

## MATERNAL FACTORS IN STUNTING AMONG VULNERABLE CHILDREN

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### Abstract

Children with stunting in Indonesia and other low-middle countries remains a serious problem. This study aimed to identify the association between maternal education, maternal age, maternal height, preceding birth interval, and ANC clinic visits, and stunting among vulnerable children in Kupang Regency, Indonesia. A cross-sectional study was conducted of two villages in Kupang Regency. The study sample comprised female ex-refugees from Timor Leste who had children aged 24–59 months. The subjects were chosen using consecutive sampling, with a total number of 154. Data were collected from both primary and secondary sources. There was a significant relationship between maternal education ( $p = 0.014$ ), maternal height ( $p = 0.003$ ), preceding birth interval ( $p = 0.001$ ), ANC clinic visits ( $p = 0.009$ ) and stunting. In contrast, maternal age showed no significant association ( $p = 0.611$ ). Further studies are needed to help eradicate stunting by intervening in the reduction of risk factors.

**Keywords:** antenatal care, children, Indonesia, maternal age, mother, refugee, stunting

### Abstrak

*Faktor-faktor Ibu terkait Stunting pada Anak-Anak yang Rentan.* Anak-anak yang mengalami stunting di Indonesia dan negara-negara berpenghasilan rendah masih menjadi masalah serius. Tujuan penelitian ini adalah mengidentifikasi hubungan antara pendidikan ibu, usia ibu, tinggi badan ibu, jarak melahirkan dan kunjungan antenatal care (ANC) dengan stunting pada anak rentan usia 24–59 bulan di Kabupaten Kupang, Indonesia. Metode penelitian yang digunakan adalah cross-sectional yang dilakukan di dua desa di Kabupaten Kupang. Sampel dalam penelitian ini adalah para ibu mantan pengungsi Timor Leste yang memiliki anak usia 24–59 bulan. Teknik sampling yang digunakan adalah consecutive sampling, sebanyak 154 responden. Data diperoleh dari sumber primer dan sekunder. Terdapat hubungan yang signifikan antara pendidikan ibu ( $p = 0,014$ ), tinggi ibu ( $p = 0,003$ ), jarak kelahiran ( $p = 0,001$ ), kunjungan ANC ( $p = 0,009$ ) dengan stunting. Namun tidak ada hubungan antara usia ibu dengan stunting ( $p = 0,611$ ). Penelitian selanjutnya dibutuhkan untuk memberantas stunting melalui intervensi untuk menurunkan faktor risiko.

**Kata Kunci:** anak, antenatal care, ibu, Indonesia, pengungsi, stunting, usia ibu

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### Introduction

Stunting refers to children who are too short for their age (UNICEF & World Bank, 2020). It is defined as less than -2 standard deviations (-2 SD) from the median of height-for-age of the reference population (Beal et al., 2018; Svefors et al., 2020; World Health Organization, 2006). In 2019, stunting affected an estimated 21.3 percent, or 144.0 million, children under 5 globally. Around 94% of these children lived in Africa and Asia. Global progress against stunting

has been steady, but not fast enough to reach the targets set (UNICEF, WHO & World Bank, 2020). The Indonesian Basic National Health Survey stated that the prevalence of stunting in Indonesia was 35.6% in 2010, 37% in 2013, and 31% in 2018 (Ministry of Health Republic of Indonesia, 2018).

The short-term consequences of stunting are a higher risk of morbidity and mortality, increased health expenses, and reduced cognitive, motor, and language development (Stewart et al., 2013).

The long-term consequences include lower achievement at school; reduced cognitive development and economic productivity; effects on maternal reproductive outcomes (Dewey & Begum, 2011); and delayed pubertal development (Svefors et al., 2020).

Stunting can be a result of various factors, such as maternal factors, home environment, poor quality food, inadequate health care practices, unsafety food and water, inadequate breastfeeding practices, and clinical and subclinical infection (Batiro et al., 2017; Beal et al., 2018; Berhe et al., 2019; Chan et al., 2020; Geberselassie et al., 2018; Khairi et al., 2013; Stewart et al., 2013). The maternal factors associated with stunting include poor nutrition, adolescent pregnancy, mental health, short birth spacing (Stewart et al., 2013), short maternal height, low maternal education (Beal et al., 2018; Nshimiyiryo et al., 2019), low level of antenatal care (Khan et al., 2019), and advanced maternal age (Manggala et al., 2018). The refugee group, as a vulnerable group, meets these various factors, but no previous studies have identified the maternal factors in children's stunting among vulnerable populations especially ex-Timor Leste refugee mothers. This study therefore aims to assess the association between maternal education, maternal age, maternal height, preceding birth interval, and ANC clinic visits, and stunting among vulnerable children 24–59 months old in Kupang Regency.

## Methods

A cross-sectional study was conducted in two villages in Kupang Regency, East Nusa Tenggara Province, Indonesia. The samples were ex-Timor Leste refugee mothers who had 24–59-month-old children and lived in the Naibonat Public Health Centre working area. The sample size was calculated using G\*Power 3.1.9.4 software with 80% statistical power and an alpha value of 0.05 (Faul et al., 2007). Consecutive sampling was applied to recruit samples, of whom a total of 154 were enrolled.

