

# Food Insecurity and Healthcare Utilization in Indonesia: Evidence from Indonesian National Household Surveys

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## Abstract

Treatment for sicknesses in healthcare is a crucial determinant to improve health. In Indonesia, the unmet need for healthcare is common for people in the lower economic group. This study aims to examine how food insecurity affects outpatient care using the indicators of food insecurity to highlight individuals with high health risks and experiencing problems with limited resources. The data used in this study consisted of 159,236 individuals representing different age ranges from the 2017 National Socio-Economic Survey (SUSENAS) and the 2018 Village Potential Census (PODES). Data were analyzed using ivprobit to address bias due to the endogeneity in the food insecurity variables. The results indicate that a higher food insecurity score will increase the chances of not accessing modern healthcare for outpatient care when sick. Several variables like sex, types of residence, number of household members living together, access to healthcare, health insurance, social protection, and illness characteristic were also found to influence individual behavior in not utilizing modern healthcare for outpatient care. This study suggests that policymakers should pay attention to the utilization of modern healthcare, especially for outpatient care in groups experiencing food insecurity.

## Keywords

Endogeneity; food insecurity; healthcare; outpatient; poverty

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## Introduction

Health is an essential aspect of an individual's life, seeing as good health is an asset to increase an individual's activities and employment (Becker, 1962). Good health is also the key to stimulating economic growth (WHO Commission on Macroeconomics and Health & World Health Organization, 2001). Healthcare utilization is essential in determining the health level of an individual (Blum, 1981). The response to an illness through undergoing treatment at modern healthcare will naturally reduce the risk of illness and death (Hausmann-Muela et al., 2003; Taffa & Chepnego, 2005).

Previous studies argued that the main obstacle in using modern healthcare for poor and developing countries is economic limitations or poverty (Peters et al., 2008; Wagstaff, 2002). Meanwhile, various approaches can measure poverty, such as biological impairment and relative deprivation (Sen, 1981). Also, hunger is a tangible form of poverty (Sen, 1981), and food insecurity indicates deprivation, affecting various welfare dimensions (Shariff & Lin Khor, 2008). Limited resources experienced by individuals who have difficulty accessing food will affect their choices between buying food or accessing modern healthcare (Baer et al., 2015; Kushel et al., 2006; Ma et al., 2008).

In Indonesia, the population with health complaints and seeking outpatient treatment is considered low and widely varied between different provinces (World Bank Group, 2016). The proportion of unmet need for healthcare in 2018 was around 5% and predominantly in rural areas with a low economic status. This percentage is also far from the 1% target set by the Indonesian government in the National Action Plan (BPS-Statistics Indonesia, 2019). In addition, the current condition in Indonesia shows that out-of-pocket (OOP) health expenditures are relatively high compared to neighboring countries, such as Singapore, Malaysia, Thailand, and Brunei Darussalam (World Bank Group, 2019). The amount of OOP health expenditures shows that most expenses encountered for medical treatment still have to be borne by the patient, seeing as many Indonesians are not covered by the Jaminan Kesehatan Masyarakat (JKN) [National Health Insurance System]. The coverage is not comprehensive nor includes brand-name medications (World Bank Group, 2016). The amount of fees incurred during treatment, either directly or indirectly, is often why individuals with economic limitations are not receiving healthcare access (Awiti, 2014).

The Global Hunger Index reported that Indonesia was ranked 73 out of 119 countries and is still categorized as having a serious food insecurity status (von Grebmer et al., 2018). In 2018, Indonesia's food insecurity index improved. However, 19% of its districts remain vulnerable to food areas (Badan Ketahanan Pangan, 2018). Food insecurity is related to the inability or limitation of fulfilling nutrition through healthy food and can be used to describe the difficulties faced by either individuals or households (Beverly, 2001). The use of food insecurity to realize the challenges faced by a person departs from research in several countries, which shows that financially poor individuals do not feel food insecurity. In contrast, individuals who are not poor feel deprived (Grobler, 2016; Iceland & Bauman, 2004).

People experiencing food insecurity represent the condition of a person who has limited resources, so that they tend to reduce the fulfillment of other needs to meet their basic needs. Nutritional deficiencies and reduced allocations to health can affect the health status of people in this group. At the same time, their condition can lead to high health risks and permanent adverse effects on health (Gundersen & Ziliak, 2015). Several studies have shown that

individuals in this group are commonly associated with delaying treatment, not using healthcare, or showing non-adherence to treatment (Bishwajit & Yaya, 2017; Kushel et al., 2006; Ma et al., 2008; Seligman et al., 2012; Young et al., 2014).

In this study, we attempt to discover the effect of food insecurity on the behavior of individuals using modern healthcare for outpatient care when sick. The use of healthcare to improve health will better function when targeted (Bhattacharya et al., 2014). Studying how the outpatient behaviors of individuals with food insecurity are expected to give an overview of what interventions should be conducted to improve their health status. Moreover, improving the public health status is expected to enhance the quality of human resources and reduce the burden on the state due to a lower health quality in the future.

