

# The Understanding of Household Food Security among Glutinous Rice Smallholder Farmer in Langkawi, Malaysia

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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v13-i16/18761> DOI:10.6007/IJARBSS/v13-i16/18761

*Published Date: 07-10-2023*

## Abstract

Malaysia has 44% of the population who are rural communities with smallholder farmers. Langkawi is one of the districts in Kedah with the potential for glutinous rice production. However, food security still occurs in areas such as Langkawi because of the price and market accessibility. The objective of this research is to examine the financial status of households and their access to sufficient food by utilizing the food poverty line. Additionally, it seeks to explore the connection between different sources of household income (total household income, respondent's income, and wife's income) and the availability of food in local markets. Respondents were selected according to a list of names of smallholder farmers who participated in the glutinous rice planting program. There are 118 respondents from eight villages in Langkawi was all population (census). The finding shows that the household income has a significant relationship with household food security using Pearson correlations (Household income = 0.08, respondent's income = 0.00, wife's income = 0.03). The findings of this study can be applied as a first step to addressing poverty and food insecurity among Langkawi small farmers participating in the glutinous rice program. In addition, it helps identify important elements that affect food safety.

**Keywords:** Food Access, Food Poverty Line, Poverty Line, Food Security, Smallholder Farmers

## Introduction

Food demand is expected to rise as the world's population grows, but the number of young farmers is declining (Tauer, 2019). There are numerous reasons why taking up farming at a later stage in life. These include the presence of alternative job prospects in non-agricultural sectors, the limited profitability associated with agriculture, and the prevailing negative perceptions towards farming among younger generations (Akhtar et al., 2019). Small-scale farmers encounter a multitude of challenges, such as the agricultural framework, their

geographical location, prevailing weather patterns, and governmental regulations that can either enhance or exacerbate their circumstances (Dedehouanou & McPeak, 2020). In Malaysia, more than 1.6 million people were employed in the agriculture sector in 2013, which also produced more than 23% of Malaysia's total export revenue and 7.2% of its GDP (Dardak et al., 2022; Ng, 2016; Omar et al., 2019). As much as 56% of farmers currently grapple with persistent food insecurity, while 36% encounter episodic food insecurity, and 24% have experienced both forms of food insecurity (Alpizar et al., 2020).

Malaysia is concentrating on poverty alleviation (Department of Statistics Malaysia, 2018). Malaysia currently has a poverty incidence of 5.6% in 2019, and 8.4% in 2020. Meanwhile, the percentage of people living in poverty in Kedah was 8.8% in 2019 and 12.7% in 2020. The average PLI (Poverty Line Income), calculated using the 2019 technique, is RM2208 per month, according to the 2019 Economic Planning Unit (EPU) However, the Food Poverty Line is RM1038 a month for households with an average of four persons (Mohamad et al., 2021). Food insecurity affects 50% or more of rural communities with low incomes, and 34.5% of children are hungry (Shariff & Khor, 2008). Characterized by a larger family size, a mother who is only a housewife, and a larger number of children 59.5% of food-insecure families live below the poverty line, and 7.8% are classified as hard-core poor households. The data reveals that poverty affects rural communities, where small-scale farmers reside and face significant challenges (Gomez, 2020).

The majority of the world's food, ranging from 50% to 70%, is produced by smallholder farmers. However, it is ironic and heartbreaking that these farmers often experience poverty and food insecurity within their households. Recent research by Giller et al (2021) highlights this issue. Several studies, including Dedehouanou and McPeak (2020); Marco et al (2020b), have provided strong evidence of a link between household income and food insecurity. The objective of this study is to examine the level of household income and food security by using the food poverty line as a measure. Additionally, the study aims to explore the correlation between different sources of household income (total household income, respondent's income, and wife's income) and the accessibility of markets for the respondents.

