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Determinants of Household Food Security of the Elderly in the Special Region of Yogyakarta

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ABSTRACT

The Special Region of Yogyakarta is one of the provinces in Indonesia with a relatively large elderly population. As the number of older adults continues to increase, food security among elderly households has become an important issue that warrants further investigation. This purpose of this research is to examine the determinants of food security among elderly households in the Special Region of Yogyakarta, focusing on demographic, socioeconomic, household, social protection, and regional characteristics. The study utilizes data from the March 2021 National Socioeconomic Survey (SUSENAS). Descriptive statistical analysis and binary logistic regression were used to examine the determinants of food security. The results indicate that socioeconomic characteristics, particularly poverty, are the most important factors related with food security among elderly households. Elderly households classified as poor are more likely to experience food insecurity compared to non-poor elderly households. The social assistance variable shows a significant negative association with food security, indicating that recipients of social assistance are more likely to belong to food-insecure elderly households. This finding also suggests that social assistance programs have relatively succeeded in reaching vulnerable elderly households. Furthermore, age, education, number of household member, and region are statistically significant factors of food security among elderly households. The findings imply that improving food security among elderly households requires efforts to reduce poverty, enhance food literacy and nutritional awareness, and strengthen more effective social protection programs targeted at vulnerable elderly population.

Keywords: **Food Security, Elderly Households, Logistic Regression**

INTRODUCTION

Indonesia is facing an aging population, with an increasing elderly population (aged 60 and above). This is due to improvements in healthcare facilities and services, a declining birth rate, increased life expectancy, and a declining mortality rate. This increase in the elderly population can lead to various social and economic challenges related to the well-being, health, and economic resilience of elderly households (United Nations, 2017). According to the publication *Badan Pusat Statistik* (2021), the proportion of the elderly population reached 10.82 percent, or 29.3 million people, in 2021. The increasing elderly population is directly proportional to the increasing needs, which has increased the economic burden on the productive-age population and made food security a critical issue for the well-being of the elderly (Amhas et al., 2023).

The elderly population tends to experience declining health, economic limitations, reduced assets, increased dependency, low income, and physical and physiological changes (Parwodiwiyono, 2022). These conditions place the elderly as a population group vulnerable to food insecurity. Limited mobility experienced by the elderly hinders their ability to obtain food, and fixed income levels *are* not balanced with rising food prices, resulting in a lack of access to nutritious food (Tohit et al., 2025). Elderly people with chronic diseases have a significantly higher probability of experiencing food insecurity compared to elderly people without chronic diseases. This means that the more chronic diseases an elderly person suffers from, the greater the risk of food insecurity (Cai & Bidulescu, 2023). This makes food insecurity a *multidimensional* problem that negatively impacts the health and well-being of the elderly (Aday et al., 2023).

The Special Region of Yogyakarta is a province with an elderly population exceeding ten percent in 2021, at 15.52 percent, making it the province with the largest elderly population in Indonesia. This indicates that the province is experiencing a more rapid demographic aging phenomenon than to other provinces in Indonesia. Furthermore, the province also faces disparities in urban and rural characteristics. Elderly people living in rural areas are more vulnerable to meeting their health and food needs than those living in urban areas (Das et al., 2023; Srivastava & Muhammad, 2022). Households living in urban areas are more food secure, because they have easy access to food, even though rural households are generally considered food producers (Oktalia et al., 2025).

Food security consists of availability, access, utilization, and stability dimensions (FAO, 2003). Among these dimensions, food access is particularly critical for elderly households. Elderly household heads are more likely to be retired or no longer economically active, resulting in limited income. This income constraint reduces their ability to obtain adequate food, thereby increasing their vulnerability to food insecurity.

Household food security in the elderly is affected by several social and economic factors, namely poverty, education level, number of household members, and social protection. Households in poor conditions tend to have low purchasing power due to low income and influence access to nutritious food, making them vulnerable to food insecurity (Ainistikmalia

et al., 2022). This is in line with the results of research by Evalia et al. (2025) which shows that higher poverty significantly reduces food security. In contrast, research by Yudita (2022)which found that poverty does not significantly affect food security in East Java. The education of the head of the household also plays an important role in improving household food security. Heads of households with higher education tend to have a better understanding of meeting food and nutritional needs compared to heads of households with lower education (Oktalia et al., 2025). The higher the level of education of the head of the household, the lower the likelihood of the household experiencing food insecurity (Azwardi et al., 2019; Damayanti & Khoirudin, 2016; Pattinasarany, 2025).

