

DETERMINANT OF STUNTING AMONG CHILDREN 15-49 MONTHS IN ZAMBIA (ZAMBIA DHS ANALYSIS 2018)

*Ulfa Al Uluf¹, Trias Mahmudiono¹, Mahmudah¹, Soenarnatalina Melaniani¹

¹Faculty of Public Health, Universitas Airlangga, 60115 Surabaya, East Java, Indonesia

*Corresponding Author: Ulfa Al Uluf ; Email: ulfaaluluf43@gmail.com

Published by Fakultas Kesehatan Masyarakat Universitas Airlangga

ABSTRACT

Keywords:

stunting,
children 15-49 Months,
marital status,
Zambia

One of the countries with a high prevalence of *stunting* in East Africa is Zambia. Globally, 22% of children under 5 years old are stunted or 149.2 million children in 2020. *Stunting* prevalence in Zambia remains above 35% in children under 5 years old at the national level. Research in Zambia about determine of *stunting* is still few and limited. The aim of this study was to identify determine with *stunting* in children aged 0-59 months in Zambia. The method used is observational in secondary data from the 2018 Demographic and Health Survey (DHS) in Zambia. Mothers of toddlers are Respondents aged 15 - 49 years and having toddlers aged 15 - 49 months. The sample size used in this study was 3804 mothers with children under five. Bivariate analysis using Chi-Square test and multivariate analysis using Multiple Logistic Regression. The results showed that the factors related to *stunting* were maternal age ($p=0.164$), marital status ($p=0.187$), wealth index ($p=0.149$), age of children under five ($p=0.164$) and order of children ($p=0.077$). Marital status OR 2.724 (0.846-8.769) the most influence the occurrence of *stunting* in children under five. The implication of this study is the more mothers who never married, the greater the risk of *stunting*.

ABSTRAK

Kata kunci:

stunting,
balita 15-49 bulan,
status pernikahan,
Zambia

Salah satu negara dengan prevalensi stunting tinggi di Afrika Timur adalah negara Zambia. Secara global, anak dibawah 5 tahun yang mengalami stunting sebesar 22% atau 149.2 juta anak di tahun 2020. Prevalensi stunting di Zambia masih di atas 35% pada balita di bawah 5 tahun di tingkat nasional. Penelitian mengenai determinan stunting masih sedikit dan terbatas di Zambia. Studi ini bertujuan untuk mengidentifikasi determinan stunting pada anak usia 0-59 bulan di Zambia. Metode yang digunakan adalah observasional berupa data sekunder Demographic and Health Survey (DHS) tahun 2018 di Zambia. Ibu balita sebagai responden penelitian yang berusia 15-49 tahun dan memiliki balita usia 15-49 bulan. Besar sampel yang digunakan pada penelitian ini adalah 3804 Ibu balita. Analisis bivariat dengan uji Chi-Square dan analisis multivariat menggunakan Uji Regresi Logistik berganda. Hasil dari studi menunjukkan bahwa faktor-faktor yang berhubungan dengan stunting adalah usia ibu ($p=0.164$), status perkawinan ($p=0.187$), status ekonomi ($p=0.149$), usia balita ($p=0.164$) dan urutan anak ($p=0.077$). Status perkawinan mempengaruhi terjadinya stunting pada balita (OR 2.724, 95% CI 0.846-8.769). Implikasi dari penelitian ini adalah semakin banyak Ibu yang tidak pernah menikah maka semakin besar pula resiko stunting.

INTRODUCTION

Stunting is a condition of toddlers with a length or height less than their age, where this condition is measured by length or height that is more than -2 Standard Deviation (SD) according to the World Health Organization (WHO) (1). *Stunting* is one of the significant obstacles in human development (2). Globally, 22% of children under 5 years old

are stunted or 149.2 million children in 2020 (3). *Stunting* toddlers are spread across fourteen countries, 80%. There are ten countries with the largest absolute burden with *stunting* prevalence of 40% or more (4).

In 2016, there were 87 million stunted children in Asia, 59 million in Africa and 6 million in Latin America and the Caribbean (5). The five sub-regions with

stunting rates > 30% are West Africa (31.4 %), Central Africa (32.5%), South Asia (34.1%), Oceania (38.3%) excluding Australia and New Zealand) and East Africa (36.7%) (6).

