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DETERMINANTS OF HOUSEHOLD FOOD SECURITY IN WEST NUSA TENGGARA, INDONESIA

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ABSTRACT

This study analyzes the influence of socioeconomic and demographic characteristics with include maternal occupation status, household expenditure, maternal education, access to the internet, maternal age, and household size on the food security household level at NTB Province. Based on the data of The National Socioeconomic Survey (SUSENAS) March 2018 from the Central Statistics Agency (BPS), this study is conducted by using a multinomial logistic regression method to achieve the objective. The results show that household expenditure, maternal education, maternal age, access to the internet, and household size have a significant effect on the food security household level at NTB province. This study is expected to provide an overview of household food security in NTB Province and its determinants.

Keywords:
Food security, Household, Susenas, Multinomial Logistic

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INTRODUCTION

West Nusa Tenggara Province (NTB) is a food surplus area, it's indicated by the availability of surplus rice production and the availability of other plant and animal food which tends to increase (BKP, 2018). The results of the National Socioeconomic Survey (Susenas) in March 2018 showed that the average calorie and protein consumption of NTB residents was 2,316.43 kcal and 68.04 grams, already above the standard of the adequacy of national nutritional consumption (BPS, 2018a: 32-33). However, in 2018, the Ministry of Health designated NTB Province as one of the areas prone to malnutrition and currently ranks 2nd in the number of malnutrition in 34 provinces in Indonesia after East Nusa Tenggara (NTT) Province. This finding is supported by the results of Nutrition Status Monitoring (PSG) by the NTB Health Office that the prevalence of malnutrition from 22.6 percent in 2017, rose to 29.5 percent in 2018.

The results of the Basic Health Research Survey (Riskesdas) also found a similar condition. There is around 38 percent of NTB toddlers consume energy (carbohydrates and fat) below the minimum standard requirements and around 45 percent experience inadequate protein consumption. Likewise, the percentage of the population of productive age. Productive age population who consume calories below the AKG standard reaches 38 percent and more than 50 percent consume protein below the recommended minimum protein requirement (Kemenkes, 2018). This situation shows that the use of food, especially in terms of consuming calorie nutrition by households in NTB province is still not optimal, whereas it is expected that with the condition of a food surplus region, NTB can also increase the level of household food security and increase quality human resources.

Previous research on the level of household food security has been widely carried out. In general, previous studies have focused on the determinants of food security. Omotesho, et al (2008) show that household size and household expenditure to buy food (food expenditure) have a positive and significant relationship to household food security. Bashir, et al. (2012) found that income and education level of household heads in rural areas in Pakistan had a positive impact on household food security in the region. Meanwhile, the age of the head of the family and family size has a negative impact on household food security. Based on Faridi and Wadood (2010) and Akerele et al. (2014), determinants of household food security are household income, expenditure on food, education, and employment of household heads, household size, and living conditions.

Several other studies have shown that housewives have an important role in improving household food security.

Ibnouf (2009) shows that housewives contribute to the food production process and improve food quality and diversity of consumption. The role of women is not only limited to the domestic role in the household as a housewife, but also as a public role generally in the labor market (Rustiani, 1996). Working housewives tend to allocate a large portion of their income to buy food and basic needs for their children and families (Quisumbing, et al., 1996; Levin, et al., 1999).

Along with the very rapid development of technology, the internet can now be accessed from anywhere either through computers, laptops, and the like, as well as cellular phones with smartphones. According to BPS data from the Susenas Survey data collection, in 2014 the percentage of NTB Province residents aged 5 years and over who claimed to have accessed the internet in the last three months was around 10.6 percent and increased to 28.31 percent in 2018. Increased use of this internet occurs in both urban and rural areas (BPS, 2018b: 125). The high use of the internet reflects the climate of information openness and public acceptance of technological developments and changes towards the information society including access to information related to nutritional knowledge.

Several studies in developing countries found a positive and strong relationship between literacy and maternal education level on children's nutritional levels [for example, Borooah (2002), and Ramachandran (2007)]. Pena, et al. (2000) in her research in Nicaragua also found evidence that increasing women's education has a very significant impact on children's nutrition. Educated women are considered capable of measuring the nutritional needs of each individual in the household according to the burden of varying nutritional needs and providing high -quality care to their children (Del Nino et al., 2003; Beyene & Muche, 2010). This is contrary to Penders et al. (2000) who find that maternal education does not have a significant impact on the nutritional status of children. According to Thomas et al. (1991), this can occur when incorporating maternal access variables into the media into the research model.

