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Prayitno, Gunawan
Regional and Urban Planning Department, Engineering Faculty, Brawijaya University

Efendi, Achmad
Department of Statistics, Faculty of Mathematics and Natural Sciences, Universitas Brawijaya

Hayat, Ainul
Faculty of Administrative Sciences, Universitas Brawijaya

Fikriyah
Regional and Urban Planning Department, Engineering Faculty, Brawijaya University

他

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Quality of Life and Food Security in Rural Areas of Indonesia: a Case Study of Sedayulawas Village, Lamongan Regency, Indonesia

Gunawan Prayitno[1*], Achmad Efendi[2], Ainul Hayat[3], Fikriyah[4], Hagus Tarno[5], Aris Subagiyo[6], Femiana Gapsari[7], Enock Siankwilimba[8], Jacqueline Hiddlestone-Mumford[9]

[1]Regional and Urban Planning Department, Engineering Faculty, Brawijaya University, Malang, Indonesia

[2]Department of Statistics, Faculty of Mathematics and Natural Sciences, Universitas Brawijaya, Malang

[3]Faculty of Administrative Sciences, Universitas Brawijaya

[4]Regional and Urban Planning Department, Engineering Faculty, Brawijaya University, Malang, Indonesia

[5]Faculty of Agriculture Universitas Brawijaya, Malang, Indonesia

[6]Regional and Urban Planning Department, Engineering Faculty, Brawijaya University, Malang, Indonesia

[7]Mechanical Engineering Department, Engineering Faculty, Brawijaya University, Malang, Indonesia

[8]Graduate School of Business, University of Zambia, Lusaka, Zambia

[9]Management School, University of Liverpool, United Kingdom

*Author to whom correspondence should be addressed:

E-mail: gunawan_p@ub.ac.id

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Abstract: As part of a poverty alleviation program enshrined in the global sustainable goals numbers one and two, Sedayulawas Village in the Lamongan Regency was selected as a pilot project with abundant agricultural land for crops such as corn, tubers, beans, and collecting salt. However, the declining institutional governance in the farming sector due to conflict has been brought on by the COVID-19 pandemic. To figure out the quality of life (QOL) of the people in Sedayulawas Village, an evaluation was done using a questionnaire about QOL and food security. This strategy completely accomplishes its goals of providing information, identifying food security, and measuring it. This study also evaluates the impact of food security on residents of Sedayulawas Village who work in agriculture. A confirmatory factor analysis (CFA) approach was used, followed by analysis in SEM-PLS with smart-PLS software to develop the resultant model. The results show a positive result of the link between the QOL and food security, with the most important material variable having an effect of 77.9%. Therefore, increasing household food security for farmers is a to their subjective well-being and encourages human capital accumulation. This positively affects productivity and helps keep farming in rural Indonesia sustainable. Food insecurity in rural areas can be reduced by conducting research, developing mitigation strategies, and implementing them. To advance food security at the village level, several programs must be implemented by the government, including readiness programs that reduce hunger risk and improve quality of life.

Keywords: quality of life; food security; SEM-PLS; subjective well-being

1. Introduction

The younger generation in developing countries has a decreasing intention to work in agriculture[1)] and both developed and developing countries regularly experience the abandonment of agriculture[2,3)]. However, despite economic, social, or environmental disturbances, agriculture remains a key driver of job creation, poverty reduction, and industrial development in many developing countries[4)]. As a result, family farming[5)] requires a succession plan as aging farmers lead to rural depopulation and subsequent under development[3)].

Social, economic, and environmental indicators measure the quality of life (QOL) and farmer welfare[6)]. QOL refers to welfare (well-being) and living standards[7)]. In addition, there are similarities between well-being and QOL. Both are related to satisfying an individual's material, biological, psychological, social, and cultural

needs and demands[8]. However, well-being also has a broad concept of mental health[9]. Todaro and Smith[10] argued that control of one's own life or freedom of choice is a central aspect of most understandings of well-being globally. Because QOL encompasses both approaches to human life from a material and mental perspective, it can be said that QOL is a broad and complex concept that combines objective and subjective elements[11]. Nevertheless, QOL can be viewed at many levels, ranging from the individual to the community to the nation, making it difficult to measure[12]. QOL is "a multi-scale, multi-dimensional concept comprising objective and subjective elements that interact." Indicators, further subdivided into subjective and objective categories, measure QOL[13]. Various aspects of life, such as work, family, friends, and leisure, are represented by subjective indicators, which show how satisfied a person feels in each area. External assessments of family, social, and other health-related factors and income levels are examples of objective indicators[14].

Indonesia is an agrarian country, with agriculture being the main livelihood in rural areas with lower income level[15]. One of the dimensions of social indicators is the actual social dimension, namely the well-being of farmers and their families[16], where the quality of life aspects can be utilized from the farmer's perspective[17] although, there is no definite concept of measurement[18]. QOL is also influenced by aspects of well-being, which can be seen from the time spent working on agricultural land, the age of ownership of agricultural assets, financial condition and savings, and community involvement[19,20]. Increasing the well-being of farmers can directly contribute to improving QOL in multi-functional activities, including food security[21] that will support sustainable agriculture.

Measuring farmers' QOL in rural areas can be related to their food security because it relates to their ability to meet food needs and influences their happiness[22]. There are various degrees of food security, ranging from very low to low, categorized as food insecurity, and marginal to high, categorized as food security[23]. Law No. 18 of 2012 of the Republic of Indonesia on Food defines food security as[24]: "the condition of fulfilling food for the state down to individuals, which is reflected in the availability of sufficient food, both in quantity and quality, that is safe, diverse, nutritious, equitable, and affordable and does not conflict with the religion, belief, and culture of the community, to be able to live a healthy, active, and productive life in a sustainable manner." To live an active and healthy existence, everyone must have access to enough food on a micro and macro level, which is why food security is defined as both the availability of enough food for the entire nation and the satisfaction of those needs. A healthy and active life will positively influence the QOL of people, especially the children and aged in rural areas.