One of the countries with a high prevalence of *stunting* in East Africa is Zambia. In recent years, the prevalence of *stunting* in Zambia has gradually decreased but has not been significant because there are still many children at risk. *Stunting* prevalence remains above 35% in children under 5 years old at the national level (7). gender, child age, mother's age, mother's education level, wealth status, improved drinking water sources, duration of breastfeeding and place of residence are factors that have an association with *stunting* in Zambia (8).

Factors that contribute to stunted growth include poor maternal health and nutrition, inadequate CI, and infection. Maternal health and nutrition factors include health status before, during and after pregnancy that affect child development from an early age (2). Other factors that play a role in *stunting* are short maternal stature, birth spacing too close, pregnancy at a young age and lack of nutritional availability to the fetus during pregnancy (9).

Stunting also has an impact on socioeconomic conditions such as mothers with low education tend to have stunted children (10), Mothers with low incomes may also have more difficulty getting enough and varied foods that will provide good nutrition (11). Research in Zambia on the determinants of *stunting* is still few and limited. Further analysis is needed to reduce *stunting* rates. This study aims to identify the determinants of *stunting* in children aged 0-59 months in Zambia.

METHODS

This study uses quantitative research, cross-sectional design with secondary data. The data source comes from the 2018 Demographic and Health Survey (DHS) in Zambia. Participants in this study were mothers of toddlers aged 15-49 years and had toddlers aged 15-49 months. The number of samples used in this study were 3,804 mothers of children under five.

The dependent variable in this study was the incidence of *stunting* under five. While the independent variables are the age of the toddler, the gender of the toddler, birth weight, birth

order, breastfeeding history, mother's age, area of residence, mother's education, marital status, occupation and economic status. Bivariate analysis was with Chi-Square test, Confidence Interval (CI) 80% and a significance level of $p < 0.20$, and then analyzed using multiple logistic regression, showing 95% CI and a significance level of $p < 0.05$.

RESULT

Variable characteristics of mothers, around 23.8% among mothers aged 30-34 years old and 60% of mothers lived in rural areas have education level of elementary school (51.2%) education and almost 80% are married. Mother's employment status is around 47% of mothers working seasonally and 45.7% with permanent jobs. The results also showed 25% of mothers with very poor economic status while very rich contributed 18%.

Table. 2 describes the characteristics of the child. The category of children aged 30-34 months has the highest frequency of 23.8% from the other categories. The frequency of male and female sexes is on average the same, with a low birth weight of 12.8%, while the results of the study show that the order of children 2-3 is 34% and children with a sequence of 7+ are 14%.

The results of the analysis of the relationship between independent variables on maternal characteristics showed an association between maternal age ($p = 0.164$), marital status ($p = 0.187$) and economic status ($p = 0.149$) with *stunting* under five while for the variable of residence ($p = 0.618$), mother's education ($p=0.319$), working status ($p=0.792$) and breastfeeding history ($p=0.466$) did not show any relationship with under-five *stunting* (Table 3).

The results of the analysis of the relationship between the independent variables on the characteristics of children showed that there was a relationship between the age of the toddler ($p=0.164$) and the order of the child ($p=0.077$) with the sex variable *stunting* ($p=0.246$) and birth weight ($p=0.586$) there was no relationship means with *stunting* (Table 4).

After the Chi-Square test was carried out, it was followed by a logistic regression test, namely the variables of mother's age, marital status, economic status, child's age, and child's order. The results of logistic regression analysis showed that marital status

and order of children had a significant effect on the incidence of *stunting* in children under five ($p < 0.05$).