The dependent variable was stunting that is defined as WHO HAZ scores below  $-2$  SD, according to sex (Aryastami et al., 2017; Briaux et al., 2019; Manggala et al., 2018; World Health Organization, 2006). The Z-scores were calculated using WHO anthropometry software (Aryastami et al., 2017; Blössner et al., 2011). Stunting was classified as stunted or not stunted. The independent variables were maternal education, maternal age, maternal height, preceding birth interval, and ANC clinic visits. Maternal education was defined as the mother's highest education completed, classified as low (elementary school/junior high school) or high (senior high school or university) (Utami et al., 2019). The children were classified as 2–5 years old. Maternal age was categorized as under 30 or 30 or above (Rachmi et al., 2016), while maternal height was categorized as under 150 cm (low stature) or 150 cm or above (normal height) (Berhe et al., 2019). Antenatal care (ANC) is the care provided by healthcare professionals, including doctors, midwives, and nurses, to pregnant women to ensure the best welfare for mothers and babies (WHO, 2016). ANC clinic visits were categorized as fewer than four times or four times or more (Budhathoki et al., 2020). The participants' data were primary and secondary; primary data were obtained to determine socio-demographic items consisting of maternal age, education, height, and preceding birth interval. The secondary data were obtained from the Maternal and Child Health Handbook (MCH handbook) and the Healthy Card Record to ascertain maternal health and the development of infant from birth to 5 years of age (including ANC clinic visits and stunting) and the data were cross-checked with the Naibonat Public Health Centre.

Descriptive analysis was conducted to establish the participants' characteristics in terms of maternal education, age, and height, preceding birth interval, ANC clinic visits, and stunting. Data analysis was also conducted to assess the relationship between possible risk factors and stunting using the Chi-square test and odds ratio (OR). The results were considered statistically

significant if the p-value was < 0.05.

**Ethical Consideration:** Written informed consent was obtained from each respondent. The study was approved by the STIKES Buleleng Research Ethics Committee (002/EC-KEPK-SB/I/2020).

## Results

The data in Table 1 show that more than half of the respondents had a low education; that the majority were 30 years or over; their mean age was  $29.6 \pm 6.4$ ; just over half were < 150 cm tall; the majority has a preceding birth interval of fewer than 24 months; most had visited an ANC clinic four times or more, and the majority were not stunting.

The analysis showed that there was a significant relationship between maternal education and stunting among children ( $p = 0.014$ ). The OR value was 2.784 (95% CI : 1.284–6.037), meaning that mothers with lower education levels had

a 2.784 times higher risk of having stunting children aged 24–59 months in Kupang Regency, Indonesia. The results of the bivariate analysis also conclude that maternal height was significantly related to stunting in children ( $p = 0.003$ ). According to the analysis, the OR value was 2.895 (95% CI : 1.465–5.721). These results reflect that mothers under 150 cm tall had 2.895 times higher risk of having stunted children aged 24–59 months. According to the results in Table 2, there was a significant relationship between the preceding birth interval and stunting among children ( $p = 0.001$ ). The OR value was 3.250 (95% CI : 1.611–6.557); this means that mothers with a preceding birth interval of < 24 months had 3.250 times higher risk of having stunted children. The bivariate analysis also showed that there was a significant relationship between ANC clinic visits and stunting among children ( $p = 0.009$ ), with an OR value of 2.947 (95% CI : 1.369–6.346), meaning that mothers who made fewer than four ANC clinic visits had a 2.947 times higher risk of having stunting children. In contrast, there was

Table 1. Characteristics of the respondents (n = 154)

Characteristics	Results
Mothers' age (years) - Mean (SD*)	29.6 (6.4)
Maternal education - n (%)	
Low	106 (68.8)
High	48 (31.2)
Maternal age - n (%)	
< 30 years old	73 (47.4)
≥ 30 years old	81 (52.6)
Maternal height - n (%)	
< 150 cm	80 (51.9)
≥ 150 cm	74 (48.1)
Preceding birth interval - n (%)	
< 24 months	86 (55.8)
≥ 24 months	68 (44.2)
ANC clinic visits - n (%)	
< 4 times	36 (23.4)
≥ 4 times	118 (76.6)
Stunting - n (%)	
Stunted	59 (38.3)
Not stunted	94 (61.7)

\*SD = standard deviation

Table 2. Relationship Between Maternal Education, Maternal Age, Maternal Height, Preceding Birth Interval, ANC Visits, and Stunting (n = 154)

