

**HEALTH, FOOD CONSUMPTION, SOCIAL ECONOMY, AND STUNTING INCIDENCY IN TIMOR LESTE**Cipriano do Rosrio Pacheco^{1,2✉}, Intje Picauly², Mindo Sinaga²¹Faculty of Public Health UNPAZ Dili, Timor Leste²Public Health Study Program, Universitas Nusa Cendana Kupang, Indonesia**Article Info***Article History:*

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*Keywords:*Health; Food Consumption;
Social Economy; Stunting**DOI**<http://dx.doi.org/10.15294/kemas.v13i2.11248>**Abstract**

Stunting can affect the health of toddlers. The prevalence of stunting in Timor Leste in 2014 is 50.2%, whereas in Aileu District is 52.3%. Stunting can interfere intellectual growth and development. The purpose of this study was to analyze the relationship between stunting determinants. The research design was cross sectional. The population of this study was toddlers 24-59 months old, with a sample size of 102 people. Sampling technique used was simple random sampling. Data were analyzed bivariately using simple linear regression, while multivariate analysis was performed using multiple logistic regressions. Bivariate analysis revealed variables that have significant relationship with stunting: immunization ($p=0.026$), infectious disease ($p=0.049$), income ($p=0.003$), total family member ($p=0.045$). Multivariate analysis obtained two variables as determinant factor of stunting: infectious disease ($p=0.025$; OR=0.355; 95% CI=0.144-0.877), income ($p=0.028$; OR=0.332; 95% CI=0.124-0.887). The incidence of stunting in toddlers in Aileu District is very serious (54.9%). Toddlers with stunting demonstrated the adverse effects of stunting on growth, development, and the quality of human resources. Stunting is not only a health sector issue. It is necessary to have appropriate interventions with early and liable management through various related sectors.

Introduction

Children who suffer malnutrition at the age of toddlers will grow short (stunting) and have growth and brain development disorders that lead to low level of intelligence, because 80% of brain growth occurs during pregnancy until the age of two years (Adisasmito, 2010). The incidence of stunting in children is a cumulative process that occurs since pregnancy, childhood, and throughout the life cycle. At this time it is the process of stunting in children and the chance of stunting increased in the first 2 years of life. Insufficient maternal nutritional before

and during pregnancy lead the fetus to develop Intrauterine Growth Retardation (IUGR) and consequently be born with malnutrition, and have growth and developmental disorders. IUGR infants are unable to pursue optimal growth during the first two years of life.

High prevalence of stunting among children under five is in Africa (36%) and Asia (27%). The prevalence of malnutrition in children under five years old was in accordance to the UN (United Nations) sequence of chronic malnutrition (stunting), that is Timor Leste ranked third in the world after Afghanistan

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(59%) and Yemen (58%). The prevalence of stunting among children under five in Timor Leste is increasing every year. The decrease in prevalence of stunting per year is insignificant, as in some national reports and survey, data on stunting of children under five in Timor Leste from year to year are fluctuating (Asis, 2004). MICS survey (2002) reported 46.7%, SDK survey (2004) reported an increase to 48%, SGFS survey (2006) reported a decrease to 46%, PDSTL survey (2010) reported similar increase to 58.1%, UNICEF data (2011) was 54% and TLFN survey (2014) reported a decrease to 50.2%. In general, it can be concluded that the prevalence of stunting in toddlers in Timor Leste is very high because the percentage is above the standard (Bambang, 2016).

The prevalence of stunting in Timor Leste is spread all across the territory. The national stunting prevalence is 50.2%, and the lowest is 39.5% (TLFNS-2014). Aileu regency is among the districts with high prevalence of stunting at 52.3% compared to the national rate of 50.2%. National survey results for Health and demographics in 2010 showed that 31.4% children under five in Aileu District suffered stunting and it increased to 52.3%. Existing data indicated that toddlers in Aileu District tend to still have stunting problems (Becker, 2012).

