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# Adaptation Strategies to Climate Variability Used by Farming Households in Selected Municipalities in Romblon Province, Philippines

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***Abstract***
*Resilience in communities is further fueled by understanding adaptation strategies and socioeconomic factors. Climate variability significantly impacts agriculture and livelihood in resource-rich areas such as the Province of Romblon. This study utilizes a descriptive-correlational research design. Problem finding about adaptation strategies used by farm households and whether any correlation exists between the socioeconomic characteristics of these households, gender roles, and the chosen adaptation measures. Based on proportional allocation, 313 registered farming households were sampled randomly through the stratified sampling technique. The data were analyzed using frequency, percentage, mean, Chi-square, and Pearson correlation tests. Most households depend on crop farming, and farmers in the area are highly conversant with the different types of climate change, its causes, and effects. Some of the adaptation strategies used were crop diversification, irrigation, mulching, and crop insurance, but a lack of government support and high costs of inputs plagued these strategies. For the gender roles, men took on marketing- and mechanization-related operations, while women were mainly responsible for post-harvest activities. Correlation was found between women's adaptation and access to credit, irrigation, agricultural inputs, government support payments, and training. More experienced and older farmers were found to be better at adaptation. However, larger family size was not observed to foster adaptation. Interventions to improve adaptive capacities should provide enough support to target the barriers of finance and access, taking gender-inclusive approaches. Policy intervention has to deal with financial backing, technology dissemination, and gender-sensitive training. Future research should explore community-based strategies to manage climate variability sustainably.*
***Keywords:*** *adaptation strategies, climate variability, farming household*

## INTRODUCTION

Agriculture forms the backbone of rural families throughout the Philippines, but is now at the forefront of climate change. There are increasingly frequent sun droughts and rains or extraordinary typhoons every season. Small-scale farmers globally were affected by their harvests bouncing up and down, squeezing planting schedules, and welcoming in strange pests, all of which were said to threaten both the food and the cash in their pockets (Morton, 2007).

Whether a household can withstand most shocks depends not only on the climate. Research into "adaptive capacity" suggests that a farmer's safety net comprises two key elements: first, the severity of climate shocks, and second, the resources, knowledge, and local support available to them when these shocks occur (Smit & Wandel, 2006). In areas with doubly unpredictable weather, the way to go in terms of survival is through crop diversification, good weather information services, and strong community networks. Sadly, in those developing areas around the globe where these strategies are most needed, farmers lack the means to put them into effect due to the absence of money, information, and institutional support (Mertz et al., 2009).

On a global scale, adaptation is considered the most effective solution to minimize the adverse impacts of climate change and help farmers retain their livelihoods.' However, adaptation is also not easy. Smallholder farmers face barriers such as low access to financial services and insurance, limited knowledge of adaptive technologies, and insecure property rights that may hinder adaptation (Castells-Quintana et al., 2018). Gender-sensitive fieldwork in coastal communities also reveals that women diversify livelihoods and engage in post-harvest processing as adaptation measures against extreme events; however, their roles are generally not recognized in any form of local adaptation plan (Graziano et al., 2018).

In the Philippines, no detailed empirical data document the perception and response of smallholder farmers to climate variability in regions such as Romblon (Hernandez, 2017). Upland farmers in Bukidnon use labor-intensive soil conservation and water harvesting methods for their farms. However, cost and labor availability limit their wide-scale adoption (Pulhin et al., 2016). In Bohol, agroforestry, particularly planting fruit and timber trees as a climate shock buffer, has been culturally acceptable and a source of additional co-benefits such as income generation and nutrition (Lasco et al., 2016).

Given the weight that climate change impacts have gained, different adaptation strategies employed by farming households in Romblon are yet to be adequately studied. There are pertinent questions on the barriers being confronted, the effectiveness of the existing adaptation measures, and the gendered dimension in climate responses. Without this information, policymakers and practitioners risk formulating interventions that may not be appropriate for local realities.

The primary purpose of the study was to analyze the socio-economic characteristics of farming households in Romblon, assess farmers' knowledge and awareness regarding climate variability, identify the strategic adaptation employed by farming households, determine the barriers that farmers faced in the adoption of adaptation measures, examine gender key responsibilities in crafting and executing adaptation strategies, and to analyze the relationship between farmers' socio-economic characteristics, gender roles, and their adaptation strategies implemented.

The need for adaptation has been highlighted in global literature as a matter of climate resilience, while local studies in the Philippine context remain few, more so for island provinces such as Romblon. Intertwining adaptation should steer household responses; however, gendered analysis of adaptation is rarely done. This study tackles some of these concerns by providing context-rich, gendered insights into the various adaptation strategies taken by Romblon farming households.

## REVIEW OF LITERATURE

In the surrounding phase of cropping, change in climate affects agricultural production and the livelihoods of farmers in the Philippines. Romblon is mainly mountainous and dependent on rainfed agriculture, making it a vulnerable situation, which makes finding the proper adaptation strategies imperative for the farmers.

According to the study of Bryan et al. (2013), the primary adaptation strategies include growing different crops or varieties of the same crops, tree planting, soil conservation, changes in planting dates, and irrigation. However, many farmers did not adjust their farming operations despite perceived changes in temperature and rainfall. While in South Africa, the trader's primary impediment is credit; in Ethiopia, it is the lack of land, information, and credit. A probit model analyzes the various factors affecting farmers' choice to adapt or not to changes perceived to be caused by climate. The analysis reveals that in Ethiopia, the option to adopt is influenced by wealth, access to extension service delivery, credit, and information on climate risks, whereas in South Africa, life wealth, government support programs to farms, fertile lands, and credit decide on the choice. The factors affecting decisions on adaptation to perceived climate change across the two countries reveal that farmers were likely to adapt if they had access to extension, credit, and land. Food aid, extension

services, and climate change information all supported adaptation among the poorest farmers. Therefore, we conclude that policymakers must create adaptation strategies by enhancing access to credit, climate information, markets, and focusing on small-scale subsistence farmers with limited resources to counter climate change.

In their systematic review, Zulkepli et al. (2022) studied the relationship between adaptation strategy factors and the influence of climate variability on farmers in countries in Southeast Asia. In an operative term spanning many years, climate change has affected the livelihood of farmers in the agricultural sector. The study highlights five major thematic issues: sociodemographic factors, physical capital, assistance, information, and social networking. The findings bring forth the key factors influencing the adaptation strategies among the Southeast Asian farmers that include income, size of the household (number of members living in the household), size of the farm, land ownership, availability of workforce, access to information, level of education, level of passing down practical experiences (skill), opportunity for training, agency support, and social network. Under this systematic review, most evidence indicates that the most critical factors in developing adaptation strategies for farmers concerning climate change should be information accessibility, education, training, income, rather than program, internet usage, relatives, and the number of workers. Combining the major factors can support technological advancement for farmers who depend on agriculture as their primary source of income and assist farmers in combating climate variability for sustainable livelihoods.

Complementing this, the cultivation of tiger grass in the uplands of Romblon, documented by Landicho et al. (2020), showed that monocropping approaches alongside the Slash-and-burn farming method practices degrade the soils and loss of biodiversity. Hence, to counter such effects, agroforestry has been accepted as a form of sustainable adaptation by training farmers and establishing agroforestry models that balance economic needs against environmental conservation.

In the case of rainfed areas, the water deficits experienced are mainly during the blooming and seed development periods (known as terminal drought stress), with profound impacts on crop yield and production. Conversely, orchards and vineyards, mainly cultivated in irrigated areas, will suffer from water deficits because of less water available for irrigation and increased evaporation. The impact of agriculture on climate change in Mediterranean-climate regions requires integrated strategies that form across several levels, including the crop, that is, orchards and vineyards, the cropping system, the sequence of crops and effective management strategies implemented on a particular agricultural field, and the farming system, which includes the farmer (del Pozo et al., (2019).

Regional studies provide relative analysis of adapted measures across regions. According to the recently published survey by Dawid & Boka (2025) in Ethiopia, reported approaches included terracing, crop diversification, shifting planting dates, and diversifying income streams as the most common measures people use to cope with changing rainfall and temperature patterns. Their analysis further stressed the effect of education, extension services, and access to complete climate data on farmers' adaptation decisions.

The study analyzed by Destaw & Fenta (2021) posits that some parameters such as farmers' age, family size, level of education, measured farm size, income, livestock ownership, access to agricultural extension services, access to markets, climate information availability, and agro-aesthetic conditions had a significant direct influence on farmers' choice of adaptive strategies. Finance, land, climate information, skills, and labor were identified as the main constraints limiting adaptation to climate change. Accordingly, intervention strengthening in income generation activities and climate information access is a must in any climate change adaptation strategy, with the need for early-maturing and high-value crop varieties better suited for the local environment.

Similarly, a global synthesis across sectors in agricultural adaptation options has found crop diversification, drought-tolerant varieties, and shifts in planting dates to be the most widely adopted

among farmers to improve their resilience to climatic variability (del Pozo et al., 2019). Inadequate financial support, inaccessibility to inputs, lack of credible technical knowledge, and others are devoid to successful adaptation, and hence, supportive policies should be in place alongside capacity-building. Khan et al. (2020) mention that farm households practice adaptation strategies like the diversification of crops and the choice of alternative crop varieties with reference to crop calendar, fertilizer, mulching, and farm insurance. The binary logit model highlights factors such as age, education, farm size, household size of farmers, including access to credit, and annual income. Perceiving temperature increase and rainfall decrease influenced adaptation strategy choices significantly. Chetri et al. (2024), the farmers' capacity and accessing weather data as a valuable resource, unlinked or otherwise from other correlated variables, are under review for their temporal relationship in accepting farm-based adaptation strategies. The study also considered the role of weather information dissemination through ICTs to farmers. The investigation considered whether farmers had direct access to ICT equipment, had the technical know-how to use these ICTs, their willingness to use ICTs for productive matters, and the extent to which social situations embedded them in ICT. More substantial information-adaptation links could be moderated through the farmer's community network concerning ICTs. Farmers' ability to use ICTs is fundamental in securing greater access to weather updates. On their part, farmers' willingness to employ ICTs for productive content uplifts their placement in the social ecosystem concerning the use of ICTs. Though wealth is a critical determinant for access by farmers to other resources, its association through adopting adaptation at the farm level measures is tenuous.

With its climate change-prone nature, Romblon sees its farming households' adaptation strategies tie local realities with the broader agricultural backdrop. Agroforestry and diversification approaches from the cover of national adaptations should provide the needed avenue for resilience. However, socio-economic constraints should be tackled, and improved climate services remain another adaptation pillar.