QOL in rural areas is a concern because, in recent times, there has been turmoil, and the interest of the younger generation has decreased. High quality of life and the ability to maintain food security are the keys to maintaining the rural population, attracting the younger generation, and encouraging village economic development. This study explains how a farmer's QOL affects their food security. There is little literature that discusses the relationship between these two aspects. This study attempts to explain the determinants of QOL and food security among farming families in the Sedayulawas Village of Indonesia. Sedayulawas Village is one of the villages in Lamongan Regency selected as a pilot project for poverty alleviation through a self-sufficient food program. Furthermore, Sedayulawas Village is included in the coastal village with potential not only for the coast, but also for agriculture with a technical irrigation system. The village also has abundant potential for productive agricultural land for growing corn, tubers, beans, and collecting salt. As a result, the evaluation of the standard of living and food security in this village can be applied to other villages in areas with similar characteristics, particularly in Indonesia.

Poverty reduction or alleviation is a global concern. As such, the United Nations' Sustainable Development Goals have highlighted it as goal number one, while zero hunger is goal number two[25]. However, the declining institutional governance of the farming sector due to the COVID-19 pandemic has caused conflicts. This is due to the lack of information obtained, capital assistance channeled to where needed, and low cooperation that affect the management of agricultural products.

This study uses a modeling framework with Partial Least Square-Structural Equation Modeling (PLS-SEM) to explain the QOL and well-being of the people of Sedayulawas Village in Indonesia. Therefore, low QOL standards threaten sustainable agricultural development[26,27]. This study offers fresh perspectives on the variables affecting food security. A sample of 479 farmers was used to estimate an accurate data model, leading to a structural equation model in which each influencing factor was examined, qualitatively and quantitatively. Furthermore, the analysis presented in this study offers crucial data for subsequent studies investigating life quality and food security in sustainable agriculture.

2. Literature Review

2.1 Quality of Life (QOL)

QOL is a person's perception of their position in life with respect to their goals, expectations, standards, mental and physical health, independence level, social relationships, self-confidence, and interactions with their environment[28]. Economic, political, and social behavior and abilities are essential dimensions influencing QOL between different communities[29]. As well as material, emotional, community, and health/safety well-being, QOL encompasses dimensions of happiness in life[30]. Income

and cost of living are two dimensions of QOL, a type of material well-being. As the first dimension of material well-being, income comes from an individual's work or livelihood, including new businesses or business opportunities that can be achieved. At the same time, the cost of living includes a residence tax and the price of necessities. In the second dimension, emotional well-being is measured by the quality of free time and comfort in carrying out religious activities. The third dimension, community well-being, is seen from the position of an individual in society or the local environment in social life, public services, and public facilities. Finally, the fourth dimensions of well-being related to health and comfort are measured through health conditions, acceptable environmental quality (water and air), as well as the safety and comfort of the living environment. From the above definition of "quality of life" (QOL), it is our considered opinion that QOL is a complex issue that is both subjective and objective in nature.

According to research conducted in rural Indonesia[31], older age groups with low socioeconomic and educational levels have a higher quality of life than groups with higher levels of education. This study highlights the need for immediate action to address issues with quality of life, particularly for groups with older ages and lower levels of education.

2.2 Food Security

Food security consists of three sub-systems that must be met, including the availability of food commodities (food availability), easy food access (food access), and affordability, though scholars have extended food security to include food absorption (food utilization). If one cannot be fulfilled, it can be said that the needs are not evenly distributed and food security are still fragile[32]. Stability in food security is not only based on the production aspects but also on the community's ability to access food, food security, and safe distribution[33]. Food affordability is the determinant of access to food and a balanced diet. It can be characterised as the ability to purchase food at market prices in relation to the amount of a household's income and other expenses[34]. However, food security is becoming unstable due to climate change and the financial crisis, which comes from three factors. First, the large number of poor people results in low access to food. Second, there is not enough food production to meet food reserves. Third, the lack of development of varied staple food consumption patterns[35]. However, recent wars and conflicts have been attributed to the cause of food insecurity[36]. For instance, the war between Ukraine and Russia has crushed food delivery and production systems, affecting global food security and incomes[37]. Therefore, the approach to developing food security in the future requires participation between the government (central and regional), the private sector, and the community through empowering local institutions such as village barns and increasing the role of the community in food supply[33].

As the fourth-largest nation in the world, Indonesia is the most agriculturally productive nation in Southeast Asia. With such a large population, Indonesia faces the challenge of how to provide food for its people, as up until now, Indonesia has not been able to ensure the fulfillment of food supply for its people[38]. Data from Indonesia's Food Security Agency or BKP demonstrates that rural areas have lower food security than urban areas[39]. The amount of food security in Indonesia is greatly influenced by factors like land area, rice production, livestock production, and population density, which includes housing, electricity, and gas[38]. Therefore, in this situation, improving consumption in terms of quantity and quality as well as availability, affordability, and stability of access to food are all necessary to achieve food security.

2.3 Well-being

Human well-being is the culmination of emotional and cognitive elements that individuals encounter through the subjective assessment of their lives. This evaluation also evaluates the cognitive aspects of affective life responses[9,40]. The term "well-being" refers to a variety of evaluations of life satisfaction, happiness, and both positive and negative affective aspects of the human experience[41]. There is empirical proof that people who experience high levels of well-being are better able to positively impact their surroundings and succeed in areas like self-acceptance, discovering a meaningful purpose in life, growing personally, and fostering positive relationships with others and the environment[42,43]. This data indicates a reciprocal relationship between well-being and sustainable behavior (self-care). The link between sustained behavior and wellbeing has been established, whereby people with higher subjective well-being behave healthier and experience longer life spans[44]. In contrast, the inability to experience pleasure in life is associated with low self-care. Similarly, less self-care is linked to more severe fatigue and traumatic stress symptoms[45].

Education has a favorable effect on subjective well-being, according to the findings of research conducted in rural Indonesian regions[46], On subjective welfare measures like happiness and life satisfaction, this has a favorable and significant impact. Additionally, happier and more satisfied with life people are in better health.

3. Methods

3.1 Research Location

Researchers conducted this research in East Jawa, Indonesia. The village of Sedayulawas is situated along the north coast, close to Pantura, with an area of approximately 10.64 km^2. Administratively, Sedayulawas Village is divided into three hamlets: Sedayulawas, Wedung, and Ngesong. Land use in this village is dominated by semi-technical irrigated rice fields, which

reach 150 ha, or 76.57% of the total administrative area of Sedayulawas Village. This means that the predominant types of work carried out by rural people are farming and farm labor. Nevertheless, due to its advantageous location next to the Java Sea, residents can work in the pond and fishing industries. The above factors led the team of researchers to choose Sedayulawas Village.

