

Resilience of nutmeg farming families in Fakfak District, West Papua: the impact of vulnerability, economic pressure, and social participation

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Abstract. Nutmeg farming plays a crucial role in supporting the economic resilience of families in Fakfak Regency, West Papua Province. This study examines the effects of economic resilience, social resilience, vulnerability, and social participation on the psychological resilience of nutmeg farmers' families. Additionally, it explores variations in these factors based on poverty status (poor vs. non-poor) and family savings capacity. A cross-sectional design was employed, involving 160 participants selected through disproportional stratified random sampling from nutmeg-producing areas. Primary data were collected via structured interviews and direct surveys conducted in August 2022. Findings indicate that non-poor nutmeg farming families exhibit higher psychological resilience, social participation, and cohesion, along with lower economic pressure. Families with savings sufficient for six months demonstrate higher social resilience and lower economic pressure. Structural Equation Modelling-Partial Least Squares (SEM-PLS) analysis confirms that psychological resilience is positively influenced by economic resilience, social resilience, and social participation, while family vulnerability has a negative impact. These findings highlight key areas for policy development and strategic interventions to improve the well-being of nutmeg farming families, in line with the Sustainable Development Goals (SDGs).

1 Introduction

Agriculture remains a primary source of livelihood and income for a significant portion of Indonesia's population. However, its contribution to regional economic growth remains disproportionately low compared to the number of individuals reliant on it for employment. The absence of a comprehensive regulatory system governing production and pricing exacerbates uncertainties within the agricultural sector, making smallholder farmers particularly vulnerable to economic instability and business risks. As a result, farming families often resort to coping strategies to sustain their livelihoods, such as reducing expenditures on high-quality food and substituting with less preferred alternatives.

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In Fakfak District, West Papua Province, Indonesia, nutmeg farming holds significant economic and cultural importance. The majority of nutmeg production in this region comes from wild forest nutmeg, which has been cultivated across generations as a family inheritance, while a smaller proportion originates from government-supported plantation initiatives. Fakfak's nutmeg is distinguished by its unique characteristics, including elongated fruit, thick mace, and vibrant red colour, making it a valuable agricultural commodity. Despite its potential, nutmeg farmers continue to face challenges, particularly regarding their economic security and overall well-being. Traditional farming practices dominate cultivation, reinforcing the need to examine family resilience as a key factor in sustaining the nutmeg agro-industry.

The family ecology perspective has gained increasing attention due to its emphasis on the interconnectedness between family well-being and environmental sustainability [1]. This perspective highlights the need for families to maintain a balance between physical and social environments, enabling them to effectively manage household, occupational, and community responsibilities. A well-functioning family ecology promotes resilience by fostering adaptability and sustainable living practices. Within this framework, the ecovillage model, highlights the role of social networks in enhancing mutual support, resource management, spatial organization, and informed decision-making. These interconnected factors play a crucial role in strengthening the resilience of farming families, particularly those facing economic and environmental uncertainties.

Building on this perspective, family resilience is defined as a family's ability to manage available resources through inputs, processes, and outputs to meet the needs of family members while overcoming challenges to maintain overall well-being. Strengthening resilience requires a holistic approach that addresses both internal and external factors. Recognizing its significance, Indonesia has identified family resilience as a national development priority under Law No. 52 of 2009 on Population and Family Development, which positions resilience as a key metric for assessing how well families fulfil their roles and responsibilities in ensuring collective welfare. As a multidimensional concept, family resilience integrates physical, social, and psychological aspects, all of which contribute to long-term stability and prosperity.

There are two primary approaches to analyzing family resilience: the latent components approach and the systems approach. The latent components approach identifies three core dimensions. The first dimension is physical resilience, which refers to a family ability to meet fundamental needs such as food, clothing, housing, education, and healthcare, which are essential for maintaining a stable living environment. The second dimension is social resilience, which involves religious adherence, effective communication, adaptability to social changes, and strong family bonds, all of which contribute to a family's capacity to navigate challenges within their social environment. The final dimension is psychological resilience, which reflects a family's ability to manage conflicts, regulate emotions, cope with stress, and develop a positive self-concept, ensuring stability in the face of adversity. Meanwhile, the systems approach views family resilience as consisting of three interrelated elements. First, inputs include essential resources such as family values, goals, and assets, which form the foundation for resilience and influence how families respond to external pressures. Next, processes refer to the mechanisms through which families manage their resources and resolve challenges, allowing them to adapt to changing circumstances and maintain stability. Finally, outputs represent the tangible outcomes of these efforts, including the family's overall well-being and ability to sustain resilience over time.