The objectives of this study were (1) to describe the child's health history (immunization, LBW, infectious disease), child consumption pattern (energy sufficiency level, food consumption history, exclusive breastfeeding history), family's social economy (maternal education, family income, number of family members), and stunting event, (2) to analyze the relationship between child's health history, children's consumption pattern, and family's social economy and stunting event, (3) to know the determinant factor of stunting event.

Method

This study is analytic observational study, with cross sectional design. The study was conducted on 4 CHC in Aileu District, CHC Aileu, CHC Laulara, CHC Lequidoe and CHC Remexio. The population in this study was mother of all children aged 24-59 months in Aileu District which numbered 3205 from four CHCs. The sample size in this study is 102

toddlers. Based on national survey data, the number of toddlers who experience stunting in Aileu region is 52.3%. Sampling was performed using probability technique with simple random sampling type.

Result and Discussion

Aileu was established into a district under Portuguese government based on the official bulletin no. 52 dating December 13th, 1974, and to date remains a district. The district of Aileu is Table 1. Distribution of Frequency Results of Respondents in Aileu District by 2016

Variable and Category	Sample (n=120)	Percentage (%)
Stunting Event		
Normal	46	41.5
Stunting	56	54.9
Immunization History		
Complete	83	81.4
Incomplete	19	18.6
Low Birth Weight (LBW)		
Normal	82	80.4
LBW	20	19.6
Infectious Disease Status		
Rarely	36	35.3
Frequently	66	64.7
Energy Sufficiency Level		
Adequate	18	17.6
Low	84	82.4
Food Consumption History		
Adequate	37	36.3
Low	65	63.7
Breast Feeding History		
Exclusive	66	64.7
Not exclusive	36	35.3
Maternal Education		
High	40	39.2
Low	62	60.8
Maternal Employment Status		
Employed	66	64.7
Unemployed	63	35.3
Income Level		
Moderate	35	34.3
Low	67	65.7
Number of Family Member		
Small	40	39.2
Large	62	60.8

Source: Research Primary Data

Table 2. Bivariate Analysis

Immunization Status	Stunting Event				Quantity		PR	p
	Normal		Stunting		n	(%)		
	n	(%)	n	(%)				
Complete	42	91.3	41	73.2	83	81.4	9.6	0.026
Incmplete	4	8.7	15	26.8	19	18.6		
Total	46	100	56	100	102	100		
LBW								
Normal	38	82.6	44	78.6	82	80.4	1.15	0.610
Low	8	17.4	12	21.4	20	19.6		
Total	46	100	56	100	102	100		
Infectious Disease Status								
Jarang	21	45.6	15	26.8	36	35.3	1.53	0.049
Sering	25	54.4	41	73.2	66	64.7		
Total	46	100	56	100	102	100		
Energy Sufficiency Level								
Adequate	6	13	12	21.4	18	17.6	0.63	0.273
Low	40	87	44	76.6	84	82.4		
Total	46	100	56	100	102	100		
Food Consumption History								
Adequate	12	26	20	35.7	32	31.4	0.78	0.299
Low	34	74	36	64.3	70	68.6		
Total	46	100	56	100	102	100		
Breast Feeding History								
Exclusive	33	71.7	33	87.2	66	64.7	1.39	0.176
Not exclusive	13	28.3	23	12.8	36	35.3		
Total	46	100	56	100	102	100		
Maternal Education								
High	18	39.1	22	39.3	40	39.2	1	0.987
Low	28	60.9	34	60.7	62	60.8		
Total	46	100	56	100	102	100		
Maternal Employment Status								
Employed	13	28.3	23	41	36	35.3	0.72	0.180
Unemployed	33	71.7	33	59	66	64.7		
Total	46	100	56	100	102	100		
Income Level								
Moderate	23	50	12	21.4	35	34.3	1.94	0.003
Low	23	50	44	78.6	67	65.7		
Total	46	100	56	100	102	100		
Number of Family Member								
Small	23	50	17	30.4	40	39.2	1.51	0.045
Large	23	50	39	69.6	62	60.8		
Total	46	100	56	100	102	100		