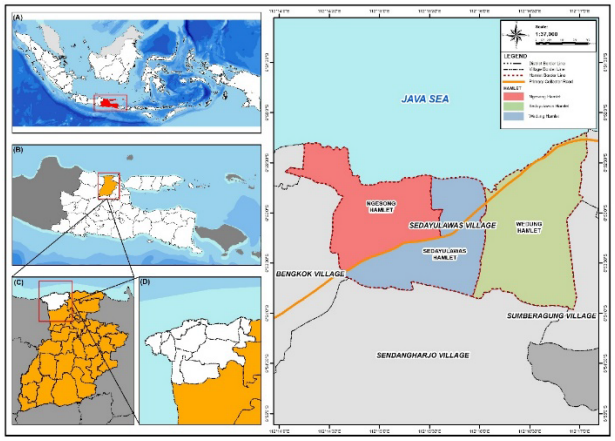


Fig. 1: Map of the Study Area A. East Jawa Indonesia. B. Lamongan Regency to East Jawa. C. Brondong District is highlighted on the Lamongan Regency map in the area that is highlighted. D. Village in the district of Brondong. E. Sedayulawas Village Map.

3.2 Research Design

The research methodology used in Sedayulawas Village was a type of descriptive analysis to ascertain the state of food security and QOL following the COVID-19 pandemic. An evaluation analysis was conducted using a questionnaire focused on QOL and food security to gauge the quality of life of the residents of Sedayulawas Village. The data was then analyzed using confirmatory factor analysis (CFA). After receiving the QOL results, a structural equation modeling analysis (SEM) was carried out to model the connection between QOL and food security in Sedayulawas Village.

This study used a 47-question questionnaire, 38 of which were related to the QOL variable and 9 of which were related to the food security variable. The head of the household who was employed in agriculture served as the unit of respondents in this study, serving as the representative.

3.3 Research Variables

QOL and food security variables, as shown in Table 1, were identified. The QOL consists of sub-variables of material well-being, community well-being, emotional well-being, and health and safety well-being. While the food security consists of the sub-variables of food availability, food accessibility, and food utilization.

Table 1. Research Variables.

Variable	Sub Variable	Indicator	References
QOL	Material Welfare	Cost of living	47)
		Income	48)
		Job Availability	49)
		Employment Opportunity	49)
		Financial Guarantee	47)
	Community Well-being	Social Life	47)
		Public service facilities:	
		Health services	48)
		Education	48)
		Transportation	49)
		Telephone Network	49)
		Bank/ATM (Automatic Teller Machine)	49)
		Agriculture/depot	49)
		Clean water	49)
		Security	48)
		Improving community welfare:	
		Road	49)
		Places of worship (mosque/temple/church)	49)
		Hospital	49)
		Market	49)
		Port/ terminals/stations /similar	49)
	Emotional Well-being	Safety	48)
		The quality of leisure time	48)
		Comfort of worship	49)
		Local cultural activities	49)
		Time spent while working.	48)
	Health and Safety Well-being	Health	48)
		Clean water	49)
		Air quality	49)
		Environmental cleanliness	49)
		Safety in the living environment	48)
		Comfort in the living environment	48)

Variable	Sub Variable	Indicator	References
Food Security	Availability of Food	Availability of carbohydrate sources for farming families within 1 month	50)
		Concern/fear of food sufficiency	51)
		Availability of facilities (markets/stalls/shops)	52)
	Food accessibility	Road conditions	50)
		Transport facilities available to meet the needs of the community	50)
		An out-of-home meal. Travel costs to food sources (markets, stalls, convenience stores) at optimal prices	50,51)
	Utilization of food	Indicators of the absence of children under five who have malnutrition problems/died due to illness	50)
		Ability to buy fish, meat, eggs, tofu, and tempeh as a source of protein for family nutrition	52)
		Availability of the main source of drinking water and water for cooking	52)

3.4 Research Sample

The determination of the sample in this research uses the method of Krejcie & Morgan[53]. 971 farmers are living in Sedayulawas Village, according to the information available. The number of samples was determined as follows.

$$S = \frac{x^2.N.P(1-P)}{d^2.(N-1) + x^2.P(1-P)} \quad (1)$$

$$S = \frac{3{,}841 \,.\, 971 \,.\, 0{,}5(1-0{,}5)}{0{,}05 \,.\, (971-1) + \, 3{,}841 \,.\, 0{,}5(1-0{,}5)}$$

$$S = \frac{932{,}49}{3{,}39}$$

$$S = 277 \; household \; of \; farmer$$

$$S = 479 \; household \; of \; farmer$$

To prevent bias in the study and adhere to the minimum data processing requirements for the SEM analysis, which will be used to model the study's findings, the number of research samples was originally 277 farmers, but it was rounded up to 479 farmers. The minimum threshold for data processing with structural equation modeling (SEM) has been reached with this amount. To conduct SEM, 200–400 respondents must be used as effective samples[54].

3.5 Analysis

SEM calculates the correlation between a person's quality of life and their access to food. To ascertain QOL, food security circumstances, and respondent characteristics from Sedayulawas Village, the analysis was conducted using descriptive statistical analysis. The following presentation of data uses diagrams, tables, and graphs of each indicator discussed[55,56].

CFA analysis is a method used to test how well the measured variable can represent a construct or factor. Latent and indicator variables make up the two categories of CFA variables. It is important to understand that latent variables are variables that cannot be directly measured but can be formed from variables that can be measured. These variables are called indicator variables[57]. The CFA model is formed; the number of latent variables is determined first, and parameter identification is required.

The concept of SEM as a second-generation multivariate analysis method that allows researchers to examine the relationships between recursive and non-recursive variables to gain an overview of a situation[58]. A statistical method called SEM processes measurement errors, indicators, and latent variables simultaneously. SEM evaluates relationships between latent variables after latent variables have been evaluated through each variable indicator[59]. The SEM method could analyze up to the highest level of a variable or model under study. Many data assumptions are necessary for SEM's benefits, and if they are not met, it will affect how research findings are determined[60]. Both the dependent and independent variables in a path analysis are directly measurable (observable). SEM, on the other hand, uses dependent and independent variables that are unobservable and cannot be directly measured. Latent variables are frequently used to describe unobserved variables. SEM is employed to test theories in order to establish the causality between latent variables. The selection of SEM was made considering its superior accuracy in variable analysis. This study uses SEM with SmartPLS software.

