stunting if the z score HAZ<-2 SD.[3] Stunting is a chronic nutritional issue induced by socio-economic factors, maternal nutrition during pregnancy, infant morbidity and infant malnutrition.[4] Toddlers diagnosed with stunting can experience impaired physical and cognitive development.[4]

The latest WHO publication (2018) states that globally in 2016, 22.9% or 154.8 million children under five were stunted.[5] In Asia, there were 87 million stunting toddlers in 2016. Indonesia is the third country with the highest prevalence in the Southeast Asia Region (SEARO). The estimated prevalence of children under five who experienced height problems in Indonesia in 2005-2017 was 36.4%.[5] Based on the 2017 National Nutritional Status Monitoring (NSM), toddlers experiencing stunting in Indonesia accounted for 29.6% and there were 9.8% toddlers with severe stunting.[6]

Previousstudiesfoundthedeterminants associated with stunting are length of birth, non-exclusive breastfeeding, early breastfeeding and socio-economy.[7] Children aged 6-24 months with low birth length have a 3.169 times higher chance of stunting compared to children who have normal birth length.[8] Meanwhile, exclusive breastfeeding in children is a factor that affects the likelihood of stunting in children.[8-10] Children who are exclusively breastfed will grow and develop effectively, because breastfeeding

can meet the nutritional needs of babies from birth to 24 months of age.[11]

Kulon Progo District is included in the list of 100 districts/cities which prioritized for stunting intervention. The prevalence of stunting in this district was 22.65% in 2018,[12] hence Kulon Progo became a district in the Special Region of Yogyakarta to be monitored and supported by the Ministry of Health in managing stunting problems. Based on those backgrounds, researchers were interested in conducting a risk analysis study of the factors associated with stunting in Kulon Progo District. This study aims to explore maternal factors associated with stunting, including education, family income and history of exclusive breastfeeding in Kulon Progo District, Yogyakarta.

## METHODS

The study employed analytical observation with a cross-sectional design. The population was all children age 0-59 months in Kulon Progo District, namely in 10 out of 12 sub-districts where stunting cases were found. According to the records of the integrated health service posts *(posyandu)* in Kulon Progo, there were 729 children aged 0 to 59 who met the inclusion criteria which include living in Kulon Progo and mothers were willing to complete the questionnaire. Children with medical history of comorbidities were excluded from the study.

A structured questionnaire was used to collect data on children's identity, birth weight and length/height and breastfeeding history. The questionnaire also contains information related to the mothers including mother's date of birth, education, occupation and family income. For the incidence of stunting, the researchers retrieved the information on children age and height from the growth monitoring card known as *Kartu Menuju Sehat (KMS)*. Stunting status was determined if the children height and body length are below two standard deviation from the multicentre growth of reference standard or the median standard deviation of the child's growth standard. The data were then analysed descriptively and with the Chi-square Test for assessing the association between maternal factors and stunting at a 5% significance level.

This study has been approved by the The Ethics Committee of Universitas Ahmad Dahlan with number: 011903012.

## RESULTS

Table 1 shows the characteristics of children and mothers. There were slightly more male children, 392 of 729 (53.8%), than female. A quarter (24.7%) of the children were at the age of 25-36 months and the majority (67.4%) of mothers completed senior high school education with 73.3% mothers categorised as high level of education, while 82.7% of the family had low income. For the history of breastfeeding, most of the children (673 of 729 toddlers (92.3%)), were exclusively

**Table 1. Characteristics of children and mothers**

| Characteristics | Frequency (n) n=729 | Percentage (%) |
|---|---|---|
| Age of children | | |
| 0-12 | 107 | 14.7 |
| 13-24 | 150 | 20.6 |
| 25-36 | 180 | 24.7 |
| 37-48 | 175 | 24.0 |
| 49-59 | 117 | 16.0 |
| Gender | | |
| Male | 392 | 53.8 |
| Female | 337 | 46.2 |
| Level of mother's education | | |
| No school | 1 | 0.1 |
| Elementary school | 40 | 5.5 |
| Junior High School | 154 | 21.1 |
| Senior High School | 491 | 67.4 |
| Diploma | 16 | 2.2 |
| Bachelor | 27 | 3.7 |
| Category of mother's education | | |
| Low | 195 | 26.7 |
| High | 534 | 73.3 |
| Family income | | |
| Low | 603 | 82.7 |
| High | 126 | 17.3 |
| History of breastfeeding | | |
| Not exclusive breastfeeding | 56 | 7.7 |
| Exclusive breastfeeding | 673 | 92.3 |
| Stunting event | | |
| Stunting | 274 | 37.6 |
| Normal | 455 | 62.4 |

**Table 2. Relationship between mother's education, family income, history of exclusive breastfeeding and stunting**

| Variable | Stunting event | | | | p | PR (95%CI) |
|---|---|---|---|---|---|---|
| | Stunting | | Normal | | | |
| | n | % | n | % | | |
| Mother's education | | | | | | |
| Lower | 59 | 30.3 | 136 | 69.7 | 0.013 | 0.75 |
| High | 215 | 40.3 | 319 | 59.7 | | (0.59-0.95) |
| Family income | | | | | | |
| Lower | 262 | 43.4 | 341 | 56.6 | 0.000 | 4.562 |
| High | 12 | 9.5 | 114 | 90.5 | | (2.64-7.87) |
| History of breastfeeding | | | | | | |
| Not exclusive breastfeeding | 17 | 30.4 | 39 | 69.6 | 0.239 | 0.795 |
| Exclusive breastfeeding | 257 | 38.1 | 416 | 61.9 | | (0.529-1.196) |

breastfed. Meanwhile, the proportion of children experiencing stunting was 37.6%.