Source: Research Primary Data

Table 3. Multiple Logistics Analysis of Modeling Stunting Determining Factors in Toddlers

Variable	B	Sig.	Exp (B)	95% CI	
				Lower	Upper
History of Infectious Disease	-1.035	0.025	0.355	0.144	0.877
Family Income	-1.102	0.028	0.332	0.124	0.887
Constant	1.982	0.004	7.254		

Overall percentage 71.6%

located on the southern part of Dili, the capital of the state of Timor Leste, which is 47 km away, with an area of 729 km². Administratively, Aileu District has four subdistricts, 31 villages and 135 hamlets. Geographically, the Regency of Aileu is on the line 88.25° - 8.42° South Latitude and 120.25° - 126.46° East Longitude. The area of Aileu Regency is bumpy with a height of + 350-1500m above sea level.

We found that most toddlers in Aileu District are stunting, have complete immunization status, normal birth weight, frequent infectious diseases, have less energy sufficiency, and exclusive breastfeeding as shown in Table 1. The majority of mothers' education is low, and employment status is predominantly employed, income levels are low and the average number of family member is large.

We found four variables that have significant relationship with stunting incident in toddlers in Aileu District as shown in Table 2 that is immunization (proportion: 9.6, $p=0.026$ ($p<0.05$)), history of infection disease (proportion: 1.53, $p=0.049$ ($p<0.05$)), family income (proportion: 1.96, $p=0.003$ ($p<0.05$)), maternal job (proportion: 0.72, $p=0.180$) and number of family members (proportion: 1.51, $p=0.045$ ($p<0.05$)).

Based on table 2, it can also be seen that six variables can be continued to multivariate analysis. These variables are immunization status, history of infectious diseases, exclusive breastfeeding, maternal employment, family income and the number of family members.

The analysis result in Table 3 shows that from the multivariate test, two variables were found to be consistently related to stunting incident as well as to be the determinant variable of stunting incidence in toddlers in Aileu Regency. Table 3 also shows the

probability model of stunting incidence in toddlers in Aileu Regency region occurred from two variables which is the determinant of stunting incident. Overall, this model can predict the high or low factor associated with stunting incident in toddlers which is 71.6% (overall percentage). The cause of stunting can be estimated if the history of infectious diseases and family income was known.

Statistical test showed that the history of infectious diseases has $p=0.025$, family income has $p=0.028$. Therefore, with alpha (α) at 5%, there is a linear relationship between frequent infectious diseases and low family income and stunting incident in toddlers in Aileu County. With OR (Exp/ B) value, we can determine the relationship between determinant factors of stunting incident. This present study revealed the OR of variable history of infection disease to be 0.355 (95% CI=0.104-1.363) which mean in Aileu Regency, the risk of stunting is 0.4 times greater in toddlers who often contract infectious diseases compared to toddler who rarely have infectious diseases. As for the income variable, it has OR=0.332 (95% CI: 0.124-0.887), which means in Aileu Regency, the risk of stunting is 0.332 times greater on toddlers from low income family compared to toddlers from high income family. History of infectious diseases is the more dominant variable associated with the incidence of stunting in toddlers because the value of OR is greater.

Toddlers who often suffer from infectious diseases such as malaria, respiratory infection and diarrhea are likely to become stunting. If the toddlers rarely have infectious diseases, the risk of stunting is very small. However, in reality, not all toddlers who rarely suffer from infectious diseases have normal nutritional status. There are toddlers who rarely have infectious diseases but still suffer stunting. As shown in Table 2, some toddlers who rarely

have infectious diseases still have stunting. This is due to nutritional problems being not the only the problem of infectious diseases, but many factors influence as well.