PLS-SEM analysis has the advantage of allowing for the measurement of intricate model relationships while accounting for indicator measurement error. Furthermore, PLS-SEM can better measure formative models and has

advantages when the sample size is small when analyzing[61]. However, the drawback of using PLS-SEM is that you must use many samples to get a perfect model.

4. Results

4.1 Respondent Characteristic

Based on responses to a survey given to 479 residents of Sedayulawas Village, the study's respondents' characteristics were determined. Age, gender, as well as earnings and outgoings, are among the respondents' traits. The various characteristics are shown in Table 1.

Table 2. Respondent Characteristic.

Variables	Respondents	Percentage (%)
Age		
15–19	2	0.4
25–29	1	0.2
30–34	12	2.5
35–39	14	2.9
40–44	27	5.6
45–49	59	12.3
50–54	52	10.9
55–59	90	18.8
60–64	91	19.0
65–69	72	15.0
70–74	33	6.9
75+	26	5.4
Gender		
Male	372	77.7
Female	107	22.3
Income/month (IDR) District minimum wage Lamongan Regency = IDR 2,501,977.27		
Income < 2,501,977.27 (less than district minimum wage)	422	88.1
Income = 2,501,977.27 (district minimum wage)	4	0.8
Income > 2,501,977.27 (more than district minimum wage)	53	11.1
Expenditure/year (IDR)		
500,000-10,000,000	127	27
10,100,000-20,000,000	273	57
20,100,00-30,000,000	62	13
30,100,000-40,000,000	9	2
40,100,000-50,000,000	6	1
>50,100,000	2	0

Table 2 shows that most of the population is composed of people between the ages of 15 and 64, or the productive age, accounting for 348 respondents, or 73% of the total. Additionally, 372 people, or 78% of the respondents, identified as male, making up most of the respondents. Hal ini because male residents are typically involved both actively and inactively in agricultural development.

The district minimum wage of Lamongan Regency is IDR 2,501,977.27 per month according to the Governor of East Java's Decree 188/803/KPRS/013/2021 concerning District/City Minimum Wage in East Java in 2022. Using the standard district minimum wage to calculate farmers' income has an impact not only on the monthly income received but also on the assurance that they will be paid. Additionally, employment in the agricultural sector is seasonal and not always year-round.

Up to 426 individuals, or the equivalent of 89% of farmers, have a main income that is lower than the district minimum wage. Most of the population's main income, especially for those affected by the COVID-19 pandemic where people's additional income has significantly decreased, can be inferred to be less than the district minimum wage of Lamongan Regency in 2022. In addition, most respondents in Sedayulawas Village—273 respondents, or 57% of all respondents—have annual expenditures between IDR 10,100,000 and IDR 20,000,000. This suggests that income has a greater impact on farmers' quality of life, particularly their emotional wellbeing and improvement of life evaluation.

4.2 Characteristics of Food Security

Respondents were given questionnaires in order to gather information on the characteristics of food security. This questionnaire includes responses based on the previously identified food security variables. Table 2 provides a data description of the food security characteristics in Sedayulawas Village.

Table 3. Reliability of Food Security Indicators.

Indicators	Min	Max	Mean	SD	Alpha
Availability of Food					
Availability of carbohydrate sources for farming families	1	5	3.05	1.21	0.583
Concern/fear of food sufficiency	2	5	3.50	0.93	0.622
Availability of facilities (markets/stalls/shops)	2	5	3.95	0.77	0.583
Food accessibility					
Road conditions	1	5	3.26	0.84	0.513
Transport facilities available to meet the needs of the community	1	5	3.25	0.93	0.604
An out-of-home meal. Travel costs to	1	4	3.16	0.70	0.525

Indicators	Min	Max	Mean	SD	Alpha
food sources (markets, stalls, convenience stores) at optimal prices					
Utilization of food					
Indicators of the absence of children under five who have malnutrition problems/died due to illness	3	5	4.14	0.64	0.565
Ability to buy fish, meat, eggs, tofu, and tempeh as a source of protein for family nutrition	1	4	3.24	0.84	0.531
Access to a reliable source of both cooking and drinking water	2	5	4.06	0.73	0.541
Well-being					
Income	2	5	3.47	0.92	0.613
Education	2	5	3.71	0.71	0.593

Based on Table 3, respondents showed a reasonably positive attitude toward dealing with the impact of agriculture on family food security on all existing indicators. Even so, each respondent had various answers in responding to the indicators. It is possible that there are differences in the condition of food security in each farmer's household.

Almost all food security indicators have varying levels of reliability. As can be seen, Sedayulawas Village has the highest mean value of 4.14 and a standard deviation of 0.64 for the indicator indicating that no toddlers there are stunted. This demonstrates that the vast majority of people are in good health. The ability to provide for family food needs has the lowest score among the indicators, with a mean of 3.05 and a standard deviation of 1.21. This is evident by the sizeable population of people who still earn less than the minimum wage; consequently, it is possible that some farmers are still unable to supply their families with food.

4.3 CFA QOL of Sedayulawas Village

The CFA QOL was conducted using indicators for every variable, including material well-being, community well-being, emotional well-being, and health and safety well-being. Eliminating indicators that did not satisfy the standards or were invalid based on the loading factor enabled this process to be concluded. Figures 2 and 3 depict the results of Sedayulawas Village's CFA QOL.

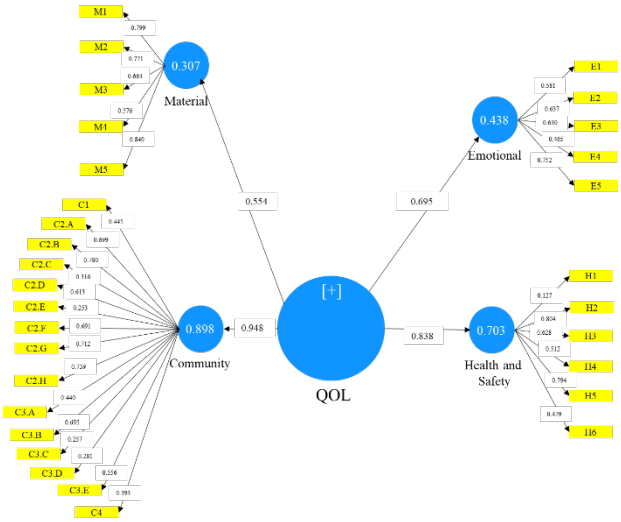


Fig. 2: First Phase CFA Model of Sedayulawas Village

Based on Figure 2, the QOL variable is influenced by material, emotional, community, and health and safety factors. Valid indicators for these factors are material (cost of living, income, and financial security), community (education, clean water, and security), emotional (time spent working), and health and safety (clean water and safety in the living environment), with a loading factor value of 0.7.

