



Analysis of determinant stunting primary school students in remote areas of southeast Aceh District

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Abstract

Southeast Aceh District has always been in the top five of the highest stunting rate in Aceh from 2013-2021, so it is necessary to know the contributing factors through children born in 2013-2015. This study aims to determine the prevalence and determinants of stunting in primary school students in grades I-II in Leuser Sub-district, Southeast Aceh. The study used a case control study design with a sample of 30 stunted children and a control of 60 children who were not stunted. This was carried out by purposive sampling with the criteria of stunting children, poor families and living in that location. Data on father/mother's education and knowledge, socioeconomic status, history of maternal pregnancy, history of child infectious diseases, child care patterns and early childhood food supplements were obtained through interviews. Measurement of student height was carried out using microtoise and then processed using WHO Anthro Plus software to determine stunting/not stunting. Statistical analysis using Odds Ratio test and Logistic Regression. The prevalence of stunting in Leuser is 32.1%. The determinants of stunting were exclusive breastfeeding OR = 8.73, knowledge of maternal health OR = 98.95, completeness of immunizations OR = 34.78, father's work factor as a unskilled laborers OR = 22.89, the incidence of diarrhoea OR = 17.9, and low birth weight OR = 0, 78. There are 1 in 3 children who are stunted in Southeast Aceh Regency and the main factors that trigger stunting in these children in the family are the mother's low level of knowledge about health, incomplete immunization of children, fathers who work as unskilled laborers, children do not receive exclusive breastfeeding and frequent children experience diarrhoea in childhood, while the condition of sanitation and drinking water consumed by the family has no effect on stunting. Children who are stunted are more common in mothers with a history of giving birth <21 years and >36 years.

Keywords: Stunting; Diarrhoea; Socio-Economic; Primary School Students

1. Introduction

Stunting is a chronic nutritional problem in toddlers which is characterized by a shorter height compared to children their age. Children who suffer from stunting will be more susceptible to disease and as adults are at risk for degenerative diseases. The impact of stunting is not only in terms of health but also affects the level of intelligence of students [1].

In the last 5 years stunting continues to be a worrying event, the ADB report states that Indonesia is in the 2nd highest stunting position in ASEAN after Timor Leste and the 4th highest in the world [2]. Meanwhile, for Indonesia based on the results of basic health research (2018), Aceh's stunting rate was 37.9% or was in the 1st highest position in Indonesia and for Southeast Aceh the stunting rate in the same year reached 45.3%, the 2nd highest after Subulussalam City which reached 49.6% [3].

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In 2021 Aceh was ranked 7th nationally with a stunting rate of 33.2% and based on the 2021 Indonesian Nutrition Status Study [4] there were 13 districts/cities in Aceh that were included in the red category because they had stunting prevalence above the 30 percent range, namely Pidie, North Aceh, East Aceh, Central Aceh, Southeast Aceh, Aceh Jaya, Southwest Aceh, Nagan Raya, Aceh Besar, and Aceh Tamiang while the other three regions have prevalences above 40 percent, namely Gayo Lues, Southeast Aceh District and Bener Meriah. Overall, since 2019-2021 Aceh has only been able to reduce its stunting rate by 1%, from 34.2% to 33.2% in 2021 [4].

Southeast Aceh District in 2021 shows a stunting rate of 34.1% or is the 8th highest in Aceh [3]. This is a cause for concern considering that this district in the last decade was an area whose economic growth and per capita income were in the top 10 out of 23 districts/cities in Aceh [5].

Southeast Aceh consists of 16 sub-districts and consists of 386 villages. The sub-district that is difficult to access and the most underdeveloped in Southeast Aceh is Leuser Sub-district which has 23 villages with an area of 212.93 KM² or 5% of the district area [5]. This sub-district is located in the Leuser Ecosystem Area, which is directly adjacent to the National Park and Protected Forest, which makes it difficult to access various health, education and social services due to poor infrastructure and the location of settlements that are far apart. Leuser sub-district can be classified as the only remote sub-district in Southeast Aceh [5].