The number of household members also influences the food security of elderly households. The greater the number of household members, the greater the need for food consumption that must be met. This condition leads to increased economic pressure, especially on low-income poor households (Astuti, 2018). In line with research by Wahyuni & Sukarniati (2018), which shows that the number of family members negatively affects food security, when the number of household members is small, food security increases. However, research by Hastuti et al. (2022) shows different results, where the number of family members does not have a significant effect on food security. Social protection also influences the food security of elderly households. The provision of social assistance can help households meet food needs and reduce food vulnerability. Social assistance also encourages increased purchasing power and access to food (Purba et al., 2025). However, research by Syamola & Nurwahyuni (2019), shows that Raskin does not significantly affect food security, while family hope program (*Program Keluarga Harapan*/PKH) has a negative effect on food security.

Although numerous studies have examined the determinants of household food security, their findings remain inconclusive. For example, Evalia et al. (2025) found that poverty significantly affects household food security. In contrast, Yudita (2022) reported that poverty has no significant effect on food security. Similarly, the effects of social assistance and household size on food security have produced mixed findings across previous studies. Furthermore, empirical evidence on the determinants of food security among elderly households in Special Region of Yogyakarta remains limited, despite the distinct socioeconomic characteristics of elderly households. Therefore, this study aims to examine the determinants of food security among elderly households in the Special Region of Yogyakarta. By focusing specifically on elderly households, this study provides a more nuanced understanding of the factors associated with their food security and identifies the key determinants that contribute to food security among this vulnerable population.

RESEARCH METHODS

This study uses secondary data, namely the March 2021 National Socioeconomic Survey (SUSENAS). The unit of analysis in this study is elderly households whose heads are categorized as elderly in the Special Region of Yogyakarta (DIY) province. Based on Law of the Republic of Indonesia Number 13 of 1998 concerning the Welfare of the Elderly, an elderly

person is an individual aged 60 years or older. The sample size used in this study was 1,034 elderly households.

The variable of elderly household food security is measured by the food security indicator initiated by Jonsson & Toole (1991). Food security according to Jonsson & Toole (1991) can be measured using two indicators, namely food sufficiency and the proportion of household food expenditure to total food expenditure. Food sufficiency can be measured by the adequacy of calories consumed by an individual per day. The threshold for daily calorie sufficiency for each individual is 2,000 kcal. Calorie consumption is declared sufficient if it exceeds 1,600 kcal per day (>80%). Meanwhile, an individual is declared to experience a calorie deficiency if daily calorie consumption is less than 1,600 kcal per day (<80%). Furthermore, the proportion of elderly household food expenditure is said to be high if the proportion of elderly household food expenditure in one month is greater than 60%. If it is less than 60%, then the proportion of elderly household food expenditure is included in the low category.

Based on this classification, Food security is categorized into four categories (Jonsson & Toole, 1991). These four categories are food secure, food vulnerable, not enough food, and food *insecure*. Elderly households are categorized as food secure *if* their daily calorie consumption is greater than 1,600 kcal and the proportion of food expenditure to total household expenditure is less than 60%. Elderly households are categorized as food vulnerable *if* their daily calorie consumption is greater than 1,600 kcal and the proportion of household food expenditure is more than 60%. Elderly households that are categorized as not enough food *are* indicated by their daily calorie consumption of less than 1,600 kcal and the proportion of food expenditure is less than 60%. Elderly households that are categorized as food *insecure* are indicated by their daily calorie consumption of less than 1,600 kcal and the proportion of food expenditure is more than 60%. The classification of the food security conditions of elderly households is listed in Table 1 below.

Table 1. Food Security Matrix

Daily Calorie Adequacy Level	**Proportion of Food Expenditure**	
	Low (<60%)	Tall (>60%)
Sufficient (>80%)	Food *Secure*	Food *Vulnerable*
Less (<80%)	Not *Enough* Food	Food *Insecurity*

Source: Maxwell (2000)

The food security status of elderly households was subsequently classified into two categories: food secure (coded as 1) and food insecure (coded as 0). The food-insecure category comprised three groups: food vulnerable, not enough food, and food insecure, following the classification proposed by Jonsson and Toole (1991). This binary classification was adopted to facilitate a clearer comparison between food-secure and food-insecure elderly households. Moreover, the binary nature of the dependent variable justifies the use of a binary logistic regression model, which is appropriate for estimating the probability that an elderly household is food secure or food insecure.

