

## Gender Dynamics in The Agricultural Sector in The NTT-Timor Leste Border Region

Frederic Winston Nalle<sup>1\*</sup>, Sirilius Seran<sup>2</sup>, Anggelina Delviana Klau<sup>3</sup>

<sup>1</sup>*Faculty of Economics and Business, Brawijaya University Malang, Indonesia*

<sup>2,3</sup>*Faculty of Economics and Business, University of Timor, Kefamenanu, Indonesia*

<sup>1</sup>*fredericnalle@student.uny.ac.id*, <sup>2</sup>*sirilius.s@yahoo.com*, <sup>3</sup>*anggelinaklau@gmail.com*

\*Corresponding Author

### Abstract

Women play a crucial role in the agricultural sector in the NTT-Timor Leste border region but continue to face economic disparities. This study examines the impact of job type, education, resource access, socio-cultural norms, and health on the income of women farmers. Using simple random sampling and Slovin's formula, 100 respondents were selected from a population of 66,545 women farmers across four border districts. Multiple linear regression analysis indicates these factors significantly influence women farmers' income. The findings highlight the need to improve access to agricultural resources, education, and healthcare services to support women's economic empowerment and reduce economic disparities in border areas.

**Keywords:** Type of Occupation, Education, Access to Resources, Socio-Cultural Patterns, Health, Income

## Dinamika Gender dalam Sektor Pertanian di Perbatasan NTT-Timor Leste

### Abstrak

Perempuan berperan penting dalam sektor pertanian di perbatasan NTT-Timor Leste, tetapi masih menghadapi kesenjangan ekonomi. Studi ini menganalisis pengaruh jenis pekerjaan, pendidikan, akses sumber daya, norma sosial-budaya, dan kesehatan terhadap pendapatan petani perempuan. Dengan teknik simple random sampling dan rumus Slovin, dipilih 100 responden dari 66.545 petani perempuan di empat kabupaten perbatasan. Analisis regresi linier berganda menunjukkan bahwa semua variabel memiliki pengaruh signifikan terhadap pendapatan petani perempuan. Temuan ini menekankan pentingnya peningkatan akses terhadap sumber daya pertanian, pendidikan, dan layanan kesehatan guna mendukung pemberdayaan ekonomi perempuan serta mengurangi kesenjangan ekonomi di daerah perbatasan.

**Kata Kunci:** Jenis Pekerjaan, Pendidikan, Akses Sumber Daya, Pola Sosial Budaya, Kesehatan, Pendapatan

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## INTRODUCTION

The border region of East Nusa Tenggara (*ENT*) and Timor Leste is distinctive in its economic structure as it is dominated by the agricultural sector, which is the main foundation of economic and social development. Agriculture in this region not only contributes significantly to local food production but also plays a role in providing job

opportunities for most of the population, especially those who live in rural areas. The economic structure dominated by agriculture illustrates the importance of this sector as the main source of income for people in the border region. In addition, agriculture is also an integral part of the social and cultural life of local communities, with traditional farming practices still carried out for generations. Thus, agriculture not only plays a role in the economic aspects, but also shapes the identity and sustainability of local culture in the ENT-Timor Leste border area. The diversity of agroecology and natural resources available in the region also adds to the distinctiveness of its economic structure, with various types of crops and agricultural products produced, such as rice, corn, coffee, cocoa, and spices. Therefore, the role of the agricultural sector as the main ‘motor’ of economic and social development in the NTT-Timor Leste border region is very significant and noteworthy for formulating sustainable development policies (Nalle, 2018).

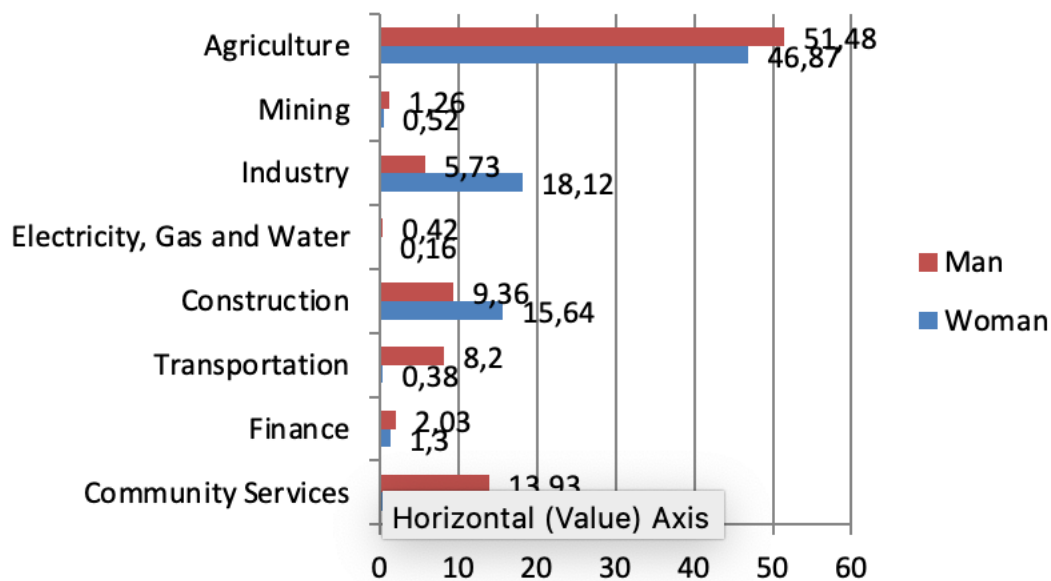


Figure 1. Graph of the Employed Population 15 Years and Over By Main Occupation and Gender in 2023.

