ASIAN JOURNAL OF AGRICULTURE
Volume 9, Number 1, June 2025
Pages: 226-232

E-ISSN: 2580-4537
DOI: 10.13057/asianjagric/g090124

Socio-demographic profile of food farmers in Carcar City, Cebu, Philippines amid challenges and opportunities for agricultural development

EDGARDO P. LILLO♥, GLORY GRACE G. DIAZ♥♥, JOHN LOU B. DIAZ, JIMMY E. MAGO, CHERYLEN R. DAVIRAO

Department of Forestry, College of Agriculture, Forestry and Environment, Cebu Technological University. Argao Campus, Argao 6021, Cebu, Philippines. Tel.: +63-32-4858290, ♥email: lillo.edgardopabia@gmail.com, ♥♥glorygracegealon123@gmail.com

Manuscript received: 30 January 2025. Revision accepted: 21 April 2025.

Abstract. *Lillo EP, Diaz GGG, Diaz JLB, Mago JE, Davirao CR. 2025. Socio-demographic profile of food farmers in Carcar City, Cebu, Philippines amid challenges and opportunities for agricultural development. Asian J Agric 9: 226-232.* This research specifically examines the socio-demographic profile of food farmers residing in Carcar City, Cebu, focusing on their age, sex, educational attainment, income, household size, land ownership, and farming experience. The study employed a descriptive quantitative research design, which involved conducting structured interviews and administering surveys. The results showed that most farmers are middle-aged or older, implying that those aged 36-55 years comprise 46%, while those aged 56 years and older comprise 40%. The youngest age group is the young adults, comprising 14% of individuals aged 18-35 years old. Most of the women engaged in farming activities are middle-aged, which correlates with their household responsibilities. The economics of return could limit opportunities due to low monthly earnings, ranging from PHP 5,000 to 15,000 (89 to 267 USD), and insecure land tenure, which discourages sustainable agricultural practices. Farmers educational attainment is limited and restrictive in terms of modern technological acceptability, as more than 70% of them received only primary education. Strategic interventions are thus needed to address these issues, including enhancing youth engagement in agriculture, increasing training programs, and developing mechanisms to improve financial support and secure land tenure. Therefore, working together with government agencies, stakeholders, and community organizations is crucial in reviving the agricultural sector, promoting food security, and achieving sustainable rural development. The results consistently indicated a clear need for comprehensive policies that would enhance farmer resilience and economic viability.

Keywords: Agriculture, Carcar City, farming practices, socio-demographics, sustainable development

INTRODUCTION

Depending on the sharpness of view and the laws of one society's economy, sociology, politics, and other relevant areas, agriculture has been a long-term cornerstone in the foundation of human society. It is a food producer and a supplier of raw materials-based industries, and it also plays a vital role in the livelihoods of people worldwide. Farmers are the backbone of agriculture, producing food and commodities that sustain human life and support economic development. Farmers today face numerous challenges, including climate change, environmental degradation, socioeconomic disparities, and resource depletion, all of which threaten the stability of food systems and sustainable development. These have significantly hindered farmers ability to maintain productivity and resilience, especially in developing countries (FAO 2021). By 2050, the world population is expected to reach 9.7 billion, as predicted by the United Nations (2022). In addition to the increasing number of people, agriculture will face serious challenges. Age, gender, educational background, and access to resources also increase the challenge in terms of the politics of resilience and productivity among those reliant on agriculture (World Bank 2020). Thus, beyond restricting solution spaces, these constraints and barriers will require multi-regional considerations and a thorough understanding of farmers capabilities and opportunities.

In the Philippines, agriculture is the country's most important economic sector, accounting for nearly a quarter of the entire workforce (Philippine Statistics Authority 2022). The agriculture sector is vital as it contributes 20% of the gross national domestic product and 37% to the national labor force. Within this agricultural sector, there are approximately 4.5 million farms that directly support 25 million Filipino farmers and their families (Oakeshott et al. 2016). Although it is significant, this sector has continually encountered challenges, including a growing aging farmer population, limited access to formal education, capital, and technology, as well as a decreasing interest among the youth. These challenges are exacerbated by unpredictable changing climatic conditions, which cause crop failures and considerably reduce agricultural yields (Rola et al. 2016). The capability of farmers to adjust to and cope with the impacts of climate change is also strongly related to their socioeconomic setup aspects, including income, social security, and assets.

There is a point at which a city like Carcar, situated in southern Cebu's agricultural belt, reflects the issues and opportunities of the agricultural sector within the Philippines. A site renowned for its rich, ancient soils and agricultural

heritage, it continues to play a significant role in the region's food production. Above all, farming communities in Carcar are subject to increasing urbanization and industrial pressures alongside the encroaching horizons of new economic trends. These are indeed worrying trends regarding the sustainability of traditional farming practices and the survival prospects of their beneficiaries.

Yet, these few observations on Carcar as an agricultural city fail to fulfill the set promise of data regarding the socio-demography of Carcar farmers. Such understanding is relevant because it defines how farmers access resources as well as how they internalize and respond to external pressures. As Serrat (2017) notes, certain socio-demographic factors, such as age, education, and land ownership, appear to significantly influence their decisions and ability to adopt modern technologies into their farming practices. Furthermore, it has been observed that many rural development programs have failed because their planners did not adequately consider the socio-demographic contexts of their target populations (Pingali et al. 2019).