## **Literature Review**

### **Food Security**

Problems such as financial crises, unstable food prices, climate change, rising production costs, and natural disasters (drought and pests) cause food security in an economic approach to be a consideration (Giller et al., 2021). There are several food security approaches, such as dimensions, levels, and components that show in the Table 1 (Leroy et al., 2015). Food security is a multidimensional concept, the assessment of which requires the measurement of several indicators that can together capture the various dimensions of food security (Cafiero, 2019). There are four dimensions of food security, physical availability, economic and physical access, food utilization, and stability (FAO, IFAD, UNICEF, WFP, 2019).

Table 1

*The Definition of each dimension of Food Security (FAO, 2014).*

Dimensions of Food Security	Definition
Physical Availability of Food	Food availability addresses the supply side of food security and is determined by the level of food production, stock levels, and net trade.
Economic and Physical Access to Food	An adequate supply of food at the national and international level does not guarantee household-level food security. Concerns about insufficient food access have resulted in a greater policy focus on incomes, expenditures markets, and prices in achieving food security objectives.
Food Utilization	Utilization is commonly understood as the way the body makes the most of various nutrients in the food. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, diversity of the diet, and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the <i>nutritional status</i> of individuals.
Stability the other three dimensions	Even if your food intake is adequate today, you are still considered to be food insecure if you have inadequate access to food on a periodic basis, risking a deterioration of your nutritional status. Adverse weather conditions, political instability, or economic factors (unemployment, rising food prices) may have an impact on your food security status.

Food availability is determined by levels of food production, stock levels, and net trade and addresses the supply side of food security. However, it is important to note that having access to sufficient food supplies at national and international levels does not guarantee food security at the household level, as highlighted by (Leroy et al., 2015). Recognizing concerns regarding insufficient access to food leads to a greater policy focus on income, expenditure in markets, and prices to achieve food security objectives, as discussed by (Cantillo et al., 2020). Utilization refers to the body's ability to extract the maximum nutrients from food. Adequate energy and nutrient intake are influenced by factors such as proper grooming and feeding practices, food preparation, dietary diversity, and equitable food distribution within the household, as emphasized by (Cafiero, 2019). More importantly, if current food intake is deemed sufficient, individuals may still be considered food insecure if they lack regular access to adequate food. Adverse weather conditions, political instability, and economic factors such as unemployment or rising food prices can all contribute to the risk of worsening nutritional status and impact food security.

Hence, to comprehensively capture the complex reality of food insecurity in any given context, it is necessary to employ a combination of measures and indicators, as stated by (Carletto et al., 2013). Access to food security exists at various levels, including global, regional, national, household, and individual levels, as discussed by (Sulaiman et al., 2021). Household food security refers to the capacity of a household to consistently have access to nutritious and safe food, enabling each member to lead an active and healthy life. This encompasses the physical, social, and economic aspects of accessing food that is of sufficient

quality, quantity, and variety to meet nutritional requirements and preferences, ultimately supporting a healthy lifestyle (Ibrahim et al., 2023). Factors such as poverty, unemployment, rising food prices, and discrimination can all contribute to household food insecurity, leading to adverse effects on physical and mental health, as well as social and economic well-being (Bahta & Lombard, 2023; Giller et al., 2021; Ogutu et al., 2020; Shaw et al., 1999; Tarasuk, 2001).