Source: Central Bureau of Statistics of NTT Province, 2024

Agriculture is indeed a strong economic foundation in the border area between ENT and Timor Leste Province. Geographical conditions that are generally dominated by fertile and potential agricultural land strengthen the role of this sector in providing the main livelihood for local communities (Nalle, Duli, et al., 2022). Women in this context, had a significant and consistent role in agricultural activities. They are not only in work fields such as planting, crop maintenance, and harvesting but are also responsible for most household tasks related to agriculture, such as processing agricultural products and resource management (Nursalamah et al., 2023). In addition, as household caretakers, they also contribute to the financial management and distribution of agricultural products at the household level. Women’s involvement in all aspects of these agricultural activities has become an integral part of the economic and social

sustainability of the ENT-Timor Leste Province's border area, demonstrating how important their role is in maintaining stability and prosperity in the border region. The contribution of women who work in different types of business fields in East Nusa Tenggara Province can be seen in Figure 1.

The first graph provides an overview of the distribution of female labor participation in ENT Province in various business sectors. From the data that can be seen above, it can be interpreted that women's labour participation is evenly distributed across several economic sectors, with quite significant figures. The agricultural sector is the main highlight with the most striking participation percentage, reaching 46.87 per cent of the total female workforce in this Province. This means that out of a total of 1,438,901 people working in the agricultural sector, around 629,056 of them are female workers. This emphasizes the large role played by women in supporting economic activities, especially in the agricultural sectors in ENT Province.

The role of women workers in the agricultural sector is very important because this activity not only provides a livelihood for the family but also contributes to providing food demand for the wider community (Bertham et al., 2011). In this context, women often act as the breadwinners of the family in the agricultural sector, involved in various activities ranging from planting, tending, to harvesting crops. Women's active involvement in every stage of production contributes significantly to local food production, thus ensuring the availability and sustainability of food supply for the community (Suradisastra, 2016).

Furthermore, women's role in agriculture is not only limited to the production aspect but also extends to resource management and distribution of agricultural produce. They are often responsible for land management, household financial arrangements related to farming as well as the sale or marketing of crops (Yuwono, 2013). Thus the contribution of women in the agricultural sector is not only impacts at the family level but also the community and society as a whole. The presence of women in agriculture also has a positive impact on local food security, as they tend to be more oriented towards environmental sustainability and food diversity (Pongge et al., 2023).

Although women play a significant role in the agricultural sector, they often face challenges in terms of access to resources such as land, capital, and agricultural technology. These challenges often act as barriers for women to optimize their potential in agricultural activities and expand their positive impact on the economic and social development of the region (Vivian Chinelo & Peter Ayodeji, 2022). In addition, social and cultural factors, such as gender norms and traditional roles in society, also influence their level of participation and contribution in the sector. Gender *stereotypes* that place women in domestic roles often hinder women's opportunities to fully engage in agricultural activities, even though their contributions can add significant value (Richardson & Roberts, 2020).

There are several challenging factors that cause women's role in increasing agricultural productivity to be limited, especially related to accessibility limitations, among others; *First*, access to resources is a major challenge for women in the

agricultural sector. One aspect that is highlighted is access to agricultural land. Women often face difficulties in owning or accessing agricultural land. Research conducted by Adekola (2013) shows that although the role of women in the development of the agricultural sector is very large, they still face obstacles in gaining access to resources and strategic decision-making. The presence of a strong patriarchal culture in border communities is also a factor that hinders women from obtaining land rights or gaining equal access to agricultural land compared to men (Lawal et al., 2017).

*Second*, access to capital is a serious challenge for women in the agricultural sector. Financial capital plays a key role in acquiring seeds, fertilizers, farm equipment, and other resources needed to start or expand an agricultural enterprise. However, women often face limitations in accessing capital compared to men (Barman et al., 2023). They do not have land ownership that can be used as collateral to obtain loans from financial institutions or do not have access to financial institutions that provide financial services according to their needs. For example, research conducted by Lika (2021), found that the average farmer in Belu Regency finds it difficult to get access to credit from banking institutions due to limited land ownership and the inability to fulfill collateral requirements requested by banking institutions. In addition, the lack of support from the government through budget allocations in the Regional Revenue and Expenditure Budget (*APBD*) of NTT Province, as revealed in the research of Liufeto & Angi (2019), shows that several relevant technical agencies such as the Health, Education, and Child and Women Protection Departments have not allocated sufficient budget support for women's empowerment. This confirms that constraints on access to capital for women in the agricultural sector are not only individual but also related to the policies and structural support that are available.

*Third*, access to agricultural technology is also a challenge for women. Modern agriculture technologies such as soil cultivators, irrigation systems, or agro-processing techniques are often unavailable or difficult to access for women in rural areas. Research results presented by Nalle et al. (2022) showed that the high level of poverty in the agricultural sector is one of the significant contributing factors due to low access to technology in land management and agricultural production. In addition, their lack of access to training and education on new agricultural technologies is also a significant barrier. This can hinder their ability to increase productivity and efficiency in farming practices (Mumuni & Oladele, 2016). Thus, improving women's access to agricultural technologies and the provision of appropriate training is a crucial step in improving their economic conditions and welfare in the agricultural sector (Murray et al., 2016).

Traditional gender roles in society are often an obstacle for women in the agricultural sector. Established norms tend to place women in roles related to household duties, such as childcare, cooking, and cleaning. This results in a lack of opportunities for them to take part in decision-making or to have an active role in farm management (Busthanul et al., 2023). Timor Island, as an integral part of ENT Province, the majority of its people still uphold a patriarchal culture in the marriage system. This condition reinforces the belief that women are better suited for domestic work compared

to occupations outside the home, which still has an impact on the view that women are less competent or less worthy to lead or be involved in aspects of agriculture that require strategic decisions or problem-solving skills. These limitations not only hamper women's ability to play a full role in agricultural development but also reduce the potential for innovation and overall advancement of the agricultural sector (Das, 2020).