There are 11 primary school units in Leuser Sub-district with a total number of 1,439 students. There are only 516 students in Grades 1-2 of primary schools out of the total primary school students in the sub-district. In 2021 the prevalence of children under five in the stunted category (height according to age) in Southeast Aceh was 34.1%, wasted (weight according to height) was 7.7%, and underweight (weight according to age) was 20.4% and normal was 37.8% [4] while for Leuser Sub-district the prevalence of under-fives in the stunted category (height according to age) is 32.1%, wasted (weight according to height) is 12.9%, and underweight (weight according to age) is 28.7% and normal is 22.1 % [5]. Based on these various circumstances, this study aims to determine the determinants of stunting and the factors that greatly influence the occurrence of stunting in children in Southeast Aceh.

2. Methods

Quantitative research using a Case Control Study design which selects cases of stunted students and the control group are students who are not stunted which is carried out in the Leuser Sub-district, Southeast Aceh Regency. The population is grade I and II primary school students from 11 primary schools totalling 506 students. The number of samples in this study were 90 primary student consisting of 30 case groups and 60 control groups and their mothers. The case samples according to the inclusion criteria were: students who were in the stunting category in class I and II Primary School, born in 2014-2015 were poor families and lived in the research location along with their mothers.

The control sample was individuals from the same group and 60 children were not stunted. In the selection of case and control groups, matching was done based on the subject's birth period, namely 2014 and 2015. Data collection through interviews with questionnaires was carried out on case samples and control samples. Stunting was measured by microtoise which was carried out on 200 elementary school students to identify their nutritional status using the WHO AnthroPlus software. The measurement of nutritional status was to obtain case samples (30) and control samples (60).

Measurement of height using microtoise glued to the wall/vertical plane and measurement of weight with digital scales were carried out by enumerators assisted by Puskesmas staff while data such as family socio-economic data, mother's pregnancy history, history of child infectious diseases, child care patterns and food early childhood enhancement was carried out by structured interviews based on prepared questionnaires.

The data from the measurement of children's height and weight are used to get the BMI value, then the value is classified based on WHO (2004) to get an assessment of stunting or not stunting through the WHO AnthroPlus software. The results of interviews with the mother of the child were then analysed using the statistical test of Odds Ratio and Multiple Linear Regression test with a 95% confidence level. Ethical clearance is carried out by the ethical institute of the Faculty of Nursing, University of North Sumatra, Medan. The EC Number is No.2488/XII/SP/2021 December 6, 2021.

3. Results and discussion

3.1. Univariate Analysis

Height measurements were carried out on 134 primary school students, from this number, 65 male students (48%) and 69 female students (52%) obtained and the highest student height was 156.9 cm and the lowest student height was 117.2 cm. Based on the results of processing height measurement data using the WHO AnthroPlus software, 38 elementary school children (28.3%) were included in the stunting category and 96 children (71.7%) were in the non-stunted category.

3.2. Bivariate Analysis

Based on the results of the bivariate analysis (Table 1), the educational variable which was statistically significant related to stunting was maternal health knowledge with OR = 3.37. The individual variable obtained by exclusive breastfeeding with OR = 8.73 means that there is a statistically significant relationship between exclusive breastfeeding and maternal health knowledge with stunting [6]. Environmental variables indicate that the type of latrine and drinking water sources are not statistically associated with stunting [7]. The mother variable shows that the mother's age at delivery, work as a farmer, mother's job as a trader, and mother's level of education statistically have no relationship with stunting [8].

