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Determinants of Household Food Security Based on the Status of Human Development Index (HDI) in West Nusa Tenggara Province

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ABSTRACT

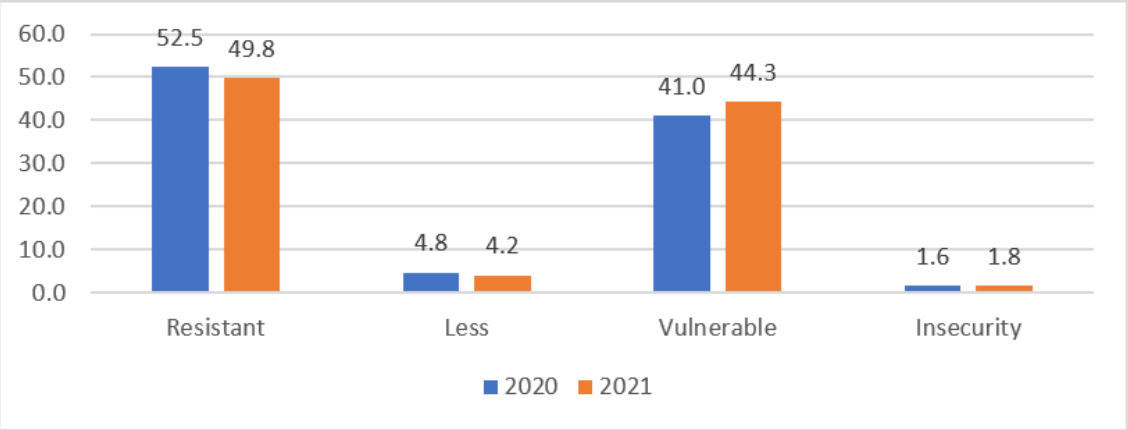
This study aims to determine the determinants or factors that affect household food security in areas with moderate HDI status and areas with high HDI status. Based on the data of the National Socioeconomic Survey (SUSENAS) March 2021 from Statistics Indonesia (BPS), this study is conducted by using multinomial logistic regression method to achieve the objective. The results show that poverty status, dummy recipients of the BPNT program, presence of toilets and presence of toddlers have significant effect to the food security household in areas with high HDI status. While in areas with moderate HDI status, the factors that affect household food security are poverty status, gender of the head of the household, classification of residential area, presence of toilets and presence of toddlers. From this research it is necessary to apply policies that can strengthen household food security in both the moderate HDI and high HDI areas, especially in poor households with toddlers.

Keywords: Food Security, HDI Status, Household, Multinomial Logistic Regression, SUSENAS.

INTRODUCTION

West Nusa Tenggara is one of the archipelagic provinces with a population of 5.32 million people in 2020 (Central Bureau of Statistics, 2021a). West Nusa Tenggara is one of the provinces that will experience a surplus of rice production in 2021 with an increase in production of 7.77%. The average calorie consumption of the West Nusa Tenggara population is above the national figure. However, West Nusa Tenggara is one of the provinces that has the highest stunting rate in Indonesia. The results of the Indonesian Nutrition Status Study (SSGI) by the Ministry of Health placed West Nusa Tenggara Province in the first rank of the region that has the highest prevalence of underweight children under five in Indonesia.

According to SUSENAS data, the percentage of the population categorized as food insecure or resistant is decline in 2021. Figure 1 is the condition of West Nusa Tenggara food security in 2020-2021



Source: Central Bureau of Statistics, 2021b (processed)
Figure 1. Percentage of Household Food Security Status in West Nusa Tenggara

This condition indicates that there are problems in the aspect of food utilization at the household level. In addition, the food security index according to the National Food Security Agency of West Nusa Tenggara in 2021 is 75.67. This figure is included in the food security category, but several districts experienced a decrease in the food security index. The characteristics of a region will affect how the people's food consumption behavior and ultimately describe the condition of food security. One of the qualities of human resources is determined by the condition of food security. The development indicator used to measure the quality of human resources is the Human Development Index (HDI). Therefore, in this study using regional characteristics based on HDI status. HDI values range from 0-100. The higher HDI value, the better achievement of human development. HDI achievements in a region are grouped into four categories: low if the HDI < 60; moderate if 60 ≤ HDI < 70; high if 70 ≤ HDI < 80 and very high if HDI ≥ 80. Based on official statistics published by Central Bureau of Statistics, West Nusa Tenggara is divided into two areas, namely the moderate HDI area (7 districts/cities) and the high HDI area (3 districts/cities).

