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The Associations of Children Characteristics, Sociodemographic, and Sanitation Factors and The Risk of Stunting in Bandung Regency (Case Study: Rancaekek and Majalaya District)

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Abstract. Stunting is a condition of failure in children-under-five's growth as a result of chronic malnutrition. Thus, children become too short for their age. In Indonesia, the stunting rate has decreased from the previous year. However, the prevalence still exceeds the maximum stunting rate target set by WHO. Bandung regency is one of the priority areas for stunting prevention in Indonesia. The causes of stunting are quite complex. This study aims to analyze the relationship among children characteristics', sociodemographic, sanitations factors and the incidence of stunting in the Bandung regency. The method used is a case-control study (retrospective), using a questionnaire and interviews to the parents, and observational method. The research subjects are children under five in Rancaekek and Majalaya District that is divided into 26 respondents for the case group and 25 respondents for the control group. The Chi-square Test analysis (bivariate) and the binary logistic regression (multivariate) are used to determine the significance of children's characteristic, sociodemographic, and sanitation factors on the risk of stunting. The results show that the significance factors to the risk of stunting is the sociodemographic factors, such as mothers' lower education (p-value = 0.017), fathers' lower education (p-value = 0.003), and lower household income (p-value = 0.005). The sociodemographic factor that contributed the most is the household income (OR = 10.063; 95% CI = 1.079 – 93.898).

Keywords: *children characteristics; sanitation; sociodemographic; statistic; stunting.*

1 Introduction

Globally, stunting affects approximately 162 million children under 5. In Indonesia, although in 2019 there was a decrease in the number of stunting cases, the number still exceeded the limit set by WHO. Therefore, The Government had determined 100 regencies to be the main priority for stunting intervention and management, and Bandung Regency is one of them. There are several factors that can trigger stinting in children under 5 years old, such as low birth weight, low

parental education, middle to lower economic status, and poor environmental sanitation. This indicates that nutritional and health conditions during pregnancy, the quality of consumed by children, and the sociodemographic factors must be considered in preventing stunting (Andini & Hardiansyah in [1]).

According to World Health Organization in [2], some factors that cause delays of growth (stunting) generally are the poor health and nutritional conditions before, during, and after the pregnancy period affecting the children's growth and development, the practice of feeding including non-exclusive breastfeeding and limited complementary food in the terms of quantity, quality, and variety, as well as the subclinical infection due to the exposure of contaminated environment and poor hygiene. Indirectly, stunting incidence is also influenced by social factors in the terms of politics and economics, public health, education, social culture, and environmental sanitation. Almatsier in [3] stated that there are several conditions affecting stunting. Those conditions are nutritional intake, gender, birth weight, number of household members, parent's education and occupation, and family economical status.

Based on Bandung Regency Health Profile in 2020, the number of stunting cases in Rancaekek District was the highest in Bandung Regency which reached 1585 cases. In Majalaya District, the number of stunting cases reached 915 cases (Dinas Kesehatan Kabupaten Bandung in [4]). Based on the background described, this study aims to determine the significance of the association between each of the children characteristics factors, the sociodemographic factors, and the sanitation factors and the risk of stunting and to determine the most influencing factors to the risk of stunting in Bandung Regency specifically in Rancaekek and Majalaya District.

2 Materials and Methods

This study was conducted using a quantitative approach with a retrospective epidemiological study model to observe the association among children's characteristics, sociodemographic, and sanitation factors with the incidence of stunting in children under 5. The field study was conducted in Bandung Regency, based on the health and nutrition data obtained from the local healthcare centre. The research was conducted in Majalaya and Rancaekek District. The sampling was done using the purposive sampling technique. Purposive sampling was a technique that considered certain considerations (Sugiyono in [5]). The total sample in this research was 51 respondents, with 26 respondents as the case group and 25 as the control group. The respondents for the case group were children under five years old who suffer from stunting. Meanwhile, the respondents for the control group were normal children under five years old. The respondents were taken based on the inclusion criteria, such as aged 1-5 years old and domiciled in Rancaekek and Majalaya District.