Enhancing family resilience is essential, as families form the primary environment for individual growth, emotional development, and long-term well-being [2]. Family resilience is shaped by effective resource management and family vulnerability across various developmental stages. Resilient families demonstrate a remarkable capacity to adapt to

stressors, secure resources, and foster recovery mechanisms [3]. Furthermore, research conducted by Lee and Han [4] identifies three critical outcomes of resilience: enhanced personal growth, effective crisis management, and reduced risk of family dysfunction. These findings underscore that families facing high vulnerability risks can effectively address challenges and achieve their goals by optimizing resilience. Building on this foundation, this study aims to: (1) analyze the relationships between family characteristics, resilience, economic pressure, vulnerability, social cohesion, and participation; (2) assess variations in these factors based on poverty status and savings capacity; and (3) examine the impact of physical-economic resilience, social resilience, economic pressure, vulnerability, cohesion, and participation on psychological resilience.

2 Methodology

2.1 Research design, location, and time

This study employed a cross-sectional design to provide a snapshot of the characteristics and resilience levels of nutmeg farming families at a specific point in time. The research was conducted in Fakfak District, West Papua Province, an area renowned for its nutmeg cultivation. Data collection and data processing were carried out in August 2022.

2.2 Sampling procedure

The sample consisted of 160 families engaged in nutmeg farming, selected using disproportional stratified random sampling from eight districts: Fakfak, Fakfak Barat, Fakfak Tengah, Kokas, Kramongmongga, Teluk Patipi, Pariwari, and Kayauni. The sampling framework ensured representation across diverse geographic areas within the district, facilitating a comprehensive analysis of the study variables.

2.3 Types and methods of data collection

Primary data were gathered through structured interviews and direct surveys conducted in August 2022. The interview instruments were developed to capture multiple dimensions, including family characteristics, physical-economic resilience, social resilience, psychological resilience, economic pressure, vulnerability, social cohesion, and social participation. Secondary data, including regional development statistics, were utilized to complement the primary data and provide contextual information.

The family resilience instrument, adapted from Sunarti [5], integrates systemic components (inputs, processes, and outputs) and latent components (physical-economic, social, and psychological resilience). Each latent component comprises 13 indicators measured using binary responses (0 = No, 1 = Yes). Reliability was confirmed with Cronbach's alpha values of 0.701 for physical-economic resilience, 0.675 for social resilience, and 0.682 for psychological resilience.

In addition, economic pressure was assessed through both objective and subjective measure adapted from Sunarti [5]. The objective dimension included indicators such as per capita income, debt-to-asset ratio, employment status, and job stability. In contrast, the subjective dimension captured participants' perceptions of economic hardship, measured using a semantic differential scale ranging from 1 (lowest) to 7 (highest). Reliability analyses yielded Cronbach's alpha values of 0.663 for objective economic pressure and 0.783 for subjective economic pressure.

Furthermore, family vulnerability was evaluated using a 24-item instrument with binary response options (0 = No, 1 = Yes), achieving a Cronbach's alpha value of 0.745. The social cohesion and participation variable refers to the instrument developed by Sunarti [5], and were divided into two dimension that is social cohesion and cohesion-and-participation, with Cronbach's alpha values of 0.761 and 0.758, respectively. Social cohesion consists of five statements with two answer scales (0 = No and 1 = Yes), while cohesion and participation consist of nine statements with four answer scales (0 = never, 1 = rarely, 2 = often, and 3 = very often). These metrics provided a robust framework for assessing relational dynamics and community engagement.

2.4 Data processing and analysis

Data processing followed six distinct stages: data entry, editing, coding, scoring, verification, and analysis. Quantitative analyses were conducted using SPSS version 25 and Microsoft Excel 2010. Descriptive statistics summarized participant characteristics, while inferential statistics, including correlation and variance analyses, examined relationships among variables and differences across subgroups based on poverty status and savings capacity. Structural Equation Modeling-Partial Least Squares (SEM-PLS) was employed to evaluate the effects of independent variables on psychological resilience. Model fit indices and path coefficients were assessed to determine the significance of hypothesized relationships, providing a comprehensive understanding of the factors influencing family resilience.

3 Results

3.1 Family characteristics

The family characteristics (Table 1) examined in this study included the age and education levels of both the wife and husband, the length of marriage, and the size of the house. The age of wives ranged from 20 to 80 years, with an average of 39.9 years, while the age of husbands ranged from 20 to 76 years. The duration of marriage varied between newlywed couples (1 year) and long-established marriages spanning up to 60 years. On average, the education level of both husbands and wives equated to 9 years, corresponding to the completion of secondary school. The average number of family dependents was four members, with the largest family consisting of 12 members. Household sizes varied from 20 m² to 247 m², with an average size of 76.31 m². The largest house ownership was 247 m², with a maximum population density of 76.31 m² per capita.