The high incidence of infectious diseases among toddlers in Aileu Regency is related to sanitation and clean water problems, as observations have shown that most families lack clean water. The system is available but is often not working, so they must consume well water. The average family or household already has a toilet but not a permanent toilet, but a Community Lead Total Sanitation (CLTS) model. The environment is not clean enough because people still dispose garbage arbitrarily. There are low awareness in using mosquito nets; the government has distributed bed nets for free, but they rarely use it. These are the factors thought of by researchers as the trigger for the occurrence of infectious diseases, especially in toddlers.

The results of this study were in line with Taguri (2008), that there is a relationship between the history of infectious diseases with the incidence of stunting. Toddlers with a history of infectious diseases have a 2.2 times greater risk of stunting compared to toddlers with no history of infectious diseases. The results of Picauly (2013) study, with logistic regression analysis showed that children with a history of infectious diseases had a 2.332 times greater chance of stunting compared to children with no history of infectious disease. The results of this study differ from Welasasih (2012) and Erna (2017), studies that found no significant association between stunting events and a history of infectious diseases such as ARI and diarrhea in children.

Stunted children tend to be more vulnerable toward infectious diseases, thus risking a decrease in the quality of learning in school and risking more often skipping school (Hendra, 2013). The contribution of infectious diseases can lower food intake. Bad environments such as polluted drinking water, no sewerage wastes, no good use of closets/toilets, will lead to the spread of disease germs. These are a big risk factor that has an impact on health especially for pregnant women and children (Semba, 2008).

The research result on Table 1 showed

that most families in Aileu Regency have low income. The low income family was a determinant factor for stunting incidence in children aged 14-59 months. Toddlers from low income family have a 0.332 times higher risk for stunting compared to higher income families. Interview from respondents revealed that the source of income was mostly from farming activities for fruits and vegetables, because Aileu Regency was a horticultural region. The return from farming crop was used to meet the daily needs of the family. One aspect that is challenging and worrying was farming production, because their income sources are seasonal. We assumed that this seasonal income source could impact the income, making it unstable or even minimal. This situation indirectly affected family health status, especially for toddler, due to the difficulty of providing quality foods.

The research result that related to stunting incidence in toddler was also related to the income factor in family according to the conceptual framework of UNICEF where the root of problem of nutritional issues in family would affect the growth and development of the children due to various factors, one of which was financial crisis issue, where the family was unable to fulfill the nutritional adequacy for children qualitatively or quantitatively, and resulted in poor children growth and development (Merita, 2017; Oktia, 2017). Our result showed that the average population of Aileu Regency had low income. This low income was probably due to the fact that most population in Aileu Regency was farmers. Data obtained from Statistic Office that showed the dominating livelihood was farmers.

Taguri (2008), stated that social economic issue, such as the low family income, had significant association with stunting incidence in children where the low-income family carried a possibility for nutritional problem, compared to the children from a higher-income family. Socio-economic factor was the root of problem for malnutrition. The family's ability to conform the nutritional needs would be affected by the level of family income. Families with relatively low income would have difficulty meeting the nutritional needs. This situation usually occurred in toddlers from

family with low earning (Theron, 2004). Several factors in this study that were not included as stunting determinant factors are: immunization status, birth weight, energy adequacy status, history of nutritional intakes, history of exclusive breastfeeding, the mother's education, the mother's employment, and number of the family members.

The results in Table 1 presented that the most toddlers had gained full-immunization but this condition did not warrant for respectable nutritional status. The analysis results in Table 2 showed that immunization status had a significant correlation with stunting incidence. However, in the multivariate test, immunization status revealed a non-significant correlation with stunting incidence. It is possibly due to the cause of malnutrition being multifactorial. The increase in complete immunization status in toddlers was due to the support from government regulation that provided health worker, especially doctor, in each health post at village level and also implemented the KSP (*Konsulta Saude Pesoa*) program and sweeping program in collaboration with other stakeholders easing monitoring of the problem.

Immunization program was the governmental program to achieve optimum health status in the population, especially in children. Mothers who had leisure time bring their children to primary health center for immunization free of charge. Busy mothers could bring their children to private services for immunization, such as doctors or midwives. If the second option was chosen, it was important to allocate expenses for immunization (Damanik, 2010). This research result was consistent with the research of Welasasih (2012) which stated that immunization did not correlate to and was not a risk factor for stunting incidence in toddlers.