## THEORETICAL FRAMEWORK

Climate adaptation theory thinks of adaptation primarily as how human beings, through individuals and communities, seek to adjust to actual or expected stimuli arising from environmental changes. It highlights key concepts such as adaptive capacity, or the ability of farming households to change their farming activities to reduce vulnerability and increase resilience. This theory further identifies common impediments to adaptation strategies, such as a lack of financial resources, access to climate information, and technological know-how. With any inadequately addressed a proper response to climate variability will be hampered. Knowing these barriers will allow interpreters to express why types of adaptation differ among farming households in selected municipalities in Romblon. This research, embedded in these theories, can delve into a deep understanding of the complex variables affecting household climate adaptation, giving valid points of entry for policies and programs to build agricultural resilience for Romblon.

Figure 1 was conceptual diagram of the theoretical framework for “Adaptation Strategies to Climate Variability in Romblon”, named as the **Vulnerability–Assets–Strategies–Outcomes (VASO) Framework** for Climate Adaptation in selected municipalities in Romblon Province.


**Figure 1. The VASO Framework**

The Vulnerability-Assets-Strategies-Outcomes Framework is a perfect example of a very comprehensive way of understanding the struggles of the farmer households of Romblon in negotiating climate variability. Placing farmers at the outermost ring reinforces the idea of a broader **vulnerability context** with climate shocks (droughts, floods, typhoons), socio-economic disruptions (market swings, pandemics), changing trends and seasonality, as well as enabling or constraining policies, institutions, and governance structures. By emphasizing these exogenous factors, VASO pushes the analyst to realize that the household does not respond in isolation to its component levels—hence, adaptation interventions must be tailor-made to the community exposure profile and institutional landscape.

At the center of the vulnerability set are the five livelihood **assets**-or capitals-that represent the core set of assets used by the farming community: natural capital (land, water, biodiversity), physical capital (tools, infrastructure, irrigation), human capital (skills, knowledge, health), social capital (networks, structures of community support), and financial capital (income, savings, credit access). These assets are deeply interdependent; like strong social networks may empower farmers to access informal credit, while legitimate natural capital will support agroecological practices. The VASO Framework maintains that adaptive capacity emerges from the portfolio of these capitals, keeping in mind that weakening an asset limits the practical options available regarding the strategies.

The households can select their livelihood **strategies** to adapt to climatic stressors using their asset base. Crop diversification, shifting planting dates affected by untimely rainfall, agroforestry interventions, soil and water preservation measures like terracing and mulching, income diversification both on- and off-farm, and climate information and technologies like seasonal forecasts and mobile advisories were commonly practiced by farmers. VASO says that the choice of strategy is not purely a matter of preference but is contingent on the relative strength of each of the other capitals, such as financial liquidity, as crop diversification might require very liquid assets to purchase different seed stocks and human capital to manage varying crop cycles effectively.

The design of the inner layer of the framework captures the desired livelihood **outcomes:** resilience against climate variability, sustained agricultural productivity, food security, income stability, and reduced vulnerability. These outcomes represent both the objectives and measures for successful adaptation. Significantly, the arrows depicted in VASO linking outcomes to assets highlight that adaptation is a dynamic process: higher income from crop harvests increases households' financial capital and social capital, which enhances the capacity to invest in technologies or methods later on. Finally, VASO incorporates **feedback loops** showing adaptation as an iterative and adaptive management process. Positive outcomes would enrich asset stocks and encourage institutional support like local governments adopting policies favorable to irrigation after a community successfully initiates water-harvesting practices. Conversely, adverse shocks to assets may even compel a re-orientation of strategies like from crop production to wage labor if natural capital is eroded by extreme weather. A systematic application of the **VASO Framework** to the ADSTRAC study would map out the vulnerability landscape of Romblon's farming communities; it could measure asset endowments, list existing adaptation practices, and gauge the resilience dividends being accrued.

Therefore, an integrated approach considers the context-specific drivers and universal pathways to adaptation, offering insights rooted in local realities but translatable into other climate-vulnerable areas.

## METHODOLOGY

### *Study Design*

This study primarily employs a descriptive-correlational research design. The descriptive part mainly identifies and analyzes the adaptation strategies of farming households against climate variability. In contrast, the correlational part tests the association between the socioeconomic characteristics of farmers, gender roles, and their adaptation strategies. This design was appropriate since it enables describing existing phenomena while exploring relationships among variables.

### Study *Site*

This study is based on the selected Municipalities in the Province of Romblon. An area that depends mainly on the agricultural sector and is highly prone to the effects of climate variability. The Municipality of San Andres comprises 13 barangays, mainly comprising people engaged in farming activities, wherein 6 Barangays, namely Agpudlos, Calunacon, Doña Trinidad, Linawan, Mabini, and Tan-agan, were selected. On the 15 Barangays comprising the municipality of San Agustin, Romblon, chosen for the study, were 4 Barangays- such as Doña Juana, Buli, Dubduban, and Cabolutan, known for farming activities. In the municipality of Magdiwang, Romblon, there are 9 Barangays made up of Silum, Tampayan, Dulangan, Jao-Asan, Poblacion, Ambulong, Ipil, Agsao, and Agutay, which all participated for their agricultural activities.

### Participants

Farming households were part of the target population, which included three municipalities, namely San Andres, San Agustin, and Magdiwang, in the province of Romblon. Stratified random sampling was done about the barangay units to guarantee their representation in the sample from the above-mentioned municipality. The Barangays were classified into strata for this stratification technique. Proportional sampling, as per the number of registered farming households per barangay and selected farmers randomly within each stratum, was the procedure. The sample size was computed from the population size of the registered household farmers in each of the following municipalities-Based on data from the Rao Soft calculator model using a 95% confidence level and 5% margin of error: San Andres, N=245, San Agustin, N=134, Magdiwang, N=75. The number of 313 registered farming households was proportionally distributed among the selected Barangays in San Andres (150), San Agustin (100), and Magdiwang, Romblon (63) to ensure representativeness across the barangays selected.

### Instruments

A structured survey questionnaire was generated based on existing literature and studies from online resources. The questionnaire covered the following: socioeconomic characteristics of farming households, knowledge of climate variability, adaptation strategies employed, constraints to adaptation, and the roles of gender in adaptation decisions. The survey instrument underwent content validation from three knowledgeable persons in agriculture. The questionnaire was then pilot-tested among 15 farmers from a neighboring municipality to ascertain clarity and reliability. Cronbach's alpha was computed for internal consistency. A value of ≥ 0.70 was deemed to be acceptable.

### Data Collection

Informed consent was obtained from all parties, including the Office of the Municipal Mayor, Municipal Agriculture Office, Barangay Officials, and the Association President. Enumerators were trained extensively to administer the survey uniformly. Face-to-face interviews were conducted in the local dialect to ensure understanding and accuracy. Data collection took two months (March to April

2024). The researchers ensured that participation was voluntary, respondents could withdraw at any time, and confidentiality and anonymity were guaranteed.

**Data Analysis**

The data collected was entered on a Microsoft Excel datasheet and then analyzed with SPSS 20. Frequencies, percentages, means, and standard deviations were run as descriptive statistics to describe the socioeconomic characteristics, knowledge of climate variability, adaptation strategies employed, constraints faced, and gender roles. Inferential statistics such as the Chi-square were run to test for association between some socioeconomic characteristics concerning the respondent's gender, land ownership, access to resources, source of income, subsidies and price support, agricultural extension services, provision for insurance, and provision for social welfare programs with the gender roles of farming households in crafting and implementing adaptation strategies. Also, Pearson's correlation was used to determine the relationships between continuous variables such as age, years of farming experience, farm size, household income, education level, and household size with the adaptation strategies adopted by the farming households.

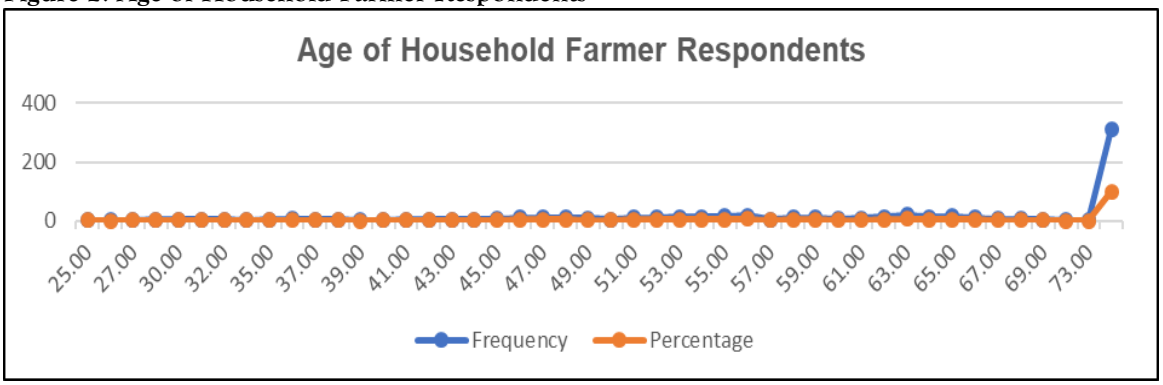
**Discussion, Results, and Findings**

The results of the data analysis, which aligned with the study's objectives, were presented in both graphical and tabular formats.

Analysis and Interpretation of Socio-Economic Characteristics of Farming Households in Romblon. The results of the analysis of the socioeconomic characteristics of farming households are presented in the following figures and tables.

The age profile Figure 2 of household farmers in Romblon reveals a markedly older farming population. More than 90% of respondents are around 73 (100 percent of cases), while fewer than 10 percent are younger than 67. The clustering of farmers in older age brackets implies an elderly workforce with limited capacity for labor-intensive tasks and a slower pace of adapting to new technology. According to the Central Statistical Authority of the Philippines' report on Agricultural Statistics 2020, Filipino rice farmers had an average age of 56 in the year 2020, indicating a demographic trend that is aging agricultural workers. The aging farming population has been identified as having lower levels of innovative practice adoption and a potential decline in productivity of the farming sector; thus, it necessitates the implementation of policies that will foster youth engagement in agriculture (PSA, 2020).