The average monthly household income was Rp 7,333,516, ranging from Rp 500,000 to Rp 45,340,000. On a per capita basis, the average monthly income was Rp 1,988,589, with a range of Rp 200,000 to Rp 20,000,000. When assessed against the Fakfak Regency poverty line of Rp 628,418 per capita per month, the majority of families (81.9%) were categorized as non-poor, while 18.1% were identified as poor. However, this categorization of poverty did not always align with family savings levels. Approximately 41.3% of families had savings sufficient to cover less than two months of household expenses, while only 4.4% of families reported savings sufficient to meet 7–12 months of expenses. The remaining families had savings exceeding 12 months' worth of household needs.

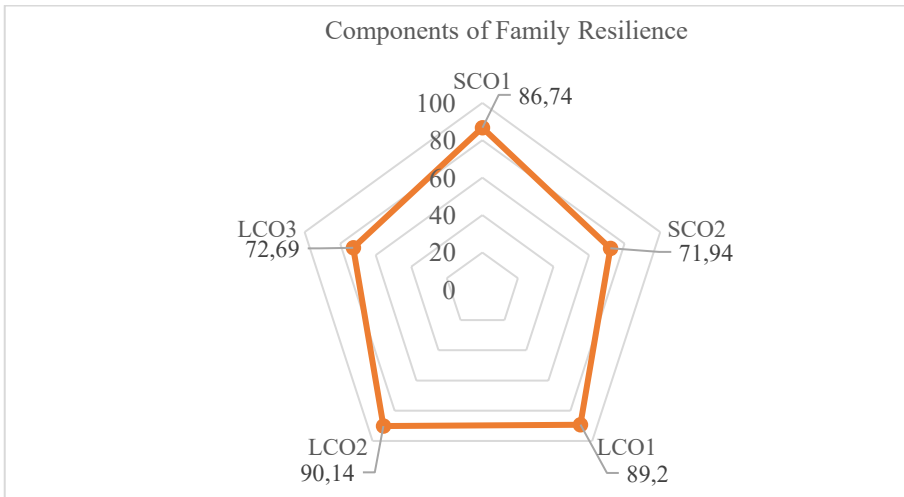
Table 1. Family characteristics of Nutmeg Farmers

| Family Characteristics | Min | Max | Mean | St.Dev |
|----------------------------|---------|------------|--------------|--------------|
| Husband | | | | |
| Age (years) | 20 | 76 | 43.42 | 13.7 |
| Years of education (years) | 0.0 | 18.0 | 9.4 | 3.5 |
| Wife | | | | |
| Age (years) | 20 | 80 | 39.9 | 12.13 |
| Year of education (years) | 0 | 16 | 9.22 | 3.53 |
| Length of marriage (years) | 1 | 60 | 18.31 | 12.02 |
| Family dependents (years) | 1 | 12 | 4.22 | 2.05 |
| House Size (m2) | 20 | 247 | 76.31 | 36.77 |
| Density (m2/capita) | 3.33 | 80 | 17.66 | 11.99 |
| Family income/month (Rp) | 500,000 | 45,340,000 | 7,333,516.67 | 6,559,482.50 |
| Income per capita (Rp) | 200,000 | 20,000,000 | 1,988,589.48 | 2,259,299.76 |

3.2 Family resilience

The average index of the family resilience components of nutmeg farmers in Fakfak Regency is presented in Figure 1. Among the three latent components, physical-economic resilience had the lowest index, while inputs had a lower index compared to the family resilience process. This suggests that while families may have developed adaptive mechanisms to cope with challenges (as reflected in the resilience process), their initial resource availability—particularly in the form of financial assets, savings, and economic stability—remains inadequate. The lower index for physical-economic resilience highlights persistent economic vulnerabilities, such as limited savings, income instability, and restricted access to essential needs like education and healthcare.

Physical-economic resilience encompasses the fulfilment of food, clothing, housing, education, and health needs. The data indicate that while the majority (90%) of families maintain a clean and healthy home environment, only 42.5% have sufficient savings to cover six months of household needs, and about 67.5% attempt to allocate funds for old age. This further reinforces the economic fragility of these families, where immediate survival often takes precedence over long-term financial planning. In contrast, social resilience, which includes religious adherence, adaptation to the social environment, effective communication, and family commitment, appears to be stronger. Nearly all families (97.5%) expressed a commitment to prioritizing family relationships and emphasized mutual respect among members. Additionally, the relatively low educational attainment of family couples—where nearly half (45.6%) had only completed secondary school—may contribute to weaker economic resilience by limiting employment opportunities and earning potential. These findings underscore the need to strengthen financial capacity, improve savings behaviour, and enhance access to education and economic opportunities for nutmeg farming families. Moreover, fostering a culture of mutual respect and religious values remains crucial in supporting overall family resilience, as social and psychological resilience appear to be compensating for economic limitations.