Regions with a moderate HDI category are West Lombok regency, Central Lombok regency, East Lombok regency, North Lombok regency, Sumbawa regency, Dompu regency and Bima regency. Meanwhile, areas with a high HDI category are Mataram City, Bima City and West Sumbawa regency.

LITERATURE REVIEW

According to Nugraha et al. (2021), consumer behavior is defined as actions that are directly involved in obtaining, consuming and disposing of products and services. According to the explanation of Kotler and Keller in Nugraha et al. (2021), there are three factors that influence consumer buying behavior, namely cultural factors, social factors and personal factors.

Suryana (2008) examines the diversification of food consumption and nutrition as a supporting factor for improving the quality of human resources. Diversification of food consumption and nutrition is influenced by many factors, including internal (individual) factors such as income, preferences, beliefs (culture and religion) and knowledge of nutrition as well as external factors such as agroecological factors, production, availability and distribution, variety of food and promotion/advertisement.

Poverty is seen as an economic inability to meet basic food an non food needs as measured from the expenditure side. It could occur because the slower pace of job creation (Semwal, 2018). A population is categorized as poor if it has an average monthly per capita expenditure below the poverty line. The poverty line reflects the rupiah value of the minimum expenditure required for a person to meet the basic needs of life for a month, both food and non-food needs. The poverty line is calculated by adding up the food poverty line and the non-food poverty line. The food poverty line is the minimum expenditure value for food needs which is equivalent to 2100 kilocalories per capita per day. While the non-food poverty line is the minimum value for non-food needs such as housing, clothing, education and health (Central Bureau of Statistics, 2021).

One of the efforts to increase food security is the fulfillment of minimum needs for the poor. To achieve this, the government provides the RASKIN program for the poor. RASKIN or now called RASTRA in 2016 in the form of subsidies which were later transformed into two in 2017 namely RASTRA subsidies and Non-Cash Food Assistance (BPNT).

Bhakti, Istiqomah, and Suprapto (2017) analyzed the relationship between the proportion of food consumption on human development in a region. The results of the study stated that household food consumption has a negative and significant influence on human development. This supports Engel's theory, that the level of household welfare is getting better if the proportion of household food consumption is lower.

Food and Agriculture Organization (2014) mentions several factors in determining food security where these elements include aspect of food availability, access to food, stability and food utilization. Randal and Sanjur (1981) explained that the factors that influence food consumption behavior are individual; food and environmental characteristics. Ajzen (1991) states that there are many factors that influence consumption behavior such as age, gender, education, income and media exposure.

RESEARCH METHOD

The type of research used is cross sectional method. The type of data used is secondary data in the form of household micro data that became the SUSENAS sample in March 2021, amounting to 6118 households. To find out the relationship between variables in this study, multinomial logistic regression analysis was used. The results of the data analysis will be presented in the value of the marginal effect. Coefficient in model regression logistics multinomial difficult to be interpreted or not can be interpreted directly. By because that need to calculate marginal value effect to provide

understanding what is better about the model logistic regression multinomial. Score marginal effect able to measure the effect of change one unit of independent variable on each probability category (Greene, 2003)

Food security status is divided into four categories: resistant (0), less (1), vulnerable (2) and insecurity (3). The variables are work, education, and gender of the head of household; size of household, poverty status, dummy recipients of non-cash food assistance program (BPNT), internet access in the last 3 months, classification of residential area, presence of toilets, source of drinking water, fuel for cooking and presence of toddlers. Work categories are agriculture (1) and non-agriculture (0), education categories are elementary school/never attended school (1) and higher (0), poverty status are poor (1) and not poor (0), dummy BPNT are recipient (1) and not recipient (0), access internet is yes (1) and no (0), residential area is urban (1) and rural (0), presence of toilet is yes (1) and no (0), source of drinking water is (1) bottled water or sourced from regional drinking water companies (PDAM) and others (0), cooking fuel are electricity or LPG gas (1) and others (0), presence of toddlers is yes (1) and no (0).