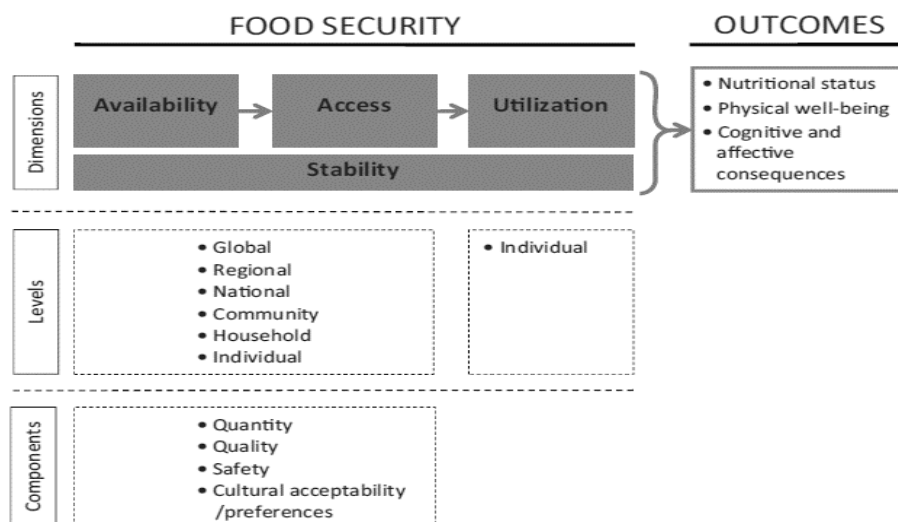


Figure 1. Food Security Dimensions, Levels and Components (Leroy et al., 2015)

In economic approaches to food security, there is a tendency to prioritize the dimension of food access over other dimensions such as availability, utilization, and stability. The access dimension refers to the ability of individuals, households, and populations to acquire and consume a nutritious diet by having adequate economic and physical resources, including the capacity to purchase and transport food, knowledge, and skills to make appropriate food choices, and the time and mobility required for food shopping and preparation. Researchers such as Coates et al (2007); Ibrahim (2021); Leroy et al (2015) have highlighted the importance of the access dimension. Economic approaches to food security have traditionally focused on evaluating aggregated indicators related to food supply, agricultural production, and trade balances within the agricultural sector, as discussed by (Gittelsohn et al., 1998). Food security has conventionally been understood in terms of national and global food supplies. However, in the 1980s, there was a growing interest in examining household food security. The Food and Agriculture Organization (FAO, 2008) identified the dimensions of food security as the physical availability of food, economic and physical access to food, food utilization, and the stability of these dimensions over time. It is important to acknowledge that food insecurity can exist even in the absence of food poverty as a contributing factor, but food poverty cannot occur without food insecurity.

Food poverty refers to the inadequate economic access to a sufficient quantity and quality of food necessary to maintain a nutritionally satisfactory and socially acceptable diet, as described in the (Food Security Model, 2002). This condition arises primarily from a lack of income, but other factors such as volatile food prices, inflation, and significant price hikes can further diminish the purchasing power of consumers. Prolonged exposure to food insecurity resulting from food poverty can have detrimental effects on health and well-being (Cafiero, 2019; Coates et al., 2007; Department Of Statistics Malaysia, 2020; Cantillo et al., 2020;

Messer, 2009). Health issues such as malnutrition and stunted growth are common consequences of this situation. Furthermore, challenges related to education, income levels, personal preferences, and cultural acceptance also influence food security. Numerous studies show that education plays a significant role in improving nutrition outcomes in developing countries, with higher levels of education being associated with better nutrition (Bashir & Schilizzi, 2013; Cantillo et al., 2020; Messer, 2009; Mustaffa et al., 2019).

According to (Alpizar et al., 2020) to ensure food security among rural communities under a changing climate, this study shows the prevalence of food insecurity among smallholder farmers on a seasonal and episodic basis. Among smallholder farmers, a significant percentage face food insecurity, with 56% experiencing recurrent food insecurity, 36% encountering episodic food insecurity, and 24% facing both types. Various factors contribute to food insecurity, including the age of the household head, household size, and the education level of family members. Previous research conducted by Mango et al (2014) focused on household food security among smallholder farmers and aimed to identify the factors influencing it. The study differentiated between independent variables (such as the age of the household head, education level of the household head, household size, and market independence) and dependent variables (Household dietary diversity score and Household food insecurity access score). The findings of this study revealed that the age and size of the household head have a negative impact on food security, while education, increased labor availability, access to remittances, and market information have a positive effect on food security.