Notes: SCO1: system components process; SCO2: system components input; LCO1: latent components psychological resilience; LCO2: latent components social resilience; LCO3: latent components physical-economic resilience.

Fig. 1. Average Index of Family Resilience Components of Nutmeg Farmers in Fakfak Regency

Psychological resilience encompasses the ability to manage conflicts, regulate emotions and stress effectively, and maintain a strong self-concept. The data reveal that nearly all respondents (98.8%) consistently practice gratitude for their current conditions, demonstrating a positive outlook despite challenges. However, around half (54.4%) frequently experience feelings of helplessness, discouragement, and despair, suggesting that emotional strain remains a significant issue for many families. In terms of family resilience input, the findings show that almost all families (97.5%) prioritize family-related matters, highlighting strong familial commitment. Additionally, nearly half (48.8%) of families reported earnings above the threshold for a decent standard of living, reflecting economic stability among a portion of the respondents. Within the process component, the majority of families (71.9%) demonstrated effective financial management by allocating resources to savings, reinforcing their ability to plan for future needs. As a result, almost all families (98.8%) expressed satisfaction with their efforts to improve their current economic conditions.

However, the output component presents a contrasting picture, as approximately 54.4% of families continue to experience frequent feelings of helplessness and distress. This discrepancy between financial management efforts and persistent emotional strain highlights the need for stronger psychological support mechanisms. These findings underscore the importance of strengthening psychological resilience, particularly by addressing factors that contribute to emotional and mental well-being, such as stress management, community support, and access to mental health resources.

3.3 Economic pressure

Family economic stress was assessed using both objective and subjective indicators. Objective measures included per capita income, debt-to-asset ratio, employment status, and job security, while subjective measures captured family perceptions of economic hardship. Table 2 presents the average scores for objective economic pressure indicators. The data indicate that the highest economic pressure score (81.9) was recorded among families with

savings sufficient for six months or less, suggesting heightened financial insecurity. In contrast, the lowest pressure score (13.8) was associated with irregular or unstable employment, reflecting a relatively lower financial strain in this group. These findings underscore the financial vulnerabilities faced by families.

Table 2. Average objective economic pressure indicator scores

| Objective Economic Pressure Indicator | Score |
|--|--------------|
| Savings less than or equal to 6 months of family needs | 81,9 |
| Income is less than expenses | 36,3 |
| Potential job loss | 33,8 |
| Credit/loan installment payment burden | 20,0 |
| Get into debt | 18,2 |
| Income per capita per month is categorized as poor | 18,1 |
| Irregular employment or not working | 13,8 |

Table 3 highlights the average scores for subjective economic pressure indicators, which measure perceptions of economic conditions related to fulfilling basic and developmental needs. The results indicate relatively minor variations in the mean scores compared to objective measures, suggesting a consistent perception of financial strain across households. Notably, the highest mean score (41.96) is associated with the ability to purchase essential food supplies, highlighting food security as a primary economic concern for families.

Table 3. Average score of subjective economic pressure indicators

| Indicator of Subjective Economic Pressure | Score |
|---|--------------|
| Purchasing family food needs | 41.96 |
| Paying for family health services | 38.48 |
| Social expenses for extended family | 37.23 |
| Home maintenance costs | 37.14 |
| Paying for education services | 36.25 |
| Cost of participating & engaging in social activities | 35.80 |
| Cost of social donation (infaq & shodaqoh) | 35.00 |
| Family recreation expenses | 32.59 |
| Cost of accessing information and knowledge | 31.79 |
| Cost of improving life skills | 31.43 |

3.4. Family vulnerability

Family vulnerability refers to conditions that hinder the fulfillment of family roles and disrupt overall functionality. Table 4 presents the mean scores for family vulnerability indicators, which range from 11.9 (associated with a lack of happiness) to 31.3 (related to forgetting or neglecting family special events). Notably, seven out of fifteen indicators scored above 20.0, highlighting significant areas of concern. Among the key findings, high scores were observed for indicators such as occasional feelings of hopelessness (30.6) and difficulties in meeting various family needs (29.4). These results suggest that many families experience emotional distress and financial struggles, which may weaken their overall resilience. The prevalence of these vulnerabilities underscores the importance of targeted interventions to alleviate family challenges, enhance well-being, and promote stability.

