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## Affecting Factors of Stunting Incidences among Children Aged 12-59 Months in West Nusa Tenggara Province Indonesia

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### Abstract

**Introduction:** Stunting is a state body that very short to exceed the deficit two Standard Deviation (SD) under the median length or high body of the population that shown indicator of welfare condition, education and income level of community. In the whole world, one of four children under the age of five years had experienced stunted growth. Stunting may have a permanent effect on children's development growth, such as disturbance in motoric capability.

**Purpose:** To figure out the correlations between antenatal care visits and stunting incidences among children aged 12-59 months in North Lombok Regency, West Nusa Tenggara Province Indonesia in year of 2016, by involving extraneous variables such as the age of mother during pregnancy and the family income level.

**Methods:** This research was a case control study design by using a retrospective data. The respondents of this research were 128 children aged 12-59 months (ratio of case group and control group was 1:1). The Schlessman and Stolle calculation was conducted to determine of the sample size of each groups. The univariate, bivariate, and multivariate analysis with level  $p < 0.05$  and OR 95% were conducted as statistical data analysis.

**Results:** There was a correlation between ANC (Antenatal Care) visits and the incidence of stunting among children aged 12-59 months by involving extraneous variables such as the age of the mother during pregnancy, family income level, birth weight and body length (OR 2.13 (95% CI: 1,012-4,494)).

**Conclusion:** Antenatal Care visits by involving extraneous variables such as the age of the mother during pregnancy and family income level have strong correlation with stunting incidences.

**Keywords:** Antenatal care visit; Stunting incidences; Health services; Health professionals; Pregnancy

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### Introduction

Stunting is a state body that very short to exceed the deficit two Standard Deviation (SD) under the median length or high body of the population that became a reference in the international and is a success indicator, welfare, education and income level of community. The impact of a very wide ranging from economic dimension, intelligence, quality, and the dimensions of the nation that has backfired on the future of children [1]. In the whole world, there are 171 million toddlers (23.8%) or one of

four children under the age of five years' experience growth retardation (stunted growth).

Stunting is the result of a long process, which started with the growth failure during pregnancy or until the early two or three years of the child's life. It affects in the loss of bone growth proportion or the soft tissue inside the body [2]. Stunting, which happened in the critical period of pregnancy until the age of two years of children, may have a permanent effect on children's development. Children with stunting will have disturbance in motoric capability, such as delayed walking capability [3].

The Antenatal Care (ANC) visit is the health services provided by health professionals to the mother during pregnancy in order to detect the risk of pregnancy complications. The lack of quality and the number of ANC visits have more risk to deliver a child with low birth weight, which causes stunting [4]. The family income level affects the limited ability of the family to buy proper food, which will impact on the quality and quantity of food. The inadequate quality and quantity food may lead to failure fulfillment of family's nutritional needs [5]. Another factor which is assumedly contributes to the stunting incidences is the the age of the mother during pregnancy. If during pregnancy the mother is too young (less than 20 years), will lead to higher risk of pregnancy's complications as they are not ready to face both physically and emotionally difficulties of pregnancy [6]. On the other hand, if the mothers is getting older, the body function will not perform well, and will cause abnormal fetus or children development [7]. The low birth weight especially in the first 6 months has a very significant risk towards children growth. Low birth weight children followed by inadequate food intake and health services, caused infections among children, which eventually lead to stunting incidences. The children who born with short birth lengths are more likely to grow shorter than normal length ones. The children who born with shorter birth lengths may indicate a lack of maternal nutritional intake during pregnancy, which caused non-optimal growth.

The prevalence of stunting in Indonesia was the highest of the other countries in Southeast Asia. Indonesia has reached a number of low height children to 37.2%. In West Nusa Tenggara Province reached 45.3% of nation wide cases of stunting children [8]. Within West Nusa Tenggara Province area, North Lombok regency has the highest of stunting children prevalence, which reached 44.22% of cases [9]. Antenatal Care (ANC) is a health care given by medical personnel for women during pregnancy and done professionally based on Obstetric Service Standard to prevent the risk of complication during pregnancy. ANC indicators based on MDGs is at least four times of ANC visits. Health Profile of West Nusa Tenggara province, stated that at least four times visit of ANC was only reached 75.97% of pregnant women's numbers [10].

The objective of this research was to figure out the correlation between ANC visit and stunting occurrence among infants under aged of 12-59 months in Lombok Regency of North West Nusa Tenggara 2016, by involving the extraneous variables such as the age of women during pregnancy, the family income level, birth weight and body length.