2.1 Data Collection Method

The primary data in this study were obtained through interviews and observation. The data collection points from the 51 respondents in Bandung Regency are shown in **Figure 1**. The interview is conducted to obtain the children's characteristics and sociodemographic data and the observation is conducted to obtain the children's housing and sanitation condition. The respondents were given code based on the location of the data collection point. The respondents code used namely MJ code for the respondents form Majalaya District and RC code for the respondents from Rancaekek District. There are 26 respondents from Majalaya District with the code MJ and 25 respondents from Rancaekek District with the code RC.

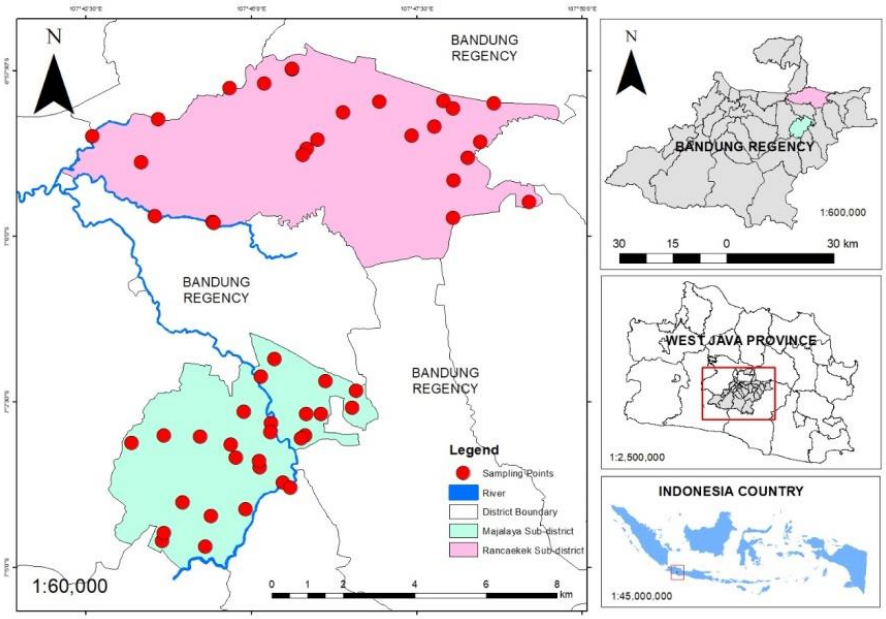

Figure 1 The location of the data collection points

2.2 Data Processing

The data obtained was processed and statistically analysed. The statistical analysis was carried out through bivariate and multivariate analysis. In the bivariate analysis, the Chi-square test was used to determine the significance of children's characteristic, sociodemographic, and sanitation on stunting incidence. Then, the multivariate analysis using binary logistic regression is done to determine the most influential independent variables to the incidence of stunting. The statistical analysis was done with the help of Software Statistical Product and Service Solutions 22.0 (SPSS 22.0).

3 Result and Discussion

3.1 Stunting Incidence

Stunting is a condition of failure in children's growth as a result of chronic malnutrition so that the children become too short for their age or when a person is shorter than the average height of other people (of the same age) in general (Rahayu, *et al*. in [6]). HAZ (height to age z-score) is an anthropometry measurement to determine the stunting status. Based on the WHO classification, children are said to be stunted if the HAZ ≤ -2SD and severely stunted if the HAZ ≤ - 3 SD (World Health Organization in [7]. **Figure 2** shows the distribution of stunting cases based on the WHO classification.