Table 1. Variable Frequency Distribution Based on Maternal Characteristics

Mother's Characteristics	N	%
Age		
15-19	216	5.7
20-24	797	21
25-29	868	22.8
30-34	904	23.8
35-39	626	16.5
40-44	326	8.6
45-49	67	1.8
Residence		
Rural	2494	65.6
Urban	1310	34.4
Mother's Education		
No education	278	7.3
Elementary School	1947	51.2
Junior High School	1307	34.4
Senior High School	272	7.2
Marital status		
Never married	345	9.1
Married/Living together	2995	78.7
Widowed/divorced	464	12.2
Working Status		
Permanent	1738	45.7
Seasonal	1805	47.5
Part time	261	6.9
Economic Status		
Very poor	939	24.7
Poor	820	21.6
Currently	694	18.2
Rich	667	17.5
Very Rich	684	18
Breastfeeding History		
Breastfeeding	2527	66.4
Not breastfeeding	1277	33.6

Table 3. *Stunting* Prevalence Based on Maternal Characteristics

Mother Characteristics	<i>Stunting</i>		No <i>Stunting</i>		Significance Value
	n	%	n	%	
Age (Years)					0.164a*
15-19	313	5.6	3	0.1	
20-24	788	20.7	9	0.2	
25-29	858	22.6	10	0.3	
30-34	887	23.3	17	0.4	
35-39	615	16.2	11	0.3	
40-44	315	8.3	11	0.3	
45-49	66	1.7	62	0.0	

Table 2. Variable Frequency Distribution Based on Child Characteristics

Child's Characteristics	n	%
Age		
15-19	216	5.7
20-24	797	21
25-29	868	22.8
30-34	904	23.8
35-39	626	16.5
40-44	326	8.6
45-49	67	1.8
Gender		
Male	1904	50.1
Woman	1900	49.9
Birth Weight		
LBW	486	12.8
Normal	3318	87.2
Child Order		
1	768	20.2
2-3	1295	34
4-6	1207	3.7
7+	534	14

The probability of children in the order of 4-6 being 0.64 times greater than the first, second and third order children who have a risk of experiencing *stunting* is 0.46 and 0.26 times lower than the order of children to 4-6 (Table 5). Mothers who have never married tend to have *stunting* children by 5.42 times greater than mothers who are married or live with a partner.

Multivariate analysis with the ideal model chose two variables that were proven to be associated with *stunting*. The related variables were the age of the child and marital status. This multivariate analysis can be used to obtain variables related to *stunting* in toddlers by comparing the value of the Odds Ratio (OR) in the model. The marital status variable is the variable that has the most association with *stunting* in children under five.

Mother Characteristics	<i>Stunting</i>		<i>No Stunting</i>		Significance Value
	n	%	n	%	
Residence					0.618 a
Rural	2451	64.4	43	1.1	
Urban	1291	33.9	19	0.5	
Mother's Education					0.319 a
No education	270	7.1	8	0.2	
Elementary School	1920	50.5	27	0.7	
Junior High School	1285	33.8	22	0.6	
Senior High School	267	7	5	0.1	
Marital status					0.187 a*
Never married	338	8.9	7	0.2	
Married/Living together	2943	77.4	52	1.4	
Widowed/divorced	461	12.1	3	0.1	
Working Status					0.792 a
Permanent	1710	45	28	0.7	
Seasonal	1774	46.6	31	0.8	
Part time	258	6.8	3	0.1	
Economic Status					0.149 a*
Very poor	928	24.4	11	0.3	
Poor	810	21.3	10	0.3	
Currently	679	17.8	15	0.4	
Rich	658	17.3	9	0.2	
Very Rich	667	17.5	17	0.4	
Breastfeeding History					0.466a
Breastfeeding	2489	65.4	38	1	
Not breastfeeding	1253	32.9	24	0.6	

^a : Using Chi-Square Test ; ^{**} : Multiple Logistic Regression Candidate (p<0.20)

Table 4. *Stunting* Prevalence Based on Child Characteristics

Child Characteristics	<i>Stunting</i>		<i>No Stunting</i>		Significance Value
	n	%	n	%	
Age (Month)					0.164 a*
15-19	313	5.6	3	0.1	
20-24	788	20.7	9	0.2	
25-29	858	22.6	10	0.3	
30-34	887	23.3	17	0.4	
35-39	615	16.2	11	0.3	
40-44	315	8.3	11	0.3	
45-49	66	1.7	62	0	
Gender					0.246 a
Male	1878	49.4	26	0.7	
Woman	1864	49	36	0.9	
Birth Weight					0.586 a
LBW	480	12.6	6	0.2	
Normal	3262	85.8	56	1.5	
Child Order					0.077 a*
1	760	20	8	0.2	
2-3	1277	33.6	18	0.5	
4-6	1186	31.2	21	0.6	
7+	519	13.6	15	0.4	