The research model for the level of household food security in West Nusa Tenggara in the moderate and high HDI areas is written as follows:

$$z_1 = \ln\left(\frac{P(Y=1|x)}{P(Y=0|x)}\right) = \beta_{10} + \beta_{11}\,work + \beta_{12}\,edu + \beta_{13}\,size + \beta_{14}\,poverty\_status + \beta_{15}\,gender + \beta_{16}\,dummy\_bpnt + \beta_{17}\,info + \beta_{18}\,res + \beta_{19}\,toilet + \beta_{110}\,water + \beta_{111}\,fuel + \beta_{112}\,toddlers + \varepsilon_1$$

$$z_2 = \ln\left(\frac{P(Y=2|x)}{P(Y=0|x)}\right) = \beta_{20} + \beta_{21}\,work + \beta_{22}\,edu + \beta_{23}\,size + \beta_{24}\,poverty\_status + \beta_{25}\,gender + \beta_{26}\,dummy\_bpnt + \beta_{27}\,info + \beta_{28}\,res + \beta_{29}\,toilet + \beta_{210}\,water + \beta_{211}\,fuel + \beta_{212}\,toddlers + \varepsilon_2$$

$$z_3 = \ln\left(\frac{P(Y=3|x)}{P(Y=0|x)}\right) = \beta_{30} + \beta_{31}\,work + \beta_{32}\,edu + \beta_{33}\,size + \beta_{34}\,poverty\_status + \beta_{35}\,gender + \beta_{36}\,dummy\_bpnt + \beta_{37}\,info + \beta_{38}\,res + \beta_{39}\,toilet + \beta_{310}\,water + \beta_{311}\,fuel + \beta_{312}\,toddlers + \varepsilon_3$$

Where z_1 is the probability of households having less status than resistant status, z_2 is the probability of households having vulnerable status compared to resistant, z_3 is the probability of households having insecurity status compared to resistant. Symbol β_{i0} is intercept, (I = 1,2,3); β_{ij} is the coefficient of the independent variable/slope (i = 1,2,3; j = 1,2,…,12) and εI_i is the error term (i = 1,2,3).

The classification of the level of food security used in this study according to Jonsson and Toole in Maxwell (2000) is in Table 1.

Table 1. Cross-Classification of Adequacy of Calories and Share of Food Expenditure

Level of Calories	Share of Food Expenditure	
	Low (< 60% total expenditure)	High (≥ 60% total expenditure)
sufficient (> 80% calories)	Resistant	Vulnerable
deficient (≤ 80% calories)	Less	Insecurity

The share of food expenditure (PPP) is the ratio between food expenditure to total household expenditure, formulated as follows:

$$PPPi = \frac{PPi}{TPi}\ x\ 100\%$$

Where PPi is the food expenditure of the household and TPi is the total expenditure of the household. Total household expenditure is the result of a combined calculation of expenditure for food for a week and expenditure for non-food groups for a month.

Energy consumption is the number of calories from food consumed by households. The level of energy consumption (TKE) is calculated by comparing the actual energy intake conditions and the standard energy intake, calculated as follows

$$TKEi = \frac{Ni}{Stdi}\ x\ 100\%$$

Where N_i is the total household nutritional intake which is the total actual intake of the household in a week and Std_i is the total intake of household nutritional standards referring to the Regulation of the Minister of Health Number 28 of 2019.