The above description confirms that the determinants of household food security in previous studies are different. Likewise, research results also vary. For example in the last paragraph before this. This indicates that research on household food security is still quite relevant to do. This study differs from previous studies in terms of a broader range of determinants covering socio-economic and demographic aspects, as well as access to information by highlighting the role of housewives based on work, age, education level, and access to information on household food security. Another

and methods used.

LITERATURE REVIEW

Food Security Concept and Measurement

The definition of food security also changes from one time period to another. In the 1970s food security paid more attention to global and national food availability than to the household level. While in the 1980s food security shifted to access to food at the household and individual level. But since the early 1990s, the question has been far more complete and complex which is to become: "can the world produce sufficient food at a price level that is reasonable and affordable by the poor and does not damage the environment" (Pinstrup -Andersen, 2009). So, in general, the understanding of food security is guaranteed food access for all households and individuals at all times so that they can work and live healthily.

In Indonesia, food security is defined as a condition of adequate food availability for everyone at any time and every individual who has access to obtain it, both physically and economically. The focus of food security is not only on regional level food supply but also on the availability and consumption of regional and household food, and even for individuals in meeting their nutritional needs. To measure the degree of household food security, in this study researchers used indicator measurements from Jonsson and Toole (1991). The indicator used is a cross-classification between the share of food expenditure and the adequacy of energy consumption. The classification of food security level according to Jonsson and Toole (1991) is as follows: (1) a household is categorized as food security if it has a low share of food expenditure that is less than 60% of household expenditure and consumes enough energy that is more than 80% sufficiency figures energy (AKE); (2) a household is categorized as food less-security if they have a low share of food expenditure and less energy consumption (≤ 80% of AKE); (3) a household is categorized as food vulnerable-security households, i.e. households that have a high share of food expenditure that is more or equal to 60% of household expenditure but consumes enough energy; and (4) households are included in the food insecurity category if they have a high share of food expenditure and the level of energy consumption is lacking. The reference standard for energy adequacy rate (AKE) refers to the National Nutrition Adequacy Rate (AKG) based on the Ministry of Health Regulation No.75 of 2013 (Kemenkes, 2013).

Table 1. The Degree of Household Food Security

The Adequacy of Energy Consumption	The Share of Food Expenditure	
	Low (< 60% household expenditure)	High (≥ 60% household expenditure)
Enough (> 80% AKE)	Food Security	Food Vulnerable-security
Less (≤ 80% AKE)	Food Less-security	Food Insecurity

Sources: Jonsson dan Toole (1991)

Determinants of Household Food Security

A mother's decision to work or indirectly will affect household food security. According to Rustiani (1996), an individual woman has a dual role. The first role is the domestic role in the household, namely as a housewife and the second has a public role that is generally in the labor market. Levin, et al. (1999) added the role of women in the household is to improve food security because a woman who chooses to work tends to use a large part of their income to buy food and basic needs for children and their family members. Most research finding that household expenditure has a significant and positive relationship to increasing household food security (Makinde, 2000; Omotesho, et al., 2008; Kungu, 2014; Ebeh & Agama, 2018). Household expenditure is one indicator that can provide a picture of the welfare state of the population and reflects household income. Household expenditure is important because it determines how much can be spent on various household needs. The quantity and quality of household expenditure patterns are highly correlated with household purchasing power (Sekhampu, 2013).

Some empirical evidence reveals that age has a significant and positive relationship on the level of food security (Iram & Butt, 2004; Arene & Anyaeji, 2010; Sharaunga et al., 2016; Ebeh & Agama, 2018). Maternal age is important for measuring household food security because age is associated with the experience. Older mothers can better understand the food quality and nutritional needs of the family compared to younger mothers. However, Titus and Adetokunbo (2007) also Ahmed and Abah (2014) in their research in Nigeria found an inverse relationship between the age of household heads and food security. They revealed that as the age of the head of the household grows, the possibility of household food security is decreasing. With similar topics, Sekhampu (2013) and Muhoyi et al. (2014) revealed that age was not significant in determining the level of household food security. This relates to the grants program in the form of old-age pension funds provided by the government for the elderly.