Social support and cultural norms play a vital role in determining the level of women's involvement in the agricultural sector (Balayar & Mazur, 2022). Lack of social support from family or community and cultural norms that limit women's mobility and independence are often challenges faced in the context of agriculture (Holmelin, 2019). This can inhibit women's confidence to take initiative and actively engage in agricultural activities (Fraser et al., 2021). In addition, cultural norms that assign women traditional roles within the home often limit their opportunities to develop the skills and knowledge required in modern agricultural practices. These restrictions not only affect their ability to improve agricultural productivity efficiency but also hinder the innovation potential and overall development of the agricultural sector (Qanti et al., 2022).

Women often face significant economic challenges, which impact their access to essential services such as health and education, as well as hinder their ability to develop productive agricultural enterprises (Iyanda et al., 2014). These economic limitations can result in difficulties in paying for necessary health costs, even causing delays in obtaining essential medical care (Yuliani, 2014). The results of a research conducted by Sinu (2023), highlighted the high rate of maternal and child mortality in ENT Province. In 2022, there were 171 cases of maternal death and 1.139 cases of child death. There was a significant increase from the previous year, where in 2021 the number of child deaths reached 995 cases. Ironically, almost all of these cases occur in rural areas where most people work as farmers.

Unstable economic conditions can also limit women's ability to invest capital in agricultural enterprises, such as purchasing high-quality seeds, fertilizers, or modern farming equipment. With limited capital, women may be forced to rely on less efficient farming practices or experience difficulties in expanding or improving the productivity of their farming enterprises (Okezie, 2021). Therefore, to improve the economic well-being of women in the agricultural sector, it is important to adopt policies that support greater access to economic resources, training, and financial assistance, and promote their inclusion in sustainable economic development programs (Mulema et al., 2019).

Based on the analysis presented, this research shows substantial relevance in the context of inclusive and sustainable agricultural sector development, especially in the ENT-Timor Leste border region. By deeply exploring the challenges and constraints faced by women in the agricultural sector, this research makes an important contribution to the formulation of more effective and inclusive policies by local governments. Through a comprehensive research approach supported by empirical evidence, this research has the potential to make a significant contribution to creating an enabling environment that empowers women to play a more active role in managing

agricultural business, increasing productivity, and improving their economic and social welfare. In addition, the findings of this research will also provide a strong basis for policy advocacy that focuses on the interests and needs of women in the agricultural sector to achieve broader inclusion and more substantial gender equality in agricultural development.

**METHOD**

This research uses a quantitative approach by collecting primary data through questionnaire surveys, field observations, and in-depth interviews. The main objective of this research is to understand how variables such as type of occupation, education, access to resources, socio-cultural patterns, and health conditions affect the income levels of women farmers in the border area of East Nusa Tenggara (*ENT*) and Timor Leste. Primary data was collected through structured interviews with women farmers living in the border area. Interviews were conducted by trained female interviewers to ensure sensitivity to gender issues and create a comfortable atmosphere for respondents. The selection of female interviewers was based on the literature, which states that respondents tend to be more open in interviews conducted by interviewers of the same gender.

This research identifies the income earned by women farmers as the dependent variable. This variable is measured through annual income data from agricultural activities and other relevant income sources. Income information was collected through interviews with respondents.

Independent variables include the type of occupation, education level, access to resources, sociocultural patterns, and health conditions. The type of occupation is categorized based on agricultural and non-agricultural activities undertaken by women. Education level is measured based on the formal education completed by respondents. Access to resources includes access to land, agricultural equipment, and financial services. Socio-cultural patterns were assessed through indicators of participation in community activities, involvement in household decision-making, and perceptions of gender roles. Their health conditions are evaluated based on access to health services, frequency of visits to health facilities, and general health status of respondents. To provide a clear picture of how the dependent and independent variables are measured in this research, the following table presents the indicators used, measurement methods, and data collection approaches.

Table 1. *Indicators and Data Collection Methods*

<b>Variable</b>	<b>Indicator</b>	<b>Measurement (Likert Scale 1-5)</b>	<b>Data Collection Method</b>
Income Womens Farmers' (Y).	1. Average monthly income.	Measured in local currency (IDR) through surveys.	Structured questionnaire and interviews.

<b>Variable</b>	<b>Indicator</b>	<b>Measurement (Likert Scale 1-5)</b>	<b>Data Collection Method</b>
Type of Occupation (X <sub>1</sub> )	2. Proportion of income from agriculture.	Percentage of total income obtained from agricultural activities.	Structured questionnaire and interviews.
	3. Income stability	Measured by the variation in monthly income over the past year	Structured questionnaire and interviews.
	1. Socio-Culture diversification	How many types of work are undertaken (1 = Very few, 5 = Very many).	Structured questionnaire.
Access to Education (X <sub>2</sub> )	2. Work productivity	How effective the work is in increasing income (1 = Not effective, 5 = Very effective).	Structured questionnaire.
	3. Satisfaction with the type of occupation. .	Level of satisfaction with the type of work performed (1 = Very dissatisfied, 5 = Very satisfied).	Structured questionnaire.
	1. Formal education level	Last completed formal education (1 = No schooling, 5 = Bachelor's degree).	Structured questionnaire.
Access to Resources (X <sub>3</sub> )	2. Access to training	How easy it is to access agricultural training (1 = Very difficult, 5 = Very easy).	Structured questionnaire.
	3. Application of knowledge of the job.	How often knowledge from education is applied in agriculture (1 = Never, 5 = Very often).	Structured questionnaire.
	1. Access to land.	Ease of access to agricultural land (1 = Very difficult, 5 = Very easy).	Structured questionnaire.
The Role of Socio-Cultural Patterns (X <sub>4</sub> )	2. Access to capital/credit.	Ease of obtaining capital/credit for agriculture (1 = Very difficult, 5 = Very easy).	Structured questionnaire.
	3. Access to agricultural technology.	Ease of access to agricultural technology (1 = Very difficult, 5 = Very easy).	Structured questionnaire.
	1. Family support in agriculture.	Level of family support for agricultural activities (1 = Very low, 5 = Very high).	Structured questionnaire.
The Role of Socio-Cultural Patterns (X <sub>4</sub> )	2. Participation in family decision-making.	The extent of participation in family decision-making related to agriculture (1 = No participation, 5 = Full participation).	Structured questionnaire.
	3. Community perception of gender roles.	Community perception of gender roles in agriculture (1 = Very negative, 5 = Very positive).	Structured questionnaire.