**Figure 2. Age of Household Farmer Respondents**




Given the gender, marital status, and educational attainment information, 54.3% of respondents are males, while 45.7% are females Figure 3. Hence, this gender composition is balanced against national numbers; men represent roughly 82% of the agricultural labor force. Most of them in farming are married (76%), with the possibility of imparting some degree of household stability and bearing to dependency. Forty percent have finished secondary education, 20.4% primary, and 19.5% tertiary education, while the remainder comprises barely 2% of those without formal education. The

educational levels considered here are far higher than the 58% who have never completed elementary education among the Masbate farmers (de la Cruz & Santos, 2023), thus, education was less prevented in Romblon, a factor that would have facilitated the patronage of extension services and better farm management practices.

**Figure 3. Profile of farming households as to gender, marital status, and education level**

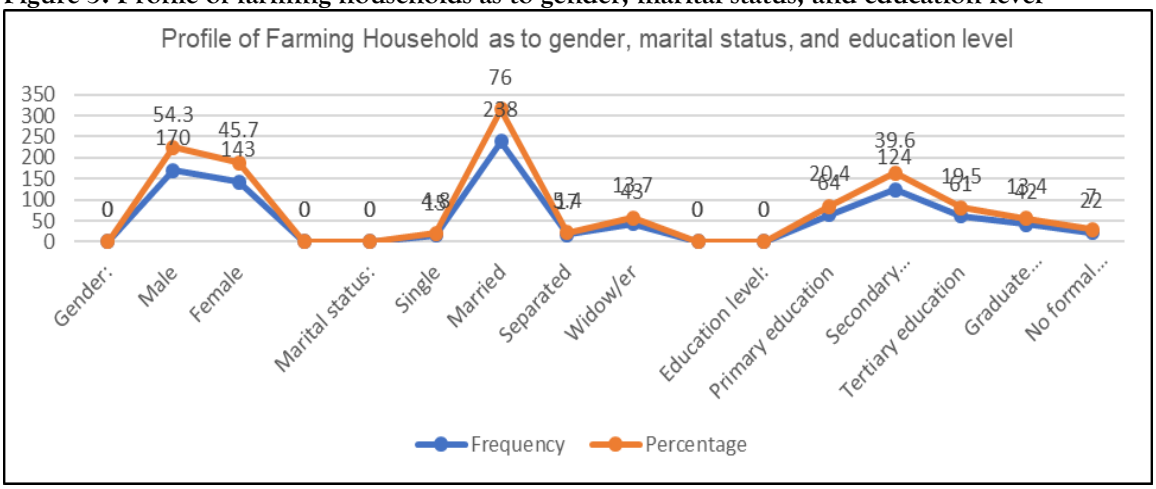



Figure 4 labor-force composition within households, the share contributed by mothers is largest in all cases (38.6% of all labor inputs; 54.4% of cases in some capacity), followed by children (26.8%; 37.7% of the cases), fathers (18.7%; 26.3% of the cases), and grandparents (15.9%; 22.4% of the cases). The distribution of labor within these households emphasizes the dominance of females in smallholder agriculture, which is in line with FAO findings indicating that women provide over 40% of agricultural labor in Asia (FAO, 2011). Dependency on household and child labor may indicate an inability to access hired labor and hence may signal potential vulnerabilities in case demographic or migration changes occur (Pingali et al., 2019).

**Figure 4. Labor Force of Farming Household**

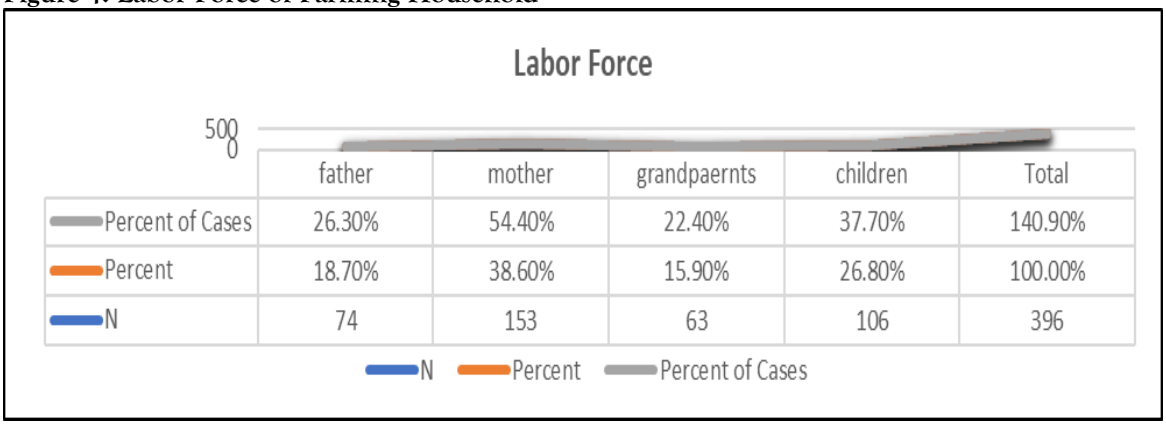



Figure 5 recodes the family-size distribution of farming households, stating both frequency and percentages. The family-size distribution peaks at four (22%), while those with three and five members are also quite ordinary (10.9% and 16.6%, respectively), with larger households of more than six members sharply running off. The family composition of nearly four is consistent with

national rural averages of 4.2 members per household (Philippine Statistics Authority, 2020). Smaller household sizes may imply few member family labor resources, but may help in lessening per-capita resource constraints and better per-member welfare outcomes. Bryan et al. (2013) mentioned that family size averages approximately four members, affecting labor and household adaptation.

**Figure 5. Family-Size Distribution**

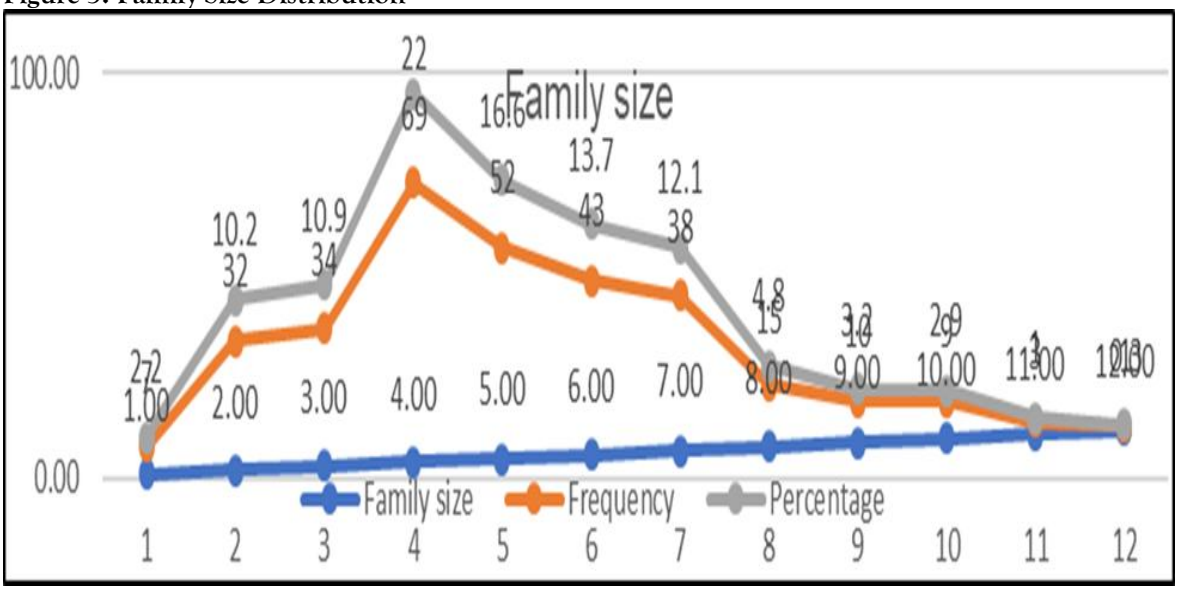
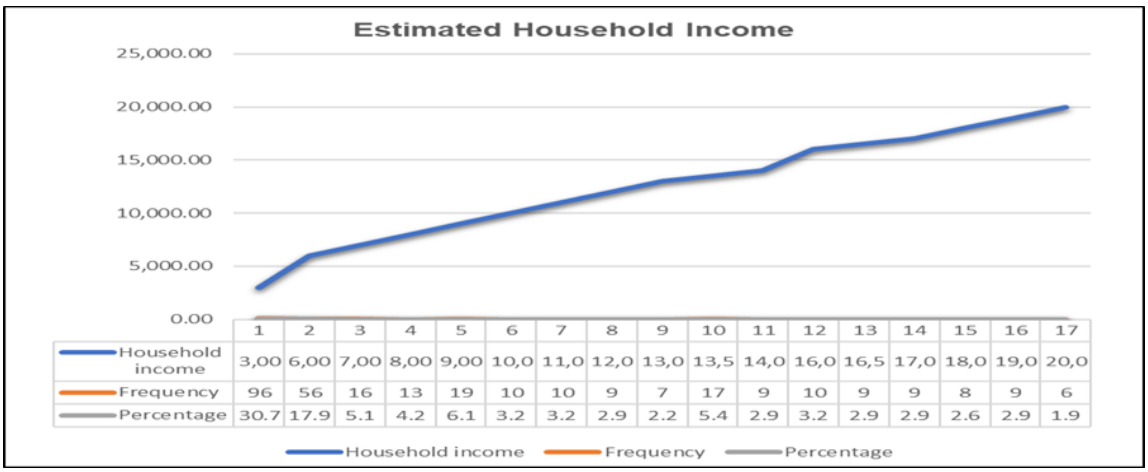



Figure 6: Income Estimates of Farming Households. Income estimates show that, while 30.7% of the households earn ₱3,000 per harvest period, 17.9% earn ₱6,000, with the frequency generally diminishing towards the higher income bracket, except for a spike at ₱13,500 (5.4%). Income in Romblon amongst farmers was very low and unevenly distributed, with most farmers near or below the subsistence level. According to the national poverty threshold, the average income of a rural family was about ₱10,727 monthly, suggesting that most of these households are financially vulnerable (Philippine Statistics Authority, 2020). Once income vulnerability comes into play, building on the discourse of linking markets, value addition, and provision of credit would be considered.

Significant insights have been elicited through these studies into the strategies for climate variation adaptation practiced by Romblon farming families. From the socioeconomic profile, most of the respondents are males, mostly married persons with secondary education. Most households primarily rely on crop farming with little to no diversification in livestock or employment.