RESULTS

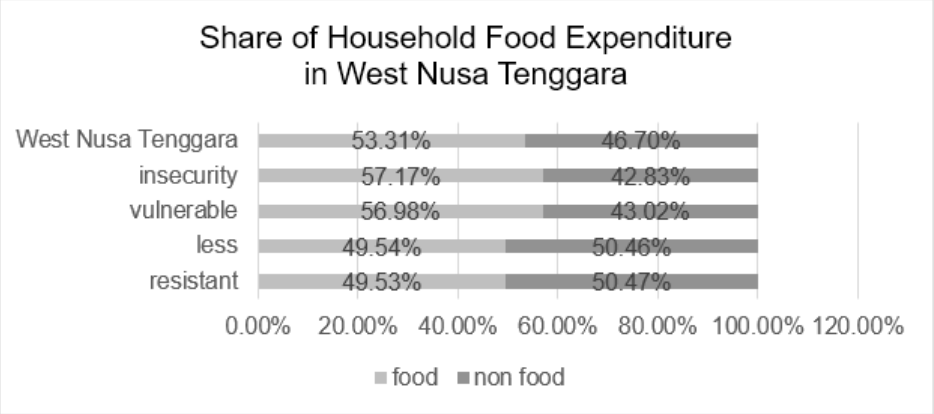


Figure 2. Overview Result

Figure 2 shows the share of household food expenditure in West Nusa Tenggara, which is 53.31% for food expenditure and 46.69% for non-food expenditure. The share of food expenditure is negatively related to food security. The higher share of food expenditure will reduce food security.

The general description described in Table 2 is an overview of the household conditions in this research observation

Table 2. Descriptive Statistics (*N* =6118)

Variable	Mean	SD	Min	Max
Head of household work (work)	0.47	0.49	0	1
Head of household education (edu)	0.41	0.49	0	1
Number of household members (size)	3.56	1.39	1	11
Poverty status	0.12	0.32	0	1
Gender head of household (gender)	0.86	0.34	0	1

Dummy BPNT	0.26	0.44	0	1
Internet access (info)	0.77	0.42	0	1
Residential area (res)	0.42	0.49	0	1
Presence of toilet (toilet)	0.88	0.32	0	1
Source drinking water (water)	0.45	0.49	0	1
Fuel for cooking (fuel)	0.78	0.42	0	1
Presence of toddlers (toddlers)	0.33	0.47	0	1

Note: SD: standard deviation

The average head of household working in agriculture in this study was 47%. The average percentage of education of the head of household in this study was 41% with elementary school education or never attending school. In this study, the lowest number of dependents was 1 person and the highest was 11 people in each household.

The average number of poor households in this study was 12%. Households receiving non-cash food assistance (BPNT) on average 26%. An average of 77% of households have accessed the internet in the last three months. There is an average of 42% of the households studied live in urban areas. An average of 88% of the households studied have toilet facilities.

The source of drinking water used by households is bottled water or PDAM water with an average percentage of 45%. Households use electricity or LPG for cooking an average of 78%. The average percentage of toddlers in the household in this study was 33%.

Table 3. Regression Results Areas with Moderate HDI Status

Variable	Marginal Effect (resistant = base outcome)		
	Model 1 (less)	Model 2 (vulnerable)	Model 3 (insecurity)
work	-0.000247 (0.160586)	0.034944** (0.070104)	-0.004103 (0.243302)
edu	-0.016611 (0.155373)	0.083539*** (0.066965)	-0.006202 (0.231711)
gender	0.022778* (0.283151)	0.033291** (0.097265)	0.011342* (0.446450)
size	0.006892*** (0.061205)	0.021877*** (0.029862)	0.003976*** (0.089652)
poverty status	0.071046*** (0.171389)	0.029556*** (0.110858)	0.019461*** (0.252566)
dummy BPNT	-0.002407 (0.169335)	0.038988** (0.074536)	-0.004543 (0.259623)
info	0.002544* (0.200447)	-0.143654*** (0.081148)	-0.007707*** (0.266276)
res	-0.022208** (0.178861)	0.056869** (0.072016)	-0.010893* (0.303202)