Meanwhile, the independent variables consist of several aspects, namely demographic, socioeconomic, household, social protection, and regional characteristics, referring to previous studies conducted by Azwardi et al. (2019), Ainistikmalia et al. (2022), Oktalia et al. (2025), and Pattinasarany (2025). The demographic characteristics include gender, marital status, and age. The socioeconomic characteristics comprise education, employment status, and poverty status. The household characteristic is represented by the number of household members and homeownership. The social protection variable is measured by the social assistances. The regional characteristic is classified into urban and rural areas. A detailed description of the independent variables used is presented in Table 2.

Table 2. List of Independent Variables

Variables	Description Variables
Demographic Characteristics	
Gender	Male = 1, Female = 0
Marital status	Married = 1, Others = 0
Age	
Socioeconomic Characteristics	
Working Status	Working = 1, Others = 0
Education	Higher Education (High School/ equivalent, Diploma/S1/S2/S3) = 1 Lower Education (Junior High School/equivalent, Elementary School/equivalent, not attending school) = 0
Poverty	Poor = 1, Not Poor = 0
Household Characteristics	
Home Ownership	Owned = 1, Others = 0
Number of Household Member	
Social Protection	
Social Assistances	Receive Social Assistances = 1 Do Not Receive Social Assistances = 0
Region	Urban = 1, Rural = 0

Source: SUSENAS 2021

This study uses descriptive statistical analysis and a binary logistic regression model to examine the relationship between household food security in the elderly and various characteristics, including demographic, socioeconomic, household, social protection, and regional characteristics. The logistic regression model can be explicitly written as follows:

$$Food\_Security_i = \beta_0 + \beta_1 Demog_i + \beta_2 SocEco_i + \beta_3 RT_i + \beta_4 Bansos_i + \beta_5 Region_i + \varepsilon_i$$

Information:

$Food\_Security_i$:	Food security indicator (1=food secure, 0=not food secure)
$Demog_i$:	Demographic characteristics (gender, marital status, age)
$SocEco_i$:	Socioeconomic characteristics (employment status, education, poverty)
RT_i:	Household characteristics (home ownership, number of household members)
$Bansos_i$:	Social protection (1=Receive social assistance, 0=do not receive social assistance)
$Region_i$:	Region (1=urban, 0=rural)

RESULTS AND DISCUSSION

Factors associated with food security of the elderly households in the Special Region of Yogyakarta (DIY) can be explained through descriptive statistical analysis and logistic regression estimation results. Table 3 shows the descriptive statistical results of various determinants suspected of being related to food security among elderly households in the Special Region of Yogyakarta (DIY). Based on Table 3, of the total 1,034 elderly households in the Special Region of Yogyakarta (DIY) headed by an elderly person, 581 (56.19%) are food secure. Meanwhile, 453 elderly households are categorized as food insecure. Furthermore, the cross-tabulation results in Table 3 indicate that almost all independent variables have a significant relationship with food security, except for home ownership.

When examined in more detail by gender, there is a significant association between gender and food security of elderly households as seen from the probability value χ^2 of less than 0.05. From the total elderly households headed by men, there are 52.67% of households that are categorized as food secure. On the other hand, as many as 67.34% of elderly households headed by elderly women are included in the food secure category. This shows that the percentage of households with elderly female heads that are included in the food secure category is higher than households with elderly male heads. Meanwhile, when viewed from marital status, the percentage of elderly households with married heads of households included in the food secure category is lower than elderly households with heads of households other than married (unmarried/divorced/divorced).

When viewed from an economic perspective, the percentage of households headed by elderly people who are employed and considered food secure tends to be lower than that of households headed by elderly people who are unemployed. In terms of education, the percentage of households headed by elderly people with higher education and food secure tends to be higher than that of households headed by elderly people with lower education. Furthermore, elderly households categorized as poor and food secure only accounted for 8.97%. However, the percentage of elderly households that were not poor and food secure was higher, at 63.89%.

Based on household characteristics, elderly households living in their own homes and categorized as food secure have a lower percentage than elderly households living in rented/contracted or other housing. In terms of social protection, the percentage of elderly

households receiving social assistance and categorized as food secure is lower than that of elderly households not receiving social assistances. Meanwhile, elderly households living in urban areas and being food secure have a higher percentage than those living in rural areas.