**Figure 6. Estimated Income of Farming Households**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Household income | 3,00 | 6,00 | 7,00 | 8,00 | 9,00 | 10,0 | 11,0 | 12,0 | 13,0 | 13,5 | 14,0 | 16,0 | 16,5 | 17,0 | 18,0 | 19,0 | 20,0 |
| Frequency | 96 | 56 | 16 | 13 | 19 | 10 | 10 | 9 | 7 | 17 | 9 | 10 | 9 | 9 | 8 | 9 | 6 |
| Percentage | 30.7 | 17.9 | 5.1 | 4.2 | 6.1 | 3.2 | 3.2 | 2.9 | 2.2 | 5.4 | 2.9 | 3.2 | 2.9 | 2.9 | 2.6 | 2.9 | 1.9 |

In Table 1, farming households are composed of different characteristics. Most of them fall into the majority lacking credit (61.7%) and irrigation (53.7%), though the majority further have agricultural inputs (55.6%) and technology (62.6%). As a primary means of earning, crop farming is practiced by 85.6%, with little else in the way of additional income from livestock and employment. Water for agriculture is necessary for most landholding households (60.7%). Agricultural extension service participation is relatively low; few receive subsidies for their farming practices. Access to social welfare programs is also very low. The majority never received food support (54.3%), health services (68.1%), or educational support (84.3%), and some 73.8% indicated social welfare needs remain unmet.

**Table 1. Farming characteristics of farming households**

| **Indicators** | **Responses** | **Frequency (n=313)** | **Percentage** |
|---|---|---|---|
| **Access to resources:** | | | |
| Access to Credit | No | 193 | 61.7 |
| | Yes | 120 | 38.3 |
| Access to Irrigation facilities | No | 168 | 53.7 |
| | Yes | 145 | 46.3 |
| Access to Agricultural inputs | No | 139 | 44.4 |
| | Yes | 174 | 55.6 |
| Access to Technology | No | 117 | 37.4 |
| | Yes | 196 | 62.6 |
| **Source of income:** | | | |
| Crop Farming | No | 45 | 14.4 |
| | Yes | 268 | 85.6 |
| Livestock rearing | No | 288 | 92.0 |
| | Yes | 25 | 8.0 |
| Employment | No | 254 | 81.2 |
| | Yes | 59 | 18.8 |
| **Land ownership:** | | | |
| Land owner | | 190 | 60.7 |
| Tenant | | 109 | 34.8 |
| Lease or rent | | 14 | 4.5 |
| **Government Support:** | | | |
| *1. Subsidies and Price support:* | | | |
| Direct Payments | No | 188 | 60.1 |
| | Yes | 125 | 39.9 |
| Input subsidies | No | 17 | 5.4 |
| | Yes | 296 | 94.6 |
| Price Support Mechanisms | No | 308 | 98.4 |
| | Yes | 5 | 1.6 |
| No subsidies received | No | 307 | 98.1 |
| | Yes | 6 | 1.9 |
| *2. Agricultural extension services* | | | |
| No agricultural subsidies received | No | 284 | 90.7 |
| | Yes | 29 | 9.3 |
| Seminars and Trainings | No | 121 | 38.7 |

| | | | |
|---|---|---|---|
| | Yes | 192 | 61.3 |
| Guidance to improve farming practices | No | 213 | 68.1 |
| | Yes | 100 | 31.9 |
| Crop selection | No | 256 | 81.8 |
| | Yes | 57 | 18.20 |
| Pest and disease management | No | 227 | 72.5 |
| | Yes | 86 | 27.5 |
| Agricultural techniques | No | 279 | 89.1 |
| | Yes | 34 | 10.9 |
| **Provision for insurance program** | Yes | 250 | 79.9 |
| | No | 63 | 20.1 |
| **Provision for Social Welfare Programs:** | | | |
| Food assistance program | No | 170 | 54.3 |
| | Yes | 143 | 45.7 |
| Healthcare Services | No | 213 | 68.1 |
| | Yes | 100 | 31.9 |
| Educational Support | No | 264 | 84.3 |
| | Yes | 49 | 15.7 |
| Rural development initiatives | No | 306 | 97.8 |
| | Yes | 7 | 2.2 |
| No provision for Social Welfare Programs | No | 231 | 73.8 |
| | Yes | 82 | 26.2 |

An integrated analysis of farming-household characteristics presented summarizing Table 1 was elaborated, with interpretation supported by different empirical findings. All the percentages in the ensuing paragraphs refer to a sample of n = 313 households.

**Access to Credit and Other Resources**

Of the households surveyed, 38.3 % accessed credit, while 61.7 % could not. Due to financing challenges, smallholders cannot purchase improved inputs, adopt new technologies, or smoothen consumption through the planting cycle. In the mountainous regions of Pakistan, about 70 % of the farmers depended on informal credit. In contrast, access to institutional financing benefited from significantly higher input uptake and productivity gains (Ullah et al., 2024). Likewise, in the Philippines, constructed canal irrigation, which was often financed through credit, was suggested to have raised rice yields by 2–6 %, highlighting the complementary effects of financial and physical capital (Bravo-Ureta et al., 2020). Nearly half of the households have irrigation (46.3 %), and over half report access to agricultural inputs (55.6 %) and technology (62.6 %). However, credit remains an obstacle to fully utilizing these assets.

**Primary Income Sources and Livelihood Diversification**

At 85.6 percent, crop farming is the household members' primary income source, followed by livestock earnings (8.0 percent) and off-farm employment (18.8 percent). Livelihood diversification into non-farm activities has been widely discussed as a risk management strategy: a world review found that households pursuing different livelihood streams generally enjoyed greater income stability and resilience to shocks (Jones & Carletto, 2022). Few farmers in Romblon working off their properties for income or with livestock indicate few employment opportunities outside crop agriculture, implying that farmers are highly vulnerable to risks specific to crop agriculture, such as price fluctuations, pest infestation, and extreme weather.

**Land Tenure Patterns**

Secure land tenure guarantees long-term investments and access to credit. It is apparent that in our sample, landowners constitute 60.7% of the respondents, tenants comprise 34.8%, and renters/lessees form the

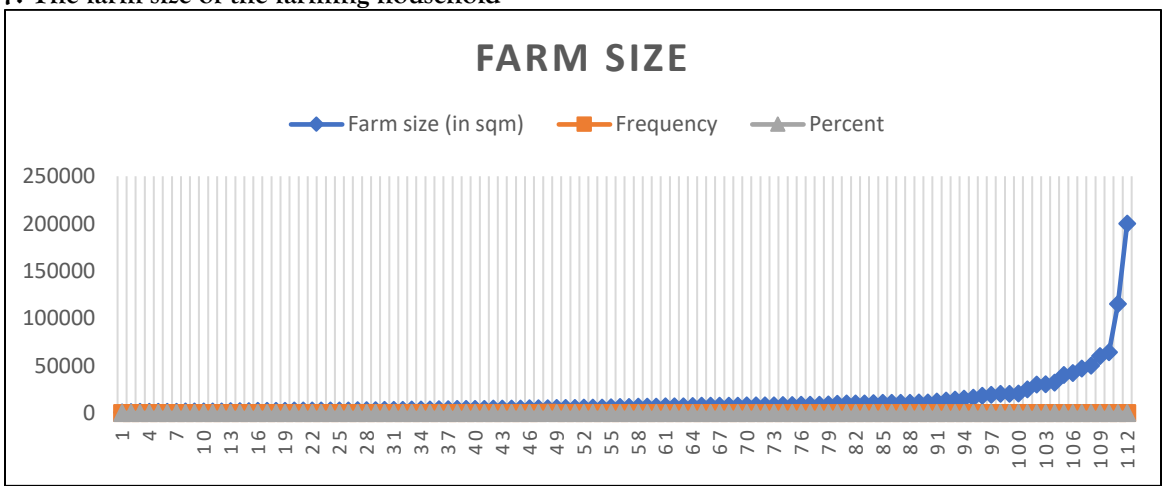
remaining 4.5%. More recent evidence from Vietnam sustains the argument that formal land registration may guarantee a 20% technical efficiency, putting farmers in a position to do soil conservation and capital-intensive practices (Zhang & Chen, 2023). Hence, the considerable proportion of tenants in Romblon points to persistent tenure insecurity, presumably discouraging long-term improvements on the land.

**Government Support, Extension, Insurance, and Social Welfare**

Almost all households, or 94.6%, enjoy input subsidies, whereas only 39.9% receive direct payments, and only 1.6% claim to benefit from price-support mechanisms. Attendance or participation in agricultural extension is moderate: 61.3% have attended seminars and training, yet only 31.9% have been given technical advice regarding improved practices. An international evaluation of farmer field schools estimated yield increases averaging 19% and very real poverty alleviation for program participants (Murphy & McNamara, 2022). Insurance programs are relatively popular at 79.9%, indicating increasing awareness of such risk-management methods; however, the uptake of other social welfare programs—such as healthcare support (31.9%) and educational support (15.7%)—remains relatively low. Furthermore, acceptance of crop insurance in the African smallholder scenario levels vulnerability to climate shocks (Kansiime & Mudege, 2021). These trends argue for more integrated policies that provide financial, technical, and social support to augment the resilience of farm households.

**Figure 7: Farm size of the farming households.** The graph compares farms' size in square meters against frequency or percentage. It shows that 82 % of farms were under 1 hectare (≤ 10,000 m²), with 57% under 0.5 ha (≤ 5,000 m²). Such highly fragmented landholdings constrain economies of scale, mechanization, and access to markets and credit (Dhillon & Moncur, 2023). A global review of small-scale farming challenges documented that farms under 1 ha, prevalent across South Asia and sub-Saharan Africa, face higher unit costs, lower bargaining power, and reduced household incomes, even as they maintain critical roles in food security (Dhillon & Moncur, 2023). Policies that promote land consolidation, cooperative marketing, and tailored financial services are therefore essential for improving both productivity and livelihoods.

**Figure 7. The farm size of the farming household**




The distribution of farming tenure, with adoption peaking at 15 to 25 years of experience and dying slowly off among less-experienced farmers (< 10 years) and very veteran ones (> 40 years). Our findings show that adoption behavior was high among those with medium experience. Those with more than medium experience were lower in adoption behavior due to being set in their ways (Zhang et al., 2024). Similarly, according to Li et al. (2024), very low and very high levels of farming tenure reduce the intention to adopt technology because newcomers with the least farming tenure lack confidence. In contrast, the more experienced ones are unwilling to change. Therefore, extension activities must resolve to offer new entrants basic training and long-time professionals peer-run innovation forums.