<b>Variable</b>	<b>Indicator</b>	<b>Measurement (Likert Scale 1-5)</b>	<b>Data Collection Method</b>
Health (X <sub>5</sub> )	1. Access to healthcare services.	Ease of access to healthcare services (1 = Very difficult, 5 = Very easy).	Structured questionnaire.
	2. Physical health	How often respondents feel physically healthy while working in agriculture (1 = Very rarely, 5 = Very often)	Structured questionnaire
	3. Impact of health on productivity	Extent to which health affects work productivity (1 = Very low, 5 = Very high)	Structured questionnaire.

This research focuses on four districts on Timor Island that share a border with Timor Leste, namely South Timor Tengah, North Timor Tengah, Belu, and Malaka. The research population consists of 66.545 women who are actively involved in agriculture, according to data from the ENT Central Bureau of Statistics (2023). Using the Slovin formula, a simple random sample of 100 participants was selected. Sample criteria included women farmers aged 25-55 years old, married, with at least ten years of consistent farming experience, and actively involved in local agricultural groups. The sample distribution from each district is as follows:

Table 2. *Representative Research Sample of the Total Population*

<b>Location</b>	<b>Population</b>	<b>Samples</b>
South Timor Tengah District	21,938	25
North Timor Tengah District	9,739	15
Belu District	7,841	20
Malaka District	27,027	40
<b>Total</b>	<b>66,545</b>	<b>100</b>

Source: Central Bureau of Statistics of NTT Province 2023

This research will focus specifically on Malaka District, which was chosen because it has a significant and representative sample size for this research. The region is well known for its sizable population of women farmers in the ENT-Timor Leste border region. In addition, the measures taken by the Malaka District Local Government through the Agricultural Revolution Program, as expressed by Servinus Servinus Leki et al. (2021), demonstrate the local government's commitment to improving the productivity of the agricultural sector. This provides a strong background for analyzing the impact of gender-responsive policies in agricultural sector development in border areas.

To present a visual and informative picture of the research location, it can be seen in Figure 1. This figure provides clear and in-depth information about the area where the research was conducted, strengthening the understanding of the relevant geographical context.





Figure 2. Map of Malaka Regency and Research Location  
Source: Map Design Results with ArcGis Application 2023

This research uses two types of data, namely primary data and secondary data. Primary data was obtained directly from respondents or research samples, who are the community of women farmers. Meanwhile, secondary data is information obtained from government institutions, especially data publication documents that are closely related to the research objectives. The primary data collected involved the active participation of the farmer communities that were the respondents in this research. They provided direct information related to farming practices, challenges faced, and various aspects related to the opportunities and challenges of women farmer's roles in the advancement of the sector. Meanwhile, secondary data was obtained from government institutions, especially the Central Bureau of Statistics of ENT Province, (2023). The data includes information on the number of women farmers in the four districts that are the focus of the research, the amount of contribution of the agricultural sector to the formation of gross regional domestic product (*PDRB*), and the amount of production and consumption of rice in the community. The use of these two types of data is expected to provide a comprehensive framework for understanding the sustainability of women's roles in inclusive agricultural sector development in the ENT-Timor Leste border region.

The main instruments for data collection in this research include the use of questionnaires, interviews, documentation, and direct observation. Each indicator related to the research variables, such as the type of women's occupation, education, access to resources, socio-cultural roles, health, and income of women farmers, was designed in the form of positive statements to make it easier for respondents to provide answers. The preparation of each indicator as a statement item is based on a review of theory and previous research relevant to the research objectives. The questionnaire presented to respondents contained guided alternative answers, using a Likert scale with four levels of categories, namely strongly agree, agree, less disagree, and disagree. This approach was chosen to describe the level of agreement or disagreement of respondents

with each statement, creating a more structured assessment framework in evaluating the research variables studied.

After all respondents had completed the questionnaire, the next step was data collection and tabulation. This tabulation process aims to provide basic material for data analysis. The analytical tool used is descriptive statistical analysis, which aims to provide a description of the characteristics of respondents and describe factual conditions based on information obtained from in-depth searches related to the variables in the research. In addition, inferential analysis was conducted through multiple linear regression analysis methods. The purpose of this analysis is to evaluate the partial and simultaneous influence of the variables of women's occupation type, education, access to resources, socio-cultural roles, and health, on women farmer's income. The formulation of this multiple linear regression analysis refers to the approach proposed by Stanley et al. (2006).

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where:

- Y = Income Security of Women Farmers
- a = Constant
- $\beta_1 X_1$  = Regression Coefficient of Job Type Variable
- $\beta_2 X_2$  = Regression Coefficient of Education Variable
- $\beta_3 X_3$  = Regression Coefficient of Resource Access Variable
- $\beta_4 X_4$  = Regression Coefficient of Socio-Cultural Role Variable
- $\beta_5 X_5$  = Regression Coefficient of Health Variables
- $\varepsilon$  = Epsilon

The data analysis process was carried out using Eviews 12 software. Before starting the analysis, an important first step is to evaluate the quality of the data collection instruments through validity and reliability. This stage is considered crucial to ensure that the analyzed data can produce accurate research output. Furthermore, classical assumptions are also tested, which include normality tests, autocorrelation tests, multicollinearity tests, and heteroscedasticity tests. All of these tests aim to meet the required statistical standards and ensure the integrity of the data analysis conducted (Nalle et al., 2022).

## **FINDINGS AND DISCUSSION**

### **Respondent Characteristics**

In this research, respondents in the research sample were drawn from the population of women agricultural business owners in the border areas of East Nusa Tenggara and Timor Leste province. The respondents have diverse characteristics, including age, educational background, business experience, and gender.