Table 4. Mean score of family vulnerability indicators

| Vulnerability Indicator | Score |
|---|--------------|
| Often forget to pay attention to special family events | 31.3 |
| Sometimes feel hopeless | 30.6 |
| Family has difficulty paying for various needs | 29.4 |
| Not easily and often refrain from sharing important matters | 27.5 |
| Sometimes feel helpless | 25.6 |
| Frequent conflicts within the family | 23.8 |
| Family rarely contributes to social activities | 21.9 |
| Difficulty performing daily worship | 17.5 |
| Family togetherness is rare | 16.9 |
| Not easily grateful for existing conditions | 16.3 |
| Lack of family and friends to assist in times of need | 15.6 |
| Lack of familiarity with neighbours or community leaders | 15.6 |
| Lack of believe in opportunities amid difficulties | 14.4 |
| Presence of a family member at risk of job loss | 12.5 |
| Not easy to feel happy | 11.9 |

3.5 Social cohesion and participation

Table 5 presents the average scores for social cohesion indicators, revealing consistently high scores across all measures. Notably, all indicators scored above 96.25, suggesting strong social ties within the community, such as familiarity with all families in the neighbourhood. The mean total score was 97.75, with the highest mean score (98.75) corresponding to the ability to recognize neighbouring families in need of support. These findings highlight the prevalence of strong social networks and mutual assistance within the community, which are essential for fostering resilience.

Table 5. Average score of social cohesion indicators

| Social Cohesion Indicator | Score |
|---|--------------|
| Familiarity with the family of neighbourhood and community head (RT/RW) | 98,13 |
| Awareness of neighbours requiring support | 98,75 |
| Familiarity with at least 20 nearest neighbour families | 98,13 |
| Familiarity with the family of the village head | 97,50 |
| Familiarity with all families within neighbourhood (RT) | 96,25 |
| Social Cohesion | 97,75 |

In addition, Table 6 provides an overview of the average scores for social participation indicators, which show greater variability compared to social cohesion indicators. The scores range from 45.42 for participation in academic activities or events to 75.21 for engaging in casual interactions such as greeting or communicating with neighbors. These findings suggest that while informal social interactions are relatively common, participation in structured or institutional activities remains lower. This disparity highlights differences in the intensity of social engagement across various domains, suggesting potential areas for strengthening community involvement.

Table 6. Average score of social participation indicators

| Social Participation Indicator | Score |
|---|--------------|
| Communicating / greeting with neighbours | 75,21 |
| Participation in extended family events | 71,67 |
| Participating in religious activities | 71,46 |
| Greening activities around the house | 70,83 |
| Maintaining/cleaning the neighbourhood with neighbours | 70,42 |
| Delivering food to neighbours | 66,46 |
| Participating in social gatherings or activities | 65,83 |
| Supporting teen/youth events | 60,42 |
| Meeting with school environment /children's friends | 51,67 |
| Participating in academic events / book review / exhibition | 45,42 |
| Intensity of Social Participation | 64,94 |

3.6 Relationship between family characteristics and research variables

The analysis revealed significant correlations between family characteristics and key research variables. Education levels of both husbands and wives, along with savings ownership, were strongly associated with components of family resilience and economic stress. Additionally, the number of breadwinners within a household showed a positive correlation with all dimensions of family resilience, suggesting that families with multiple income sources are better equipped to enhance their overall resilience (Table 7).

Table 7. Correlation coefficients of family characteristics, family resilience, and economic stress

| Family characteristic | Family Resilience | | | | | | Economic Pressure | |
|------------------------------|-------------------|---------|--------|--------|--------|--------|-------------------|--------|
| | Var 1 | Var 2 | Var 3 | Var 4 | Var 5 | Var 6 | Var 7 | Var 8 |
| Husband's Age | 0.079 | -0.006 | 0.122 | 0.059 | 0.009 | 0.148 | .205* | 0.020 |
| Wife's Age | 0.000 | -0.017 | 0.012 | 0.022 | -0.061 | 0.04 | 0.126 | 0.099 |
| Husband's Years of Education | .199* | .269** | .189* | .355** | -0.027 | .326** | -.183* | -0.11 |
| Wife's Years of Education | .182* | .166* | 0.143 | .166* | 0.135 | .226** | -0.156 | -0.084 |
| Family breadwinner | .241** | .205** | .305** | .232** | .173* | .376** | -0.056 | -0.001 |
| Family income per month | .200* | 0.012 | 0.153 | 0.134 | 0.078 | .208** | -0.088 | -0.119 |
| Number of family dependents | -0.012 | 0.101 | 0.022 | 0.073 | -0.044 | 0.08 | 0.074 | -0.141 |
| Income per capita/month | 0.056 | -.282** | 0.092 | -0.096 | -0.069 | 0.047 | 0.033 | -0.093 |
| Savings ownership | .201* | .183* | .164* | .166* | .173* | .245** | -.205** | 0.045 |
| Density (m2/capita) | 0.036 | -.199* | -0.103 | -.171* | -0.001 | -0.068 | 0.059 | -0.076 |
| Length of marriage | 0.061 | 0.058 | 0.074 | 0.059 | 0.01 | 0.125 | 0.138 | 0.007 |