### **Household Income**

Household income refers to the total earnings of all members of a household over a given time period, usually a year or month. It is a measure of the economic resources accessible to a household and is frequently used to assess people and families to achieve a standard of life (U.S Census Bureau, 2008). In Malaysia, households are classified into income categories known as B40, M40, and T20. These categories are based on the income levels of the households. The B40 category represents the bottom 40% of households with the lowest income levels, while the M40 category comprises the middle 40% of households with moderate income levels. On the other hand, the T20 category refers to the top 20% of households with the highest income levels. These classifications assist policymakers in addressing income inequality and developing targeted programs to assist low-income households, support the middle class, and ensure equitable wealth distribution. The levels consist of B40, M40, and T20, where B40 is for people with household income below RM4898, M40 is for people with household income below 10959 and T20 is for people with household income above RM10960 (Department of Statistics Malaysia, 2020).

Poverty among smallholder farmers is a serious issue marked by low and inconsistent income, restricted access to resources, market limits, climate change threats, and a lack of social and financial services. Farmers confront difficulties in earning a living, accessing markets, implementing modern farming techniques, and controlling environmental threats (Babatunde & Qaim, 2010; Bashir & Schilizzi, 2013; Marco et al., 2020). Previous research has found that farmers in Kedah fall into Group B40, with an average income of RM2000-RM4000 or less. (Afroz et al., 2019; Akhtar et al., 2019; Hadijah et al., 2012). Compared to the average Malaysian income of RM7901, this is considered small (Department of Statistics Malaysia, 2020). Thus, it indicates Kedah's farmers are in poverty (Afroz et al., 2019).

**Market Accessibility**

The ability to acquire food from markets is known as market accessibility, while food security encompasses the availability, affordability, and quality of food for all individuals (Usman & Callo-Concha, 2021). Enhancing market accessibility plays a crucial role in improving food security by increasing the availability and variety of food, stabilizing prices, reducing post-harvest losses, generating income for farmers, and enhancing resilience to shocks (Muraoka et al., 2018). However, ensuring food security requires addressing factors beyond market access alone, such as social safety nets, policies, infrastructure development, and community resilience. Physical access to food is essential for determining whether food is available or not (Usman & Callo-Concha, 2021).

**Methods****Location**

Langkawi, situated in the state of Kedah, is an island located approximately 500 kilometers north of Kuala Lumpur, Malaysia. The study was conducted in seven villages within Langkawi, namely Ulu Melaka, Lubuk Setol, Ayer Warm, Nyior Chabang, Bukit Termin, Mawat, and Padang Saga. The island has a tropical climate characterized by warm temperatures ranging from 24°C to 33°C. These favorable temperature and humidity conditions create an ideal environment for the cultivation of glutinous rice. (Zulkifly *et al.*, 2011; Zainal and Shamsudin, 2021).

**Sample and Sampling**

The population of this study is farmers engaged in the cultivation of glutinous rice. These farmers participate in a government-supported program that offers subsidies for glutinous rice production, including provisions such as seeds, fertilizers, and access to smart-farming techniques, such as drone rentals provided by service providers. The sampling method used in this study is whole population sampling, also known as a census. This approach involves including all farmers who are actively involved in government programs, specifically those practicing smart-farming techniques for glutinous rice cultivation. The total number of respondents in this study is 118. As many as 85% of respondents worked on less than 5 hectares of land. Those lands are either rented, self-owned, or both. The minimum admissible sample size for a correlational study is 30. If the data happen to be less than 30, the degree of correlation may be incorrectly calculated (Fraenkel, 2011).

**Instrument**

In the first section, the respondent was given a questionnaire regarding the respondent's income, the respondent's occupancy, the wife's job, and the wife's income. In the further section, the questions are related to monthly spending on food (adjusted to align with the food poverty line) and the frequency of consuming specific food items such as rice, chicken, fish, meat, vegetables, and fruit. The questionnaire for this section was adopted from the Khazanah Research Institute Malaysia 2018. Moving on to the third section, participants were asked about market accessibility, including the distance between their homes and the market, the mode of transportation used, and any challenges faced in acquiring certain food items. The questionnaire for this section was adopted from (Usman & Callo-Concha, 2021).