toilet	-0.004772* (0.200447)	-0.112101** (0.200447)	-0.008003*** (0.266276)
fuel	-0.035173*** (0.161589)	0.056768 (0.161589)	-0.026968*** (0.236398)
water	0.009874 (0.162363)	-0.065340*** (0.162363)	-0.009251** (0.298298)
toddlers	0.026305*** (0.158823)	0.040281*** (0.158823)	0.014502*** (0.244965)
Goodness of Fit			
Count R^2		0.0763	
Prob > chi^2		0.00000	
Number of observation		4599	
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Table 4. Regression Results areas with high HDI status

Variable	Marginal Effect (resistant = base outcome)		
	Model 1 (less)	Model 2 (vulnerable)	Model 3 (insecurity)
work	-0.014120 (0.320215)	0.046979 (0.169389)	0.005498 (0.416121)
edu	-0.018177 (0.285515)	0.165018*** (0.146272)	-0.010862 (0.380282)
gender	-0.002785 (0.448927)	0.093601*** (0.202947)	0.005549 (0.786197)
size	0.008353** (0.087486)	0.010095* (0.049279)	0.003813* (0.126994)
poverty	0.073455*** (0.305155)	0.111134*** (0.238483)	0.04837*** (0.392210)
dummy BPNT	0.009646* (0.276772)	0.096574*** (0.153631)	0.013793** (0.364271)
info	0.00937 (0.423077)	0.020141` (0.219427)	-0.014758 (0.501135)
res	-0.011494 (0.273178)	-0.016047 (0.147295)	-0.007512 (0.397039)
toilet	-0.028022* (0.830534)	-0.342682*** (0.577063)	-0.014939* (0.974625)
fuel	-0.036809*** (0.273213)	-0.048325** (0.160358)	0.002747 (0.419127)
water	-0.053926*** (0.258140)	0.013411 (0.153169)	-0.036251*** (0.298298)
toddlers	0.056968*** (0.261553)	0.039181*** (0.142273)	0.016534*** (0.379262)
Goodness of Fit			
Count R2		0.1479	
Prob > chi2		0.00000	
Number of observation		1519	
Standard errors in parentheses			

*** p<0.01, ** p<0.05, * p<0.1

DISCUSSION

The result in moderate HDI status, model 1 shows that the variables of size of household, poverty status, gender of the head of the household, classification of residential area, internet access, toilet facilities, fuel for cooking and presence of toddlers have significant effect on the probability of household having less category. The first model shows that if the household has a male household head, it will increase the probability of the household having less category is 2.27%. If the household is categorized as poor, then the probability of the household having less category will increase by 7.10%. If the household has toddlers, it will increase the probability of the household having less category by 2.63%.

Model 2 shows that all variables have significant effect on the probability of households having vulnerable category except for the variable fuel for cooking. The second model shows that if the head of the household has an elementary school education or has never attended school, it will increase the probability of the household having vulnerable status by 8.35%. If the household has accessed the internet in the last 3 months, it will reduce the probability of the household having vulnerable status by 14.37%. If the household has toilet facilities, it will reduce the probability of the household having vulnerable status by 11.21%.

Model 3 shows that the size of household, poverty status, gender head of household, internet access, residential area, toilet facilities, drinking water sources, fuel for cooking and presence of toddlers have significant effect on the probability of household having insecurity category. The third model shows that if the household is categorized as poor, it will increase the probability of the household having insecurity status by 1.94%. If the household uses electricity or LPG for cooking, it will reduce the probability of the household having insecurity status by 2.69%. If there are toddlers in the household, it will increase the probability of the household having insecurity status by 1.45%. This study is in line with the research of Damayanti and Khoirudin (2016) which states that the number of family members affects food security. Research by Arlius and Dudargo (2017) also states that families with vulnerable and insecurity status have malnourished toddlers. This statement is in line with the results of this study where the presence of toddlers has a positive and significant effect for each category of food security. The residential area variable shows a significant effect on the three models. In less and insecurity groups this variable has a negative direction, while in the vulnerable group it has a positive effect. This study is not in line with Pujilestari and Haryanto (2020) which states that the classification of the area of residence has no effect on food security.