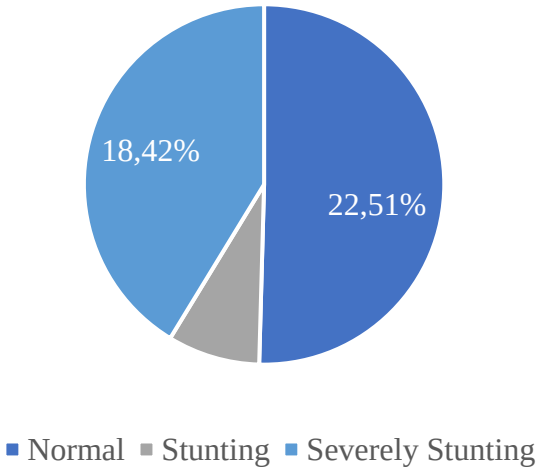

Figure 2 The distribution of the stunting cases in the study area

Stunting mostly occurs in children aged between 25 – 60 months as shown in **Figure 3**. The majority of stunting occurs in children aged 25 to 60 months, which shows that external factors such as environmental, economic, and social factors play a major role in the incidence of stunting.

This research shows that there are more female stunting children rather than the male children. In addition, there are more female children who experience stunting than who do not. The incidence of stunting among the children under five who become a respondent in the study based on the gender can be seen in Error! Reference source not found..

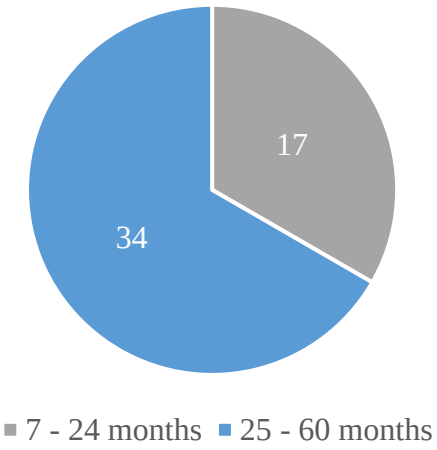

Figure 3 The distribution of stunting cases based on the age

Error! Reference source not found. is the distribution by gender of the i ncidence of stunting among children under five who become a respondent in the study.

Table 1 The stunting incidents distribution based on the genders in the study area

Gender	Case N = 26 (%)	Control N = 25 (%)
Male	12 (46.15%)	14 (53.85%)
Female	14 (56%)	11 (44%)

3.2 The Association of Children Characteristics, Sociodemographic, and Sanitation with The Risk of Stunting

The bivariate analysis to test the significance of each factor on the incidence of stunting is carried out using the chi-square test with the help of SPSS 22 software. Based on Error! Reference source not found., the independent variables t hat were significantly associated with the risk of stunting in this study are the mother's education less than senior high school (p-value = 0.017), father's education less than senior high school (p-value = 0.003), and household income under the minimum wage (p-value = 0.005). There are three relationships linking the parental education with the children's health. The first is the mother's formal education directly transfer the health knowledge to the prospective mothers. Secondly, the literacy and numeracy skills that girls acquire from school will improve mothers' ability to recognize the children's illnesses and seek for the treatment, and to be able to read medical instructions better for treating the illness and applying them. The third one is the longer duration of formal education makes women become more receptive to modern medication (Glewwe in [8]).

There had not been many studies that specifically explain the reasons why father's higher formal education can reduce the risk of stunting. However, the higher formal education of father is correlated with the better employment and leads to the better household income. The families with low household income will limit their spending on groceries. Although the staple foods can be fulfilled daily, the quality and quantity are not given much attention, thus low-income levels can indirectly trigger stunting in children under five (Gustina, *et al.* in [9]).

Table 2 The bivariate analysis of the association among the independent variables and the risk of stunting results