Table 3. *Respondent Characteristics*

Characteristics	Amount	Percentage (%)
<b>Gender:</b>		
▪ Man	58	58
▪ Woman	42	42
<b>Respondent Age:</b>		
▪ 25-35 Years	21	21
▪ 36-45 Years	31	31
▪ 46-55 Years	48	48
<b>Level of education</b>		
▪ Elementary School	43	43
▪ Junior High School	26	26
▪ Senior High School	17	17
▪ Diploma	8	8
▪ Bachelor	6	6
<b>Length of Business:</b>		
▪ 1-5 Years	11	11
▪ 6-10 Years	28	28
▪ $\geq$ 11 Years	61	61

The limited role of women farmers in increasing agricultural productivity in the East Nusa Tenggara-Timor Leste border region is reflected in the characteristics of the research respondents. Of the 100 respondents, 58 percent were male farmers. Most of the agricultural business actors were aged 46-55 years old (48 percent), which may affect productivity due to physical capacity that declines with age. In addition, 43 percent had only primary school-level education, which limits their ability to innovate and manage farming practices effectively. Furthermore, 61 percent of respondents have been farming for more than eleven years. These factors point to difficulties in adopting modern agricultural technologies and keeping up with the development of the sector.

#### **Data Validity and Reliability Test**

In this research, validity and reliability tests were conducted to ensure that the data collected from respondents was accurate and consistent. Instrument validity was measured using the Pearson correlation test, where the calculated 'r' value exceeded the 'r' table value at the 0.05 alpha significance level. Meanwhile, reliability was assessed using Cronbach's alpha method, with the expected value exceeding 0.60 (Heale & Twycross, 2015).

Based on the results of the data analysis listed in Table 3, it can be concluded that each indicator in the variable construct has met the criteria for data validity and reliability. This can be seen from the Pearson correlation value which exceeds the r-table value and the Cronbach's alpha value which exceeds 0,60 at the alpha 0,05 significance level. Thus, the instrument used can be considered valid and reliable for measuring the

variables studied. Research can proceed to the next stage of analysis with the confidence that the data obtained are able to provide accurate and accountable results.

Table 4. *Recapitulation of Data Validity and Reliability Test Results*

Variables	Items	R count	Table	<i>Crombach</i> <i>Alpha</i>	Information
Type of Occupation (X <sub>1</sub> )	X1.1	0.784	0.195	0.813	Valid and Reliable
	X1.2	0.866	0.195		Valid
	X1.3	0.764	0.195		Valid
Access to Education (X <sub>2</sub> )	X2.1	0.727	0.195	0.735	Valid and Reliable
	X2.2	0.774	0.195		Valid
	X2.3	0.797	0.195		Valid
Access to Resource (X <sub>3</sub> )	X3.1	0.831	0.195	0.842	Valid and Reliable
	X3.2	0.813	0.195		Valid
	X3.3	0.698	0.195		Valid
The Role of Socio- Culture (X <sub>4</sub> )	X4.1	0.744	0.195	0.724	Valid and Reliable
	X4.2	0.727	0.195		Valid
	X4.3	0.840	0.195		Valid
Health (X <sub>5</sub> )	X5.1	0.643	0.195	0.763	Valid and Reliable
	X5.2	0.768	0.195		Valid
	X5.3	0.784	0.195		Valid
Women's Farmer Income (Y)	Y1	0.774	0.195	0.856	Valid and Reliable
	Y2	0.907	0.195		Valid
	Y3	0.861	0.195		Valid

**Classic Assumption Test**

In multiple linear regression analysis, it is important to check the classical assumptions to validate the parameter estimation results Alita et al. (2021) emphasized this to ensure the credibility of the analysis. Common tests include normality, autocorrelation, multicollinearity, and heteroscedasticity tests.

The results in Table 5 show that all criteria for the classical assumption tests have been met, providing a solid basis for further data analysis. The normality test shows that the data is normally distributed, with Jarque-Bera values exceeding the alpha threshold (1,817288 > 0,05). Evaluation of the assumptions for autocorrelation and heteroscedasticity revealed that the Prob. Chi-Square values exceeded the alpha level (0,6545 and 0,1081 > 0,05), indicating consistent variance across the research variables. The multicollinearity

test also yielded favorable results, with Variance Inflation Factor (VIF) values below 10, indicating the absence of perfect correlation among the independent variables.

*Table 5. Recapitulation Result of Classical Assumption Test*

Variables	Classic assumption test			
	Jargue-Bera test (P-value)	Prob. Chi-Square(2) (P-value)	Prob. Chi-Square(14) (P-value)	VIF value
Residual	1.817288	0.6545	0.1081	
Type of Occupation				0.67343110
Acces to Education				0.76284094
Access to Resources				0.63778474
The Role of Socio-Culture				0.74668687
Health				0.60363075

**Multiple Linear Regression Analysis**

This analysis aims to answer the research objectives, namely evaluating the partial and simultaneous effects of the variables of type of occupation, education, access to resources, social and cultural roles, and health on the income of women farmers in the border area of ENT-Timor Leste Province.

*Table 6. Recapitulation of Multiple Linear Regression Analysis Results*

Variables	Coefficient	Std. Error	t-Statistics	Prob.
C	-0.868636	0.708211	-1.226521	0.2231
Type of Occupation	0.162831	0.087672	1.857279	0.0664
Acces to Education	0.449440	0.093932	4.784729	0.0000
Access_to_Resource	0.051404	0.087597	0.586825	0.5587
Pattern_Social_Culture	0.202959	0.098741	2.055457	0.0426
Health	0.239013	0.081651	2.927240	0.0043
R-squared	0.719325			
Adjusted R-squared	0.704396			
F-statistic	48.18146			
Prob (F-statistic)	0.000000			

The results of data analysis as listed in table 5 produce the following regression equation:

$$Y_I = -0.868636 + 0.162831_{TW} + 0.138394_E + 0.201877_{AR} + 0.187096_{SCP} + 0.439127_H$$

(0.0664)
(0.0000)
(0.5587)
(0.0426)
(0.0043)

In the regression equation, the constant value of 0.868636 suggests that if job type, education, access to resources, socio-cultural patterns, and health remain unchanged, the income of women farmers in the ENT-Timor Leste border areas would decrease by 0.868636. Each independent variable has a distinct impact on food security, as shown by their regression coefficients. The F-test results, with an F-value of 48.18146 (greater than the F-table value of 2.27) and a probability value below 0.05 (0.0000), indicate that collectively, these variables significantly affect women farmers' income in the border region.