Table 3. Descriptive Statistics Results

Variables	Food Security		Food Insecurity		Total		Chi2
	N	%	N	%	N	%	
Demographic Characteristics							
Gender							
Male = 1	414	52.7	372	47.33	786	100.00	16,474 (0 ,0000)
Female = 0	167	67.3	81	32.66	248	100.00	
Marital status							
Married = 1	370	51.7	345	48.25	715	100.00	18,571 (0 ,0000)
Others = 0	211	66.1	108	33.86	319	100.00	
Socioeconomic Characteristics							
Working Status							
Work = 1	332	50.2	330	49.85	662	100.00	27,256 (0,000)
Others = 0	249	66.9	123	33.06	372	100.00	
Education							
Higher Education = 1	207	75.0	69	25.00	276	100.00	54,116 (0,000)
Low Education = 0	374	49.3	384	50.66	758	100.00	
Poverty							
Poor = 1	13	9.0	132	91.03	145	100.00	152,785 (0,000)
Not Poor = 0	568	63.9	321	36.11	889	100.00	
Household Characteristics							
Home Ownership							
Owned = 1	535	55.6	427	44.39	962	100.00	1,864 (0 ,174
Others = 0	46	63.9	26	36.11	72	100.00	
Social Protection							
Social Assistances							
Receive Social Assistances = 1	326	46.4	376	53.56	702	100.00	84,444 (0,000)
Do not Receive Social Assistances = 0	255	76.8	77	23.19	332	100.00	
Region							
Urban = 1	404	62.2	246	37.85	650	100.00	25,292 (0,000)
Rural = 0	177	46.1	207	53.91	384	100.00	

Source: SUSENAS 2021, estimated

Table 4 presents the descriptive statistical analysis comparing age and the number of household members by household food security status. As shown in Table 3, the difference in the number of household members is greater than the difference in age. Food-secure elderly households have an average of 2.8 household members. In contrast, food-insecure elderly households have a higher average number of household members, at 3.3 members. A different

pattern is observed for age. The average age of elderly individuals in the food-secure and food-insecure groups differs only slightly, with a difference of 0.9 years.

Table 4. Comparison of Age and Number of Household Members According to Food Security Status

Variables	Food Security	Food Insecurity	Mean Difference Test	
			t- count	Probability
Age				
Min	60	60	2,087	0.037
Average	67.7	68.6		
Max	97	97		
Number of Household Members				
Min	1	1	5,377	0,000
Average	2.8	3.3		
Max	8	10		

Source: SUSENAS 2021, estimated

Table 5 presents the results of the logistic regression analysis examining the relationship between demographic, socioeconomic, household, and regional characteristics and the food security of elderly households in the Special Region of Yogyakarta (DIY). The estimation results include both the logistic regression coefficients and the marginal effects. Based on the results presented in Table 5, among the three demographic variables, only age is statistically significant in relation to the food security of elderly households in DIY. Meanwhile, gender and marital status are not statistically significant and, therefore, are not associated with the food security of elderly households. The negative coefficient for age (-0.004) indicates that an increase in the age of the elderly household head is associated with a decline in household food security. Specifically, a one-year increase in the age of the elderly household head reduces the probability of an elderly household being food secure by 0.4%. This finding suggests that as household heads grow older, elderly households become more vulnerable to food insecurity.

In terms of socioeconomic characteristics, the employment status of the elderly is not statistically associated with the food security of elderly households. Only education and poverty are significantly associated with elderly household food security. The coefficient for education is 0.115, indicating that elderly households headed by individuals with a higher level of education have an 11.5% higher probability of being food secure than those headed by individuals with a lower level of education. This finding suggests that education is an important factor in enabling individuals to meet their food needs and achieve food security. Meanwhile, poverty is also significantly associated with elderly household food security. Elderly households classified as poor have a 47.8% lower probability of being food secure. This finding indicates that poverty is one of the main factors contributing to food insecurity among elderly households.

Among the household characteristics, household size is significantly associated with the food security of elderly households in the Special Region of Yogyakarta (DIY), with a marginal effect coefficient of −0.033. This indicates that each additional household member is associated with a 3.3% decrease in the probability of an elderly household being food secure. The social assistance variable is also statistically significant and is negatively associated with elderly household food security. Elderly households receiving social assistance have a 14.8% lower probability of being food secure. In other words, elderly households receiving social assistance are more likely to be food insecure. Meanwhile, in terms of residential location, elderly households living in urban areas have a 6.6% higher probability of being food secure. Therefore, elderly households residing in rural areas are more vulnerable to food insecurity.