This indicator is consistent with the circumstances in Sedayulawas Village, where there is financial security in the form of village cooperatives that assist farmers in meeting their agricultural needs, even though the cost of living there is still relatively low (and the income earned is also modest). Every level of society in Sedayulawas Village, including farmers, has access to public services like security, clean water, and education.

The farmers feel that the amount of time they have spent working is sufficient given the circumstances. This is evident from the additional tasks they complete while taking breaks from working in the fields, such as taking care of livestock, cooking, and sleeping. Farmers in Sedayulawas Village can obtain clean water of good quality for the irrigation of their crops as well as for daily consumption by using water sources from ponds, pumping wells, and dug wells. In Sedayulawas Village, residents place a high value on having a comfortable home, as evidenced by the lack of hostility between residents and local farmers. Residents of Sedayulawas Village experience a greater sense of comfort because of the regular activities that take place there.

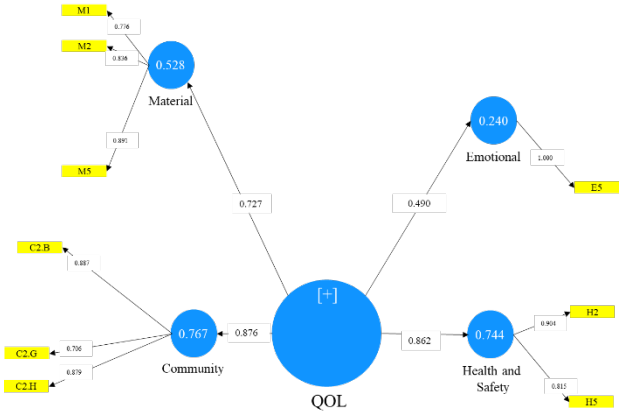


Fig. 3: Second Phase CFA Model of Sedayulawas Village

Based on calculation all values of the goodness-of-fit index indicated that the first and second stages of the CFA model were appropriate. As there were still some invalid indicators in the first stage of the analysis, the CFA model utilized was the second stage CFA model. The indicators that were used to analyze the food security variable after the CFA QOL analysis was completed in the second stage were as follows.

Table 4. Results of QOL Indicators Used

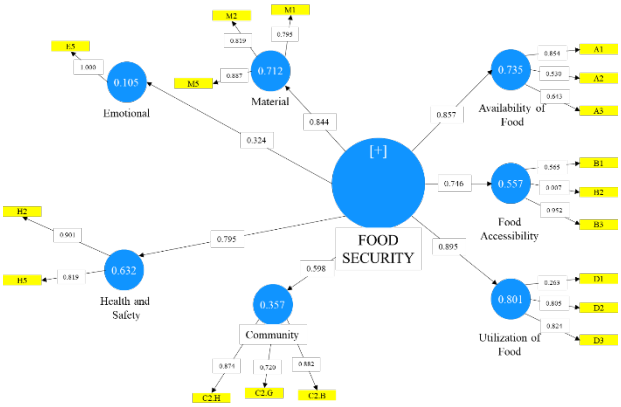
Variable	Sub Variable	Indicator	Symbol
Quality of Life	*Material Welfare*	Cost of living	M1
		Income	M2
		Financial Guarantee	M5
	Community Well-being	Education	C2.B
		Clean water	C2.G
		Security	C2.H
	Emotional Well-being	Time spent while working	E5
	Health and Safety Well-being	Clean water	H2
		Safety in the living environment	H5

4.4 SEM QOL and Food Security

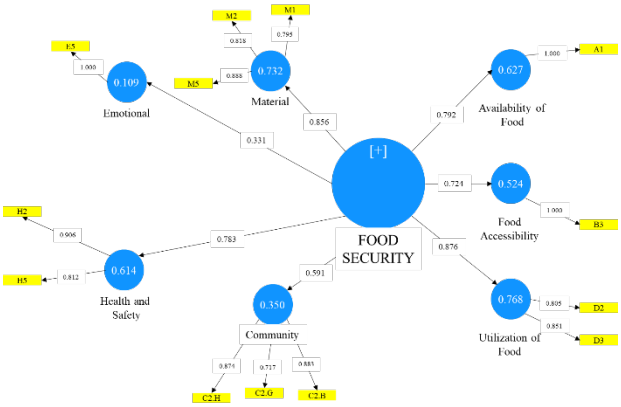
4.4.1 SEM QOL and Food Security

QOL and food security variables describes in model one. The following is a model of how QOL and food security are interconnected. Through Model 1 of the SEM analysis, it is known that, through the path coefficient, the food security variable has a direct relationship to each indicator in the QOL. According to the results of the feasibility test, four food security indicator variables must be left out of the model because their loadings are less than 0.70.

Latent variables for food security and QOL indicators are displayed in Model 2 as a model form. The results of Model 2 show that the food security variable has a direct relationship to the QOL indicator. In Model 2, it is known that there are no instruments removed from the model because all existing instruments have a loading value above 0.70. The loading indicates that there is a large influence on latent variables. After modeling twice, optimal results have been obtained. The relationship between food security and QOL are describes in Figure 4.



(a)



(b)

Fig. 4: The Structural Model (a) and (b)

The R Square values for the variable's material, community, emotional, and health and safety are all 0.732; 0.350; 0.109; and 0.614, which shows that:

1. Variable material that QOL endogenous variables can explainbe explained by QOL endogenous variables is 73.2%, while variables outside the study account for the remaining 27.8%..
2. Variables community that can be explained by QOL endogenous variables are 35%, the remaining explained by variables outside the study.
3. Variables emotional that can be explained by endogenous QOL variables amount to 10.9%, and the remaining explained by variables outside the study.
4. Variables related to health and safety that can be explained by endogenous QOL variables amount to 61.4%, the rest are explained by variables outside the study.