### Data Collection

The questionnaire utilized was one that had been approved by the UPM Ethic Committee for Research Involving Human Subjects. The respondents were chosen from a list of names provided by the Malaysian Department of Agriculture. Glutinous rice production piqued the interest of approximately 300 farmers at first, but due to natural circumstances causing crop failure, some of the responses withdrew. Data for this study were gathered in August 2022. Face-to-face meetings were held, and researchers aided farmers in filling out and comprehending surveys. The researchers created a questionnaire bundle that included an ethical concern form.

### Data Analysis

To determine the household income level and food security, a food poverty line with descriptive analysis was used. Other than that, Pearson Correlation was utilized to determine the correlation between household income (total household income, respondent's income, and wife's income) and food security, then market accessibility was determined using descriptive analysis.

### Results and Discussions

#### The Descriptive Household Income and Poverty Line

According to the Department of Statistics Portal Malaysia (2021), the current poverty line income for households is set at RM2208. In Langkawi, out of the total 118 families surveyed, 59 families (50%) had an income exceeding RM2208, while the other 59 families (50%) were considered poor as their income fell below RM2208. Referring to Table 2, the distribution among income categories reveals that 87.3% belong to the B40 group, 11.9% belong to the M40 group, and 0.8% fall into the T20 group. The average household income is calculated as RM2852.7, with a median of RM2250. The range of household income varies from a minimum of RM500 to a maximum of RM15500. Recent research by Afroz et al. (2021) suggests that climate change in Kedah can have adverse effects on farmers' income due to increased operational costs. Moreover, factors such as education inequality, crop failure, and natural disasters can render smallholder farmers vulnerable to poverty (Bahta & Lombard, 2023; Barrett, 2008).

Table 2

#### *The Tabulation of Household Income*

Household Income (RM)	n	%	Mean	Median	Min.	Max.	Std. Dev
B40 Group			2852.7	2250	500	15500	2192.3
1. Less than 500 (B1)	1	0.8					
2. 500-999 (B1)	3	3.4					
3. 1000-1499 (B1)	18	15.3					
4. 1500-1999 (B1)	21	17.8					
5. 2000-2499 (B1)	22	18.6					
6. 2500-3169 (B2)	20	16.9					
7. 3170-3969 (B3)	8	6.8					
8. 3970-4849 (B4)	9	7.6					
M40 Group							
9. 4850-10959 (M40)	14	11.9					
T20 Group							
10. Up to 10960 (T20)	1	0.8					

**The Descriptive of Food Security with Food Poverty Line**

Rice holds significant importance as a staple food, particularly in rural and impoverished areas (Khazanah Research Institute Malaysia, 2018). Respondents in the study reported consuming rice twice a day, with an average monthly expenditure of RM41.4. Based on the Department of Statistics Malaysia (2021), the average price of rice in Kedah is RM25.6 per ten kilograms. By using this price, we can estimate that the average rice consumption per household (consisting of four members) is 16.1 kilograms per month. The Khazanah Research Institute Malaysia (2018) states that the average household expenditure on rice is RM44 per month nationwide. However, in rural areas, the average expenditure on rice is higher at RM51 per month. The expenditure on rice by the respondents is lower than the national average for Malaysians and also lower than the average for rural areas. This difference may be attributed to the availability of various food choices, such as bread and cereals, in urban areas (Khazanah Research Institute, 2018).

The biggest expenditure in terms of protein sources is on fish (RM235.8), followed by other non-meat protein sources (RM24.3), and poultry (RM156.4). Respondents reported consuming fish approximately 4.7 times per week, indicating that fish plays a prominent role in their protein diet compared to meat (consumed once a month) and poultry (consumed twice a week). According to the Khazanah Research Institute (2018), the average monthly fish consumption in rural areas of Malaysia is RM163 per household. Therefore, it can be concluded that the respondents consume a higher quantity of fish and seafood compared to the average rural area in Malaysia. This is likely due to the geographical location of Langkawi, surrounded by the sea, which provides easy access to a variety of fish. Similar patterns can be observed in the consumption of meat and poultry. The average monthly consumption of meat and poultry in rural areas is RM108 per household (Khazanah Research Institute, 2018). Thus, the respondents have a higher average consumption of fish, poultry, and meat compared to the average rural area in Malaysia.

