

# Birth Length is a Dominant Risk Factor of Stunting among Children Aged 6-59 months in North Moyo Sub District, Sumbawa District West Nusa Tenggara, Indonesia

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## Abstract

**Background:** Malnutrition is still a problem of public health that occurs in the area of North Moyo Subdistrict, Sumbawa District.

**Objective:** This analysis aims to determine the major factors of stunting among children aged 6-59 months in North Moyo Subdistrict, Sumbawa District.

**Materials and Method:** This was an observational study with a cross-sectional design. Chi-square statistical test was conducted to identify the incidence of stunting in children aged 6-59 months and the major factors associated with stunting in children aged 6-59 months. Statistical test results were declared significant if the p-value was less than 0.100. There were 406 children aged 6-59 months as sample.

**Results:** The prevalence of stunting was 34.9%. Several significant variables related to stunting are age, birth length, integrated health care visits, smoke, and mother's education ( $p < 0.05$ ). Birth length is a dominant factor of stunting after being controlled by age, visit to integrated health care, smoke and mother's education.

**Conclusions:** Efforts from the government are needed to improve nutrition programs that focus on efforts to prepare mothers since prior to pregnancy; improve nutrition programs related to nutrition education and promotion of balanced nutrition for the community that not only to mothers, but also to fathers; and improve the Hygienic and Healthy Behavior-related education in the community.

**Keywords:** *Stunting, children, birth length.*

## Introduction

Stunting is a condition of growth failure in under-five as a result of chronic malnutrition from the womb until early childhood, so that the child is considered too short for their age. Globally, stunting affects about 21.9 % or 149 million children under 5 years of age in 2018. Children who suffer from stunting will probably never reach their maximum height and the brain will

never develop to their maximum cognitive potential. These children start their lives at a disadvantage: they face learning difficulties in school, earn lower income as adults, and face obstacles to participate in their community.<sup>(1)</sup> Based on the 2018 National Basic Health Research data, it is known that the prevalence of stunted under-five in Indonesia is 30.6%; while, the prevalence of stunting in West Nusa Tenggara Province is 33.49%, and Sumbawa District is at 31.53%.<sup>(2)</sup> Although a decrease occurs compared to the 2013 National Basic Health Research data, the decrease is not significant and remains a public health problem because it is still above 20% according to WHO standards.

According to UNICEF, the stunting problem is a cumulative process and caused by inadequate nutrient

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intake or recurrent infectious diseases, or both. Stunting can also occur at fetal time, which is caused by poor nutritional intake during pregnancy, inadequate care and feeding practices, poor quality of food in line with the frequency of infection, so that it can inhibit growth.<sup>(3)</sup>

A meta-analysis study conducted in 37 developing countries found that 10.8 million stunting cases (out of 44.1 million) were caused by poor sanitation (7.2 million cases) and diarrhea (5.8 million cases).<sup>(4)</sup> A study by Cummin and Cairncross also stated that poor access to clean water, sanitation and hygiene has a significant detrimental effect on child growth and development.<sup>(5)</sup>

North Moyo Subdistrict in Sumbawa District is one of the areas for developing cattle farming for both meat and milk production in the Sumbawa District area and which will be sold to other regions, such as Java, Sumatra and other regions. With the localization of livestock-farming close to residential locations, it is likely to cause many health problems, especially for children under five. Nutritional Status Monitoring Results in 2017 shows that North Moyo Subdistrict is the subdistrict with the highest stunting prevalence, compared to 23 other Subdistricts in Sumbawa District, which is at 72.19%.

The high exposure of various risk factors above has a direct impact on the incidence of stunting for under-five. The aim of this study was to determine the major factors of stunting among children aged 6-59 months in North Moyo Subdistrict, Sumbawa District in 2019.

## Materials and Method

This study used a cross-sectional study design. All variables observed in this study were carried out at the same time, obtained through direct interviews using questionnaires and anthropometric measurements. The study was conducted in North Moyo Subdistrict, Sumbawa District, West Nusa Tenggara Province. This study was conducted in June-August 2019.

The data collected were primary data in which the study subjects were children aged 6-59 months as many as 406 children. The data were collected related to child characteristics (age, sex, birth length, birth weight, anthropometric measurements (length/height), breast feeding record, food intake, infectious diseases, parity and number of household members), parent's education level, level of knowledge and attitude about health and nutrition, income level, and smoking habits, hygienic

and healthy behavior, hand-washing habits, access to health care services, and food intake. Nutritional status data were obtained from length/height and age data, which was processed using WHO-ANTRO software. The analysis used was univariate and bivariate analysis.

## Results

**Characteristics of children and families:** The total sample in this study was 406 children under five. Highest proportions of under-five are female (51.2%), age 24-59 months (62.1%), family members < 4 people (75.4%), regular visits to integrated health care (71.4%), exclusive breastfeeding (35.9%), ever experiencing infections (83.7%), not implementing Hygienic and Healthy Behavior (87.4%), and having smoker family members (77.1%). Highest proportions for under five's mothers were those attaining secondary education, and as housewives. Most of the under-five had low nutritional intakes, namely in energy, fat, and carbohydrate.

**Characteristics of children with stunting:** The nutritional status measurement results showed the mean z-score + SD was  $-1.27 \pm 1.11$  (min max  $-4.73$   $-3.18$ ), with a stunting proportion of 34.5%. There is a significant relationship of the incidence of stunting in under-five with aged, birth length, mothers did not wash their hands with running water and soap, visits to integrated health care, and mother and father's education ( $p < 0.100$ ).