According to Model 2 SEM, the path coefficient demonstrates a direct relationship between the food security variable and the QOL indicators. The results of the indicator suitability test revealed that no indicators were eliminated from the model due to loadings greater than 0.70 (Table 5), where the loading represented the affect of the indicator on the latent variables as well as the interaction between the latent variables.

Table 5. Loading for Each Indicator.

Variables	Sub Variables	Indicators	Loading Factor (≥0.70)	Information
Food Security	Availability of Food	A1	1.000	Valid
	Food Accessibility	B3	1.000	Valid
	Utilization of food	D2	0.851	Valid
		D3	0.805	Valid
QOL	Material Well-Being	M1	0.888	Valid
		M2	0.818	Valid
		M5	0.795	Valid
	Community Well-Being	C2.B	0.883	Valid
		C2.H	0.874	Valid
		C2.G	0.717	Valid
	Emotional	E5	1.000	Valid
	Health And Safety	H2	0.906	Valid
		H5	0.812	Valid

To find out whether the model can be said to be fit or not is based on the strength of the R square value. The following is an indicator of the strength of the R Square value:

1. Below 0.25 = Weak
2. 0.25 - less than 0.50 = Pretty Good
3. 0.50 – less than 0.75 = Substantial
4. 0.75 or more = Very good

Table 4 shows each strength for the R square value for each variable. The material sub-variables and food utilization have a very good power R square value when compared to the strength of the other sub-variables. Despite this, the emotional sub-variable has a weak R square. In terms of food accessibility, health and safety, and food availability, all three variables have a significant R Square value. In addition, the community sub-variable has a reasonably good R Square value.

Table 6. R Square of Model 2.

Variables	RSquare	Strength
Food Accessibility	0.524	Substantial
Community	0.350	Pretty Good
Emotional	0.109	Weak
Health and Safety	0.614	Substantial
Availability of Food	0.627	Substantial
Material	0.732	Very Good
Utilization of food	0.768	Very Good

The outcomes of the model based on structural equations, which are composed of the inner model (the measurement model) and outer model (the structural model), are constructed. The outer model determines how observable variables (indicators) relate to the underlying constructs, whereas the inner model determines how latent variables (constructs) relate to one another. The value of the t-statistic for each indicator is used to determine whether-determine, or not the indicator is significant to the latent variable and its influence (Figure 5). Determining whether a quantity is significant or not is reviewed based on the p-value compared to alpha or it can also be t-statistics compared to the t-table. Through a sample of 479 and an alpha of 0.05, the t-table value of 1.96 are obtained. If the p-value < alpha or t-statistics> t-table, the effect is significant.

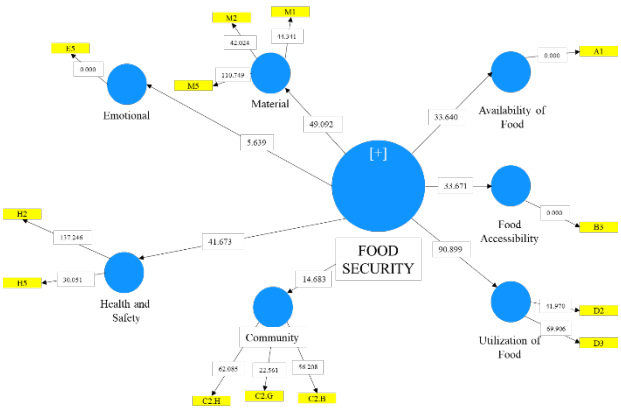


Fig. 5: The SEM Equation Model with the t-statistical value of each indicator and Sedayulawas Village Pathway

4.4.2 Model Output Results

Here is a direct correlation between indicators of QOL and food security in the structural model's output that is significant at the test level of 5% (t-statistic > 1.96). This indicates that the quality of life indicators of farmers in Sedayulawas Village are significantly and uniformly affected by food security. The structural equation model for food security with QOL indicators is as follows:

Food security = 0.627* food availability + 0.524* food accessibility + 0.768*food utilization + 0.732*Material + 0.350* Community+ 0.109*Emotional + 0.614*Health and Safety + ζ

Food security and QOL indicators, such as material well-being (material well-being), community well-being (community well-being), emotional well-being (emotional well-being), and health and safety indicators (health and security), are shown to be causally related in Table 7. This table's significant value indicates that food

security has a significant direct impact on the QOL of farmers in Sedayulawas Village.

Table 7. The Relationship of Latent Variables.

Path Relations	Sample	Stad. Err.	T -Sta	Inf.
Food Security -> Food Accessibility	0.24	0.022	33,671	Significant
Food Security -> Community	0.591	0.040	14,683	Significant
Food Security -> Emotional	0.331	0.059	5,639	Significant
Food Security -> Health and Safety	0.783	0.019	41,673	Significant
Food Security -> Food Availability	0.792	0.024	33,640	Significant
Food Security -> Materials	0.856	0.017	49,092	Significant
Food Security -> Food Utilization	0.876	0.010	90,899	Significant

Based on Table 7, it can be explained how food security affects residents of Sedayulawas Village, especially those who work in the agricultural industry, in terms of food accessibility, community, emotional, health and safety, food availability, materials, and food utilization. In other words, the latent food security variables influence both the QOL sub-variables (community, emotional, health and safety, materials) and the food security sub-variables (accessibility, availability, and utilization of food). This means that the latent variable (food security) is a causal factor that can explain how food accessibility, community, emotional, health and safety, food availability, materials, and food utilization are.

5. Discussions

A farmer is someone who combines their profession with their way of life. It is a difficult existence that requires proficiency in areas such as production, living, and business management. Factors such as identity, personality, gender, lifestyle, family structure, and off-farm part-time employment can influence a person's way of life[62]. The globalization of the economy, economic rationalization, decline in rural population, COVID-19 outbreak, and climate change have also had a significant impact on agriculture in recent decades. As a result, given the close ties between their livelihoods and well-being and employment and health, farmers can be regarded as a vulnerable population[63]. The relationship between agriculture and various aspects of QOL and well-being has been examined in several studies.

A person's quality of life (QOL) is determined by whether their basic and social factor are met[64], as well as whether they have the freedom to choose how they want to live, grow, and contribute to their community as active members of society. Within a globally sustainable physical and social environment, integration, social connectivity, trust, and other integrative norms—at the very least fairness and equity—are all possible. QOL and food security are related, according to the study's findings.