## Literature review

Individual perceptions regarding difficulties in access to food are a direct method to assess food insecurity (Radimer et al., 1990). These views can influence treatment-seeking behavior because individuals use a number of coping strategies to survive (Campbell, 1991; Weiser et al., 2011). Coping strategies involve reducing non-food requirements, such as education and health (Campbell, 1991; Shariff & Lin Khor, 2008). The Grossman (1972) model of health demand views health as a utility, so individuals often face budget constraints in fulfilling their health needs. Due to limited resources and priorities for meeting food needs, their existing budget will be prioritized to meet basic needs—food (Kushel et al., 2006; Ma et al., 2008). This arrangement reduces the budget proportion that can be used for healthcare so that someone will be more likely to choose alternative treatments with lower costs or even decide not to seek healthcare treatment, which in turn will negatively affect their health status (Berkowitz et al., 2018; Herman et al., 2015).

Previous research also revealed that healthcare expenditure was reduced by using alternative treatments, reducing visits to healthcare providers (including routine health checks for children and adolescents), not making outpatient visits when sick, and not following the required regular health examinations when experiencing certain illnesses (Baer et al., 2015; Kushel et al., 2006; Ma et al., 2008; Shariff & Lin Khor, 2008; Weiser et al., 2011). The reduction in healthcare use is due to the opinion that healthcare treatment is expensive. Although in some countries, especially those that have adopted a national health insurance system, the costs for healthcare examinations are affordable, many other additional costs are not covered, leading to individual OOP expenditures for accessing healthcare remaining high (Herman et al., 2015).

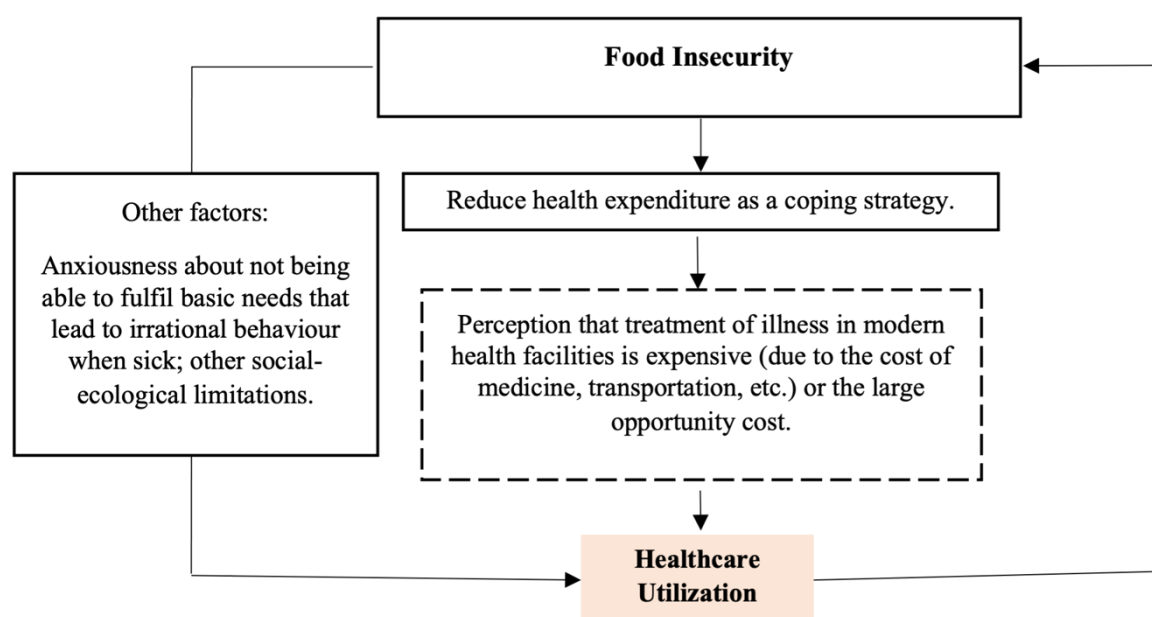
In Indonesia, the costs borne by the individual include the high cost of drugs not covered by the JKN and the transportation costs due to the difficulty in accessing healthcare facilities (World Bank Group, 2016). In addition, the poor healthcare referral system in Indonesia also increases problems for patients (Kementerian PPN/Bappenas, 2019). Another problem someone with limited resources faces is the cost incurred due to sacrificing working time for treatment, thus affecting decision-making (Awiti, 2014).

Furthermore, Weiser et al. (2011) stated that perceived food insecurity could also lead to psychological problems, such as depression or stress. Anxiety felt by individuals is due to the inability to meet food needs will result in feelings of hopelessness that trigger them to take irrational actions, such as not seeking treatment from healthcare providers when sick. In

addition, social limitations (such as disabilities and gender inequality), and ecological limitations, including physical difficulty in accessing food due to natural conditions, might also affect a person's decision-making process when deciding to use modern healthcare.

Campbell (1991) argued that a person's food insecurity would be related to one's limitations in household resources, such as money, time, and opportunity. This condition will limit a person's work opportunities, reducing their income and affecting their economic situation to meet non-food needs, such as housing and healthcare. When healthcare is needed, though not used or delayed, a person's health condition can deteriorate, resulting in decreased income and higher health costs due to worsening illness, leading to poverty (Awiti, 2014; Smith, 1999) and food insecurity (Nielsen et al., 2010).