Table 1 Bivariate Analysis of Stunting Prevalence and Determinants of Primary School Students Stunting in Southeast Aceh District

Variable	OR	95% CI	P-value
Father's level of education	0.97	(0.20-4.77)	0.969
Maternal health knowledge	3.37	(0.96-11.76)	0.056
Mother's occupation (trader)	2.65	(0.82-8.56)	0.103
Father's occupation (day labourer)	1.25	(0.43-3.64)	0.683
Mother's occupation (farmer)	1.20	(0.89-1.61)	0.222
Exclusive breastfeeding	8.73	(1.00-75.86)	0.05
Birth length < 48 cm	0.38	(0.05-2.95)	0.354
Birth weight <2500 g	1.88	(0.21-17.01)	0.574
Diarrhoea	2.14	(0.84-5.48)	0.112
Complete basic immunizations	2.53	(0.25-25.72)	0.434
Maternal age: < 20 and > 35 years old	1.62	(0.70 – 3.78)	0.261
Type of latrine	1.00	(1.00-1.00)	0.825
Source of drinking water	1.89	(0.33-10.80)	0.474

Mother's health knowledge got an OR = 3.37 while the mother's education level had an OR = 0.86 and this explains that the breadth of mother's knowledge about health greatly determines the occurrence of stunting in children compared to the level of education achieved by mothers. This indicates that the level of education is not directly proportional to the health knowledge possessed by the mother which ultimately affects the size of the child experiencing stunting [9]. Meanwhile, father's education level, mother's education, father's occupation, mother's occupation, birth length, birth weight, and maternal age were not statistically significant related to stunting [10].

3.3. Multivariate Analysis

The results of multivariate analysis which aims to determine the most dominant variable in influencing stunting. Multivariate analysis was carried out by connecting several independent and dependent variables at the same time so that the probability of stunting could be estimated. The results of the multivariate analysis can be seen in Table 2.

Based on the results of data calculations shown in Table 2, through the final analysis of the multivariate model, the results obtained that the risk factors for stunting in elementary school children in this study were: from socio-economic variables, namely knowledge of maternal health with OR = 98.95 which is a risk factor for stunting. This means that children whose mother's health knowledge is not good will have a risk of becoming stunted by 98.95 times compared to children whose mothers have good health knowledge. This finding is not much different from Halimatun et.al (2021) which states that family health knowledge has an effect on child stunting [6].

Table 2 Final Analysis of the Multivariate Model of Prevalence and Determinants of Stunting in Primary School Students in Southeast Aceh District

Variable	OR	95% CI	p-value
Maternal health knowledge	98.95	(1.38-7097.67)	0.035
Complete basic immunizations	34.78	(0.42-2895.63)	0.116
Mother's occupation (farmer)	3.06	(0.12-79.93)	0.502
Father's occupation (day labourer)	22.89	(1.05-498.12)	0.046
Maternal age: < 20 and > 35 years old	3.41	(0.68-17.25)	0.138
Birth length < 48 cm	0.42	(0.02-8.53)	0.573
Birth weight <2500 g	0.78	(0.62-0.98)	0.035
Diarrhoea	17.90	(1.04-309.16)	0.047
Source of drinking water	1.14	(0.48-2.69)	0.766
Exclusive breastfeeding	9.84	(0.88-110.57)	0.064

When compared with exclusive breastfeeding (OR = 9.84) compared with low maternal health knowledge (OR = 98.95), it means, children whose mothers have low health knowledge are more likely to suffer from stunting than children who are exclusively breastfed [10]. This can happen because as a mother who is knowledgeable about good health will be able to keep the home environment clean, make maximum efforts to meet the alternative nutritional needs of children, be disciplined in child growth and development and always give more attention to children [11].

This also shows that even exclusive breastfeeding will not be able to protect children from stunting if it is not given regularly according to the child's needs and the mother also consumes nutritious food to maintain the quality of her breast milk [12].

Completeness of basic immunization for infants with OR = 34.78 is also a risk factor that causes stunting in the sense that children (babies) whose immunizations are incomplete will be 34.78 times at risk of experiencing stunting. This also means that the more complete the immunization for children, the smaller the risk of stunting [13].

Then the father's occupation as a daily laborer with OR = 22.89 which is a risk factor for stunting. This means that children whose fathers work as day laborers have a 22.89 times risk of becoming stunted compared to children whose fathers work permanently. This can happen because fathers who work as day laborers do not get a stable and sufficient income to meet the needs of the family all the time [14].