Table 5. Logistic Regression Estimation Results

Dependent Variable: Food Security of the Elderly

Variables	Logistic Regression		Marginal Effect	
	Coefficient	Std Error	Coefficient	Std Error
Demographic Characteristics				
Gender	-0.149	0.273	-0.028	0.585
Marital status	-0.174	0.253	-0.033	0.492
Age	-0.020 *	0.011	-0.004 *	0.084
Socioeconomic Characteristics				
Working Status	-0.287	0.176	-0.054	0.102
Education	0.614 ***	0.186	0.115 ***	0.001
Poverty	-2,544 ***	0.308	-0.478 ***	0,000
Household Characteristics				
Amount Household Members	-0.178 ***	0.049	-0.033 ***	0,000
Home Ownership	0.018	0.310	0.003	0.954
Social Protection				
Help Social	-0.786 ***	0.175	-0.148 ***	0,000
Region				
Area (Urban/Rural)	0.350 **	0.158	0.066 **	0.026
Constant	3,001 ***	0.921		
Number of obs	1,034			
Prob > chi2	0,000			
Pseudo R2	0.192			

Significance Level: *p<0.1, **p<0.05, ***p<0.01

Source: SUSENAS 2021, estimated

Based on the findings of the logistic regression analysis, the largest marginal effect is observed for the poverty variable. This indicates that socioeconomic factors, particularly poverty, are the primary factors most strongly associated with the food security of elderly households compared with other characteristics, such as demographic characteristics. This finding is consistent with the results of the study conducted by Afifah & Prasetyaningtyas

(2023) and FAO (2003) which reported that non-poor households are more likely to be food secure than poor households. The findings of this study also confirm that the primary dimension of food security among elderly households in the Special Region of Yogyakarta (DIY) is economic access. Elderly households classified as poor tend to have limited purchasing power and restricted access to food, making them more vulnerable to obtaining food of inadequate quantity and quality. In addition, elderly households face relatively high expenditures on healthcare, as older adults are more susceptible to various health problems. These findings suggest that efforts to improve food security among elderly households should be closely linked to poverty alleviation strategies.

Furthermore, the positive association between education and elderly household food security indicates that higher educational attainment is associated with a greater ability among older adults to select and manage the food they consume. This finding is consistent with the study by Islam & Sim (2021), which found that individuals with higher levels of education are more likely to choose healthy foods than those with lower levels of education. Higher educational attainment also enhances an individual's ability to access information, manage available resources, and make informed decisions regarding food consumption.

Another interesting finding of this study is the negative association between social assistance and elderly household food security. This indicates that elderly households receiving social assistance are more likely to be food insecure. This finding confirms that social assistance programs have reached elderly households that are vulnerable to food insecurity. However, the prevalence of food insecurity among elderly households receiving social assistance in the Special Region of Yogyakarta (DIY) remains relatively high, suggesting that the assistance provided has not been sufficient to move these households into the food secure category. This interpretation is further supported by another finding of this study showing that a larger household size is associated with a higher likelihood of food insecurity among elderly households, as household income must be allocated to meet the food consumption needs of a greater number of household members (Fatimah et al., 2025). This finding is consistent with the study by Oktalia et al. (2025) which found that households receiving social assistance are more likely to belong to the food insecure category.

The findings of this study indicate that elderly households living in rural areas are more likely to experience food insecurity than those residing in urban areas. Urban areas generally have better infrastructure and public services than rural areas. Better access to transportation, healthcare services, and employment opportunities may enhance the ability of elderly households to obtain food. This finding is consistent with the study by Oktalia et al. (2025) which reported that households in urban areas have higher levels of food security than those living in rural areas.

CONCLUSION AND SUGGESTIONS

Food security is an essential aspect of the well-being of older adults. This study provides empirical evidence on the determinants of food security among elderly households in the

Special Region of Yogyakarta. The findings indicate that socioeconomic factors, particularly poverty, are the primary determinants of the food security of elderly households.

Based on these findings, improving food security of the elderly households should focus on poverty alleviation, as poverty is the main determinant associated with their food security. Poverty alleviation efforts may include expanding social assistance for elderly individuals who belong to vulnerable groups. In addition, the targeting of social assistance beneficiaries should be evaluated periodically to ensure that assistance continues to reach households that are genuinely eligible. Policymakers should also promote food literacy among older adults to improve their knowledge and capacity to manage available resources, particularly those related to food consumption. Furthermore, policies aimed at improving food security among elderly households should prioritize households with a larger number of household members and those residing in rural areas.

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