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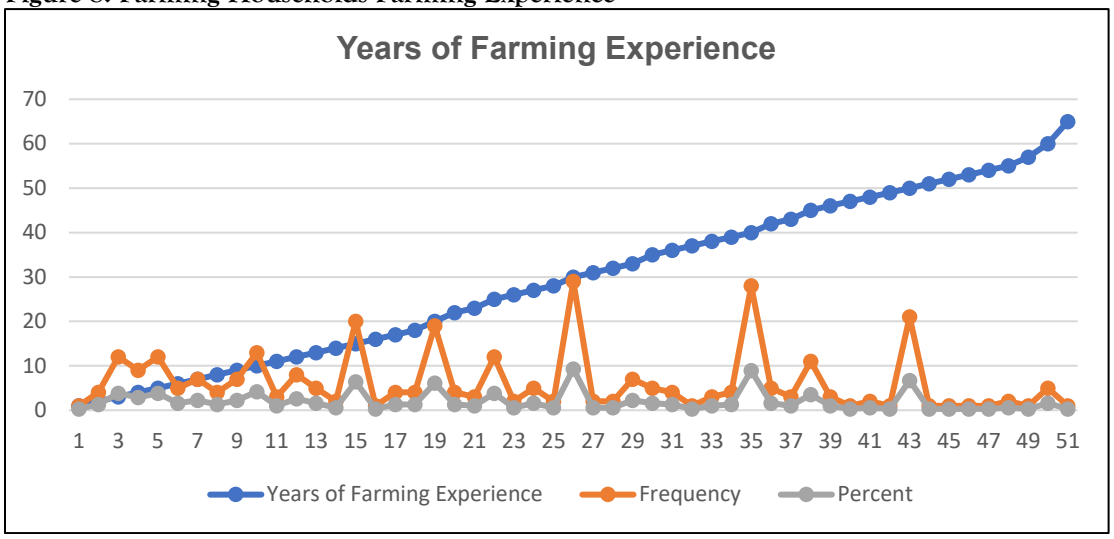
Figure 8 and Table 2 show the knowledge and awareness on climate variability of farming households.

**Figure 8. Farming Households Farming Experience**




***Farmers' knowledge and awareness of climate variability***

Farming households demonstrates knowledge of climate-related issues, with information obtained through television, radio, networks of neighbors, extension officers, and mobile apps. A systematic review of Southeast Asian communities provides evidence that multi-channel information flows significantly increase adaptive capacity, allowing farmers to vary planting dates, input use, and risk-management measures in response to erratic weather (Nguyen, Tran, & Le, 2022). Hence, scaling up local weather forecast services, establishing collaboration with farmers' learning circles, and widening mobile-based agro-advisory platforms will be crucial in capitalizing on climate variability awareness toward early and efficient adaptation.

Also, farmers were highly aware of climate variability, particularly the increase in temperatures, alteration of weather patterns, and incidences of flooding. The sources of awareness are television and radio, as well as interpersonal exchanges, which agree with Mustapha et al.'s (2012) assertion that media and social networks provide awareness of the climate.

**Figure 9. Household Farmer's Knowledge on Climate Variability**

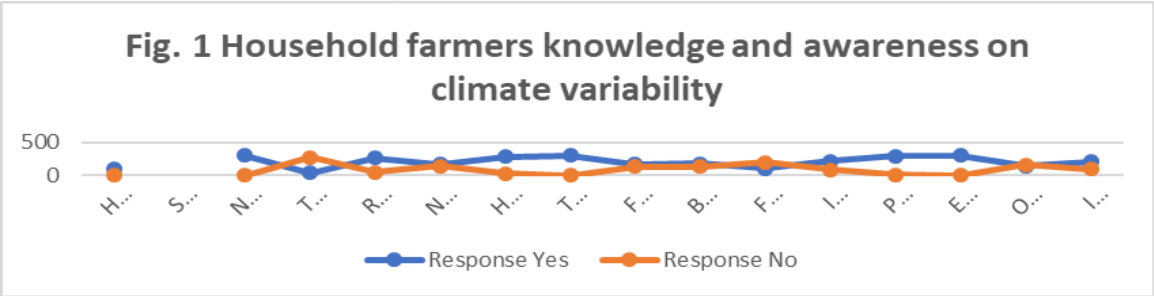



Table 2 reveals that the farming households in Romblon are intensely aware of climate change in all three dimensions: types of changes (3.17), causes (3.34), and impacts (3.45). The knowledge of the farmers on the specific types of climate change, such as extreme temperatures, rainfall patterns, or sea-level rise, yielded an overall mean of 3.17, with most indicators falling between categories "agree" and "strongly agree," signifying that respondents were aware of the key manifestations of climate variability. The report supports Santos et al., (2021) regarding rice growers' awareness in Laguna, Philippines, showing that an overall understanding of heatwaves and erratic precipitation was the top concern, and it is the most crucial factor towards assuring adaptation in the early-stage recognition of a climate shift. In a more general sense, awareness regarding

assumed causes of actions relegates climate change to the background, with farmers agreeing more on deforestation with a score of 3.45 and land-use conversion with 3.51 as capable of causing it. This level of awareness was in line with the study of Lopez & Garcia (2022), who studied smallholder vegetable producers in Batangas, wherein the causation-awareness of industrial and agricultural sources of carbon emissions was equally strongly identified as the main culprits. This higher causal awareness is good, given that it is usually positively correlated with the support of communities in mitigation measures.

Farmers mostly agreed with the attitude towards climate change impacts, with an overall mean of 3.45, especially for heatwaves caused by temperatures (3.67) and drought frequencies (3.48). This high perception of impacts is even consistent with Romero et al. (2023), who found the perceived impact to farmers in Central Luzon about threats to food security and soil health (Romero et al., 2023). Such strong impact awareness denotes perceived urgency among farmers on behalf of adaptive interventions from revised planting schedules to diversified cropping systems.

**Table 2. Household farmers knowledge and awareness on climate variability**

| **Indicators** | **Mean** | **SD** |
|---|---|---|
| ***Knowledge of the type of change in climate:*** | | |
| 1. Excessive Temperature | 3.51 | 0.68927 |
| 2. Excessive cold | 3.45 | 0.70114 |
| 3. Change of weather pattern | 3.46 | 0.68329 |
| 4. Sea-level rise | 3.40 | 0.72341 |
| 5. Frequent Flood | 3.44 | 0.74471 |
| 6. Water logging | 3.34 | 0.77298 |
| 7. Do not know/Do not understand | 1.58 | 0.93453 |
| **Overall Mean** | **3.17** | **0.44754** |
| | | |
| ***Knowledge on the causes of climate change:*** | | |
| 1. Deforestation | 3.45 | 0.78768 |
| 2. Industrial processes such as cement production and the manufacturing of chemicals | 3.23 | 0.85278 |
| 3. Population Growth | 3.42 | 0.76896 |
| 4. Black smoke of vehicles | 3.36 | 0.82081 |
| 5. Greenhouse Gas Emissions | 3.10 | 0.96198 |
| 6. The conversion of forests to agricultural land or urbanization | 3.51 | 1.85553 |
| 7. Use of synthetic fertilizers in agricultural activities | 3.36 | 0.76779 |
| 8. Improper waste management practices | 3.35 | 0.76719 |
| 9. Changes in land and water management, like wetland drainage and modified irrigation | 3.28 | 0.79197 |
| **Overall Mean** | **3.34** | **0.58268** |
| | | |
| ***Knowledge on the impact of climate change:*** | | |
| *Climate change has an impact on:* | | |
| 1. High temperatures, which lead to more frequent and intense heatwaves, droughts, and wildfires. | 3.67 | 0.53441 |
| 2. Rainfall patterns, causing alterations in the frequency, intensity, and distribution of precipitation. | 3.50 | 0.65104 |
| 3. Sea-level rise putting at risk of flooding and erosion, displacing populations and damaging infrastructure of the communities | 3.43 | 0.69085 |

| | | |
|---|---|---|
| 4. Intensity of extreme weather events, including hurricanes, cyclones, typhoons, and intense storms. | 3.47 | 0.73820 |
| 5. Ecosystems and biodiversity | 3.45 | 0.71517 |
| 6. Agricultural productivity and food security. | 3.45 | 0.69701 |
| 7. Human health through food and waterborne infections | 3.42 | 0.73381 |
| 8. Can lead to famine and widespread disruption of socio-economic well-being. | 3.42 | 0.69874 |
| 9. Agricultural production due to loss of land and products | 3.42 | 0.67977 |
| 10. Worsening of food insecurity | 3.35 | 0.73236 |
| 11. Degradation of marine ecosystems, including coral reefs | 3.31 | 0.79045 |
| 12. Decreases in crop yield | 3.46 | 0.71573 |
| 13. Intense rainfall events cause landslides and severe floods. | 3.46 | 0.70199 |
| 14. Droughts during the summer months and El Nino phenomena | 3.48 | 0.71627 |
| **Overall Mean** | **3.45** | **0.49196** |

*Rating Scale: 4 – strongly agree (3.26-4.00); 3-agree (2.51-3.25); 2-disagree (1.76-2.50); 1-strongly disagree (1.00-1.75)

**Climate variability adaptation strategies used by farming households**

Presented in Table 3 the adaptation strategies adopted by farming households in the province of Romblon. Presented in Table 3 are the mean scores for the sixteen adaptation choices made by farming households, scored on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree).

The scores move between a maximum of 3.54 for adequate irrigation and conservation of water techniques and 3.19 for using organic fertilizers, with a grand mean of 3.34. The first three adaptation options—adequate irrigation (3.54), crop diversification (3.53), and mulching/contour plowing/terracing (3.49) fall under "strongly agree," showing close to a unanimous agreement among farmers. Middle-scoring practices between 3.22 and 3.44 include crop insurance, agroforestry integration, and weather forecast dissemination. From the lowest and lower mid-range come organic fertilization (3.19) and off-farm diversification (3.28), belonging to the "agree" category.

With agronomic alterations, mitigations for climatic risks, based on the broader evidence base, farmers rank water management and diversification largely. Intra-seasonal variability works against monoculture yields, causing farmers to interplant or rotate crops to ensure resilience (Ponce, 2020). Systematic reviews conducted in Southeast Asia have further underscored irrigation improvement as the basis of adaptation, reinforcing protection against irregular rainfall and stabilization of yields (Nor Diana et al., 2022). The prominence of mulching and terracing supports the finding that soil conservation measures reduce erosion and sustain moisture, which is particularly critical given the shifting precipitation patterns (Nor Diana et al., 2022).