^a : Using Chi-Square Test ; ^{**} : Multiple Logistic Regression Candidate (p<0.20)

Table 5. *Stunting* Determinant Logistic Regression Analysis Results

Variable	B	Significance Value	OR (95%CI)
Mother Characteristics			
Mother's Age		0.785	
15 - 19	0.445	0.743	1,560 (0.116 – 22,177)
20 – 24	0.325	0.786	1.385 (0.133 – 14,435)
25 – 29	0.123	0.914	1.131 (0.122 – 10.460)
30 – 34	0.508	0.640	1,661 (0.198 – 13, 913)
35 - 39	0.296	0.782	1.345 (0.166 – 10, 925)
40 - 44	0.913	0.389	2, 493 (6,312 – 19,901)
Marital status		0.069	
Never married	1,691	0.021*	5,424 (1,289 - 22,814)
Married/Living together	1.002	0.093	2,724 (0.846 – 8,769)
Economic Status		0.171	
Very poor	0.770	0.050	0.463 (0.214-1.001)
Poor	0.733	0.070	0.481 (0.217-1.062)
Currently	0.189	0.599	0.827 (0.409-1.675)
Rich	0.660	0.110	0.514 (0.227-1.114)
Child Characteristics			
Age		0.785	
15 - 19	0.445	0.743	1,560 (0.116 – 22,177)
20 - 24	0.325	0.786	1.385 (0.133 – 14,435)
25 - 29	0.123	0.914	1.131 (0.122 – 10.460)
30 - 34	0.308	0.640	1,661 (0.198 – 13, 913)
35 – 39	0.296	0.782	1.345 (0.166 – 10, 925)
40 – 44	0.913	0.389	2, 493 (6,312 – 19,901)
Child Order		0.042*	
1	-1,315	0.080	0.268 (0.102 - 0.708)
2-3	-0.773	0.031*	0.462 (0.228 - 0.933)
4-6	-0.472	0.168	0.642 (0.319 - 1.220)
Constant	-4,475	0.000	

*Significant effect (p<0.05)

DISCUSSION

Relationship of Mother's Age with Toddler *Stunting* Incidence

The results of this study indicate an association between maternal age and the incidence of *stunting*. In line with studies conducted in the Democratic Republic of the Congo, it shows that maternal age >20 years will increase the risk of *stunting* (12). Research in Ghana also states that mothers aged 35-44 years tend to have children with stunted growth and maternal age is also a significant predictor of *stunting*. This result is also supported by a study conducted by (13) that maternal age is associated with *stunting*, which is 1.56 times higher in mothers aged <20 years and >30 years. Very young maternal age at delivery is associated with increased preterm birth, limited intrauterine growth, death and malnutrition.

Young mothers have lower nutritional status which causes low birth weight, which makes them susceptible to *stunting* (14).

Relationship of Marital Status with *Stunting* Incidence in Toddlers

Marital status in this study is associated with the occurrence of *stunting*. The data show that mothers who have never been married have a higher risk of *stunting* than mothers who are married and live with their partners.

Different research conducted in sub-Saharan African countries found that mothers who had multiple marriages experienced a 5% increase compared to mothers who lived alone (15). Another study from the 2017 Indonesia Nutrition Status Monitoring Survey data in toddlers aged 0-5 months found that mothers with married marital status had a 0.8 times

greater risk of experiencing *stunting* and 0.77 times greater experiencing *stunting* (16).

Marital status is a factor related to the occurrence of *stunting*. Married mothers have a higher risk of *stunting* than single mothers (17). This is because the mother's marital status can reflect the socioeconomic status in the household which is also related to the occurrence of *stunting*.