Variable	Stunting		OR	95% CI	p
	Stunted n (%)	Not stunted n (%)			
Maternal education					
Low	48 (31.2)	58 (37.7)	2.784	1.284–6.037	0.014
High	11 (07.1)	37 (24.0)			
Maternal age					
< 30 years	30 (19.5)	43 (27.9)	0.799	0.417–1.533	0.611
≥ 30 years	29 (18.8)	52 (33.8)			
Maternal height					
< 150cm	40 (26.0)	40 (26.0)	2.895	1.465–5.721	0.003
≥ 150 cm	19 (12.3)	55 (35.7)			
Preceding birth interval					
< 24 months	43 (27.9)	43 (27.9)	3.250	1.611–6.557	0.001
≥ 24 months	16 (10.4)	52 (33.8)			
ANC visits					
< 4 times	21 (13.6)	15 (09.7)	2.947	1.369–6.346	0.009
≥ 4 times	38 (24.7)	80 (51.9)			

no significant relationship between maternal age and stunting ( $p = 0.611$ ); the OR value was 0.799 (95% CI : 0.417–1.533) (see Table 2).

## Discussion

It is demonstrated that maternal educational level was significantly associated with stunting in their children. The majority of the respondents had low education. The mothers, as their children’s caregivers, may influence their nutritional intake. Mothers with lower education levels have fewer opportunities to receive information about growth, development nutrition, and other children’s health information. This issue remains a serious problem in Indonesia. The culture in many areas in East Nusa Tenggara still influences parents’ limiting of girl’s continued studies at university. Mothers with lower educational levels had a 2.8 times greater risk of having stunted children (aged 24–59 months) than more highly educated ones. These results are similar to a study of South Jakarta, which showed that the maternal educational level significantly affected stunting among children under-five (Utami et al., 2019). Three studies in

Ethiopia also found that mothers’ educational level was associated with stunting in children aged 12 to 59 months (Takele et al., 2019), aged 6 to 59 months (Kahssay et al., 2020), and aged 5 to 59 months (Tariku et al., 2017). Maternal education is positively correlated with the healthy linear growth of children in several low-middle countries, such as Mozambique, Nigeria, Ghana, and Congo, but not Kenya (Amugsi et al., 2020). Increasing mothers’ education level can improve their knowledge about breastfeeding, complementary feeding practices, and child growth.

In our study, mothers’ age was not significantly associated with stunting in 24–59-month-old children. This is in line with other studies conducted in Indonesia (Rachmi et al., 2016; Torlesse et al., 2016). In contrast, a cross-sectional study conducted in Bali showed that maternal age could influence a child’s nutritional status (Manggala et al., 2018). The study found that the risk of pregnancy, preterm birth, and intra-uterine growth restriction was higher in older mothers. Young mothers (15–19 years) had a negative association with the length-for-age Z-

score of infants at birth, but this was not associated with the infants' linear growth (Workicho et al., 2019).

In our study, maternal height was significantly associated with stunting in children. Studies in Indonesia, and of African and Latin American countries such as Malawi, Rwanda, and Colombia, have reported that maternal height was related to stunting (Aldana-Parra et al., 2020; Nshimyiryo et al., 2019; Rachmi et al., 2016; Walters et al., 2019). In addition, a study conducted in Vietnam showed that maternal height had a strong association with child stunting (Beal et al., 2019). The short stature of some mothers may lead to intrauterine growth restriction, which contributes to stunting in children (Manggala et al., 2018).

Our study shows that children with a preceding birth interval of fewer than 24 months were 3.25 times more likely to be stunted than those with an interval of more than, or equal to, 24 months. This is similar to a previous study carried out in Ethiopia (Takele et al., 2019). Preceding birth intervals of less than 24 months increase the risk of the depletion of maternal reserves in subsequent pregnancies and negatively impacts both child and mother (Stewart et al., 2013; Takele et al., 2019).

Stunting in children is also shown to be significantly associated with mothers' access to health-care, as indicated by a sufficient number of ANC clinic visits ( $\geq 4$  times). This is in line with previous studies (Amugsi et al., 2020; Budhathoki et al., 2020; Torlesse et al., 2016). Antenatal care is an important factor in ensuring healthy outcomes in women during pregnancy. It influences mothers' and children's outcomes by increasing mothers' knowledge, attitude, and practice in nutrition education, together with counseling during antenatal care (Ghosh-Jerath et al., 2015). Enhanced access to antenatal care reduces the risk of stunting among children, including vulnerable ones (Budhathoki et al., 2020; Khan et al., 2019).

Our study highlights the emerging issue of stunting caused by maternal factors. Many interventions and strategies that are already in place to manage stunting cases in Indonesia, e.g. “*Gerakan 1000 hari pertama kehidupan*” or “the first 1000 days of life movement”, need to be improved to respond to the problem.

## Conclusion

Our cross-sectional analysis shows that maternal educational level, maternal height, preceding birth interval, and ANC clinic visits had significant associations with stunting among children aged 24–59 months in Kupang Regency, Indonesia. However, maternal age had no significant association with stunting. We suggest that various interventions are needed to increase mothers' knowledge of caring for children in critical periods. Future studies should investigate several maternal factors, such as nutrition during preconception, pregnancy, lactation, adolescent pregnancy, intrauterine growth restriction, preterm birth, infection, mental health, and hypertension.

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