## Methods

This research was a case and control study by using a retrospective data. The study population consisted of children under the age of 12-59 months, who resided in the working area of the 3 primary health center in Gangga, Pemenang and Nipah districts, North Lombok Regency, West Nusa Tenggara Province Indonesia. North Lombok Regency has highest number of stunting incidences in West Nusa Tenggara Province. Within the study population, there were 7444 children, which consisted of 1,807 stunting children and 5,637 non stunting children.

The Schlessman and Stolle calculation was conducted to determine the sample size of case and control group's respondents. This research obtained 128 respondents which divided into case and control groups (64 respondents for each group, with ratio 1:1). In this study, the size number control group was selected by matching the age and residence of respondents. Accidental sampling method was employed to select the eligible respondents, based on the inclusion and exclusion criteria for each groups. The inclusion criteria of the respondents of case group consisted of the children under the age of 12-59 months who suffered stunting; resided in Gangga, Pemenang and Nipah districts; having Antenatal Care visit record book (KIA/KMS); and do not have any stunted children history within their family. The respondent's exclusion criteria of case group was the children under age 12-59 months with congenital anomalies/physically or chronic diseases. Meanwhile, the respondent's inclusion criteria of control group consisted of children under age of 12-59 months who did not suffered stunting; resided in Gangga, Pemenang and Nipah districts; having Antenatal Care visit record book (KIA/KMS); and do not have any stunted children history within their family. The respondent's exclusion criteria of control group was the children under age 12-59 months with congenital anomalies/physically or chronic disease.

The research variables consisted of stunting incidences as dependent variable, and antenatal care visit independent variable. However, this research also employed extraneous variables, the age of mother during pregnancy and family income level, which assumedly increase or decrease the magnitude or strength of the correlation between independent and dependent variables [11]. For the family income level variable definition, this research adapted the Minimum Income Index West Nusa Tenggara Province year 2015, which divided into two categories. These variables are parts of suspected affecting factors of stunting children from mother's side. The structured questionnaires, Microtoice, length board, and WHO-based standard table z-score were used as research instruments. Data collection method used primary data (structured questionnaires), and secondary data based on antenatal care visit book records (KIA/KMS) belong to primary health center in Gangga, Pemenang and Nipah districts, North Lombok regency, West Nusa Tenggara Province, year 2016. The chi square test, calculation of odds ratio (OR), and logistic regression with significance level  $p < 0.05$  and 95% CI were used as statistical data analysis, by using SPSS version 18.0. The study was approved and registered by the Ethical Committee for research of Primary Health Center of Pemenang, North Lombok Regency. West Nusa Tenggara Province Indonesia (312/PKM.P/XI/2016).

## Results

### Characteristics of the research subject

**Table 1** shows that age of women during pregnancy (<20 and >35 years old), which have higher risk, are mostly found in stunting groups (18.8%). The low family income level numbers is also higher in case group (79.7%) than control group. The birth weight found in case groups are lower (23.4%). Meanwhile, the

birth length <48 cm are mostly found in case groups than control groups (34.4%).

### Description of the visit Antenatal Care (ANC) in North Lombok regency of West Nusa Tenggara province

**Table 2** shows that the mother who did unstandardized ANC visit (57.8%) are mostly found in children with stunting group. Based on the chi-square analysis, there was a significant correlation between ANC visit with stunting incidences among children aged 12-59 months with value *OR* 2.284 (p-value 0.021<0.05 and CI 95% 1.124-4.639). This result means that the mother who did unstandardized ANC visit have 2.28 times greater risk of having children with stunting, than the mother who did standardized ANC visit.

### Correlation between Antenatal Care (ANC) visit and stunting incidences, by involving extraneous variables (the age of the mother during pregnancy and family income level)

On **Table 3** the results of the analysis of the model 1 shows a significant statistic correlation between ANC visit with stunting incidences on children aged 12-59 months old (*OR* 2.28; 95% CI: 1.124-4.639). The result concluded that the mother who did unstandardized ANC visit had 2.28 times greater risk to experience stunting than children without stunting. Model 1 produced the value of *R*<sup>2</sup> 0.054, which could be interpreted that ANC visit contributed to stunting incidences by 5.4%.

Based on statistical analysis model 2, it obtained a significant correlation between ANC visit with stunting incidences among children aged 12-59 months with *OR* 2.81 (95% CI: 0,996-7,292). It can be concluded that the unstandardized ANC visit, by involving extraneous variable, the age of the mother during pregnancy have 2.8 times higher risk having stunting children than who did standardized ANC visit. The value of *R*<sup>2</sup> 0,101 could be interpreted that the ANC visit by involving extraneous variable, such as the age of the mother during pregnancy contributes 10.1% of stunting incidences.