Crop rotation/intercropping (3.35), weather-forecast utilization (3.39), and access to insurance/financial services (3.44) fall under the mid-tier category, showing moderate acceptance of socio-economic means by farmers. From the behavioral standpoint, it is seen that attitudes and social norms grossly affect the adoption of climate-smart practices (Atta-Aidoo et al., 2022). That is, farmers adopt practices when they believe in their benefits and when the idea is supported by their peer group (Atta-Aidoo et al., 2022). On the contrary, the empirical evidence argues that financial tools such as insurance and credit access enhance risk-taking capacities and drive investments toward resilient technologies (Jena et al., 2023).

There remains a positive, though decreased, level of endorsement for organic fertilization and off-farm income diversification because of barriers related to resource availability and labor. Long-term syntheses indicate that, over decades, diversification and organic amendments are the best way to secure significant ecological and economic benefits. Still, knowledge gaps and up-front costs might stop or delay an initial adoption (Raveloaritiana & Wanger, 2024). Moreover, it is also argued that diversification away from agriculture has

to be supported through market linkages and capacity-building initiatives to provide supplemental income in a meaningful way (Olabanji & Chitakira, 2025).

Adaptation strategies preferred consist of crop diversification, irrigation, mulching, and crop insurance, which align with Bryan et al. (2013), who considered diversification and irrigation as paramount for building resilience. However, in the absence of adequate government support, the cost of inputs remains high, and the weather remains unpredictable to trigger the application of adaptation actions fully. Research findings by Morton (2007) and Smit & Wandel (2006) show similar constraints, implying that systemic barriers ought to be tackled through policy interventions.

**Table 3. Adaptation strategies adopted by farming households**

| Indicators | Mean | SD |
|---|---|---|
| ***Farmers implement.....*** | | |
| 1. Crop diversification by planting a variety of crops to spread the risk of climate-related crop failures | 3.53 | 0.68411 |
| 2. Effective irrigation systems, rainwater harvesting, and water conservation techniques. | 3.54 | 0.69280 |
| 3. Mulching, contour plowing, and terracing techniques making crops more resistant to harsh weather events. | 3.49 | 0.78080 |
| 4. Crop rotation and intercropping to improve soil fertility, reduce pest and disease buildup. | 3.35 | 0.73540 |
| 5. Integrates trees and shrubs into farming systems to provide shade, windbreaks, and additional income sources. | 3.22 | 0.76028 |
| 6. Uses climate-resistant and drought-tolerant seed varieties | 3.33 | 0.76188 |
| 7. Access to weather forecasts and early warning systems as a proactive strategy to prepare for extreme weather events | 3.39 | 0.74775 |
| 8. Access to crop insurance or other financial services | 3.44 | 0.73606 |
| 9. Active engagement in capacity-building activities to learn and apply climate-smart agriculture practices and sustainable farming methods | 3.28 | 0.77472 |
| 10.Develop and implement resilient livestock management practices to protect animal health and ensure consistent productivity | 3.25 | 0.77844 |
| 11.Collaboration with neighboring farmers and local communities | 3.32 | 0.73827 |
| 12.Off-farm diversification by engaging in alternative income-generating activities outside agriculture. | 3.28 | 0.72338 |
| 13.Tree planting to improve soil stability, enhance biodiversity, sequester carbon, and provide additional sources of income or food | 3.36 | 0.74631 |
| 14.Fallowing by resting their garden or farmland for a period to restore soil fertility | 3.28 | 0.81023 |
| 15.Frequently use insecticides and chemical fertilizers as a strategy to protect crops from pests and diseases | 3.26 | 0.80471 |
| 16.Organic fertilizers to enhance soil health, promote sustainable crop growth and reduce dependence on synthetic agricultural inputs. | 3.19 | 0.78829 |
| **Overall Mean** | **3.34** | **0.50819** |

*Rating Scale: 4 – strongly agree (3.26-4.00); 3-agree (2.51-3.25); 2-disagree (1.76-2.50); 1-strongly disagree (1.00-1.75)

**The constraints on climate variability adaptation strategies faced by farming households**

Presented in Table 4 are the constraints faced by farming households on climate variability adaptation strategies. Elucidates the perceived constraints for farming households in the adaptation against climate variability, measured for agreement with each statement from 1=strongly disagree to 4=strongly agree.

The means run from 3.15 on poor weather information to 3.39 on inadequate government support, with an overall mean of 3.25, suggesting general agreement by respondents that all factors listed do pose some form of constraint against adaptation. From the analysis, the highest-rated constraints are institutional and environmental barriers, with "Inadequate Government Support" (3.39), "High Cost of Inputs" (3.37), and "Unpredictable Weather" (3.36). Similar studies across West Africa rank unpredictable weather as the primary constraint, institutional deficiencies, and financial constraints (Ige et al., 2021). The high input cost is another barrier corresponding to studies that credit-constrained smallholders are less inclined to adopt adaptation measures that need upfront costs (Ojo & Baiyegunhi, 2020). Barriers with mid-range scores such as "Land Tenure Issues" (3.17), "Limited Technical Knowledge" (3.23), and "Inadequate Extension Officers" (3.23) reflect issues with institutions and capacity constraints. Land tenure insecurity has been evidenced to restrain investment in long-term adaptation practices such as agroforestry (Ofori-Kyereh et al., 2022), while a lack of extension supports farmers with access not just in terms of high-quality weather forecasts but also in terms of best practice guidance (Gashure, 2024).

Lower, despite still being a considerable constraint, are Poor Weather Information (3.15) and Inadequate Credit Facilities (3.16), suggesting that, since these portray problematic issues, they seem less pressing than the problems of institutional policy and cost problems. Weather information received a middling score because the existing forecast dissemination channels are only of limited efficacy; a similar trend exists in Southeast Asia, where farmers consider weather unpredictability and information gaps to be dual constraints (Nor Diana et al., 2022). In general, this indicates that farmers feel that strengthening institutional support through such avenues as government programs, extension services, and credit facilities will enable the enhanced uptake of adaptation strategies.

Environmental factors of weather unpredictability and resource costs remain essential. However, they would be somewhat eased if large-scale intervention on the part of policymakers and the market was able to cut down some barriers, which can be interpreted as the distribution of institutional more than technical constraints, which makes it crystal clear what in terms of priority, the policymakers have to concentrate on: improving subsidy schemes, improving formal credit channels for smallholders, and investing in agricultural extension to build technical capacity and enhance information flow.

**Table 4. Constraints on climate variability adaptation strategies**

| Indicators | Mean | SD |
|---|---|---|
| 1. High Rate of Deforestation | 3.33 | 0.51512 |
| 2. Unpredictable Weather | 3.36 | 0.53725 |
| 3. Inadequate Government Support | 3.39 | 0.68311 |
| 4. Poor Adaptation Strategy | 3.31 | 0.56606 |
| 5. Poor Weather Information | 3.15 | 0.61386 |
| 6. Inadequate Credit Facilities | 3.16 | 0.61151 |
| 7. Land Tenure Issues | 3.17 | 0.67473 |
| 8. Lack of Information and Awareness | 3.29 | 0.51899 |
| 9. Limited Financial Resources | 3.23 | 0.56360 |
| 10. Lack of Access to Credit | 3.19 | 0.58391 |
| 11. Limited Technical Knowledge | 3.23 | 0.58938 |
| 12. Dependency on Traditional Practices | 3.19 | 0.63404 |
| 13. Market Access and Price Volatility | 3.17 | 0.57648 |
| 14. Gender Inequality | 3.23 | 0.58886 |

| | | |
|---|---|---|
| 15. Policy and Regulatory Constraints | 3.21 | 0.55042 |
| 16. Vulnerability to Extreme Events | 3.25 | 0.55268 |
| 17. High Cost of Inputs | 3.37 | 0.55747 |
| 18. Inadequate extension officers | 3.23 | 0.57160 |
| 19. Use of Drought-Resistant Crops | 3.28 | 0.61131 |
| 20. Farmyard Manure | 3.23 | 0.60456 |
| 21. Planting Season Variation | 3.32 | 0.55834 |
| **Overall Mean** | **3.25** | **0.07276** |

*Rating Scale: 4 – strongly agree (3.26-4.00); 3-agree (2.51-3.25); 2-disagree (1.76-2.50); 1-strongly disagree (1.00-1.75)

**The gender role in the adaptation strategies in climate variability of farming household**

It is depicted in Table 5 the gender role of farming households on the adaptation strategies in climate variability. Presents 25 statements rated by farming households from 1 = strongly disagree to 4 = strongly agree, with an overall mean of 3.26, regarding perceptions of gendered roles in adaptation strategies.

The table shows that men and women "may engage in diversification strategies," joint tasks during peak seasons, and joint decision-making in the labor division (3.50). Men fairly dominate the activities of field preparation-Plowing, planting, fertilizing (3.39), and market-related operations (3.37). Women's core tasks include post-harvest processing, cleaning, sorting, storage (3.24), and weeding or harvesting, which require physical strength (3.22). Structural inequalities include limited access to land by females (3.0671) and unequal access to technology/information (3.13). Capacity building needs gender-sensitive training (3.23) and extension services focusing on women (3.24).

Gender-transforming aspects of the concept imply not just symmetrical roles inside the home but the equal responsibility of adaptation. Recent studies emphasize that gender-transformative approaches to climate-smart agriculture build capabilities through co-learning and joint decision-making, strengthening resilience (Huyer et al., 2021). The divide between men's mechanized and market activities and women's post-harvesting labor follows the gendered labor allocation within smallholder systems, further influencing resource and adaptation choices (Huyer et al., 2024). Women scored less for access to land, which supports evidence that insecure land tenure systems hamper their capacity to invest in long-term adaptations such as agroforestry or irrigation infrastructure and moderate agreement exists about the need for extension services tailored for women, which corresponds with findings that gender-sensitive advisory services double climate-smart practice adoption rates among women (Gumucio et al., 2025).

The analysis concludes that while deep-seated gender divisions remain, the relatively strong approval of joint activities signals fertile ground for gender-transformational interventions; granting land tenure to women through joint titling and establishing legal mechanisms facilitates rightful investment in adaptation infrastructure. Whereas extension is to be gender-responsive, training schedules should be done at temporal/spatial intervals accessible to women; extension directives should encourage participatory methods and collaboration on business concepts on the already high consensus for joint diversification at a household level for building resilience.