Notes: Var 1: physical economy; Var 2: social; Var 3: psychology; Var 4: input; Var 5: process; Var 6: output; Var 7: objective economic pressure; Var 8: subjective economic pressure

Significant correlations were also found between family characteristics, family vulnerability, social participation, and social cohesion. Family vulnerability showed a

positive correlation with the age of both husbands and wives, as well as the number of breadwinners, suggesting that older households and those with multiple earners may experience higher levels of vulnerability (Table 8). Meanwhile, social participation was positively associated with family income, per capita income, and the number of dependents, indicating that families with greater financial resources and larger household sizes tend to be more engaged in social activities. In contrast, social cohesion exhibited a positive correlation with family size but a negative correlation with house density per capita, implying that larger families tend to have stronger social bonds, while overcrowded living conditions may hinder social connectedness.

Table 8. Correlation coefficients of family characteristics, family vulnerability, cohesion, and social participation.

| Family Characteristics | Variable | | |
|----------------------------------|----------|--------|---------|
| | Var 1 | Var 2 | Var 3 |
| Age of husband | .213** | 0.085 | 0.116 |
| Age of wife | .267** | 0.03 | -0.08 |
| Husband's years of education | 0.043 | -0.114 | 0.005 |
| Wife's years of education | -0.098 | -0.001 | -0.009 |
| Family breadwinner | .165* | 0.045 | 0.1 |
| Total family income /month | 0.046 | .172* | 0.048 |
| Number of family dependents | 0.044 | .186* | .205** |
| Income per capita/month | 0.009 | .169* | -0.131 |
| Savings ownership | -0.071 | -0.09 | 0.024 |
| Density (house size/living area) | 0.038 | -.188* | -.259** |
| Length of marriage | 0.107 | 0.057 | 0.053 |

Notes: Var1: Family Vulnerability; Var2: Social Participation; Var3: Social Cohesion.

3.7 Test of variance by poverty status and savings ownership

The results in Tables 9 and 10 highlight significant differences in family characteristics and resilience variables based on poverty status and savings ownership. Table 8 shows that non-poor families demonstrate higher levels of family resilience across all latent and systemic components, experience lower objective economic pressure, and exhibit greater social cohesion and participation compared to poor families. These findings suggest that economic stability contributes to enhanced resilience and stronger community engagement.

Table 9. The difference test results based on poverty status

| Characteristics and Variables | Poor | Not Poor | P-Value |
|---|-----------|-----------|-----------------|
| Family breadwinner (person) | 1.17 | 1.63 | 0.000*** |
| Total family income/month | 2.337.356 | 8.439.536 | 0.000*** |
| Number of family dependents (people) | 5.10 | 4.03 | 0.011*** |
| Income per capita/month (IDR) | 398.092 | 2.340.684 | 0.000*** |
| Physical economic resilience (index) | 65.25 | 74.34 | 0.028** |
| Psychological resilience (index) | 83.82 | 90.43 | 0.006*** |
| Process (index) | 80.92 | 90.23 | 0.001*** |
| Output (index) | 82.99 | 87.58 | 0.083* |
| Objective economic pressure (index) | 34.48 | 21.37 | 0.000*** |
| Social cohesion and participation (score) | 59.77 | 66.06 | 0.057** |

The independent T-test results presented in Table 10 further reveal that nutmeg farming families with savings exceeding six months of household needs exhibit stronger resilience across multiple components and experience lower objective economic pressure than those

with savings lasting less than six months. Notably, families with greater savings tend to have higher social resilience, stronger resilience outputs, and significantly lower economic pressure. These findings emphasize the crucial role of financial preparedness in mitigating economic stress and enhancing overall family resilience.