Additionally, the Adjusted R-squared value of 0.719325 shows that the model explains 71.93 percent of the income variability based on the independent variables, with the remaining 28.07 percent attributed to other factors not included in the study.

## **Discussion**

### **The Effect of Occupation Type on The Female Farmers' Income Level**

Regression analysis shows that variation in the type of occupation has a positive and significant impact on the income of women farmers in the border area of ENT-Timor Leste Province. The regression coefficient of 0.162831 indicates that every 0.162831 percent increase in occupational variation contributes to a one percent increase in women farmer's income. The significance of this impact is supported by a probability value lower than the alpha value ( $0.0664 < 0.05$ ), which confirms the importance of occupational diversification in increasing women farmer's income. Occupational diversification expands market access, increases productivity opportunities, and offers additional income potential through productive and value-added activities.

The first thing that needs to be understood is that the type of occupation done by women farmers in the NTT-East Timor border region plays a very important role in determining their income level. Previous research conducted by Malelak et al. (2019) showed that women in the agricultural sector are often involved in various types of occupations, ranging from production activities to marketing agricultural products, but they do not have adequate access to land and expertise to optimize income. Therefore, it is important to understand how variations in these types of occupations can affect women farmer's income.

The role of occupation type in determining the income of women farmers in the ENT- Timor Leste border region is very important. Previous research by Amheka et al. (2020) revealed that although the role of women farmers in Kupang Regency, especially in Noelbaki Village, has a significant contribution, the time they spend working in the agricultural sector is still limited. This condition encourages the adoption of diversification strategies as an important effort for women farmers to increase their income. Occupational diversification is considered a measure that can help reduce economic risks associated with fluctuations in market prices and demand. In addition, diversification also provides the flexibility needed to deal with various environmental and social challenges in border areas.

However, it should be noted that the effect of occupation type on women farmer's income is also influenced by other contextual factors, such as access to resources, market conditions, and policy support. Therefore, it is important to align existing policies and programs with the needs and challenges faced by women farmers in border areas. This can be done through policy revisions or adjustments that are more inclusive and responsive to their needs.

Strengthening local markets is an important strategy. This can be done through the promotion and marketing of local agricultural products, collaboration with local market players, and the development of sustainable supply chains (Rwelamira, 2015).

In this way, women farmers can gain better access to markets and more favorable prices for their products. The first step in strengthening local markets is to increase the promotion of local products. This can be done through various channels, including local agricultural fairs, traditional markets, and social media. Effective promotion can increase public awareness of the existence of local products as well as increase consumer interest in purchasing them (Pyzhikova et al., 2020). The next step is to collaborate with local market players. Collaboration between women farmers and local market players such as traders, wholesalers, and retailers is an important step in strengthening local markets. This collaboration can help improve women farmer's access to markets, expand distribution networks, and increase market penetration of local agricultural products. (Li et al., 2023).

The development of sustainable supply chains is also a key component in strengthening local markets. This involves establishing strong linkages between producers, distributors, and consumers, and ensuring the flow of products from farmers to markets and then onto the consumers. By strengthening the supply chain, a more efficient, transparent, and fair system can be created for all parties involved (Leng et al., 2018). By effectively implementing this local market-strengthening strategy, it is expected to create a more dynamic, inclusive, and sustainable market ecosystem for local agricultural products, and make a significant contribution to increasing the income and welfare of women farmers in the ENT-Timor Leste border region.

### **Effect of Educational Access on Female Farmers' Income Levels**

The education variable shows a regression coefficient of 0,138394 with a probability value lower than the alpha value ( $0,0000 < 0.50$ ). This indicates that partially, education has a significant influence on the income of women farmers in the border area of ENT-Timor Leste Province. An increase in education by 0,138394 percent will contribute to an increase in the income of women farmers by one percent. Education plays an important role in opening up job opportunities and improving skills that have a positive impact on income. The higher the level of education, the greater one's ability to get a better and higher-paying job. The finding is in line with the theoretical perspective and previous research by Heldawati et al. (2023), which links education with better employment opportunities, access to more skilled jobs, and the ability to take advantage of better economic opportunities.

In this context, women farmers who have access to higher education tend to have broader skills and knowledge, enabling them to engage in more productive and competitive agricultural activities. These results suggest that education not only provides direct benefits in the form of increased individual capacity but can also be a key factor in addressing economic inequality among women farmers (Sell & Minot, 2018). Previous research conducted by Nalle (2018), revealed that there are still symptoms of high exclusivity in the development of the agricultural sector in North Timor Tengah District, due to limited accessibility to educational resources among farmers, including in the education sector.

Providing equal access to education is an important step that the government must take to ensure that women farmers in rural areas have equal opportunities to access education. Considering that the education level of farmers in the border area of East Nusa Tenggara and Timor Leste Province tends to be low, on average equivalent to primary education, efforts to equalize access to education are very important. Innovative measures need to be implemented in an integrated manner to achieve this goal.

First of all, the provision of adequate education facilities should be a top priority. Based on the research results submitted by Rosyadah (2021), one of the crucial problems faced by the ENT Provincial government is the lack of quality human resources (*SDM*), even recorded as one of the lowest in Indonesia. Data from the National Socio-Economic Survey (*Susenas*) in 2018 confirmed that 111.040 children dropped out of school as a direct result of the significant gap in access to education between regions, which is still a concerning challenge.