Interventions can thus enhance climate adaptation and gender equity where interventions remove structural hindrances to access to land rights and extension while building from strong consensus-based areas on joint actions

**Table 5. The Gender Role of Farming Households**

| Indicators | Mean | SD |
|---|---|---|
| 1. Men are often responsible for tasks related to crop cultivation, such as plowing, planting, applying fertilizers, and pesticide spraying | 3.39 | 0.76888 |

| | | |
|---|---|---|
| 2. Men typically take the lead in managing livestock, including feeding, breeding, and veterinary care | 3.29 | 0.74795 |
| 3. Men are more likely to handle mechanized tasks and operate agricultural machinery for planting, harvesting, and processing | 3.35 | 0.78372 |
| 4. Tasks requiring physical strength, such as land preparation and heavy lifting, are usually assigned to men | 3.31 | 0.81441 |
| 5. Men may be more involved in selling agricultural produce and engaging in market-related activities | 3.09 | 0.76021 |
| 6. Women often take charge of post-harvest activities, such as cleaning, sorting, processing, and storing agricultural produce | 3.24 | 0.79467 |
| 7. Women are frequently involved in weeding, harvesting, and other labor-intensive activities in the fields | 3.22 | 0.80819 |
| 8. Women may be responsible for fetching water for household and agricultural use, especially in areas with limited access to water sources | 3.13 | 0.82889 |
| 9. Women often manage kitchen gardens, which provide a supplementary source of food for the family. | 3.31 | 0.76073 |
| 10.Women play a key role in seed preservation and traditional seed-saving practices. | 3.20 | 0.76443 |
| 11.Men and women work together in various agricultural activities, especially during peak seasons like planting and harvesting | 3.45 | 0.68753 |
| 12.The division of labor can also be influenced by joint decision-making within the household. | 3.45 | 0.75422 |
| 13.Both men and women may engage in diversification strategies, such as cultivating multiple crops and raising different livestock species. | 3.50 | 0.73870 |
| 14.Land ownership and control are traditionally skewed towards men | 3.29 | 0.80654 |
| 15.Women often have limited access to land, which can hinder their ability to adopt certain adaptation practices | 3.07 | 0.80780 |
| 16.Men are typically more engaged in financial matters and have better access to financial resources, including credit and loans | 3.20 | 0.78512 |
| 17.Men are often more involved in using and adopting modern agricultural technologies and machinery. | 3.28 | 0.75799 |
| 18.Women, especially in certain regions, may have limited access to climate information and modern agricultural technologies | 3.13 | 0.79034 |
| 19.Men and women in farming households may have different types of agricultural knowledge and expertise. | 3.21 | 0.76691 |
| 20.Engage in gender-sensitive capacity-building programs and training to empower both men and women farmers. | 3.23 | 0.72818 |
| 21.Men's stronger presence in agricultural extension programs and services can shape the information flow and knowledge dissemination within farming communities | 3.24 | 0.75639 |
| 22.Men are often more involved in marketing agricultural produce and have better access to markets | 3.37 | 0.70486 |
| 23.Women often possess deep knowledge of traditional farming practices and natural resource management | 3.13 | 0.75028 |
| 24.Women frequently utilize natural resources to create products like food and handicrafts. | 3.19 | 0.75768 |

| | | |
|---|---|---|
| 25.Women can actively participate in farmer organizations and community groups | 3.25 | 0.75119 |
| **Overall Mean** | **3.26** | **0.45784** |

***A*nalyze the relationship between farmers' socio-economic characteristics, gender roles, and their adaptation strategies implemented.**

The chi-square test between socioeconomic characteristics in terms of gender, land ownership, source of income, government support, provision for insurance, and provision for social welfare program with the gender roles of farming households is presented in Table 6.

**Table 6. Chi-square test between socioeconomic characteristics and the role of women in adaptation strategies**

| | Chi-Square Tests | | |
|---|---|---|---|
| **Socioeconomic Variables** | **Cramer's V** | **Value** | **Asymp. Sig. (2-sided)** |
| **Gender** | 0.374 medium | 43.668 | 0.611$^{ns}$ |
| **Access to resources:** | | | |
| • Access to credit | 0.494$^{medium}$ | 76.296 | **0.004** |
| • Access to Irrigation facilities | 0.472$^{medium}$ | 69.688 | **0.017** |
| • Access to Agricultural inputs | 0.484$^{medium}$ | 73.407 | **0.008** |
| • Access to Technology | 0.396$^{medium}$ | 49.106 | 0.389$^{ns}$ |
| **Source of income:** | | | |
| • Crop Farming | 0.501$^{large}$ | 78.409 | **0.003** |
| • Livestock rearing | 0.268$^{medium}$ | 22.398 | 0.999$^{ns}$ |
| • Employment | 0.447$^{medium}$ | 62.516 | 0.064$^{ns}$ |
| **Land ownership** | 0.591$^{large}$ | 109.190 | 0.135$^{ns}$ |
| **Government support:** | | | |
| *1. Subsidies & price support:* | | | |
| • Direct Payments | 0.510$^{large}$ | 81.327 | **0.001** |
| • Input subsidies | 0.413$^{medium}$ | 53.479 | 0.240$^{ns}$ |
| • Price Support Mechanisms | 0.491$^{medium}$ | 75.470 | **0.005** |
| • No subsidies received | 0.340$^{medium}$ | 36.222 | 0.873$^{ns}$ |
| *2. Agricultural extension services* | | | |
| • No agricultural subsidies received | 0.344$^{medium}$ | 37.110 | 0.849$^{ns}$ |
| • Seminars and Trainings | 0.479$^{medium}$ | 71.668 | **0.012** |
| • Guidance to improve farming practices | 0.411$^{medium}$ | 52.898 | 0.257$^{ns}$ |
| • Crop selection | 0.332$^{medium}$ | 34.481 | 0.913$^{ns}$ |
| • Pest and disease management | 0.408$^{medium}$ | 52.086 | 0.283$^{ns}$ |
| • Agricultural techniques | 0.388$^{medium}$ | 47.004 | 0.472$^{ns}$ |
| **Provision for insurance program** | 0.346$^{medium}$ | 37.388 | 0.841$^{ns}$ |
| **Provision for social welfare programs:** | | | |
| • Food assistance program | 0.430$^{medium}$ | 57.932 | 0.132$^{ns}$ |
| • Healthcare Services | 0.372$^{medium}$ | 43.301 | 0.627$^{ns}$ |
| • Educational Support | 0.494$^{medium}$ | 76.253 | **0.004** |
| • Rural development initiatives | 0.475$^{medium}$ | 70.754 | **0.014** |
| • No provision for Social Welfare Programs received | 0.413$^{medium}$ | 53.326 | 0.244$^{ns}$ |

p-value < 0.050 significant p-value > 0.050 not significant (ns) Strength of Association: 0.10 small; 0.30 medium, 0.50 large

The analysis revealed that financial resources are related to women's role in adaptation; indeed, a persistently strong medium association-level was observed between credit access (V = .494) and direct payment (V = .510), by which the running of women's adaptation activities is bound to fund support, which accentuates other research findings that say convincing women farmers in securing credit increases their ability to implement climate-smart practices (Shiferaw, Bryan, & Ringler, 2021).

A significant medium association between irrigation access (V = .472) and agricultural inputs (V = .484) was observed for infrastructure and input access, with the women's role emphasizing resource availability. Studies further confirm that women with access to irrigation and inputs actively engage in water management and crop-production-type adaptations (Tessema et al., 2022).

Looking at livelihood packages, a very high effect size of association for crop farming as the primary form of income (V=.501) implies that women from crop-growing households are actively engaged in adaptation activities, justifying evidence that decisions made by women in staple production areas lead to on-farm adaptive innovations (Doss, 2020). For capacity-building and extension institutions, medium associations exist for seminar training (V=.479) and educational support (V=.494), meaning that training is the most critical enabler to women's adaptation activities, consistent with evidence that gender-responsive extension and training programs increase adoption of climate change adaptation techniques by women at least twofold (Kendall, Mburu, & Rampa, 2024).

The medium-level significant association between rural development programs (V = .475) and women's roles implies that, beyond agricultural initiatives, community programs could empower women to participate in adaptation, lending support to the multi-sectoral approach proposed in recent policy reviews (Najjar et al., 2025). All other variables tested, such as gender, land ownership, employment, and most welfare provisions, showed non-significant associations (p > .05).

This finding asserts that the participation of women in adaptation strategies is heterogeneous and is highly influenced by access to financial and physical resources, as well as educational and policy support. Hence, enhancing women's roles should focus on targeted credit facilities and subsidy schemes accessible to women farmers, infrastructure investments such as small-scale irrigation and input distribution channels that explicitly encompass women, gender-specific training and extension services that consider women's time constraints, and the inclusion of women in rural development and educational support programs to bolster their adaptive capacity.

Gender dynamics largely fuel adaptation-role determinations, with men mostly preoccupied with mechanized and market-related activities, while women undertake many post-harvest activities alongside traditional agriculture. These unequal responsibilities are akin to global patterns expounded upon by Kristjanson et al. (2017), thereby calling for targeted gender-sensitive policies for adaptation. By designing programs that merge with these key socioeconomic tools, the actors would assist in enhancing the role of women in household and community adaptation efforts.

Pearson's correlation was used to determine the relationships between continuous variables such as age, years of farming experience, farm size, household income, education level, and household size with the adaptation strategies adopted by the farming households as presented in Table 7

**Table 7. Pearson's correlation between some socioeconomic profiles and the adaptation strategies implemented by farming households.**

| | | The adaptation strategies used by farming households |
|---|---|---|
| **Age** | Pearson Correlation | .138* |
| | Sig. (2-tailed) | **.015** |
| | N | 313 |
| Education level | Pearson Correlation | -.046 |

| | | |
|---|---|---|
| | Sig. (2-tailed) | .414[ns] |
| | N | 313 |
| Household income | Pearson Correlation | -.062 |
| | Sig. (2-tailed) | .277[ns] |
| | N | 313 |
| **Family size** | Pearson Correlation | -.191[**] |
| | Sig. (2-tailed) | **.001** |
| | N | 313 |
| Farm size | Pearson Correlation | .081 |
| | Sig. (2-tailed) | .152[ns] |
| | N | 313 |
| **Years of farming experience** | Pearson Correlation | .158[**] |
| | Sig. (2-tailed) | **.005** |
| | N | 313 |

**. Correlation is significant at the 0.01 level (2-tailed) *. Correlation is significant at the 0.05 level (2-tailed)

Age and farming experience are positively correlated with adaptation strategies, which means that older and experienced farmers take more measures ($p<0.05$). Family size has a negative correlation ($p=0.001$), which means, the bigger households will be less willing to adapt. Education level, household income, and farm size showed no significant correlation with adaptation strategies.