**Figure 1:** Conceptual Framework of Research



*Note: Author's compilation*

## Methodology

### Data and sources

This study used secondary data from the 2017 National Socio-Economic Survey (SUSENAS) and the 2018 Village Potential Census (PODES) (BPS-Statistics Indonesia, 2020). SUSENAS is a biannual national survey (conducted in March and September) and the primary source of Indonesian socioeconomic statistics gathering information about demography, education, health, and household consumption and expenditure. Whereas PODES is conducted three times during a ten-year period to obtain data about infrastructures and conditions in Indonesia's villages. In 2018, PODES was implemented in all government administrative areas at the village level and covered all sub-districts throughout Indonesia (83,931 villages). PODES provides data about the availability of healthcare facilities and the ease of access to healthcare facilities, such as hospitals, maternity hospitals, polyclinic or medical centers, and public health centers. The data from SUSENAS and PODES have been validated by BPS-Statistics Indonesia and disseminated officially for government or public research. This study

used the 2017 March SUSENAS comprising 297,276 household samples or 1,132,749 individual samples throughout Indonesia.

The unit of analysis in this study was individuals who had been sick during the month prior to the SUSENAS being conducted. Individuals experiencing sickness were classified from the respondents who answered “yes” for two questions: “During the last month, did (name of respondent) ever have health problems (fever, coughing, flu, headache, diarrhea, chronic illness, etc.)” and “Did it prevent (name of respondent) from continuing work, studies, or daily activities?” This classification is based on the idea that even though a person feels sick, action to treat the sickness will not occur until the individual believes that being sick will seriously impact themselves or others socially (Becker, 1974). After removing 1,039 individuals from households who responded “do not know” or “refused” in all eight access to food questions, the selected samples classified as sick were 159,236 (14.06% of the total samples) in all age groups throughout 34 provinces. The samples were then merged with the PODES 2018 data using the village identity code where the respondents live to view the ease of access to healthcare.

## Variables

The healthcare utilization in this study was based on the response of someone experiencing sickness and seeking outpatient treatment for recovery. The use of outpatient care when being sick is used to identify healthcare utilization because this behavior tends to be more flexible towards prices and income than inpatient care or other preventive care (Bhattacharya et al., 2014). The response was coded ‘0’ if within the last month the sick individual had been to a modern healthcare facility for outpatient treatment (hospital, doctor/midwife practice, clinic/joint doctor practice, *puskesmas/pustu* [public health center], or Upaya Kesehatan Bersumberdaya Masyarakat (UKBM) [Community-Based Health Unit]; and otherwise ‘1’ if the respondent had not sought modern healthcare for outpatient treatment during the month preceding the survey.

Meanwhile, the food insecurity variable was created from the household food insecurity experience, derived from eight questions in the Food Insecurity Experience Scale (FIES). The Food and Agriculture Organization (FAO) developed this set of questions to describe the food insecurity severity by direct response regarding an individual’s access to adequate food (FAO et al., 2018). A score was formed from the eight questions using the Item Response Theory (IRT) with the Rasch model. This method is widely used in human and social science domains to observe the latent trait that cannot be observed directly (FAO et al., 2018). The probability that a respondent will report a given experience is as follows.

$$P(X_{vi} = 1) = \frac{\exp(\theta_v - \beta_i)}{1 + \exp(\theta_v - \beta_i)} \quad (1)$$

Where:  $X_{vi}$  is the response given by respondent  $v$  to item  $i$ ;  $\theta_v$  is the latent trait parameter; and  $\beta_i$  is the parameter describing the difficulty of the item. The food insecurity score is formed by the sum of the individual’s responses to each item. The higher score represents a more severe level of food insecurity.

In the process of formulating the food insecurity score, treatment was implemented to deal with the responses “do not know” and “refused” in the eight FIES questions. Nasrudin (2019) used the *imputerasch* Stata command to fill the empty response in the food insecurity question

due to the respondent's fatigue in answering the lengthy survey. For this study, the responses "do not know" and "refused" were coded "miss." Then, *imputerasch* was implemented to fill the missing response. Imputed data is estimated by the probability for every individual to respond to each item (Hardouin, 2008).

According to the behavioral model of healthcare utilization, population factors such as predisposing, enabling, and need factors determine the patterns of healthcare selection pattern (Andersen, 1995). This study categorized the independent covariates based on predisposing, enabling, and need factors. The predisposing factors consisted of age, education, gender, type of residence (urban and rural), and the number of household members living together. Education, measured by the length of schooling years (education of children <18 years was based upon the education of the household head). The enabling factors consisted of per capita income as seen from per capita household expenditure, access to healthcare (individual's access to healthcare classified as easy if there are available healthcare providers in the village or easy access to health facilities in nearby villages), health insurance ownership, and social protection (if the respondent receives benefits from one of the social assistance programs provided by the government, such as Raskin, or Rice for the Poor); family welfare card (KKS) (non-cash assistance program for the poor and near-poor group); the Family Hope Program (PKH) (assistance program specialized for poor households with pregnant mothers, children, elderly, or those with disabilities); or smart Indonesia program (PIP) (Indonesia's government program for education). Meanwhile, several variables used to approach the need factors were the perception of the illness severity and the number of sick days in the last month.