In Table 2, it can be seen that mothers' education is associated with the likelihood of stunting. Children with less educated mothers have a 25% lower risk to experience stunting than those whose mothers have higher level of education (PR=0.751, 95%CI: 0.593-0.952; p=0.013). Family income is also associated with stunting, where children from low income family have a risk of 4.6 times more likely to experience stunting than those from high income family (PR=4.562; 95%CI: 2.643-7.874; p<0.001). Meanwhile, the prevalence ratio of exclusive breastfeeding history shows the reduced risk of stunting by 20.5% if the children were exclusively breastfed (PR=0.795; 95%CI: 0.529-1.196), however the p=0.239 indicating the association is not statistically significant.

## DISCUSSION

This study explored maternal factors related to stunting among children under five. We found almost 40% of under-five children were stunted and maternal education and family income were associated with stunting, while history of exclusive breast feeding reduced the chance of stunting by 20% but it was not statistically significant.

Better education usually related to better knowledge which led to a healthier behaviour. In this study, we found higher prevalence of stunting among children whose mother are from higher education groups, hence, children with less educated mothers have lower likelihood of stunting compared to those with more educated mothers. This finding is not in line with a previous study which found that mothers with a good level of education will affect 4%-6% of the reduction in the incidence of stunting, while fathers with a good level of education will lead to 2%-9% reduction in the incidence of stunting in infants.[13] Another study in Indonesia also found that mother's education level is a factor related to the incidence of stunting in infants.[14]

The explanation to the above fact is that the association may be related to other factors such as employment status of the mothers. Mothers with lower education were more likely not engaged in an employment and become housewives, so that they may have more free time to prepare for food and to breastfeed their babies. Meanwhile, parents with higher education may have more chance to get employment. The busy working parents may also force them to leave their children with caregivers (including with grandmothers) who may have a lack of understanding considering the nutritional value needed by children. In this study, we did not explore about the caregivers of the children other than the mothers and we did not explore knowledge on stunting and its prevention which may be able to provide better picture on this association, thus these aspects need to be explored in the future study.

Our study found that family income was highly associated with the incidence of stunting, where children from low-income family were more than four time more likely to experience stunting than children from high income family. The majority of people in Kulon Progo are farmers whose the uncertain income may have an impact on meeting the needs of family life. Besides, the number of family is usually also large in one household. These situations may affect their ability to provide nutritious food which may lead to the incidence of stunting.

Previous study found that in the rural environment, family income with father's work as a farmer is a risk factor for the occurrence of stunting in children because in rural areas the availability of food depends on local production, and income as a farmer cannot meet the nutritional needs of his family. Meanwhile, in urban areas, fathers with precarious work are risk factors for stunting in children, because unsettled work causes them to have low incomes so they cannot meet their needs especially for foods.[15]

Based on observation in the study area, availability of adequate and nutritious food is also limited. The full market is only available every Wednesday of the week so makes it harder for the surrounding community to get good and quality food sources to meet their nutritional needs every day. Most of the Kulon Progo District is planted with teak, durian, banana, papaya, mango, sweet potato and tea, while rice fields are planted with rice, soybeans and green beans, where some of the products from farming are partly sold and consumed. The consumption of their own gardening and farming products are not enough to be able to meet the nutritional needs of the children. Other than that, people in the study area also face the problem of sanitation where they have the difficulty in getting clean water to meet the needs of daily life. Previous studies showed that access to clean water and poor hygiene and sanitation were associated with stunting, hence further exploration on this aspect is still needed in the study area.

Studies showed strong association between exclusive breastfeeding and reduction of the risk of stunting.[16] Exclusive breastfeeding has many benefits, one of which is for the growth and development of babies, especially height. Breast milk contains calcium that can be absorbed better than calcium in formula milk, so that body growth can be optimized and the possibility of stunting can be prevented. In addition, breast milk has benefits as a source of good quality protein and is easily available, therefore increases the child's immunity, accelerates recovery when sick and have an effect on the nutritional status of children.[17]

In our study, we found 20% reduction of the risk of stunting among children who were exclusively breastfed compared to those who were not, however, the result was not statistically significant. One consideration to this finding is the high proportion (92.3%) of the mothers who reported that they exclusively breastfed their babies. There is a potential social desirability bias and recall bias that tend to over-estimate the proportion of exclusive breastfeeding, thus future study should improve the measurement of exclusive breastfeeding status.

Public health center through its integrated health services post program *(posyandu)* usually provide health education regarding nutrition besides conducting growth monitoring of the children. *Posyandu* also provides supplementary foods to be taken and recreated by caregivers at their home. However, these efforts may somehow not really reach the mothers since those who come to the health post may be the grandmothers or other caregivers. This


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situation raises the need to consider different way of education using other channels.

This study is subject to some limitations including potential social desirability and recall biases which should be minimized in future study by tailoring the questionnaire in a better way. This study did not explore other factors such as mothers' knowledge and perception, food preparation practice and parental smoking behavior. These variables should be further studied in the future.

## CONCLUSION

Stunting was associated with maternal education and family income, whereas a history of exclusive breastfeeding lowered the risk of stunting by 20% but was not statistically significant. Access to food and food availability are also important to the incidence of stunting which was observed in the area. These factors should be addressed through improving food availability and income. Other factors need further exploration in the future to better understand factors that are associated with stunting.

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## AUTHOR CONTRIBUTION

All of the authors contributed to the preparation of this study. The author double-checks the results and discussions. There were some students who assisted during the data collection.

## CONFLICT OF INTEREST

The authors have no conflict of interest to declare

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