No	Factors	Case	Control	*p-value*	OR	95% CI
1	Low birth weight	7	2	0.16	4.237	0.786 – 22.843
2	Incomplete basic immunization status	13	7	0.186	2.571	0.803 – 8.230
3	Not receiving exclusive breastfeeding	6	6	1	0.950	0.260 – 3.465
4	Mother's last education less than senior high school	20	10	0.017	5	1.486 – 16.826
5	Father's last education less than senior high school	20	8	0.003	7.083	2.049 – 24.486
6	Household income below the minimum wage	25	15	0.005	16.667	1.936 – 143.509
7	Risky maternal age	5	5	1	0.952	0.239 – 3.795
8	Frequency of ANC visits less then 4	4	2	0.701	2.091	0.347 – 12.589
9	Number of family members more than 4	12	14	0.672	0.672	0.223 – 2.031
10	Exposure to cigarette smoke	22	19	0.673	1.737	0.426 – 7.087
11	No proper sanitation access	10	6	0.417	1.979	0.590 – 6.644
12	No habit of washing hand with soap	20	15	0.317	2.222	0.660 – 7.478

3.3 The Most Determining Factors of The Stunting Incidence

To determine the most determining factor of stunting, the multivariate analysis with binary logistic regression model will be used. The variables that have p-value < 0.25 in bivariate analysis will be input into the multivariate model and then re-selected by maintaining the variables that have p value ≤ α (0.05) and removing the variables that have p-value > α (0.05) gradually from the variable with the largest p-value (Hastono in [10]). Low birth weight, incomplete basic immunization status, mother's education less than senior high school, father's education less than senior high school, and household income below the minimum wage have a p-value < 0.25, thus these factors will be input into the multivariate model. The results of the multivariate analysis are shown in **Error! R eference source not found.**.

Error! Reference source not found. shows the results of the multivariate analysis of the independent variables and the risk of stunting. Based on the table, it is known that among the 12 factors analyzed, there are factors which significantly associated with the risk of stunting (p-value ≤ 0.05). Those factors are father's education less than senior high school (p-value = 0.022) and household income below the minimum wage (p-value = 0.043). The most contributing factor to the risk of stunting in this study is the sociodemographic factor which is the household income below the minimum wage (OR = 10.063; 95% CI = 1.079 – 93.898).

Table 3 The multivariate analysis results

Stages	Factors	B	p-value	OR	95% CI	
				Exp(B)	Lower	Upper
Stage 1	Low birth weight	1.454	0.136	4.281	0.633	28.931
	Incomplete basic immunization status	0.711	0.343	2.035	0.468	8.852
	Mother's last education less than senior high school	0.685	0.442	1.983	0.346	11.352
	Father's last education less than senior high school	1.224	0.146	3.402	0.654	17.695
	Household income below the minimum wage	2.277	0.066	9.744	0.858	110.620
	Constant	-9.185	0.001			
Stage 2	Low birth weight	1.358	0.159	3.889	0.587	25.772
	Incomplete basic immunization status	0.847	0.242	2.333	0.585	9.641
	Father's last education less than senior high school	1.585	0.027	4.848	1.196	19.643
	Household income below the minimum wage	2.279	0.058	9.766	0.926	103.026
	Constant	-8.809	0.002			
Stage 3	Low birth weight	1.406	0.141	4.081	0.627	26.579
	Father's last education less than senior high school	1.586	0.023	4.883	1.243	19.188
	Household income below the minimum wage	2.446	0.046	11.542	1.040	128.049
	Constant	-7.722	0.003			
Stage 4	Low birth weight	1.406	0.141	4.081	0.627	26.579
	Father's last education less than senior high school	1.586	0.023	4.883	1.243	19.188
	Household income below the minimum wage	2.446	0.046	11.542	1.040	128.049
	Constant	-7.722	0.003			
Stage 5	Father's last education less than senior high school	1.553	0.022	4.726	1.255	17.800
	Household income below the minimum wage	2.309	0.043	10.063	1.079	93.898
	Constant	-4.968	0.001	0.007		

4 Conclusion

Based on the previous results and discussion, it can be concluded that the independent variables which are significantly related to the risk of stunting in Majalaya and Rancaekek District of Bandung Regency are the sociodemographic factors and family history, such as mother's lower educational level (p-value = 0.017), father's lower educational levels (p-value = 0.003), and lower household income (p-value = 0.005). The largest contributing factor to the risk of stunting is the household income below the minimum wage (OR = 10.063; 95% CI = 1.089 – 93.898).

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