## **Endogeneity of food insecurity variables**

In this study, the food insecurity variable is seen as an endogenous variable because its relationship with modern healthcare utilization is simultaneous. The use of an instrumental variable (IV) is to overcome endogeneity. The IV requirement to isolate the impact of endogeneity is relevant and fulfills the instrumental exogeneity. Relevant means the variation in the instrument is related to variation in the instrumented variable. While instrumental exogeneity means the IV use must satisfy the exclusion restriction using a variable that has no partial effect on the dependent variable but correlates positively or negatively with the endogenous variable (Wooldridge, 2013).

This study used the hunger experience of the household head and spouse, and the number of disasters at the district level as the IV variables. Being born in an area experiencing food supply difficulties can provide experiences about difficulties in obtaining food and hunger conditions that will affect a person's perceptions of their current hunger (van den Berg et al., 2016). The starvation area was based on Napitupulu (1968), who examined the famine condition in Indonesia. The paper listed the regions in Indonesia experiencing food shortage because Indonesia's food supplies were insufficient to meet the staple food needs of the population in the 1960s. The condition was worsened by the landlord system and substantial natural disasters (e.g., volcano eruption) affecting some areas in Indonesia around that same time. The household head and their spouse are said to experience hunger if they were 55 years old or over and born in an area of starvation. Apart from the hunger experience, this research also used information on the number of natural disasters at the district level in 2016 from the National Disaster Management Agency (BNPB). The number of catastrophes in 2016 was chosen because the condition of food insecurity in SUSENAS is related to the situation in the previous year.

## Ivprobit

The dependent variable in this study is modern healthcare utilization, which is categorical; meanwhile, the food insecurity suspected of having endogeneity problems is continuous. The ivprobit (Instrumental Variables Probit Model) function with maximum likelihood estimator provides an efficient estimator for the parameters to analyze this kind of data (Wooldridge, 2010). Individual's modern healthcare utilization function was based on the individual who classified sick in a month preceding the survey, as seen in the following equation:

$$\text{Modern Healthcare Utilization (MHU)}^* = F(\text{FI}, \text{PF}, \text{EF}, \text{NF}; u) \quad (2)$$

$$\text{MHU} = 1 [\text{MHU}^* > 0] \quad (3)$$

where MHU\* is a latent variable of modern healthcare utilization, FI is food insecurity score, PF is predisposing factors, EF is enabling factors, NF is need factors, and  $u$  is the error term capturing unobservable influences on modern healthcare utilization. Equations (2) and (3) are structural equations. Function (4) is the reduced form for food insecurity:

$$\text{Food Insecurity (FI)} = F(\text{HE}, \text{D}, \text{PF}, \text{EF}, \text{NF}; v) \quad (4)$$

where HE is hunger experience, D is the number of disasters at the district level, and  $v$  is the error term capturing unobservable influence in food insecurity.

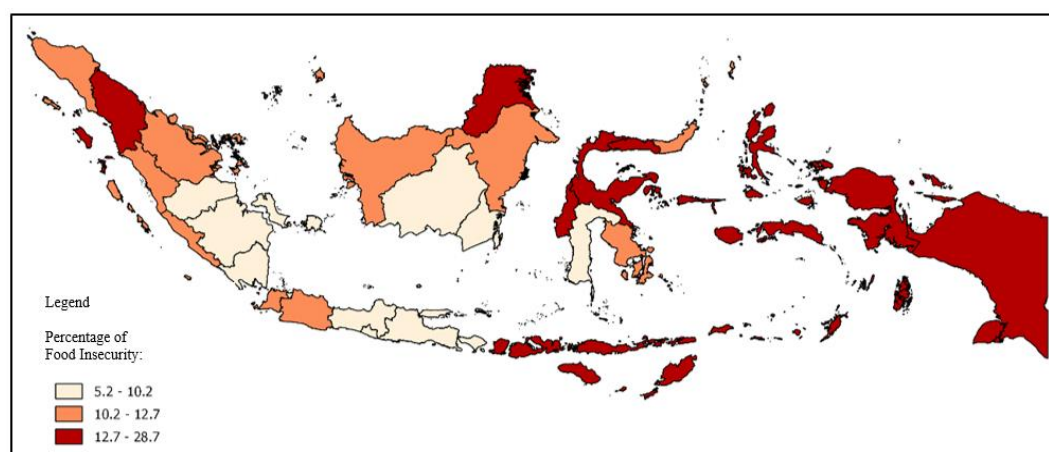
Endogeneity occurs when  $u$  and  $v$  are related. The endogeneity test in ivprobit was carried out using the parameter  $\rho$  (rho) in the Wald test of exogeneity.  $H_0$  in this test is  $\rho = 0$  (the variable is exogenous) with  $H_0$  being rejected if the  $p$ -value is  $\leq$  of  $\alpha = 0.05$  (Wooldridge, 2010). Empirically, the correlation test did not indicate a statistically significant relationship between the IV and the use of modern healthcare for the outpatient. The relationship between IV and the food insecurity variables can be seen from the significance test in the reduced form equation (Table 3).