From the table, it is evident that 90 respondents consistently include vegetables in their meals, with an average expenditure of RM104.1. Similarly, for fruits, the average expenditure is RM105. These figures surpass the average expenditure in rural areas, which is RM84 for vegetables and RM40 for fruits. However, in terms of other consumption categories, the respondents' expenditures are lower compared to the average for rural areas, which stands at RM225, whereas the respondents spend an average of RM95.4. This includes expenses on other staple foods such as bread and cereals, oil and fat, beverages, and dairy products. Research by Szałajko et al (2021) indicates that the disparities in food consumption between rural and urban areas are influenced by factors such as education and socioeconomic status. Diversity in food consumption is very important, which becomes a factor affecting overweight and stunting for children (Hatløy et al., 2000), lack of diversity in food consumption can promote health problems (Ding & Kinnucan, 2011).



Table 3

*Household Food Expenses and The Frequency*

Items	The frequency number of food intake			Expenditure (RM)		
	Mean	Median	Minimum-Maximum	Mean	Median	Minimum-Maximum
How many times do you eat rice in a day?	2.4	2	1-4			
How much do you spend to buy rice in a month?				41.4	39.5	10-100
How many times do you eat fish in a week?	4.7	5	0-7			
How much do you spend to buy fish in a month?				235.8	200	0-300
How many times do you eat poultry in a week?	2.6	2	0-7			
How much do you spend to buy poultry in a month?				156.4	120	0-300
How many times do you eat meat in a month?	1.2	1	0-5			
How much do you spend to buy meat in a month?				24.3	24	0-108
Do you always eat vegetables at every meal? 1. Yes 2. No	90 28					
How much do you spend to buy vegetables in a month?				104.1	80	0-150
How many times do you eat fruits in a week?	2.2	2	0-7			
How much do you spend to buy fruits in a month?				105	80	0-150
The other expenses in Food				95.4	18.5	0-1811

The Food Poverty Line can be used to illustrate the economic approach to ensuring food security in addition to the addition of nutrients. The food poverty line in Malaysia is RM1169 for a family of four (Department of Statistics Portal Malaysia, 2021). The food poverty line is a tool used to measure the least amount of food that a community will accept for a given food price (Cafiero, 2019; Marco V. Sánchez Cantillo et al., 2020; Omar et al., 2019).

Table 4

*The Average Household Food Expenditure*

No	Expenditure (RM)/Household in a month							Total (RM)
	Rice	Fish	Poultry	Meat	Vegetable	Fruit	Other Expenses in Food	
1	41.4	235.8	156.4	24.3	104.1	105	95.4	762.4

Out of the total 118 families surveyed, a majority of 108 families (91.5%) fall below the food poverty line, which is defined as food expenditure that costs less than RM1038. Based on Table 4, it is observed that the average food expenditure among the respondents is RM762.4. The highest expenditure is allocated towards purchasing fish, while the lowest expenditure is

associated with meat. However, there are studies explaining that food consumption in low-income families in urban and rural areas shows differences, where urban areas are more fulfilled in terms of nutritional fulfillment (Alpizar et al., 2020; Shariff & Khor, 2008). This is likely due to the different food standards and higher expenditure for food in urban areas. Hence, the amount of food expenditure affects the fulfillment of nutritional value (Shariff and Khor, 2008). Apart from that, rural communities also carry out coping strategies such as cultivating crops, raising livestock, and picking wild vegetables (Dil Farzana et al., 2017; Shariff & Khor, 2008)