In multivariate analysis, six variables were included in modelling namely age, birth length, mother's education, visit to integrated health care, and family members smoke (Table 1). The analysis result showed that standardized coefficient beta value of birth length variable was the largest, which means birth length was the dominant risk factor of stunting in children aged 6-59 months after controlling for age, mother's education, visit to integrated health care, and family members smoke.

**Table 1. Multivariate analysis results in stunting among children aged 6–59 months**

Variables	B	P-value	OR
Age	-1.034	0.0005	0.36
Birth length	0.974	0.003	2.65
Mother's education	0.461	0.017	1.59
Visit to integrated health	0.523	0.050	1.69
Family members smoke	0.699	0.027	2.012

## Discussion

Nutritional problem is a serious problem that occurs in Sumbawa District, especially stunting, making Sumbawa District determined as one of 100 districts/cities with locus stunting in an effort to reduce stunting in its region.<sup>(6)</sup> In this study, the magnitude of stunting in North Moyo Subdistrict was 34.5%, still above the standards set by WHO, so that North Moyo Subdistrict was still categorized as a health problem area specifically related to stunting.

In this study, the age of children under five was related to stunting, in which children over 2 years had a higher risk for stunting than children under 2 years. This could be related to changes in food intake received by children over 2 years at which most of them have begun to be weaned and there is an adaptation process related to changes in feeding which most likely majority of children over 2 years do not adapt well, added with mostly low education level of mothers, that contribute to the incidence of stunting in children over 2 years. Similar results from several studies that show significant relationship between age and stunting, in which the risk of stunting is higher in children over 2 years.<sup>(7),(8),(9)</sup>

In this study, mother's education was related to the incidence of stunting in children aged 6-59 months, in which children with low-educated mothers will be at risk of stunting by 2.06 times higher than children with high-educated mothers. In line with studies conducted in The Royal Kingdom of Bhutan 2015 showed the prevalence of stunting was significantly higher among children whose mothers without any formal education, and/or born to families where the household head did not have any formal education.<sup>(10)</sup> Maternal education that it may influence child growth and health through better feeding practices and home hygiene.<sup>(11)</sup>

Integrated health care, commonly known as *Posyandu* in Indonesia, is a form of community resource health efforts, which is managed and organized from, by, for and with the community where this activity had been carried out by community in early 1970s. Integrated health care is a means to facilitate community access to health care services, especially in monitoring the growth of children under five. In this study, children under five who were not routinely taken to the integrated health care significantly increased the risk of stunting incidence. Similar to other studies conducted in three districts in Indonesia, namely Sikka, Jayawijaya, and

Klaten Districts, the prevalence of stunting was also significantly lower among children of mothers who had good access to health care services.<sup>(9)</sup>

This study also showed that children under five coming from families with smoker family members had a higher risk for stunting. This is similar to studies conducted in rural and urban areas of Indonesia where smoker fathers have been proven to shift household income from food to tobacco, putting infants and children at greater risk for chronic malnutrition.<sup>(12)</sup>

Birth length was a dominant risk factor of stunting in children aged 6-59 months after controlling for age, mother's education, visit to integrated health care, and family members smoke. A study in Melawi and Bogor Indonesia showed that newborn's length was related to the incidence of stunting in children aged 6-59 months.<sup>(8),(13)</sup> Length of birth is important indicator as the initial growth and development of the individual in the next life. Birth weight and length are positively associated with later height from infancy to adulthood. Children defined as SGA (Small for Gestational Age) show that birth length is somewhat more sensitive than birth weight in predicting shortness in adulthood. The difference, however, is overtaken by the persistence or not of shortness at 2 years of age. It can be concluded that children born SGA will show remain short, however, and in these children full catch-up never occurs.<sup>(14)</sup>

Although both genetic and individual specific environmental factors influence the association between birth size and later height, genetic factors are more importantly influenced birth length rather than birth weight.<sup>(15)</sup> Various factors that increase the risk of children with low birth length. The Lancet 2013 nutrition series has identified maternal undernutrition during pregnancy as a major determinant of poor fetal growth and child stunting.<sup>(16)</sup>

## Conclusion

This study showed the prevalence of stunting among children aged 6-59 months in North Moyo Subdistrict, Sumbawa District was still high at 34.9% and included in the category of health problem.

Significant variables related to stunting are age, birth length, mother's education, integrated health care visits, and smoke. Birth length is a dominant factor of stunting in children aged 6-59 months in North Moyo

District after being controlled by age, visit to integrated health care, mother's education, and smoking.

Therefore, it is very important to ensure that women enter pregnancy in good health and with adequate nutritional status. Efforts from the government are needed to improve nutrition programs that focus on efforts to prepare mothers since prior to pregnancy; improve nutrition programs related to nutrition education and promotion of balanced nutrition for the community that not only to mothers, but also to fathers; and improve the Hygienic and Healthy Behavior-related education in the community.

**Conflict of Interest Statement:** The authors declare that there is no conflict of interest.

**Ethical Clearance:** The study was approved by the Commission of Research Expert and Research Ethics of Faculty of Public Health, Universitas Indonesia (Letter of Approval No. 308/UN2.F10/PPM.00.02/2019 dated 15 May 2019).

**Source of Funding:** This study and publication were supported by Directorate of Research and Community Service (Hibah PITTA), Universitas Indonesia, Depok, Indonesia.

**Acknowledgements:** We would like to express our sincere to the Universitas Indonesia for its financial support so that this research was carried out.

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