Household size has a negative relationship with the level of household food security (Asefach & Nigatu, 2007; Aido, et al., 2013; Muhoyi, et al., 2014). This negative association can be caused by an increase in the number of dependency ratios in the household. This means that households with many children and elderly groups may lack adequate labor, which will ultimately result in excessive dependence on limited household resources. If there is a change in the number of members, decision-makers in the household will reallocate the availability of resources for new household mem-

bers (Charmarbagwala, 2004). However, other research also found evidence that household size is not significant for household food security levels (Arene & Anyaeji, 2010; Ebeh & Agama, 2018).

Mothers with higher levels of education on average have higher information about nutrition and health compared to mothers with lower levels of education. Through nutrition and health knowledge, mothers can control nutritious food for their children (Variyam et al., 1999; Kabubo, et al., 2009). David (2013) found that education level has not been an important determinant of food security even among low-income families in rural areas. Education is important for food security not only because it correlates with income, but also because it has a positive impact on how resources in the household are managed. Gundersen and Garasky (2012) in their research in the United States, suggested a program to improve household financial management skills because the program was considered to have good potential to reduce household food insecurity.

To see the relationship between variables of information access to nutritional knowledge, Scott et al. (2016) has researched in the United States regarding the purpose of using internet technology. It was found that 65 percent of those who access the internet are used to obtain information related to nutrition with the majority accessing food recipes, tips on healthy living, and sports tips. Scott also believes that by incorporating technological elements in particular internet access is the most effective strategy for gaining knowledge about nutrition. Neuenschwander et al (2012) also found similar results. Although the number is lower than expected, internet users to find out information on food and nutrition continues to increase, and the number has almost doubled, namely around 13 percent in 2002 to 24 percent in 2008.

METHODOLOGY

This study uses a quantitative approach using multinomial logistic regression to analyze the influence of socioeconomic and demographic characteristics which include maternal occupation status, household expenditure, maternal education, maternal age, access to the internet, and household size on the food security household level at NTB Province. The data used in this study is a cross-section data from the National Socioeconomic Survey (SUSENAS) KOR (core) and the Expenditure/Consumption Module (KP) in March 2018 by the Central Statistics Agency (BPS) of NTB Province. The number of observations in this study was 5,487 households from 6,320 available households because this study only examined households with female members of productive age (15-64 years old) having been married.

The research model of household food security level in NTB Province is written as follows:

$$z_i = ln\left(\frac{p(Y=i|x)}{p(Y=0|x)}\right) = \beta_{i0} + \beta_{i1}WORKM + \beta_{i2}LN\_EXPTOT + \beta_{i3}EDUCM + \beta_{i4}AGEM + \beta_{i5}INFOM + \beta_{i6}HSIZE + \varepsilon_i \quad \ldots\ldots\ldots\ldots (1)$$

Where, z_1 is the probability of a household having a status of food vulnerable compared to food insecurity, z_2 is the probability of a household having a status of less food than food insecurity, and z_3 is the probability that the household has a food security status compared to food insecurity. Y is a household food security level variable with a dummy Y = 0 if the household has food insecurity status; Y = 1 if the household has food vulnerable status; Y = 2 if the household has less food status; and Y = 1 if the household has food security status. WORKM is a dummy variable for the maternal occupation status (WORKM = 0 if the mother is not working, WORKM = 1 if the mother works), LN_EXPTOT is the natural logarithm of total household expenditure; EDUCM is the level of education of mothers (in years); AGEM is the age of the mother (in years); INFOM is a dummy variable for access to the internet (INFOM = 0 if the mother has never accessed the internet, INFO = 1 if the mother has accessed the internet); HSIZE is household sizeβ_{i0} is the intercept (i = 1,2,3); β_{ij} is the coefficient of the free variable/slope (i = 1,2,3; j = 1,2, ... 6); and ε_i is the error term (i = 1,2,3).

Multinomial logistic regression analysis in this study uses the statistical software Stata version 13.0. The results of the data analysis will be presented in the marginal effect value. According to Greene (2003: 720-723), the coefficients in the multinomial logistic regression model are difficult to interpret or cannot be interpreted directly. Therefore, it is necessary to calculate the value of marginal effects to provide a better understanding of the multinomial logistic regression model.