QOL indicators that affect the well-being of farmers in Sedayulawas Village from a material perspective are the cost of living (M1), income (M2), and financial guarantees (M5). In general, income can be used as a tool to measure the economic condition of farmers or households. A farmers' living expenses are not only incurred for the family, but also for seed, fertilizer, and pesticide costs. Costs associated with labor are those that go toward paying the salaries of non-family employees. The impact on final production outcomes is higher than the production costs incurred by farmers in providing production certainty. Contrarily, when production factors are not distributed equally, production is not optimal or efficient[65]. Farmers' incomes decline as a result of inefficient production[66]. Amunullah evaluated how financial security impacts the well-being of farmers[67]. Most of these studies conclude that smallholders' demand for formal financial guarantees is influenced by their socioeconomic characteristics, demography, and level of smallholding[68]. A study was done using both primary and secondary data to examine how financial guarantees affected farmers' income. Agricultural financial guarantees are thought to boost the farm sector and increase farmer incomes. There may be no obvious connection between financial guarantees and increased productivity. However, it can have an indirect effect by having a positive impact on smallholders' adoption of agricultural technologies[69]. Additionally, by skilled labor, improved healthcare, and more money for agricultural investment, may have an indirect effect on productivity. By pointing out that it encourages farmers to adopt better technologies, the significance of financial guarantees for smallholder farmers[70]. Thus, important for policymakers especially the Sedayulawas Village government to make easy financial guarantee procedures for farmers. This will ultimately reduce unemployment and poverty in Sedayulawas Village.

QOL indicators that affect the well-being of farmers in Sedayulawas Village from a community point of view are education (C2.B), clean water (C2.G), and security (C2.H). According to a study of Bratberg and Kjell[71] , education improves farmers' knowledge and awareness of the use of appropriate tools and working conditions, enabling them to work safely with current technological advancements[72]. Research shows that it is estimated that along with the increase in the education level of farmers, productivity also increases and the highest return on agricultural productivity occurs in secondary school education. Extension services have a greater impact on productivity than formal education. It was concluded that formal education broadens farmers' horizons for farming, while non-formal education provides better farming techniques, and opens minds to adopt new ideas and innovations. The

welfare of farmers can also be impacted by their level of education. This is since more educated farmers are typically part-time cultivators of their own land, as opposed to less educated farmers, who typically work full-time on the farms of others. Another possibility is that farmers with higher education quit farming. This causes reduced or no income from farming. However, there is also the opportunity to have a high potential to earn more from farming[73].

Apart from education indicators, clean water indicators also affect the well-being of Sedayulawas Village farmers. It is everyone's human right to have access to clean water. It is essential for leading a healthy, respectable, and fruitful life. The human right to drinking water "'entitles everyone, without discrimination, to have access to sufficient, safe, acceptable, physically accessible, and affordable water for personal and household use"[74]. Security is also an important indicator. To promote safe practices, it is important to have a deeper understanding of how farmers perform in terms of safety and security, as well as the factors that affect these behaviors. The development of an effective national security strategy can be aided by such an understanding, which can also be mutually beneficial for agricultural authorities and farmers. The conflict between Ukraine and Russia has disrupted the production and distribution of food across the world. Therefore, understanding how farmers behave in terms of safety and security is crucial to ensuring the success of any intervention program and promoting sustainable development[75,76] in farming methods.

The QOL indicator that affects the well-being of farmers in Sedayulawas Village from an emotional perspective is the time spent during work (E5). Due to their arduous work and difficult living conditions, farmers are more susceptible to developing physical and mental health issues[77]. Furthermore, given that it is uncertain how long farmers will work. According to research, getting enough sleep is crucial for regulating both physical and mental functioning as well as maintaining one's personal health. As a result, it is critical that farmers have consistent work schedules and get enough sleep.

QOL indicators that affect the well-being of farmers in Sedayulawas Village in terms of health and safety are the quality of clean water (H2) and safety in the living environment (H5). The management of irrigation water is made easier using clean water for agricultural purposes [78]. Based on the existing conditions, Sedayulawas Village is adjacent to the coastal area, but the water used for agriculture is not sourced from the sea, it is sourced from mountain springs in the Sedayulawas Village area. Based on the survey results, the water quality in Sedayulawas Village is also of reasonable quality. Low-quality water can cause plants to grow slowly, have unsightly appearances, and in some cases, die gradually. A just, sustainable, and productive rural economy depends in large part on water. Water is not only crucial for human health, nutrition, and agricultural production; it also offers employment opportunities in important rural economic sectors[79]. It is critical to improve rural livelihoods, particularly for farmers, and to maintain a healthy and productive workforce by ensuring sustainable water management, adequate water infrastructure, and access to safe, reliable, and affordable water supplies. Water-related problems could negatively affect the rural economy, way of life, and decent employment if they are not addressed. The preservation of environmental security is also crucial. Although the government has ensured safety by deploying law enforcement bodies such as the police and army, the residents of Sedayulawas Village, especially farmers, must continue to oversee maintaining the security of their respective environments.

Food security indicators that affect sustainable agriculture are the adequacy of carbohydrate sources (A1), travel costs to food sources (markets, stalls, convenience stores) at optimal prices (B3), the ability to buy side dishes as a source of protein for family nutrition (D2), and the availability of main sources of drinking and cooking water (D3). Feeding a growing world population on scarce and degraded agricultural land is a challenge for agriculture. Historically, agricultural intensification has been viewed as a special approach to achieving goals related to global food security. The community of people involved in food policy must act right away to address the problems of natural resource scarcity and the sustainability of food production and consumption systems. In order to maintain a sustainable food system, agricultural productivity must be combined with resource conservation and public health protection[80].