Since the question of food insecurity is at the household level, this study assumed that every individual in the household had the same level of food insecurity. Therefore, standard error clustering was carried out by household to loosen the independent standard error assumption and accounts for residual autocorrelation. With this treatment, an independent error was applied between clusters, while the errors of individuals in one cluster can be related (Abadie et al., 2017).

## Results

The food insecurity score based on the FIES was classified using the FAO's food insecurity category to simplify the descriptive analysis. Food insecurity was divided into four groups: food secured (0), mild food insecurity (1-3), moderate food insecurity (4-6), and severe food insecurity (7-8) (FAO & VoH, 2015). Based on the classification, 62.04% of the sample was food secured, 26.05% was mild food insecurity, 7.82% was moderate food insecurity, and 4.1% was severe food insecurity. Figure 2 shows the cumulative percentage of individuals who experienced moderate and severe food insecurity by the province in Indonesia.

**Figure 2:** The Percentage of Moderate and Severe Food Insecurity by Province in Indonesia (based on FIES)



Note: SUSENAS (2017); author's calculation.

Table 1 describes the samples by their characteristics. Based on the socio-demographic characteristics, it can be seen that 51.24% of the sample were women, and more than half of them (58.7%) lived in rural areas. Regarding education, the sample's average length of school was 7.5 years. In addition, the sample's average age was about 34 years old, with an average family size of four people. The distribution of the sample based on the ease of access to healthcare showed that 5.06% of the sample lived in areas with difficult access to healthcare, and 37.82% did not have any health insurance. The proportion of the sample with JKN was relatively large (45.24%). Furthermore, 47.85% had one of the social protection programs. Meanwhile, based on the illness characteristics, around 22.17% of the sample believed they had a severe illness, with an average duration of six days.

**Table 1:** Sample Characteristics (N = 159,236)

Variables	Description	Frequency	Percent	Mean	SD		
Dependent							
Healthcare Utilization (Modern healthcare utilization for outpatient care)	Did not visit modern healthcare facilities	95,552	39.99	0.85	1.64		
	Visited a modern healthcare facility	63,684	60.01				
Independent							
Food Insecurity Score							
Gender	Female	81,588	51.24				
	Male	77,648	48.76				
Age (in years)	0-4	23,552	14.79				
	5-17	32,258	20.26				
	18-59	75,980	47.72				
	60+	27,446	17.24				
Education (Length of schooling)				7.50	4.53		
Residence	Urban	65,758	41.30	4.30	1.86		
	Rural	93,478	58.70				
Number of household members							
Expenditure Per Capita (Ln)				13.57	0.64		
Access to healthcare	Difficult	8,054	5.06				



Variables	Description	Frequency	Percent	Mean	SD
(District level)					
	Easy	151,182	94.94		
	No health insurance	60,228	37.82		
Health Insurance	National health insurance	72,044	45.24		
	Private health insurance	26,964	16.93		
Social Protection	No social protection (No)	83,047	52.15		
	Receiving social protection (Yes)	76,189	47.85		
Illness Severity Perception	Minor	123,941	77.83		
	Major	35,295	22.17		
Duration of sickness				5.60	6.54
<b>Instrumental Variable</b>					
Experience of Food Insecurity (Head of Household (HH))	No	145,089	91.12		
	Yes	14,147	8.22		
Experience of Food Insecurity (HH-Spouse)	No	151,814	95.34		
	Yes	7,422	4.66		
Disaster (Number of Disasters)				4.19	5.80

Note: SUSENAS (2017); author's calculation; SD = Standard Deviation

The robustness check was completed by comparing the results of the food insecurity variable using probit and ivprobit. The results showed that the food insecurity variable, regardless of using IV or not, had a significant positive relationship with modern healthcare utilization. This relationship illustrated the consistency of the main variables using both models. In the model using IV, the marginal effect results also showed a more significant influence between the food insecurity variable and the chance of not utilizing modern healthcare than without IV.

**Table 2:** Robustness Check of the Food Insecurity Variable

Variable	Model	Coefficient	Standard Error	dy/dx
<b>Food Insecurity</b>	Without IV (probit)	0.04***	0.002	0.01
	With IV (ivprobit)	0.51***	0.013	0.17

Note: SUSENAS (2017) and PODES (2018); author's calculation; \*\*\*  $p < 0.01$ ; variables include control variables; IV = instrumental variable; dy/dx = marginal effects.

The Wald test of exogeneity with ivprobit was examined through the parameter  $\rho$  (rho). The null hypothesis ( $H_0$ ) of this test was that the food insecurity variable is exogenous. The test statistic showed that the  $p$ -value  $< \alpha = 0.05$ , meaning  $H_0$  is rejected (Table 4). This result indicated that there was not enough evidence if the food insecurity variable is exogenous. The coefficient and direction of the instrument variables are shown in Table 3, where the food insecurity experience of the household head and their spouse has a negative and significant relationship to the perception of food insecurity. The results indicated that an individual's current perceptions of hunger were influenced by the experience of living in the famine area. Individuals experiencing living in areas where it is difficult to get food as a child will be more accustomed to starvation (Napitupulu, 1968; Widodo, 2017), thereby reducing their current perception of food insecurity. Meanwhile, the variable of the number of disasters that

occurred at the district level had a significant positive relationship with perceptions of food insecurity. This result was also in line with previous research stating that a disaster will affect the surrounding economy because it will result in unemployment, decrease agricultural output or increase food prices, which will raise food insecurity or difficulty accessing food (Abegaz, 2017; Adelaja et al., 2019).