Table 10. The independent t-test results according to savings ownership.

| Characteristics and variables | < 6 months | >6 months | <i>p-value</i> |
|---------------------------------------|------------|-----------|-----------------|
| Years of education of husband (years) | 9.19 | 10.48 | 0.079* |
| Social Resilience (index) | 89.20 | 94.43 | 0.059** |
| Family resilience output (index) | 85.85 | 90.80 | 0.061** |
| Objective Economic Pressure (index) | 25.45 | 16.09 | 0.000*** |

3.8 Structural Equation Modelling-Partial Least Squares (SEM-PLS)

The Structural Equation Modeling-Partial Least Squares (SEM-PLS) analysis identifies significant effect between independent variables and psychological resilience as the dependent variable. The results, presented in Table 11, indicate that physical-economic resilience has a significant positive impact on psychological resilience, with a path coefficient of 0.246 ($t = 2.41$; $p = 0.016$). This finding suggests that greater financial and material stability contributes to enhanced psychological well-being among nutmeg farming families. Conversely, family vulnerability exerts a significant negative effect on psychological resilience, as indicated by a path coefficient of -0.172 ($t = 2.149$; $p = 0.032$). This implies that higher levels of vulnerability, such as financial instability or social stressors, undermine a family's ability to maintain psychological resilience. Among social factors, social participation demonstrates a marginally significant positive relationship with psychological resilience, with a path coefficient of 0.156 ($t = 1.886$; $p = 0.06$). Similarly, social resilience also contributes positively, though its effect is weaker (path coefficient = 0.261, $t = 1.81$, $p = 0.071$).

Table 11. SEM-PLS test results

| Pathway | Path Coefficient | T-values | P-values |
|--|------------------|---------------|---------------|
| Family characteristics -> Psychological Resilience | -0.054 | 0.648 | 0.517 |
| Physical-Economic Resilience -> Psychological Resilience | 0.246 | 2.41* | 0.016* |
| Social Resilience -> Psychological Resilience | 0.261 | 1.81 | 0.071 |
| Objective Economic Stress -> Psychological Resilience | -0.053 | 0.741 | 0.459 |
| Subjective Economic Stress -> Psychological Resilience | 0.015 | 0.181 | 0.856 |
| Family Vulnerability -> Psychological Resilience | -0.172 | 2.149* | 0.032* |
| Social Cohesion -> Psychological Resilience | 0.24 | 1.606 | 0.109 |
| Participation Intensity -> Psychological Resilience | 0.156 | 1.886 | 0.06 |

4 Discussion

This study examined the resilience of nutmeg farming families in Fakfak Regency, West Papua Province. The descriptive analysis reveals that while a significant proportion of families (81.9%) are not classified as poor, only 42.5 percent have sufficient savings to sustain their needs for six months. This finding suggests that although many families are above the poverty line, they still face challenges in maintaining long-term economic stability. According to Sunarti, family resilience plays a critical role in achieving well-being, as

families serve as primary sources of support, providing access to physical, emotional, social, and financial resources [6]. Resilient families effectively manage stresses and shocks by utilizing and optimizing available resources [7]. In line with Black and Lobo [3], this study supports the notion that resilient families adapt to life's pressures and uncertainties through coping strategies, such as financial management and fostering family cohesion.

The correlation analysis reveals significant associations between educational attainment of husbands and wives, number of breadwinners, and duration of savings ownership with family resilience in its physical-economic, social, and psychological dimensions. Similarly, Maurovic et al. [8] confirms that family resilience can be enhanced through value independence, economic independence, problem-solving abilities, and active social roles within the community. Families with strong physical and non-physical resources and effective problem-solving methods are better positioned to meet their social needs and demonstrate enhanced social and psychological resilience. Families with stable employment and incomes are better equipped to meet their members' needs, resolve family and social problems, and manage emotions effectively, thereby enhancing family resilience [9].

Furthermore, the findings indicate that a higher number of breadwinners and the ownership of savings contribute positively to all aspects of family resilience—inputs, processes, and outputs. This highlights the importance of family functioning, wherein resilience impacts family life comprehensively. Contributions in family economics, parenting, and socialization play a crucial role in strengthening resilience [10]. Family resilience also serves as a protective mechanism, shielding family members from risks and mitigating the impact of economic and social challenges. Sunarti et al. [11] who emphasize that family resilience plays a crucial role in coping with stress and changes that occur within families, even in the aftermath of natural disasters.

Education and savings emerge as particularly strong determinants of economic resilience. Families where husbands have higher educational attainment and greater savings ownership tend to experience lower objective economic pressure. Other studies note that low educational attainment among husbands often limits job opportunities, thereby affecting family income and economic stability. In line with study [12], higher educational mobility significantly reduces family economic vulnerability.