Water and food security are related because both will face significant obstacles as a result of climate change [81]. Due to the short rainy season, there is difficulty finding water reserves to support crops in the dry season in the Sedayulawas Village. The start of the rainy and dry seasons, as well as the more severe rainy and dry seasons, are all impacted by climate change, which is shown by an increase in the annual average air temperature. Some farmers in Sedayulawas Village face crop failure because of climate change. Due to social, economic, and biophysical factors that have an impact on the food system, farmers' levels of adaptability vary, which makes it difficult to achieve food security, which is the capacity to lessen the vulnerability of food systems to climate change[82]. Since they are the primary crops grown by farmers in Sedayulawas Village, rice and corn are more readily available than other goods. The success of farming households in overcoming hunger and achieving food security can be measured by their capacity to adapt to eating food that is not in season. Some of the efforts that can be made by farming households in Sedayulawas Village to adjust food consumption include:

1. seeking employment outside of the area, even if as temporary workers or laborers, in order to have money to buy food; and

2. utilizing different food crops in one planting area to manage agricultural land (intercropping).

Based on the SEM model that has been carried out (Fig. 4), QOL indicators affect food security indicators. Farmers' poor general, mental, and physical health is correlated with food insecurity and shortages. Insufficient access to food in the home can also lower QOL. As a result, adult QOL is negatively impacted by food shortages. Research that investigates the role of food security in explaining life satisfaction focus on certain demographic groups within one country, such as indigenous people, youth or rural resident[83]. Numerous studies have looked at the effect of food security on mental health and well-being in both developed and developing countries. This study found that depressive disorders are more prevalent in families who experience food insecurity.

Apart from focusing on food security, the current government is also paying more attention to the general well-being and happiness of the people. Numerous studies have discussed the use of subjective well-being or life satisfaction measures to create and implement programs designed to make people happier. Additionally, there is a connection between poverty, food insecurity, and rising food prices. For example, risks and uncertainties in the food supply brought on by price increases may affect food accessibility and availability. It follows that the populace's health is also in danger. Improved QOL and food security also impact well-being. Sustainable agriculture in the coastal area of Sedayulawas Village can still be maintained.

Food security is not the only challenge for agriculture; it is maintaining sustainable agriculture, which utilizes both its natural and human resources. An integrated approach to sustainable agriculture integrates pest control, nutrition, agroforestry, soil management, and water management[84] It is possible to produce food and other agricultural products at low environmental costs using sustainable agricultural approaches and practices that do not threaten the availability and accessibility of food, or the general well-being of future generations. Food security, which necessitates sufficient food production, access to and opportunities to purchase food, adequate nutrition (including energy, protein, and micronutrients), security, and the stability of current economic conditions, is closely related to sustainable agriculture. Other economic sectors are significantly affected by the growth of the agricultural sector and the level of food security, and these developments are seen as crucial to achieving sustainable development. Sedayulawas Village, in Lamongan Regency, implements sustainable agriculture by launching a program called "Tersapujagad", which is a cattle production initiative that maximizes profitability. Zero waste is at the core of this innovation. The use of agricultural waste for animal husbandry is like using livestock waste for agriculture. As opposed to monoculture farming, this innovation also alludes to a more integrated agricultural strategy. An agricultural practice known as integrated farming combines the production of fish and livestock or livestock and crops. Food security and nutrition can be obtained by establishing well-integrated agriculture backed by good market ties.

According to studies on the connection between QOL and food security[85–87], the findings indicate that to increase food security, advancements in the agricultural sector of developing nations must also advance gender equality. Increased access to agricultural credit, educational programs for rural women and men entrepreneurs, and increased participation in community management, for instance, should influence both community welfare and sustainable agriculture[87]. Furthermore, food insecurity within the home alters eating habits and lessens the variety of foods eaten by family members. Household food insecurity has a negative impact on QoL[86]. It is important to consider food insecurity as a potential major social determinant of health[85].

Despite these drawbacks, this study could have a significant impact on future research projects, as well as the design and execution of community education and intervention programs. The findings of this research may also contribute to farmers' overall perceived well-being (i.e., life satisfaction) and advance theoretical and empirical understanding of recent changes in life satisfaction. Supporting more advanced knowledge and life skills is necessary to make this happen. The government needs to increase access to extension services for inputs, availability of credit for farmers, and the quality of formal education.

6. Conclusions and Suggestions

This study set out to test a structural equation model that analyzed the connection between QOL and food security. Based on SEM analysis, food security in Sedayulawas Village is influenced by indicators of food availability, food accessibility, food utilization, material, community, emotional, health, and safety. 77.9% of the variance explained by variables outside the scope of the study is accounted for by the material variable, which has the greatest impact on the farmers in Sedayulawas Village's ability to feed themselves. Previous studies have found a correlation between food security and a number of unfavorable individual and social outcomes, including poor mental health, obesity, and subpar educational outcomes. Social dilemma sometimes insists in this situation[88]. In Sedayulawas Village, this study also looks at the connection between farmer happiness and food security. According to the research, farmers' quality of life improves as a result of food security. As a result, improving household food security for farmers is essential for raising not only subjective well-being but also for promoting the development of human capital. Consequently, productivity will increase. Additionally,

policymakers ought to think of readiness as a practical tool for lowering the risk of hunger and raising life satisfaction. To guarantee that farmers have access to high-quality food, multi-level actions are required, such as policy making, resource provision, and provision of suitable services. In turn, farmers will have a greater sense of trust in the government's role[89].

The theoretical underpinnings provided by this research will serve as the foundation for QOL and food security assessment tools for farmers, especially those in rural areas. Additionally, this study demonstrates a positive relationship between QOL and food security, which is significant given the lack of research on the topic. Numerous policy recommendations were made in response to the study's findings. Research, development, and implementation of mitigation strategies are crucial to lowering food insecurity in rural areas. As a result, the government must carry out several programs to advance village-level food security, such as financial inclusion initiatives and food assistance.

This study serves as a foundation for further study of relationships in various agricultural, organizational, and societal contexts. According to the study's findings, it is possible to recommend adding more indicators of well-being, such as income and education indicators, which may significantly improve the well-being of farmers. Further research into the connections between food security, various human capital metrics, and sustainable development objectives may be necessary.

The implications of this research can be used as a guide for understanding how farmers' welfare is impacted by their quality of life and access to food. To support farmers in maintaining their health and a higher standard of living, public policy interventions are required to enhance their access to food. Given that shocks resulting from disasters could happen anywhere, this implication applies not just to rural areas in Indonesia but also to those abroad. Its objectives are to support sustainable development, address policy interventions to support food security and contribute to the general welfare of the farming populations in these countries.

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Nomenclature

S	Number of samples
N	Population
P	Population proportion (0.5)
x^2	Value table x^2 (3.841)
d	Degree of error (0.05)

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