**Table 3:** Coefficient Estimation, Standard Error, and Significance of Instrument Variables

Independent Variable	Coefficient	Standard Error
Experience Hunger (HH)	-0.10*	0.01
Experience Hunger (HH's spouse)	-0.21*	0.01
Disasters	0.004*	0.001

*Note:* SUSENAS (2017) and PODES (2018); author's calculation: \*  $p < .10$ ; processed by including exogenous variables

The parameter estimation was carried out based on the ivprobit method (Table 4), showing that food insecurity is significant at the 95% confidence level in influencing modern healthcare utilization with a marginal effect value of 0.17. A one-point increase in the food insecurity score raises individuals' likelihood of not utilizing modern healthcare, on average, by about 17%. Food insecurity indicates difficulties fulfilling basic needs in poor or non-poor individuals (by poverty line). For poor and non-poor individuals, food insecurity positively and significantly affects the decision not to visit a modern healthcare facility when sick. A one-point increase in the food insecurity score increases the likelihood of not utilizing modern healthcare, on average, by 11% for poor individuals and 18% for non-poor individuals.

The predisposing factor with the most significant influence on modern healthcare utilization for outpatient is the area of residence, indicating that living in rural areas increases the likelihood of not visiting modern healthcare facilities, on average, by about 1.6%. Other predisposing variables have a significant but lower effect. Men have a higher chance of not visiting healthcare facilities; the higher the educational level and the more household members also increase the likelihood of not visiting healthcare facilities. Age positively and significantly affects the chances of not utilizing healthcare, while the age squared shows the opposite effect. The equation indicates that age has an inverted-U shape pattern to the possibility of not visiting healthcare facilities for outpatient. The higher the age, the chance of not visiting healthcare facilities increases, and at the age of 57 years old, the chance start to decrease.

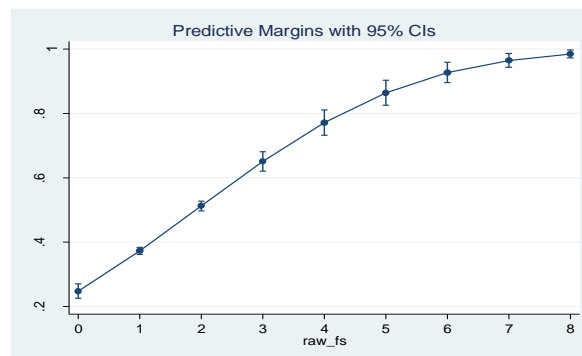
**Table 4:** Estimation Results of the Effect of Food Insecurity on the Utilization of Modern Healthcare for Outpatient Care

Independent Variable	ivprobit		
	Coefficient	Robust Standard Error	dy/dx
Food Insecurity	0.532***	0.009	0.169
<i>Predisposing Factor</i>			
Age (years)	0.004***	0.001	0.001
Age Squared	-2E-05***	1E-05	
Gender			
Female (reference)			
Male	0.026***	0.005	0.008
Education (length of schooling)	0.013***	0.001	0.004

Independent Variable	ivprobit		
	Coefficient	Robust Standard Error	dy/dx
Place of Residence			
Urban (reference)			
Rural	0.051***	0.009	0.016
Number of household assistants	0.006***	0.003	0.002
<b>Enabling Factor</b>			
Expenditure per capita	0.194***	0.01	0.062
Access to healthcare			
Easy (reference)			
Difficult	0.011	0.009	0.003
Health Insurance			
No health insurance (reference)			
National health insurance	-0.135***	0.009	-0.043
Private health insurance	-0.083***	0.012	-0.027
Social Protection			
No (reference)			
Yes	-0.137***	0.009	-0.043
<b>Need Factor</b>			
Illness Severity			
Minor (reference)			
Major	-0.347***	0.012	-0.107
Duration of illness	-0.005***	0.001	-0.002
<b>Wald Test of Exogeneity (rho)</b>	Chi2(1) = 674.74; Prob > chi2 = 0		

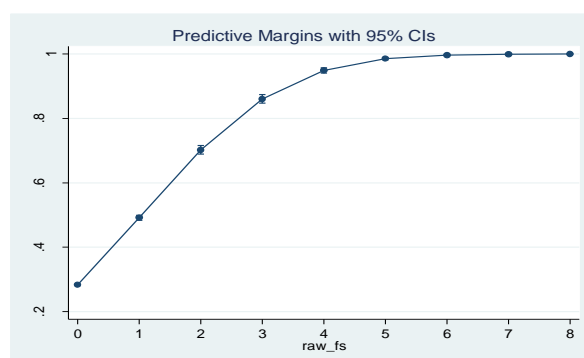
Note: SUSENAS (2017) and PODES (2018); author's calculation; \*, \*\*, \*\*\* significance at  $p < .10$ ,  $p < .05$ , or  $p < .01$  levels, respectively; dy/dx = marginal effects