The statistical analysis model 3 shown a significant statistical correlation between ANC visit with stunting incidences among children aged of 12-59 months years old (value *OR* 2.24 (95% CI: 1,001-5,022), by involving extraneous variable, such as the family income level are 2.2 times more found in the children who experienced stunting. The value of *R*<sup>2</sup> 0.093 concluded that the ANC visit by involving extraneous variable, family income level, contributed 9.3% of stunting incidences.

Based on statistical analysis model 4, it shown a significant correlation between ANC visit with stunting incidences among children aged 12-59 months with *OR* 3.56 (95% CI: 1,058-11,968). It can be concluded that the unstandardized ANC visit, by involving children birth weight, have 3.5 times higher risk having stunting children than who did standardized ANC visit. The value of *R*<sup>2</sup> 0,095 could be interpreted that the ANC visit by involving extraneous variable, such as the age of the mother during pregnancy contributes 9% of stunting incidences.

The statistical analysis model 5 shown a significant correlation between ANC visit with stunting incidences among children aged

**Table 1** The distribution of the characteristics of the respondents of research on the case group and control.

Variables	Stunting			
	Case		Control	
	n	%	n	%
<b>The age of the mother during pregnancy</b>				
At Risk (<20 years and >35 years)	12	18.8	4	6.2
Not at risk (20-35 years)	52	81.2	60	93.8
<b>The family income level</b>				
Low (<IDR 1.600.000/month)	51	79.7	40	62.5
High (≥IDR 1.600.000/month )	13	20.3	24	37.5
<b>Birth weight</b>				
At Risk <2500 g	15	23.4	6	9.4
Not at Risk ≥2500 g	49	76.6	58	90.6
<b>Birth length</b>				
At Risk (<48 cm)	22	34.4	12	18.8
Not at risk (≥48 cm)	42	65,6	52	81,2

**Table 2** Analysis of Chi square correlation between antenatal care visits and stunting incidences.

Variables	Stunting				<i>χ</i> <sup>2</sup>	<i>p</i>	<i>OR</i>	95% CI
	Yes		No					
	<i>n</i>	%	<i>n</i>	%				
<b>The ANC visit (times)</b>								
Unstandardized(<4)	37	57.8	24	37.5	5.293	0.021	2.284	[1.124, 4.639]
Standardized (≥4)	27	42.2	40	62.5				

Note: ANC: Antenatal Care; OR: Odds Ratio; CI: Confidence Interval

**Table 3** Multivariate analysis between independent, dependent, and extraneous variables (N=128).

Variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)	Model 5 OR (95% CI)	Model 6 OR (95% CI)
<b>The ANC visit</b>						
Unstandardized	2.28* 1,124-4,639	2.32* 1,128-4,786	2.19* 1,068-4,505	2.20* 1,073-4,529	2.18* 1,065-4,482	2.13* 1,012-4,494
Standardized	1	1	1	1	1	1
<b>The mother age during pregnancy</b>						
At Risk	-	3.56* 1,058-11,968	-	-	-	3.37* 0,983-11,586
Not at risk	-	1	-	-	-	1
<b>The family income level</b>						
Low	-	-	2.24* 1,001-5,022	-	-	1.94* 0,840-4,493
High	-	-	1	-	-	1
<b>Birth weight</b>						
At risk	-	-	-	2.81* 0,996-7,929	-	2.08* 0,571-7,601
Not at risk	-	-	-	1	-	1
<b>The body length</b>						
At Risk	-	-	-	-	2.14* 0,935-4,895	1.42* 0,494-4,079
Not at risk	-	-	-	-	1	1
N	128	128	128	128	128	128
R <sup>2</sup>	0,054	0,101	0,093	0,095	0,087	0,169

\*Sig; ANC: Antenatal Care

of 12-59 months years old (value OR 2.14 (95% CI: 0,935-4,895), by involving extraneous variable, such as children birth length. The children who have at risk body length, 2.1 times more found in the children who experienced stunting. The value of  $R^2$  0.087 concluded that the ANC visit by involving extraneous variable, family income level, contributed 8.7% of stunting incidences.

And for the statistical analysis of the model 6, it shows that the unstandardized ANC visit have significant correlation with stunting children aged of 12-59 months by involving and calculating four extraneous variables in the same time (value OR 2.13 (95% CI: 1,012-4,494). This result indicated that mothers who engaged in unstandardized ANC visit had 2.1 times possibility of having stunted children, by involving both extraneous variables, such as the age of the mother during pregnancy, family income level, and birth weight and body length. The obtained value  $R^2$  of 0.169 could be concluded that the ANC by involving extraneous two variables contributed 16.9% of stunting incidences.