### The Household Income and Food Security

In this study, the monthly household income is calculated by combining the primary income of smallholder farmers, their part-time earnings, and the income of their wives. Income from children was not considered in the analysis since no respondents confirmed receiving income from their children. Some respondents mentioned receiving remittances from their children but were uncertain if it would be received consistently every month. From the findings presented in Table 5, it is evident that household income, respondent's income, and wife's income have a significant impact on food security as measured by the food poverty line. Income plays a crucial role in meeting the food needs of the household, and a characteristic of food poverty is when a significant portion (80% or more) of the household income is allocated toward fulfilling the family's food requirements. This highlights the relationship between household income, respondent's income, spouse's income, and food security. To mitigate food insecurity in rural communities, various strategies can be implemented, such as cultivating vegetables and raising livestock, as suggested by (Maxwell and Smith, 1992). Adhiana et al (2022) discuss the economic contributions of wives in rural communities, as they often engage in activities such as crop selling, trading, or working as government or private employees, which can support the family's economy.

Table 5

#### *The Relationship between Household Income and Food Security*

Item 1	Item 2	Significance
Household Income	Food Poverty Line	0.08
Respondent's Income	Food Poverty Line	0.00
Wife's Income	Food Poverty Line	0.03

### Market Accessibility by Glutinous Rice Smallholder Farmers

The accessibility of markets, including factors such as road distance and transportation costs, plays a significant role in the food security of small farming households. The research findings suggest that improving off-farm employment opportunities, enhancing transportation facilities, and investing in road infrastructure can positively impact local food security (Ahmed et al., 2017). According to Table 6, the majority of respondents (94.9%) have access to the market through vehicles, and the average distance between their homes and the market is 2.4 km. Market access has a broad range of effects on dietary diversity and food security for smallholder households. By investing in infrastructure to improve rural road connectivity, transaction costs can be reduced, benefiting the well-being of smallholder farmers and their communities (Usman & Callo-Concha, 2021). In the study, it was found that some respondents experienced difficulty in obtaining specific food items such as eggs and cooking oil. Limited availability and challenges in acquiring cooking oil are more prevalent in certain

areas, particularly rural regions. The lack of food distribution can be attributed to demographic factors and unsafe food handling practices, as discussed by Patil et al. (2005).

Table 6

*Market Accessibility Factors*

Items	n	%
Distance house and market (Km)		
1. Less than 1	5	4.2
2. 1-2	71	60.2
3. 2.1-3	8	6.8
4. Up to 3	34	28.8
5. Mean	2.4	
6. Median	1	
7. Minimum	0	
8. Maximum	10	
Vehicle to go to market		
1. Have a vehicle	112	94.9
2. Don't have vehicle	6	5.1
Staple food that is hard to get in the market		
1. Yes	95	80.5
2. No	23	19.5
Kind of rare food		
1. Egg	12	10.2
2. Cooking oil	11	9.3

**Conclusions and Recommendations**

The majority of smallholder farmers belong to the B40 group (87.3%), and half of them fall below the poverty line. Concerning food security, a significant proportion (91.5%) of these farmers are below the designated food poverty line. Among their food expenditures, the highest consumption is allocated to purchasing fish, while the lowest is allocated to buying beef. There exists a correlation between the overall household income, respondent's income, and wife's income with food security. In terms of market accessibility, respondents generally own a vehicle, and the average distance to the market is 2.4 km. However, there are certain items, such as cooking oil and eggs, that are difficult to find.

Nevertheless, several limitations need to be acknowledged in this study. Firstly, the assessment of food insecurity is limited to an economic approach, and future research should consider incorporating nutrition and stability approaches for a more comprehensive analysis. Additionally, since there is no comparative research between before and after smallholder farmers participating in the glutinous rice planting program, comparing the program with other initiatives or conducting before-and-after assessments would contribute to a more robust understanding. It is important to note that the findings of this study may not be generalized to all farming communities in Malaysia. However, the findings can serve as an initial strategy to address poverty and food insecurity among smallholder farmers in Langkawi who are involved in the glutinous rice program. Moreover, the study helps identify significant factors influencing food security.

### Acknowledgement

University Putra Malaysia that providing research grant “Grant Putra” for this study. (TRGS/1/2020/UPM/02/7)

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