Immunization in children had important objective to reduce the morbidity and mortality risk in children due to immunization-preventable diseases. Immunization status in children became one of indicator of contact to health care. Because, we expected that contact to health care would help to improve and prevent new nutritional problems. Therefore, the immunization status was also expected to give positive effect on long-term nutritional

status. In this study, the birth weight was not considered as a significant risk factor or as a determinant factor for stunting incidence in toddlers of Aileu Regency. We suggested that the insignificant correlation was due to the cause of malnutrition being multifactorial.

Our result was not consistent with that of Picauly (2013), that concluded that there was a correlation between birth weight and stunting incidence. Newborns with birth weight lower than 2500 grams were at 3.26 times higher risk of stunting than those with normal birth weight. Other studies stated that toddlers with low birth weight had a 1.7 times higher risk of stunting than those with normal birth weight, and the risk for stunting would increase 3 times in toddlers with birthweight lower than 2,500 grams. Newborns with low birth weight have disturbed growth. If the situation persisted with inadequate nutritional intake, they would frequently contract infections, and the poor maintenance would lead to stunting (Becker, 2012). The analysis results in Table 2 showed that, in our study, the energy adequacy status was one of the insignificant variables for stunting incidence, which meant that it was not the determinant factor for stunting incidence in toddlers in Aileu Regency.

The analysis result showed that the trend of stunting toddlers was higher for the toddlers with inadequate energy status. It was possibly caused by several factors including frequency and number of intakes, loss of appetite, and infectious disease. The other conclusion was that stunting incidence in Aileu Regency had been chronic, hence an early intervention since pregnancy period was essential. The result of this research was also in line with the research of Bambang (2016), which stated there was an insignificant correlation between energy intake and stunting incidence in toddlers. Other similar results included a study in South Africa by Theron (2004), and also by Becker (2012). On the other hand, the researches in Bangladesh and Philippine resulted that energy intake did not correlate with the growth of children.

Energy was one of important aspect for body because of the energy need was a direct factor that affected an individual nutritional status, all of consumed nutrients would transform and generate energy for body to

work. But, this did not warrant a good and healthy body because of other factors that affected, therefore the body would be weak and powerless, as when we had an infectious disease, if an individual frequently acquired infections, hence the nutrients need in the body would decrease due to the loss of appetite that led to occurrence of energy inadequacy (Bambang, 2016). The results in Table 1 and Table 2 showed a high incidence of stunting in toddlers with history of poor nutrition intake. It occurred due to most of the observed mothers showed a low education level. This low education level would affect their knowledge in selecting good nutrition food for children's need, besides, most of them employ as farmers hence it affected their concentration to prepare their toddlers' foods.

Our study found that the toddlers' intake pattern was dominated by carbohydrate consumption which would impact their nutritional status. Based on our observation, in every interviewed family, it is mothers that always prepare foods for their toddlers, and they rarely create specific menus for toddlers – the foods preparation was for all family members. The result of multivariate analysis showed that exclusive breastfeeding had a non-significant correlation with stunting incidence and was not a determinant factor for it. This insignificance was due to breastfeeding being not the only contributing factor for the multifactorial stunting problem.

The dominant factor that affected the pattern of breastfeeding was socioeconomic factor. Mothers with low socioeconomic are 4.6 times more likely to breastfeed than those with higher socioeconomic. In giving exclusive breastfeeding, although there were tendencies of high monthly average expenditure, high average foods expenditure, and high net income from the main employment, those seemed not to directly affect exclusive breastfeeding (Erna, 2017). Other evidence showed a non-significant association between exclusive breastfeeding and stunting variable. Thus, we suggested other additional information on factors determining the mothers in breastfeeding, especially for exclusive breastfeed.