FINDINGS AND DISCUSSION

This section discusses a statistical summary of the variables used and the results of the model estimation. Table 2 shows the total information of the observation sample in this study was 5,487 households representing household information. The average percentage of working mothers is 62%. The average household expenditure in this study was IDR 3,597,531 per month. The lowest expenditure was IDR 279,929 per month and the highest expenditure was IDR 54,438,631 per month. Also, the average level of education of mothers in this study was 7.17 or equivalent to junior high school. While the average age of the mother studied was 42 years. The average percentage of mothers who have accessed the internet in the last 3 months is 18%. One of the factors that cause high and low levels of household expenditure is a large number of dependents (house

size). In this study, the lowest number of dependents was 1 person and the highest was 11 people per household.

Table 2. Descriptive Statistic of Socioeconomic and Demographic Household Characteristics

Variable and Description	Min	Max	Mean	St. Dev
Maternal Occupation Status (WORKM)	0	1	0.62	0.49
Household Expenditure (EXPTOT)	279,929	54,438,631	3,597,531	3,174,544
Maternal education Level (EDUCM)	0	18	7.17	4.73
Maternal age (AGEM)	15	64	41.23	11.31
Access to Internet (INFOM)	0	1	0.18	0.39
Household Size (HSIZE)	1	11	3.74	1.39

Sources: BPS, 2018 (Author's Calculation)

The distribution of household food security levels in NTB Province in 2018 according to the cross-classification between energy consumption level indicators and the share of food expenditure is food insecurity 7.02 percent, food vulnerable-security 55.46 percent, food less-security 3.99 percent and food security 33.55 percent. It can be seen that the food vulnerable households have the highest proportion of 55.46 percent, more than half of the population in NTB Province. Food vulnerable-security households are households that have a sufficient level of energy consumption (> 80 percent) but have a high share of food expenditure (> 60 percent of total household expenditure). This means that this household group has a less economic capacity (limited income) because a greater proportion of household expenditure is spent on food rather than non-food needs.

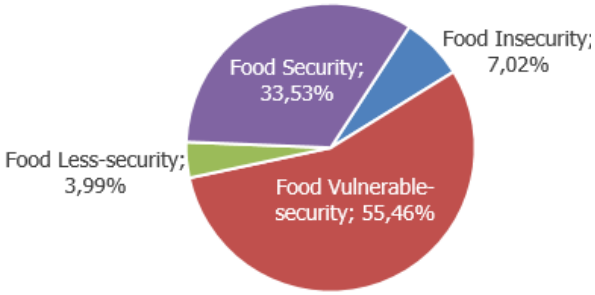

Figure 1. Distribution of Household Food Security in NTB Province in 2018
Sources: BPS, 2018 (Author's Calculation)

The empirical results of the multinomial logistic regression model are presented based on table 3. The multinomial logistic regression results in the level of household food security in NTB Province show an R-squared count value of 0.557. It can be said that in the model of socioeconomic and demographic characteristics which include maternal occupation status, household expenditure, maternal education, maternal age, access to the internet, and household size as independent variables can explain the dependent variable, that is the level household food security in NTB is 55.7 percent, while others are influenced by other variables outside the model.

The first model shows the variables of household expenditure, maternal education level, maternal

age, access to the internet, and household size significantly influence the probability of food vulnerable-security households. The household size variable has a positive effect on the probability that a household has a food vulnerable-security status. Meanwhile, household expenditure, maternal education level, maternal age, and access to the internet have a negative influence on the probability of a food vulnerable-security household. The second model shows that all independent variables have a significant effect on the probability of food less-security households except the maternal occupation status variable. Variable levels of maternal education, maternal age, access to the internet, and household size have a positive and significant effect on the probability of households having food less-security status. Furthermore, the third model shows that maternal education level, maternal age, and access to the internet have a significant and positive effect on the probability of a food security household. Meanwhile, household size variables have a negative effect. Another variable is the maternal occupation status variable does not significantly influence the probability that a household will have a food security status compared to food insecurity.