While the results in high HDI status on model 1 shows that the variables of size of household, poverty status, dummy BPNT, toilet facilities, drinking water sources, fuel for cooking and toddlers have significant effect on the probability of households having less category. The first model shows that if a household is categorized as poor, it will increase the probability of the household having less status by 7.34%. If the household uses electricity or LPG for cooking, it will reduce the probability of the household having less status by 3.68%. If there are toddlers in the household, it will increase the probability that the household has less status by 5.69%.

Then in model 2, the variables education and gender head of household, size of household, poverty status, dummy BPNT, toilet facilities, fuel for cooking and toddlers have significant effect on the probability of household having vulnerable category. The

second model shows that if the household is categorized as poor, it will increase the probability of the household having vulnerable status by 11.11%. If the head of the household has graduated from elementary school or has never attended school, it will increase the probability of the household having vulnerable status by 16.5%. If the household has toilet facilities, it will reduce the probability of the household having vulnerable status by 34.26%.

On the third model, size of household, poverty status, dummy BPNT, toilet facilities, drinking water source and toddlers have significant effect on the probability of household having insecurity category. The third model shows that if the household is categorized as poor, it will increase the probability of the household having insecurity status by 4.83%. If the source of household drinking water is bottled water or sourced from PDAM, it will reduce the probability of households having insecurity status by 3.62%. If the household becomes the recipient of the BPNT program, it will increase the probability of the household having insecurity status by 1.37%. Ermawati (2011) states that poverty will affect food security because low purchasing power causes households to pay less attention to nutritional content in consuming food. Lestari and Sarana (2018) state that the type of toilet used by households has a negative impact on household food security. Devi, Andari, Wihastuti, and Haribowo (2020) also stated that the existence of sanitation facilities (toilet facilities) will affect household food security. This statement is in line with the results of this study where the existence of sanitation/toilet facilities can reduce the probability of households becoming less, vulnerable or insecurity because they are able to utilize food properly.

CONCLUSION

The average expenditure of the West Nusa Tenggara population is mostly spent on food, which is 53.31%. This shows that the West Nusa Tenggara region has not yet entered the food security category. Factors that affect food security in moderate HDI area are number of household members, poverty status, gender of head of household, classification of residential area, toilet facilities, internet access and presence of toddlers. Factors that affect food security in high HDI area are number of household members, poverty status, dummy BPNT, toilet facilities and presence of toddlers.

From this research it is necessary to apply policies that can strengthen household food security in both the moderate HDI and high HDI areas, especially in poor households with toddlers. In addition, programs or counseling from the government are also needed about the importance of having sanitation/toilet facilities in the household so that food utilization is better and food security is increased. High population growth will increase the need for food, therefore food availability must be evenly distributed in all regions.

If food availability is evenly distributed in all areas in West Nusa Tenggara, the nutritional status at the household and individual levels will be better. Food security strengthening programs by governments should focus on areas with moderate HDI status, especially poor households headed by men, having large number of household members, living in rural areas and having toddlers. If food security in the moderate HDI area is increasing, it will produce healthy and productive human resources so that life expectancy can increase and will have an impact on increasing the HDI value in West Nusa Tenggara.

LIMITATION

The level of household food security in this study was analyzed based on cross classification between calories and share of food expenditure. In future research, other variable such as protein, both animal and vegetables, can be included so that food security is not based on calories but other nutrients. The next limitation is the use of

cross section data so that in this study only explain phenomena that occur at one point in time in 2021. Further research is recommended to use time series data to see the pattern of development of household food security from time to time.

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DECLARATION OF CONFLICTING INTERESTS
Researchers has no particular interest in this research, purely for academic purposes

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