The government must ensure that every village or rural area has access to quality schools equipped with adequate educational facilities. This includes the construction of adequate school buildings, the provision of adequate books and learning materials, and other supporting facilities such as laboratories or libraries. In addition, affordable transportation is also a key factor in ensuring equitable access to education. The government needs to provide affordable and easily accessible means of transportation for women farmers living in remote areas. This could include providing transportation subsidies, providing regular public transport, or using innovative transportation technologies such as ride-sharing services or school shuttle buses (Akangbe et al., 2013).

Support in the form of scholarships or financial aid should also be provided to encourage women farmer's participation in formal and non-formal education. The government can provide scholarships to those who qualify, including tuition fees, transportation costs, and living expenses. In addition, financial assistance can be provided in the form of low-interest education loans or subsidy programs to help with higher education costs (Becot & Inwood, 2022). By implementing these measures in an integrated and sustainable manner, it is expected that equitable access to education can be realized for women farmers in rural areas. This will open up new opportunities for them to improve their knowledge, skills, and capacities, thereby improving their overall well-being.

### **Effect of Resource Access on Female Farmers' Income Levels**

Analysis of the access to resources variable shows a regression coefficient of 0.201877 with a probability value lower than the alpha value ( $0.0426 < 0.05$ ), which indicates that access to resources has a significant influence on the income of women farmers in the ENT-Timor Leste border region. An increase in access to resources by 0.201877 percent correlates with an increase in revenue by one percent, assuming other factors remain constant (*ceteris paribus*). Adequate access to critical resources such as land, technology, capital, and markets is crucial for increasing the productivity and income



of women farmers. Therefore, more structured government interventions are needed to fulfill this need.

In the context of this research, women farmer's difficulties in gaining access to agricultural land in East Nusa Tenggara Province can be caused by various factors, one of which is the existence of a patriarchal culture in the indigenous marriage system. In many cases, women do not have land rights that have been passed down through generations. This is especially true after they marry and form households, where land ownership is more often associated with male lineage. This unequal treatment of women has its roots in the family environment itself, which is frequently governed by a strong system of tradition and custom (Seba, 2016). Therefore, in an effort to improve women farmer's access to agricultural resources, structured and in-depth policies and programs are needed, which can address the cultural and systemic challenges that perpetuate gender inequality.

A critical first step is the effort to provide productive agricultural land for women farmers. In this regard, the government has a key role to play in initiating the provision of suitable and sufficient land for their agricultural activities. This can be done through various means, including more appropriate and efficient land allocation, developing previously unproductive agricultural land into productive ones, or providing easier access for women farmers to acquire existing agricultural land, for example through subsidized land provision programs or land allocation jointly managed by groups of women farmers (Sadapotto, 2020).

The next step is to subsidize the purchase of seeds and fertilizers, a strategy that can significantly improve women farmer's accessibility to agricultural resources. Through these subsidies, women farmers will be better able to obtain seeds and fertilizers at affordable prices, allowing them to increase their agricultural productivity without having to make financial sacrifices. This will help ensure that women farmers are able to optimize their agricultural output and increase their income sustainably (Wastra & Dalhar, 2021).

In addition, it is also important to provide training and assistance in the use of modern and efficient agricultural technology (Aditina & Sugiharti, 2019). Through this training, women farmers will acquire the knowledge and skills necessary to optimize the use of agricultural technology. For example, they may learn techniques for efficient use of irrigation, proper application of fertilizers, and effective pest control. In this way, they can increase agricultural productivity and reduce the risk of losses due to environmental factors and plant diseases (Hamzah et al., 2019).

Another strategic step is through collaboration with financial institutions that can provide easier access to agricultural credit for women farmers. With this access, they can obtain the capital needed to increase their agricultural production (Setiawan et al., 2019). In this process, women farmers could apply for loans to obtain the necessary funds to purchase agricultural equipment, and raw materials, or invest in more modern and efficient agricultural technologies. The first step in this collaboration is to build partnerships between women farmers and financial institutions, where women farmers

will be provided with an understanding of the various financial products available, the requirements needed to obtain a loan, and how to manage their finances wisely. In addition, financial institutions can also provide consulting and mentoring services for women farmers in managing loans and developing solid business plans for the development of their agricultural businesses (Cornelius, 2018).

It is also important for financial institutions to ensure that the credit application process is easily accessible and understood by women farmers. This can be done by providing services that are friendly to women farmers, such as providing inclusive service, conducting trainings and workshops on financial and business management, and providing access to information on available assistance and subsidy programs (Irawan et al., 2023). Thus, through effective collaboration between women farmers and financial institutions is expected to create a conducive environment for the development of women farmer's agricultural businesses.

In sum, the implementation of policies and programs that support women farmer's access to agricultural resources requires an approach that is structured, sustainable, and oriented toward local needs and potentials. This will help improve the economic and social well-being of women farmers and their contribution to the development of the agricultural sector and the local economy as a whole. By comprehensively implementing these measures, it is expected that women farmer's access to agricultural resources could be improved, resulting in significant increases in their productivity and income. This positive impact will not only be felt by the individual welfare of women farmers, but also by the agricultural and economic development of the border region as a whole.

### **The Influence of Socio-Cultural Patterns on The Female Farmers' Income Level**

Analysis of the socio-cultural pattern variable shows a regression coefficient of 0,187096 with a probability value lower than the alpha value ( $0.0426 < 0.05$ ). This shows that socio-cultural has a significant positive impact on the income level of women farmers in the border area of ENT-Timor Leste Province. The coefficient of 0,187096 indicates that for every 0.187096 increase in socio-cultural patterns, there is a one percent increase in income, assuming other factors remain constant.