Individual variable diarrhea with OR = 17.90 shows that diarrhea is a risk factor for stunting [15]. This means that children who often suffer from diarrhea have a risk of becoming stunted by 17.90 times compared to children who never have diarrhea. The condition of birth weight with OR = 0.78 means that it is a protective factor against stunting because from the beginning it can be known the potential for stunting in children so that for every 100 g increase in birth weight the risk of stunting decreases by 22% [9].

3.4. Stunting in Primary School Students

Southeast Aceh District is a division of Central Aceh District which was officially established in 1974 while Leuser Sub-district itself was formed in 2002. Leuser Sub-district was formed as one of the strategies to accelerate the development of this sub-district which has been far from the existing development stages in other areas in Southeast Aceh.

It is hoped that the formation of this sub-district will foster accelerated development in the area given that the villages are located very far apart and each village only consists of dozens of families and is still mixed between Acehnese and North Sumatran residents. The public service infrastructure is still very limited, health infrastructure services are still difficult to access, incomplete and often health workers are found not in place [2].

Water is still sourced from wells in some households and some collect rainwater or buy water from trucks selling water. Clean water and poor hygiene and sanitation can all increase the risk of malnutrition in children [16].

The prevalence of stunting in elementary school children in Leuser Sub-district is not yet severe according to WHO because it is only found as much as 32.1% [17]. Areas that are classified as remote areas in general will of course cause quite serious stunting problems [18]. This 32.1% achievement also shows the success of the Southeast Aceh government in making breakthroughs and improving health services and meeting the needs of malnourished citizens to be able to access additional feeding services for groups of residents classified as at risk for stunting prevention and treatment [11].

3.5. Socio-Economic Risk Factors

It is known that the education level of the father and mother in the family does not guarantee that the child will avoid malnutrition if the higher education is not able to increase the mother's/father's knowledge about health. In line with the research conducted by Semwal et al. concluded that in the bivariate analysis the level of knowledge of maternal health was related to the incidence of stunting in children under five [10].

The mother as a farmer OR = 3.06 and the mother as a trader OR = 2.65 is a stunting factor that allows children whose mothers work as farmers and traders to have 2-3 times the risk of experiencing stunting. Likewise, fathers who work as daily laborers whose income is not fixed is a risk factor for stunting, which means that children have a 22.89 times risk of suffering from stunting [19].

Tran's research shows that the mother's profession as a trader and farmer, even though the potential is small, still provides opportunities for children to experience stunting [11]. The relatively small risk of stunting in children is due to the fact that even though they work as farmers/traders, mothers still have sufficient time to look after and care for their children. In contrast to fathers who work as day laborers, this situation can lead to a large potential for stunting in children because family income is small and not fixed even though the child's needs increase with age [20].

Multivariate analysis showed that the child had a 34.78 times risk of suffering from stunting if the mother was not able to provide compiled [13]. In line with research Solis-Soto et al., (2020) who received incomplete immunizations were significantly associated with disease [21] and almost the same thing it was known that the potential for stunting was greater in children if the immunizations were incomplete [22].

3.6. Environmental Risk Factors with Stunting

Multivariate test also showed that there was no significant effect between the type of latrine and the source of drinking water on child stunting. Although the latrines used are still very traditional, they are located far from residential areas so that the effect is minimal [1]. Meanwhile, the drinking water consumed by families so far is well water obtained from private wells or purchased well water.

So far, there has been no examination from the government or local health office regarding the suitability of the well water for public consumption, but as far as knowledge and research have been carried out. The condition of drinking water originating from wells is not protected from exposure to biological hazards and other environmental hazards which of course causes the water and water sources to not meet health requirements [8]

3.7. Risk Factors for Mothers with Stunting

This studied, found that children who experienced stunting were more in children with a history of maternal age <21 years and >36 years, namely 67.21%. Although from the results of multivariate analysis, maternal age at delivery with OR = 3.41, which means that it is not the main risk factor for stunting. Similar to Nadiyah's research (2014) that there was no significant relationship between parity or maternal age with stunting in children ($p > 0.05$)[23].