This result was consistent with the research of Hendra (2013), that presented that

there was no significant correlation or no role as determinant factor for stunting incidence in toddlers. This result was inconsistent with the research of Damanik (2010) that stated that toddlers with non-exclusive breastfeeding had 3.7 times higher risk for stunting than those with exclusive breastfeeding. Hendra (2013) stated that exclusive breastfeeding was a determinant factor for stunting in toddlers. The analysis result in Table 1 showed that 39.2% was high educated mothers, and 60.8% was low educated mothers. Table 2 showed that the majority of stunting incidence occurred in children from low educated mothers. The low education level of the mothers in Aileu Regency was obtained from Statistic Office database which stated most mothers only graduated elementary school. The result of research in Indonesia and Bangladesh that was performed by Semba (2008), found a tendency of higher stunting incidence in toddlers from the low educated mothers.

The insignificant correlation between education level and stunting incidence was not the only contributing factor due to the cause of nutritional problem that was multifactorial. It agreed with the UNICEF concept that stated education was not a direct factor but it was a major problem contributing in nutritional problem. The mother's education was not proven to be a risk factor for stunting in toddlers (Picauly, 2013). This research did not correspond with the research by Taguri (2008) in Libya that reported a significant correlation between mothers' education and stunting incidence in toddlers. The mother's education had a vital role in toddlers' nutritional status. The increase in mothers' education level would bring an impact on investment of quality human resource, because the toddlers' nutritional status would improve and resulted in a possibility of education for them as a fundamental asset on improvement of quality human resource (Damanik, 2010). Commonly, mothers babysit their toddler themselves, and the mothers' education level was expected to have stronger impact on stunting than fathers'. Other research in Ethiopia also showed that the mothers' education significantly correlated to the chronic malnutrition incidence.

The analysis resulted that the mothers' employment in this study was not a determining

factor for stunting incidence in toddlers in Aileu Regency. This result was consistent with the study of Erna (2017) that there was no significant association between mothers' employment and stunting incidence in toddlers. This result did not correspond with the study of Taguri (2008) that stated a significant correlation between mothers' employment and stunting incidence, because children of working mothers have a likelihood of being stunted (Picauly, 2013).

Mothers' employment was related to the parenting and economic status in families. Mothers that worked away from home might result in inattention of their children, because the toddlers were still dependent to caregivers or other family members. On the other hand, working mothers could supply family income, because the employment was an essential factor in determining the quality and quantity of foods. Employment status of mothers affected the family income, hence it would affect the consideration on selecting foods and consumptions primarily for toddlers that impacted the nutritional status of the toddlers (Erna, 2017).

Most mothers in Aileu Regency worked on the farms due to income issue. They also had to work besides their husbands for supporting income. The mothers in Aileu Regency stated that besides farming, they also took care of when their children were sick and prepared foods for families because the husbands rarely performed those duties. Due to customs, duties that should have been performed by husbands were delegated to the wives. This was the situation that triggered stunting incidence in toddlers, because our study revealed that most of stunting toddlers had the working mothers.

The test result in Table 2 showed that the stunted toddlers were more prevalent in the families with large number of members (>4). It indicated that households with large number of family members were more likely of having stunted children compared to the households with fewer numbers of family members. This absence of association was due to the cause of nutritional problem was multifactorial such as infectious diseases, environmental problems, and other factors. Family size was not a lone factor that directly affected nutritional status. Families with less than 4 members belonged

to the small family category, known as the Norms of Small Happy Prosperous Family (NKKBS). Families with more than 4 members were categorized as large family. The welfare of children that lived in small families was relatively more secure than in large families.

Conclusions

Stunting incidence in Aileu Regency was a serious problem. The history of infectious disease and the family income were the consistent variable correlated with stunting incidence and became determinant factors for stunting incidence in toddlers in Aileu Regency. We suggested the necessity of regulation from government in collaboration with other related sectors to responsibly perform an early nutritional intervention. Support from community in nutritional problem management and further studies to review other factors that associated to stunting incidence are greatly needed.

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