Table 3. The Result of Multinomial Logistic Regression

Variable	Marginal Effect (Food Insecurity = Reference)		
	Model 1 (Food-Vulnerable)	Model 2 (Food-Less)	Model 3 (Food-Security)
WORKM (dummy)	0.0008 (0.01519)	-0.0044 (0.00645)	0.0064 (0.0148)
EXPTOT	-0.0003*** (0.00002)	-0.0003*** (0.00001)	0.0004*** (0.00001)
EDUCM	-0.0183*** (0.002)	0.0047*** (0.0008)	0.0129*** (0.00193)
AGEM	-0.0055*** (0.00076)	0.0013*** (0.00031)	0.0044*** (0.00073)
INFOM (dummy)	-0.0767*** (0.02328)	0.0219** (0.01117)	0.0561*** (0.02235)
HSIZE	0.1161*** (0.00662)	0.0117*** (0.00235)	-0.1442*** (0.00651)
Count R^2	0.557		
Prob > chi^2	0.000		
Number of Obs	5,487		

Note : *, **, *** indicates significance level at 90%, 95%, 99%, respectively value standard error in parentheses
Sources: Author's Calculation

Household expenditure has a positive and significant relationship to the probability that households have food security status. The same result which states that household expenditure has a significant and positive relationship to increasing household food security is stated by Makinde (2000) and Omotesho et al. (2008). The amount of household expenditure is usually influenced by how much household income. According to Omotesho et al. (2008), an increase in income will affect the amount of household purchasing power, so that economic

access to food fulfillment will be easier. The same thing was stated by Purwaningsih (2015). According to Purwaningsih (2015), the amount of household income will provide the purchasing power to buy things better including buying food with better quality.

Maternal education level shows a significant relationship to the probability of household food security status. This means that the education level of the mother contributes to the determination of the status of household food security. This is in line with research conducted by Kaiser et al. (2003) who found that maternal education levels were positively correlated with household food security in California. Higher levels of education from mothers help reduce the chances of households becoming food insecure because in these households it is assumed to have better financial management techniques and nutritional knowledge to ensure an even and comprehensive food supply according to the nutritional needs of each household member. This shows the importance of human capital investment in improving the status of household food security.

Regarding maternal age, the variable of maternal age has a negative relationship with the level of household food security in the first model but positively correlated in the second and third models. But in general, maternal age has a statistically significant relationship to the level of food security. Iram & Butt (2004) also stated the same thing. The results of his study indicate that maternal age has a positive and significant influence on household food security levels in the United States. Because with age, mothers tend to have better insights about providing nutritious and needed food to the family, and can allocate household expenses to other expenditure items such as education and health.

The next variable is access to the internet. Based on the results of data processing, there is 18.45 percent of households that have accessed the internet and 58.34 percent of households who have accessed the internet have food security status. The logistic regression results also show that access to the internet has a statistically significant relationship to the level of household food security. This is in line with research conducted by Scott et al. (2016). According to Scott et al. (2016), internet access is the most effective strategy for gaining knowledge about nutrition. This finding provides a positive signal for the government in efforts to improve household food security because BPS in its publication also states that the number of internet users continues to increase from year to year (BPS, 2018b: 125).

The size of a household is related to the number of dependents that must be borne by productive members in the household. In the first and second models, household size variables are positively correlated with the pr-

obability that households have a food insecurity status and are less food than food insecurity. However, it is different from the third model. In the third model, household size variables are negatively correlated to the probability that households have food security status compared to food insecurity. Household size was found to have a negative relationship with food security (Asefach & Nigatu, 2007; Muhoyi, et al., 2014). According to Muhoyi et al. (2014), large-sized households have a greater chance of becoming food insecure than smaller ones. The greater the number of unemployed adults and children, the higher the burden of members who work in meeting household food costs.

CONCLUSION

The distribution of households in NTB Province according to the level of food security using the Jonsson and Toole method is 7.02% food insecurity, 55.46% food vulnerable, 3.99% foodless, and 33.53% food security. Based on the results of a multinomial logistic regression analysis of socioeconomic and demographic characteristics which include household expenditure, maternal education, maternal age, access to the internet, and household size have a significant effect on the level of household food security in NTB province. Likewise, maternal occupation status does not affect the level of household food security. Other results show that maternal education level has an important role in determining household food levels. This shows the importance of human capital investment in improving the status of household food security.

This research has weaknesses and limitations both in terms of data and variables used. In terms of data, the data presented are only cross-section data (one-time point) so that no other data can be used as a comparison. It's recommended to use time-series data to see patterns of development of household food security from time to time, so trends in the level of food security can be analyzed more deeply. Household food security in this study was only analyzed based on variables of maternal occupation status, household expenditure, maternal education, maternal age, access to the internet, and household size. Suggestions for further research, it is advisable to add other variables that have not been included in this study such as access to health facilities, access to markets, prices of food commodities, and other variables that can affect household food security.

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