Exclusive breastfeeding can be a risk factor for stunting. Based on the test results, it is known that OR = 9.84, meaning that children who are not exclusively breastfed will experience a 9.84 times greater risk of stunting than children who are exclusively breastfed. The same thing was also expressed by Glanny Anindya et al., (2020) who found an effect between exclusive breastfeeding and the incidence of stunting in children [12]. From the results of the study, only

13.10% of the case group gave exclusive breastfeeding. Based on the results of interviews with the respondent's mothers, it was found that there were many arguments why mothers did not give exclusive breastfeeding, including because breast milk did not come out, the mother worked, breast milk did not meet the needs of the baby, the mother was sick, breast milk was little and others [24]. This is the reason why there are many babies who still do not get exclusive breastfeeding [25]

In this study 90.5% of mothers did not initiate breastfeeding properly. Indeed, mothers are encouraged to be able to breastfeed their children immediately after giving birth, or at least 1 hour after giving birth [26]. In line with that research Nadiyah et al. (2014) also stated that breastfeeding initiation was not significantly related to stunting [23]

3.8. Individual Risk Factors with Stunting

Multivariate results of birth weight obtained that birth weight is a protective factor against stunting OR = 0.78 which means that for every 100 g increase in birth weight the risk of stunting decreases by 22% (WHO, 2018). The National Development Planning Agency report (2017) shows that birth weight is significantly associated with stunting in children aged 6-23 months who are born at term in Indonesia (UNICEF Indonesia, 2020), but birth weight is not a strong predictor of stunting [27]

Diarrhea variable test results obtained OR = 17.90 which indicates that children who often suffer from diarrhea will have a 17.90 times chance of experiencing stunting compared to children who never suffer from diarrhea [28] This situation is closely related to the environmental condition of the Leuser Sub-district, which lacks environmental health infrastructure and the lack of opportunities for community members to receive informal education and teaching about health and environmental management. Apart from being busy working in the garden, access to the right meeting location is often far from the location of residence, which is indeed very far apart. As a result, the incidence of diarrhea in children is becoming more common in this area. As mentioned by Vilcin that one of the common health problems encountered is poor environmental and sanitation conditions [1].

The problem encountered is the problem of the availability of clean water suitable for consumption and inadequate toilet facilities which are generally referred to as inadequate environmental hygiene, so that children are susceptible to diarrhea and itching [7] as a result of the prevalence diarrhea remains high [29] and until now diarrheal disease is still one of the environmental-based diseases that is still a health problem in Indonesia today [30]

4. Conclusion

The prevalence of stunting in Leuser Sub-district is 32.1%, and is not included in the severe category according to WHO, but because there are already 1 in 3 stunting children, it is necessary to get strong attention from the Southeast Aceh Regency government to maintain the quality of future generations.

Mother's low knowledge of health, incomplete immunization coverage for children, father's occupation as a daily laborer, exclusive breastfeeding and the incidence of diarrhea in children have been the causes or triggers for children to experience stunting in the community of Leuser Sub-district, Southeast Aceh. Meanwhile, it is also known that working mothers, maternal age, birth weight, birth length, and sources of drinking water and use of latrines have so far not been the main triggers for children to experience stunting, although the influence of these variables is still there, although not significant.

Prevention of children experiencing stunting cannot only be the responsibility of the family alone but also requires government intervention, for example by conducting a convergence of program activities from all government agencies and apparatus which also involves all interested parties outside the government so that stunting prevention and treatment programs and rehabilitation can be overcome together. In addition, the effective use of village funds, special allocations from the district government, assistance from the Aceh Government and special allocations from the central government must be synergized in preventing and handling stunting in the community.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors hereby declare that there is no conflict of interest among them or with any person/organization.

Statement of informed consent

Prospective Participants were invited and oriented on the purpose of this study, namely to Analysis of determinant stunting primary school students. Informed consent was obtained before the study and the participants were allowed to withdraw at any time.

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