## Discussion

The statistical analysis resulted a correlation between ANC visits with stunting. The proportion of unstandardized ANC visits are mostly found in case group compare to control group (57.8%). unstandardized ANC visits have 2.28 times more risk of children with stunting compare to children who did not suffer stunting, by involving the variables of women's age during pregnancy and family income level ( $p$ -value<0.05 and OR 2.13 (95% CI: 1,012-4,494). The result of this research is line with the research about pregnant women who did unstandardized ANC visits have greater risk compare to pregnant women who did standardized ANC

visits [12]. The lack of quality and the number of ANC visits have 6 times more risk to deliver a child with low newborn weight and stunting [4]. The researches were done in Columbia and Peru stated that regularly and good quality ANC visit has significant effect to reduce malnutrition [13]. The sufficient ANC visits during pregnancy are able to detect the early risk of pregnancy, especially related to nutritional status during pregnancy [14]. Based on the quality standard which stated by World Health Organization, ANC visits must be done regularly. The unstandardized ANC visits (less than four times during pregnancy) will lead to poor acquisition/dissemination of information relating to pregnancy problems/complications, such as malnutrition, chronic, and contagious diseases. Meanwhile the pregnant women who did the ANC visits minimum four times during pregnancy have more advantages such as well-prepared and save laboring process, sufficient lactation process and puerperium [15]. Related to the number of ANC visit, based on the finding of this research, some of the the respondents (the pregnant mothers) did not fulfill the number requirement of ANC during their pregnancy. Especially for the pregnant mother who has low family income level. They mostly prefer to spend their time for working, in order to earn some money to help their spouse and support their family's well being. Besides, the geographic condition or barrier in West Nusa Tenggara Province, which consists several small islands, more a less had affected the pregnant mother's motivation to do ANC visit from the beginning of pregnancy. Since they are living in remote area, which very far from the nearest primary health center, some pregnant women came for ANC visit after four or seven months of pregnancy.

The result of the bivariate analysis shown that pregnant women aged <20 and >35 years old have 3.56 times more risk of children with stunting. The pregnant women aged <20 and >35 years old were mostly found in children with stunting, than the children who were not experienced stunting (18.8%). The result is parallel with the research that stated pregnant women aged less than 25 years old have higher risk having children with stunting than pregnant women aged more than 25 years old [6]. A research done in Ghana found that stunting also happened to older women aged 35-44 years old during pregnancy [16]. Pregnancy age over 35 years old also has high risk. As a person gets older, the body function decreases leading to abnormal fetus development and abnormal hereditary conditions in children [7].

The result of bivariate analysis has shown a correlation between family income level and stunting children incidences. Low family income level has 2.14 times more risk having stunting children. This fact is linked to a research, which stated that children who live in low-income family level have a higher risk of stunting [17]. The children who live in a poor family are prone to experience stunting than other children who live in middle and high income family. Some researchers concluded that children's health status depends on their family income level [17]. The family income level will determine the ability to purchase good quality and enough food, proper housing facility, adequate health care access, which affected on children's nutritional status and needs [18]. The result of the bivariate analysis shown that low birth weight children have 2.18 higher risk having children with stunting. The low birth weight children were mostly found with stunting cases,

than the children who were not experienced stunting (23.4%). Based on previous research, the low birth weight children have 5.5 risk to experiences stunting have [6]. The result of bivariate analysis resulted in the statistic correlation between birth length and stunting incidences. The birth length (<47 cm) has 2.14 times more risk having stunting growth. The birth weight and body length are two of the indicators to measure the quality of children. In developing countries, infants with low born weight and shorter body length are related to slowly fetus growth, which caused by poor nutritional status during pregnancy [7]. A child with the history of low born weight will have less anthropometry in adulthood [7].

## Conclusion

Based on the findings of this research, it showed that unstandardized ANC visit (less than four times visits during pregnancy) had strong correlation with stunting incidences in Lombok Regency of West Nusa Tenggara province. This correlation was even stronger, by involving the extraneous variables such as the age of women during pregnancy, the family income level, birth weight, and body length. The unstandardized ANC visits lead to inadequate important information relating to pregnancy problem such as abnormal fetus development and malnutrition, which contribute to stunting incidences. The encouragement of mother's motivation to do ANC visits regularly and combating the poverty by increasing the family income level, are very needed, in order to decrease stunting incidences.

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