The T-test results reveal significant differences in family resilience based on poverty status and savings ownership across both systemic and latent components. Among latent components, non-poor families exhibit stronger physical-economic and psychological resilience compared to poor families. Families free from severe economic pressures tend to demonstrate higher resilience, as they can better recognize and utilize available resources. Such families are more capable of setting and achieving goals, managing daily life effectively, and adapting to new challenges [13]. Resilient families also exhibit greater adaptability to life's uncertainties, enabling them to maintain well-being across multiple dimensions [3]. Furthermore, significant disparities exist in the process and output components of family resilience, with non-poor families consistently demonstrating stronger resilience. Overall, as family income, per capita income, and asset ownership increase, resilience improves. Several studies confirm that poor families generally display lower resilience compared to their non-poor counterparts.

Additionally, notable differences are observed in family participation, cohesion, and child's values and environments, with non-poor families exhibiting more favorable conditions. Other studies highlights that strong social roles within families foster harmony and reduce internal conflicts. Moreover, economic pressure differs significantly based on poverty status and duration of savings ownership. While objective economic pressure is closely linked to financial constraints, subjective economic stress varies significantly with educational attainment. Families with higher education levels are more likely to secure stable employment, earn higher incomes, and accumulate greater savings, thereby reducing

financial strain. Employment stability further serves as a key indicator of economic pressure. Simonse et al. [14] establishes that steady employment enhances socio-economic well-being, while subjective economic stress often arises from dissatisfaction with income, unmet financial needs, or limited financial literacy and life skills.

The SEM-PLS analysis reveals that psychological resilience among nutmeg farming families is positively influenced by physical-economic resilience, social resilience, and social participation. Conversely, family vulnerability exerts a negative influence on psychological resilience. Furthermore, family vulnerability increases with the ages of both husbands and wives, supporting findings by Widiono [15], who highlight greater vulnerability among aging individuals, particularly within marginalized communities such as rural populations with limited access to essential services.

Age serves as another key factor influencing resilience. The wife's age positively affects the family's physical-economic resilience. Additionally, social and psychological resilience significantly enhance physical-economic resilience, reinforcing the idea that a family's ability to manage stress and maintain strong relationships contributes to financial stability. Optimal resilience is characterized by a family's capacity to navigate challenges, fulfill life's necessities, and maintain well-being. Families with strong resilience are more likely to achieve prosperity, sustain physical and mental health, excel in education and work, and build harmonious relationships with their social and natural environments. Conversely, economic pressure and family vulnerability negatively impact physical-economic resilience. Financial instability, job uncertainty, and mismanagement of resources are major barriers to resilience, increasing economic stress. Similarly, poor financial management and resource misallocation exacerbate vulnerabilities, weakening resilience. However, social cohesion and participation significantly strengthen physical-economic resilience, active social engagement plays a key role in bolstering resilience.

This study underscores the need to enhance family resilience through social participation, financial literacy, and reduced vulnerability. Local governments and community organizations should prioritize programs aimed at strengthening the resilience of nutmeg farming families, particularly through poverty alleviation initiatives and the promotion of saving habits. Addressing these key areas will enable families to better navigate economic and social challenges, ultimately improving their overall well-being and quality of life.

5 Conclusions and recommendations

5.1 Conclusion

This study on the family resilience of nutmeg farmers in Fakfak Regency reveals that while most families are not classified as poor, a smaller proportion maintain sufficient savings to cover six months of household needs. Higher educational attainment, a greater number of breadwinners, and sustained savings ownership significantly strengthen physical-economic, social, and psychological resilience. The positive interconnections among these factors highlight their collective contribution to overall resilience. In contrast, poor families and those with insufficient savings experience lower resilience and greater economic pressure. The SEM-PLS analysis further confirms that psychological resilience is directly positively influenced by physical-economic resilience, social resilience, and social participation, while family vulnerability exerts a negative impact. The studied variables explain 44.9% of the variance in psychological resilience, underscoring the importance of economic security, social engagement, and reduced vulnerability in enhancing family resilience.

5.2 Recommendations

To enhance resilience, families should focus on reducing vulnerabilities while strengthening physical-economic resilience, social resilience, and social participation. In particular, nutmeg farming families are encouraged to develop consistent saving habits to ensure financial security for at least six months' worth of expenses. By adopting these strategies, families can better navigate economic uncertainties and maintain long-term stability. At the same time, local governments and community organizations should implement targeted programs aimed at improving all aspects of family resilience. Specifically, efforts should focus on poverty alleviation and financial literacy initiatives to encourage responsible saving behavior. Furthermore, academic institutions play a crucial role in resilience development by engaging in community service programs and conducting further research on key resilience factors. Future studies could explore economic, social, and behavioral determinants of family saving habits in Fakfak or other regions in Papua, providing deeper insights into strategies for strengthening financial resilience among farming families.

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