**Figure 3:** Prediction of the Probability of Not Going to Modern Healthcare Facilities According to the Food Insecurity Score for Poor Individual



Note: SUSENAS (2017) and PODES (2018); author's calculation

**Figure 4:** Prediction of the Probability of Not Going to Healthcare Facilities for Outpatient Care According to the Food Insecurity Score for Non-Poor Individuals



Note: SUSENAS (2017) and PODES (2018); author's calculation

Andersen (1995) stated that enabling factors are population factors that most influence healthcare utilization. In this study, it was seen that an increase in per capita expenditure led to individuals not visiting healthcare facilities because of a significant positive relationship. This circumstance may occur because this variable is not controlled or interacts with other variables. Furthermore, demanding access to healthcare increases the probability of individuals not utilizing modern healthcare when sick, but the effect was insignificant. Regarding a sample of poor individuals, difficulty to access healthcare significantly increased the likelihood of not visiting modern healthcare facilities, on average, by 4.6%.

Meanwhile, health insurance ownership showed a significant negative effect. In other words, possessing health insurance can increase modern healthcare use for outpatient care. This finding applies to poor and non-poor individuals. Likewise, social protection also reduces the tendency of not utilizing modern healthcare for both groups. The need factor had a highly significant influence on modern healthcare utilization in Indonesia. The perception of severe (major) illness reduced the likelihood of not utilizing modern healthcare, on average, by 10%. Meanwhile, the duration of illness used to identify the illness severity also negatively affects the behavior of not utilizing healthcare when sick.

**Table 5:** Estimation Results of the Effect of Food Insecurity on the Utilization of Modern Healthcare for Outpatient Care by Poverty Status

Independent Variable	Poor			Non-Poor		
	Coef	Robust SE	dy/dx	Coef	Robust SE	dy/dx
Food Insecurity	0.364***	0.025	0.114	0.568***	0.010	0.182
Health Insurance						
No health insurance (ref)						
National health insurance	-0.169***	0.028	-0.053	-0.137***	0.009	-0.043
Private health insurance	-0.038**	0.054	-0.012	-0.082***	0.012	-0.027
Access to healthcare						
Easy (ref)						
Difficult	0.147***	0.031	0.046	-0.007	0.010	0.002
Social Protection						
No (ref)						
Yes	-0.127***	0.027	-0.040	-0.143***	0.010	-0.046

*Note: SUSENAS (2017) and PODES (2018); author's calculation; \*, \*\*, \*\*\* significance at  $p < .10$ ,  $p < .05$ , or  $p < .01$  levels, respectively; the number of samples of poor individuals were 17,680 observations and 141,556 non-poor observations; processed by using other control variables; coef = coefficient; Robust SE = robust standard error;  $dy/dx$  is marginal effects.*

## Discussion and conclusion

The results of the ivprobit estimation show that food insecurity, examined through the perception of access to food, is proven to be an endogenous variable. The food insecurity score has a significant positive effect on not utilizing modern healthcare services for outpatient care. The higher the food insecurity score, the greater an individual's chance to not use healthcare services. This positive effect occurs for individuals in the poor and non-poor groups (based on the poverty line). This finding shows that the priority for meeting the basic needs of food occurs not only in food-insecure individuals in the poor but also in non-poor groups.

A person experiencing food insecurity requires determining priority needs because of limited resources. This condition makes individuals allocate fewer resources for health, such as reducing the use of healthcare services (Baer et al., 2015; Campbell, 1991; Herman et al., 2015; Kushel et al., 2006; Ma et al., 2008). Research in Malaysia has shown that one of the coping strategies adopted by individuals experiencing food insecurity is to choose a cheaper healthcare treatment (Shariff & Lin Khor, 2008). Financial limitations also psychologically affect a person's behavior in seeking treatment. Fear of not meeting food needs even lowers healthcare use for maternal care in Bangladesh (Bishwajit & Yaya, 2017). Meanwhile, among individuals with certain illnesses, such as diabetes and HIV, fear of not meeting the recommended diet and continuing treatment is associated with non-compliance with medical care (Seligman et al., 2012; Weiser et al., 2011; Young et al., 2014).

Previous research in the United States about non-elderly adults showed similar results. As food insecurity worsened, the tendency for non-compliance with healthcare treatment and drug redemption from healthcare providers was higher even in individuals with full coverage health insurance. This circumstance can occur because health insurance does not cover many health expenditures when visiting a modern healthcare facility, resulting in significant out-of-pocket expenses and making it challenging for individuals with a severe food insecurity level to pay (Herman et al., 2015).