The poverty conditions experienced by communities in the border areas of ENT-Timor Leste Province are generally caused by unequal access to education, technology and science, financial services, as well as access to markets, and other economic resources (Nalle, Seran, et al., 2022). The high flow of urbanization among the male population to seek occupation outside the region encourages women to take on multiple roles, not only as housewives but also as heads of households to meet daily needs, with roles that are more focused on the sector (Amanuban et al., 2018).

In this research, it was shown that local culture and traditions strongly influence women farmer's access to resources, markets, and economic opportunities. One of the main socio-cultural factors affecting their income is the patriarchal division of gender roles. Women often face limitations in their participation in agricultural activities, with

limited access to land, resources, and economic opportunities compared to men. This inequality is a significant barrier for women farmers seeking to increase their income (Pongge et al., 2023).

However, socio-cultural norms embedded in local communities still maintain the view that women remain in the second tier of society, with roles that do not exceed those of men. In addition, social and cultural norms that view agricultural work as a domain more suitable for men may also limit women farmer's active participation in economic activities. The social roles expected of women farmers in the community often limit their opportunities to develop skills and business opportunities that can increase income (Fallo et al., 2019).

Furthermore, in some cases, local customs and traditions can also limit women farmer's access to economic opportunities and resources. For example, in some indigenous communities, inheritance of ownership tends to be attached to the male lineage, so women farmers often do not have equal access to productive agricultural land. Therefore, to increase the income of women farmers, it is important to address and overcome the negative influence of existing socio-cultural patterns. This can be done through an integrated approach between economic development policies, education, and socio-cultural change. It is important to promote gender equality in access to resources and economic opportunities and change social norms that limit women farmer's active participation in agricultural and economic activities (Giroud & Huaman, 2019). By addressing barriers arising from existing socio-cultural patterns, a more inclusive and equitable environment for women farmers is expected.

### **Effect of Health on Female Farmers' Income Level**

Analysis of the health variable, which is one of the independent variables, shows a regression coefficient of 0.439127, with a significance value below the alpha level ( $0.0043 < 0.05$ ). This shows that health has a significant positive influence on the income level of women farmers in the border area of ENT-Timor Leste Province. The regression coefficient of 0.439127 indicates that every 0.439127 percent increase in health services corresponds to a 0.439127 percent increase in the income of women farmers. Health is a key factor in maintaining the viability of agricultural activities, as good health directly affects productivity and work quality. Physical and mental health conditions, access to health services, and daily lifestyle choices affect women farmer's well-being and the agricultural output they achieve (Atinkut Asmare et al., 2022).

The results of the quantitative analysis show that poor health conditions can lead to a decrease in productivity in income for women farmers. Women farmers who experience health problems often experience limitations in carrying out agricultural products. In addition, high medical and health costs can also reduce the net income earned from agricultural activities (Anderson et al., 2021).

The government needs to take concrete steps to improve the health of women farmers in border areas. One step that can be taken is to improve access to affordable and good-quality health services. This includes the provision of basic health facilities,

such as *puskesmas* or *posyandu*, as well as the provision of competent medical personnel and proper medical equipment (Mariyono et al., 2008). In addition, preventive health programs also need to be strengthened, including immunization programs, health education, and the promotion of healthy lifestyles. Raising awareness of the importance of health and encouraging good health practices, it is expected to reduce the risk of disease and injuries that can impair the productivity of women farmers. It is also important to improve access to clean water resources and proper sanitation. Access to proper clean water and adequate sanitation are important factors in maintaining the health of women farmers and their families. The government can provide assistance in the construction of boreholes, sanitation installations, and clean water supply to fulfill the basic need for clean water and sanitation.

Overall, improving the health of women farmers is an important investment in sustainable agricultural development and improved economic welfare in border areas. By improving access to health services, raising awareness of the importance of health, and increasing access to clean water and sanitation, it is expected to increase the productivity and income of women farmers and improve their overall well-being (Gabe Gusmi Aprilla, 2020).

## **CONCLUSION**

Based on the results of the data analysis and the previous discussion, this research provides an in-depth understanding of the factors that influence the income levels of women farmers in the border area of East Nusa Tenggara and Timor Leste. First, more diverse types of occupations can increase women farmer's income by opening up access to wider markets and opportunities to increase productivity.

Second, access to higher education also contributes positively to women farmer's income by improving their skills and knowledge in managing agricultural businesses. Third, access to agricultural resources, such as land, seeds, and fertilizers, could increase women farmer's productivity and income, as good health allows them to participate in agricultural activities actively. In addition, sociocultural patterns also affect women farmer's income, with norms and values influencing their access to resources and economic opportunities.

The results of this research show that efforts to increase the income of women farmers in the ENT-Timor Leste border region require a comprehensive and integrated approach. This approach should include greater access to agricultural resources, such as land, high-quality seeds, fertilizers, and modern technology to increase productivity. Supports in the form of subsidies and strategic partnerships with financial institutions are also crucial to ensure that women farmers can access sustainable business capital without being hampered by collateral requirements or complex bureaucratic processes.

Furthermore, improving access to education and training for women farmers should be prioritized. Training programs that focus on the utilization of modern technology, agricultural management, and post-harvest processing can help them add

value to agricultural products. This initiative can be complemented with formal education scholarships for the children of women farmers as a long-term investment to break poverty.

Similarly essential is the improvement of health services in rural areas. The provision of adequate health facilities, such as health posts and clinics, should be accompanied by health prevention programs, including healthy lifestyle campaigns and routine immunizations. Maintaining good health will not only increase the productivity of women farmers but also improve the overall quality of life for them and their families.

In addition, socio-cultural barriers that limit women's role in the agricultural sector must be addressed through an inclusive approach. Awareness campaigns that promote gender equality at the household and community levels can encourage women's active participation. These efforts should be supported by changing social norms that empower women to take on strategic roles in economic activities.

This integrated approach is expected to not only increase the income and welfare of women farmers but also encourage more inclusive and sustainable economic development in the ENT-Timor Leste border region. By implementing these strategic measures, the economic inequality faced by women farmers can be significantly reduced, allowing them to contribute more to regional development.

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