Relationship between Economic Status and Incidence of *Stunting*

Poverty is a limited ability to meet decent needs such as income, skills, health conditions, economy and limited access to information. The definition of poor is the inability to meet basic human needs (18). One of the demographic characteristics is socioeconomic status. This study shows that there is a relationship between economic status and the incidence of *stunting*. Research conducted in African countries conducted found that *stunting* children under five tend to experience higher *stunting* with very poor economic status (19). Another study on economic status with *stunting* was a conducted using epidemiological and socioeconomic data from 72 Demographic and Health Surveys. It was found that the difference between children from rich and very poor households during the first 5 months of life is an important moderator for *stunting* rates in children (20). This is because poor households cannot meet the balanced consumption intake of children under five and their families.

Connection Age of Children with Incidence of Toddler *Stunting*

Stunting can be experienced by children under and over five years. The results of the study found that *stunting* and child age showed a significant relationship, the older the child, the greater the risk of *stunting*. The incidence of *stunting* in this study was experienced by children aged 30-34 months. These results are in line with research conducted in Nigeria which showed that children aged 0-23 and 0-59 months were the most consistent risk factors for *stunting* (21). This is because *stunting* occurs at a critical period during the first two years of life (22).

Children with anemia, low education and economic level of parents are among the risk factors for *stunting* in children aged 24-35 months (23); mothers who did not receive vitamin A supplementation after birth (24), family income, mother's education and knowledge, exclusive breastfeeding, age of breastfeeding to weaning food (MP-ASI) age, zinc adequacy level, iron adequacy level, history of infectious diseases and genetic factors from parents (25) and a growth deficit that continues to worsen until the age of five are also contributing factors to *stunting* (22).

Other studies also say that children over 12 months of age significantly increase the likelihood of toddler *stunting* (26). It was also stated that children aged 24-59 months were 6.34 times more likely to experience *stunting* compared to children aged 6-23 and 0-6 months (27). This may also be caused by improper feeding during the weaning period when the baby is in transition from breastfeeding to weaning food (MP-ASI) period. Another study conducted in Tanzania with secondary data from Tanzania's DHS (1991-2016) showed that children aged 24-35 months were 1.75 times at risk of experiencing *stunting* (28).

Relationship between Child Sequence and *Stunting* Incidence

From an economic point of view, the birth order of children has an impact on child mortality, child education, diabetes and asthma in children (29). In addition, research conducted in 2016 stated that birth order is a significant predictor of *stunting*. Third, fourth, and fifth or higher order children are more likely to be stunted (29).

However, there are differences in research results which say that the order of children is not related to the incidence of *stunting* (13). Research in Qazvin, Iran, found the same thing, that the child's birth order had a significant effect on the presence of *stunting* in toddlers (30). This is because the effects of birth order reflect differences in the environment that are not shared in a family and the advantages of first-order children being better with later-born children such as better health and consumption and parental affection compared to later offspring (31).

CONCLUSIONS AND SUGGESTIONS

Conclusion

There is a relationship between maternal age, marital status, economic status, child age, and order of children with stunting in toddlers. However, there are only two factors that have been shown to significantly influence the incidence of stunting, namely marital status and child birth order. Toddlers who are cared for by parents who have never been married have a 5,424 times greater risk of stunting than toddlers who are cared for by parents who are married. Furthermore, toddlers who are the first to third children are at risk of not experiencing stunting than toddlers who are born in order of four or more.

Suggestion

Based on these conclusions, *stunting* is caused by factors not only from diet but also influenced by various factors indirectly. It is hoped that mothers of toddlers can detect stunting from the start and mothers and families should always monitor growth and development from infancy so that chronic nutritional problems can be overcome. It takes cooperation and support from relevant cross-sectors in community empowerment to improve parenting and efforts to increase knowledge and increase visits to *posyandu*.

Suggestions are for health practitioners to improve nutrition program counseling for mothers under five in dealing with stunting. To overcome these stunting-related factors, it is necessary for community-based education and nutrition interventions.

ACKNOWLEDGMENT

Thank you to all the lecturers and friends from the Master's Program in Public Health Nutrition, Public Health, Faculty of Public Health, Universitas Airlangga who have contributed to the writing of this article so that it can be completed properly.

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