The World Bank Group (2016) stated that the Indonesian people have both physical and time constraints in accessing healthcare facilities. The median distance to a healthcare facility in Indonesia is around five kilometers but varies depending on geographic conditions. Maluku and Papua provinces have a median distance to a healthcare facility of about 30 kilometers. This distance will increase the time to reach a healthcare facility. It takes over one hour to reach a healthcare facility for 18% of Indonesia's population, with 40% longer times for people in Sulawesi, Kalimantan, Maluku, and Papua. These constraints will further increase the opportunity cost for individuals who experience multiple difficulties because they must sacrifice time to work and earn income (Awiti, 2014). Economic limitations and the high costs for treatment tend to make a person choose alternative treatments, such as self-medication. This choice of treatment is not entirely wrong. However, without advice from a health professional, drug consumption, especially in the long term, will lead to drug resistance due to incorrect doses, negatively affecting health (World Health Organization, 2002). Empirical research in Indonesia also shows that many practices of using drugs from self-medication are

dangerous, inappropriately used (Sclafer et al., 1997), and associated with adverse drug reactions (Andarini et al., 2019).

Age and age squared significantly influence the behavior of not utilizing a healthcare facility when sick. As an individual's age increases, the probability of not using the healthcare facility will increase. However, the age squared shows the opposite direction, indicating a turning point where individuals will reduce their chances of not utilizing a healthcare facility. This avoidance happens because younger age is associated with high productivity, affecting treatment choice compared to work. Younger age is also related to carelessness in seeking healthcare when sick and the belief that the person can recover by consuming over-the-counter drugs (Vidyattama et al., 2014). However, when a person is older, the body's ability to function decreases, and the illness tends to be more complex, requiring a higher level of healthcare (Heller, 1982). Research in India showed that the most critical factors creating a gap in higher healthcare use are economic capacity, illness characteristics, and age (Mahapatro, 2020).

Compared to individuals living in urban areas, people in rural areas have a higher chance of not utilizing modern healthcare because rural areas have fewer healthcare facilities than urban areas. Other research in Indonesia shows that even though the number of healthcare facilities in rural areas increases, the distance and ease of access remain a problem for people trying to access healthcare facilities (Vidyattama et al., 2014). In addition, research in Nigeria also showed a tendency for people in rural areas to trust traditional medicine methods (Olasehinde, 2018).

In contrast to several previous studies, the length of schooling shows a significant positive effect on individuals' behavior of not utilizing modern healthcare because someone with high education will have the efficiency of health production. They might have more knowledge to determine good health inputs and ultimately reduce the need for healthcare (Grossman, 1972). Similarly, per capita expenditure shows a significant positive relationship as well. The same results were reported in China as more affluent individuals have more resources to perform other treatment methods. One of these methods is consuming nutritious foods, thereby reducing curative treatment (Gao & Yao, 2006).

Difficult access to healthcare also positively affects not utilizing the modern healthcare facility, but the relationship is insignificant. However, this variable shows a significant association when viewed in the samples of poor individuals (Table 5). This finding is related to the higher opportunity cost when access to healthcare is increasingly challenging to reach. Difficult access to healthcare facilities will require more time so that individuals have to sacrifice working time and reduce income for medical treatment (Awiti, 2014). Meanwhile, for non-poor individuals, the effect of access to healthcare facilities is negative but insignificant. This negative effect shows that the chance of not utilizing healthcare facilities is reduced when access is difficult. The possible reason is that in this study, access was identified by the existence and convenience to the closest healthcare provider at the village level. However, non-poor individuals can choose not only to visit the nearest healthcare facility, but they can afford to reach other healthcare facilities for better quality or price (Gauthier & Wane, 2011).

This research shows that health insurance ownership reduces a person's chance of not visiting a healthcare facility. These results are consistent with several previous studies in Indonesia, where health insurance increases healthcare utilization (Erlangga et al., 2019; Vidyattama et al., 2014). Research in India reported similar results, where health insurance can drive the achievement of universal health coverage because it can reduce financial constraints and

inequality in health expenditures in healthcare use (Mahapatro, 2020). Furthermore, individuals from families who receive social protection significantly reduce the chances of not utilizing modern healthcare. This finding may happen since, with this assistance program, individuals with economic disadvantages will experience a temporary increase in income to have more resources to use for medical treatment (Sparrow et al., 2013). Research in Mexico showed a similar case; individuals receiving social protection are associated with a reduced tendency not to visit healthcare facilities (Leyva-Flores et al., 2001).

This study indicates the importance of improving healthcare use for the people and groups experiencing food insecurity because they showed lower utilization of modern healthcare, especially outpatient care. One effort is by focusing on increasing healthcare use in areas with a food insecurity status. In addition, healthcare utilization in rural areas needs to be improved by paying attention to the affordability of healthcare by considering the infrastructure and the availability of transportation facilities to reach the healthcare facility.

The use of secondary and cross-sectional data from Indonesian national household surveys creates several limitations for this study. First, this study only examined health complaints in the month before the survey without including individuals having health complaints beyond that period. This study also does not cover the utilization pattern of healthcare for inpatient care or preventive examination. Second, the PODES 2018 data, with a reference time a year earlier than SUSENAS 2017, may cause a different number of healthcare facilities that can affect the ease of the healthcare facility. Access to healthcare facilities from PODES is at the village level. The perception of easy access to the healthcare facility is generalized because the data is at the village level.

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