Significant relationships existed between the adaptation options, access to credit, irrigation, and agriculture inputs, which tally with those of Deressa et al. (2009), placing resource access as a vital matter. Age and farming experience were positively correlated with adaptive capacity-likewise observed by Bryan et al. (2013).

**Potential Impacts**

From an economic angle, agricultural production systems encouraging crop diversification, agroforestry, or diversification of income sources can smooth income streams, thus reducing potential losses due to market or weather shocks and augmenting annual average incomes. On the social front, adaptation interventions foster community cohesion and collective action. Tsesmelis et al. (2025) stated that when farmers participate in shared soil-and-water conservation schemes or share a nursery for agroforestry seedlings, they build social capital for knowledge exchange, risk pooling, and mutual support among each other in times of extreme events. According to Zeray (2025), women's participation in these groups has been associated with empowerment and decision-making autonomy, which has fostered equity in access to resources and benefits among households. Zeray (2025) mentioned that enhancing food security and nutrition—through more consistent harvests and diverse diets—also contributes to health outcomes and reduces the sales of distressed assets during crises.

## SUMMARY AND CONCLUSION

### *1. Socio-Economic Characteristics of Farming Households in Romblon*

Farmers in the country are mainly old-age workers, with the vast majority of the respondents expected to be around 73 years old, and some are below 67. It is almost evenly distributed in gender, with males making up 54.3 percent and females, 45.7 percent. Most farmers are married (76%), and the majority have completed secondary school education (39.6%), followed by primary (20.4%) and tertiary (19.5%). Mothers do most of the farm labor (38.6%); after that come children (26.8%), fathers (18.7%), and grandparents (15.9%). Most farming families have four members (22%) with family sizes ranging from three to six people. Most households reported very low incomes each harvest: 30.7% made ₱3,000; 17.9%, ₱6,000; and 5.4%, ₱13,500. For credits, 38.3% availed of it; 61.7% did not, 46.3% had irrigation; 53.7% did not, 55.6% accessed agricultural inputs; 44.4% did not, 62.6% had access to technology; 37.4% did not, 85.6% relied on crop

farming, 8% on livestock, and 18.8% on off-farm employment, 60.7% were landowners, 34.8% were tenants, 4.5% leased or rented the land, 94.6% received inputs subsidized but just 39.9% received direct payments, and a mere 1.6% received price support. It must be noted that 61.3% attended seminars and trainings, but only 31.9% obtained technical assistance. Insurance coverage reached 79.9%, and food assistance, 45.7%. A little over a third of farmers report access to healthcare facilities, and about 16% receive educational support; a mere 2.2% claim benefits from rural development programs. Furthermore, 26.2% state that they do not have access to any social welfare programs. Most farms are relatively small, though uneven concentrations of farmers at different experience levels exist. Access to credit is still a significant problem for farming families, 61.7% of the surveyed farmers indeed reporting that no credit is accessible. Then again, irrigation facilities are relatively evenly dispersed across most households (46.3%), and inputs are available to 55.6%, while technology goes to 62.6%. Crop farming is predominant across 85.6% of households, 60.7% of farmers owning the land, while another 4.5% rent or lease theirs. Almost all families benefit from government interventions, mainly in input subsidies (94.6%), whereas direct payments only support 39.9%, with price support hardly touching 1.6%. Farmers moderately pool their resources through agricultural extension services, with 61.3% attending seminars and trainings, but fewer than a third (31.9%) receiving technical advice on improving farming. Insurance schemes are not far behind in participation, with 79.9% of households having access; however, other social welfare programs, such as healthcare support (31.9%) or education support (15.7%), haven't quite caught on.

***2. Farmers' knowledge and awareness of climate variability***

Farming households were strongly aware of excessive temperature shifts (3.51), changes in weather patterns (3.46), water logging )3.34), and strongly rejected the notion that they "do not know or do not understand" these changes (1.58), indicating that gaps in basic awareness are minimal. Conversion of forest to agricultural or urban land (3.51), and slightly recognize greenhouse gas emissions (3.10), suggesting that this more technical driver is somewhat less salient in farmers' everyday experience. Acknowledge rising temperatures lead to more frequent and intense heatwaves (3.67), and degradation of marine ecosystem (3.31) slightly less emphatically than the more direct impacts on land-based farming.

***3. Climate variability adaptation strategies used by farming households***

Household farmers were mostly "strongly agreeing" that they implemented some key adaptive strategies in the face of climate variability, as shown by an overall mean score of 3.34. Most farmers strongly agreed with the establishment of effective irrigation systems, and an efficient water conservation technique (3.54) while all strategies fall within the strong agreement category, while applying organic fertilizers to maintain soil quality and sustainability so that sustainable crop growth is promoted and lessen dependence on synthetic inputs in agriculture received the least mean agreement score of 3.19.

**4. *The constraints on climate variability adaptation strategies faced by farming households***

The overall mean agreement response to the issue of constraint realization on climate variability adaptation of 3.25, was derived from inadequate government support (3.39), high cost of inputs (3.37), and unpredictable weather (3.36) while slightly lower mean agreement was reached on inadequate credit facilities (3.16) and poor weather information (3.15).

***5. The gender role in the adaptation strategies in climate variability of farming household***

Regarding male roles, there is a strong agreement that "Men are often responsible for tasks related to crop cultivation, such as plowing, planting, applying fertilizers, and pesticide spraying" (3.39), often more involved in marketing agricultural produce and have better access to markets (3.37), and take the lead in managing livestock, including feeding, breeding, and veterinary care" (3.29).

For female roles, it is "strongly agreed" that "Women often manage kitchen gardens, which provide a supplementary source of food for the family" (3.31), often take charge of post-harvest activities, such as cleaning, sorting, processing, and storing agricultural produce (3.24), However, slightly lower agreement of women's access to resources like land and information shows women often have limited access to land, which

can hinder their ability to adopt certain adaptation practices (3.07) and have limited access to climate information and modern agricultural technologies (3.13).

Working during planting and harvesting (3.45) and in joint decision-making processes within the household (3.45) are usually shared by men and women. Likewise, men and women could also work in diversification strategies such as planting many crops or raising various species of livestock (3.50), having the highest mean value of the indicator, implying stronger joint adaptation activities.

***6. Analyze the relationship between farmers' socio-economic characteristics, gender roles, and their adaptation strategies implemented.***

The study found concurrent relationships between socioeconomic characteristics and the role played by women in adaptation strategies. Specifically, the variables on credit facilities (Cramer's V = 0.494, p = 0.004), irrigation facilities (Cramer's V = 0.472, p = 0.017), and inputs for agriculture (Cramer's V = 0.484, p = 0.008) showed medium but significant associations, implying the close relationship of financial resources and infrastructure with women's efforts in adapting. On the other hand, with crop farming stated as a primary occupation for income-generation, this variable bears a significant association (Cramer's V = 0.501, p = 0.003) with women's roles in adaptation, thereby indicating that women residing in crop-growing households actively participate in adaptation efforts.

Regarding government support, direct payments (Cramer's V = 0.510, p = 0.001) and price support mechanisms (Cramer's V = 0.491, p = 0.005) showed significantly large and medium associations, respectively, establishing the significance of financial support to adaptation activities of women. Seminar and training (Cramer's V = 0.479, p = 0.012) and educational support (Cramer's V = 0.494, p = 0.004) showed medium significance, meaning training and education enable adaptation for women. Rural development (Cramer's V = 0.475, p = 0.014) was found with medium relevance; however, with women's role, community programs will empower women in adaptation apart from agriculture.

In contrast, the other independent variables like sex, land ownership, employment, livestock rearing, access to technologies, input subsidies, no subsidies received, non-agricultural subsidies, there were extension services to improve farming methods, to choose crops, pest and disease control, and agricultural operations; insurance program offered; food assistance program; health services; and no social security program, were non-significant ($p > 0.05$). Financial resources and infrastructure, income sources, government support, capacity building, and community programs had significant associations with the adaptation strategies implemented by the individual farming household.

## CONCLUSIONS

Most farmers in Romblon were aging, making very little money, with poor or no ownership of lands; therefore, they were not granted proper access to credit, irrigation facilities, or formal extension, discouraging investment in climate change adaptation strategies. While facing such impediments, farmers are acutely aware of climate variability, its causes and effects, and implement a host of adaptation measures commonly related to water management and crop diversification. Adaptation attempts, however, are constrained by inadequate support from government agencies, high input costs, erratic weather conditions, and internal limitations like a lack of working capital and technical knowledge. There remains quite evident a gender distribution of tasks based on the culture of cultivation and marketing among men, while women engage in postharvest activities and kitchen gardening. Almost critically, women's meaningful involvement in adaptation is highly associated with their access to financial resources, irrigation, agricultural inputs, direct government payments, and education support. In contrast, other socioeconomic factors such as gender and introductory welfare provisions do not show a direct statistical correlation.

### Recommendations

To established a community-based development program, the Municipal Agriculture Office, the Department of Agriculture, and other local government and non-government agencies, in collaboration with the educational institution, can bring young farmers through agripreneurship grants; provide climate-smart

training and microfinance at low-interest rates for women; and invest in irrigation and land-pooling schemes. They should also offer peer mentoring-building extension services with mass media and schools to provide localized climate information. Policies should be inculcated that respect gender equity as related to land and finance applications. In partnership with coastal resource managers, local agricultural extensionists should promulgate an understanding among farmers of greenhouse gas mitigation and degradation of marine ecosystems while strengthening the processes that apply successful water management and crop diversification (organic fertilizers) with the broader adoption and higher degrees of resilience on the farmers' end.

Another good policy would be strengthening government support through input subsidies and proper financial lending, improving weather information delivery, increasing credit access, and resolving land tenure issues. Local governments and agricultural extension agents are urged to implement gender-equitable climate change adaptation mechanisms that address the areas of limited access of women to land, climate information, and new agricultural technologies; promote consensus building in farm decision-making; and provide for credit, subsidy, training, and educational programs that are focused on women so that all farmers have equal access to resources, skills, and knowledge for effective adaptation in the forefront of climate variability.

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