The socio-demographic assessment that food farmers are undergoing in Carcar City aims to fill this void by conducting an all-encompassing study. This includes the distribution of age, gender, education level, income, household number, terms of land ownership, and farming experiences. The identified patterns and associative nature can be used to generate insights for subsequent policy and program designs that support the agriculture sector in Carcar and similar locations. This inquiry builds upon existing literature and aims to provide locally relevant contexts that are feasible and practical. The research aims to study the barriers and opportunities in rural agricultural communities through a closer understanding of the socio-demographic profiles of food producers in Carcar City. This initiative aims to provide policymakers, stakeholders in agriculture, and local government units with evidence of human-intervention-based effects, thereby enhancing the efficiency, resilience, and sustainability of agriculture in Carcar and beyond.

MATERIALS AND METHODS

Study area

The conducted study encompassed four barangays (Napo, Buenavista, Guadalupe, Ocaña) in Carcar City, Cebu, located in southern Cebu, Philippines (Figure 1). In the Philippine administrative structure, a barangay is the smallest unit, comparable to a village, district, or neighborhood. Carcar City is endowed with a rich agricultural tradition, and agriculture remains one of the primary pursuits for many of its inhabitants. The tropical monsoon climate features a wet season from June to October, characterized by rainfall, and a dry season from January to May, which facilitates the planting of crops such as corn, rice, vegetables, and root crops. The second major contributor to the local economy, after agriculture, is livestock farming. The morphology of the land varies from flat, low-lying areas to high, rolling hills, generally in contrast to the types of crops cultivated and the different farming practices employed. Adaption of farmers would depend on the distance of the farm from Cebu City and the availability of urban markets for the sale of their produce. Nevertheless, agriculture sustainability is challenged by threats from urban expansion, land-use changes, and minimal infrastructure development. According to the Philippine Statistics Authority's 2020 report, Carcar City has a total population of 136,453, a significant number of whom are engaged in agricultural activities, primarily focused on crop and livestock production. The area benefits from fertile soil conditions and access to local markets, but it also faces challenges such as land conversion, resource limitations, and climate variability that impact agricultural productivity.

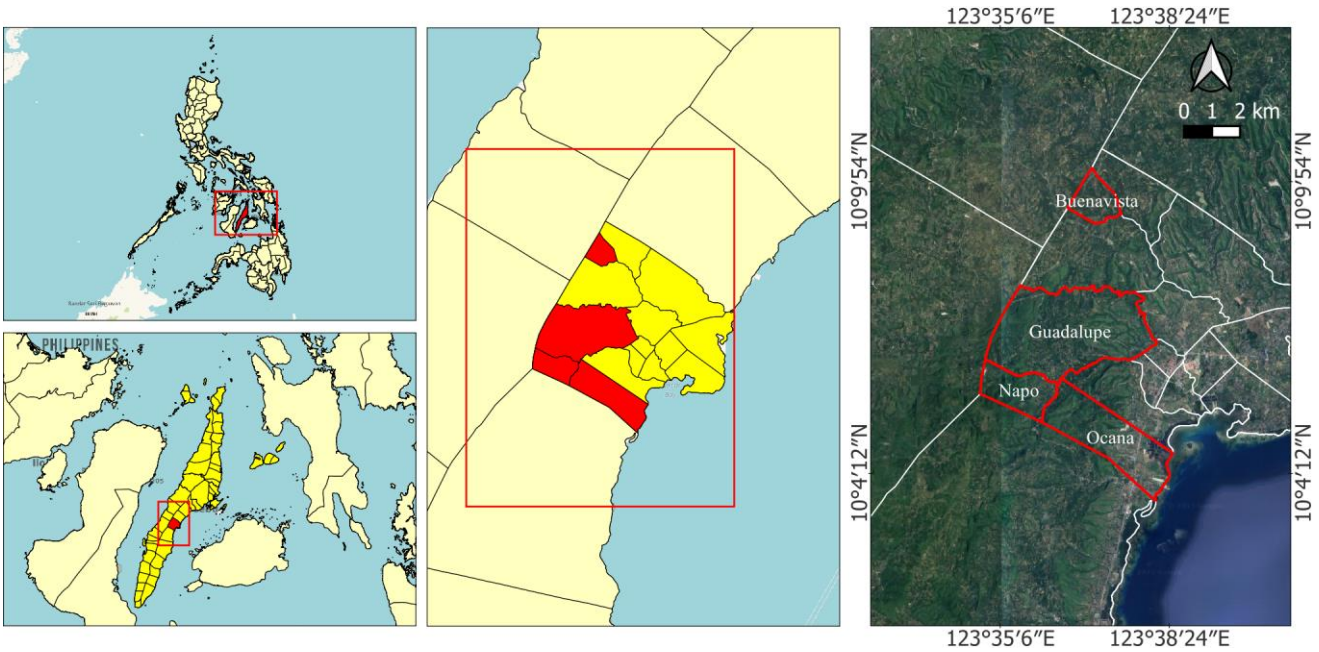

Figure 1. Map showing the four study sites in Carcar City, Cebu, Philippines

Data collection

A quantitative design was employed to systematically analyze the socio-demographic characteristics of farmers in Carcar City. This approach is commonly used in social science research to identify patterns and relationships within population groups (Creswell 2014). Data were gathered using a structured questionnaire specifically designed to meet the study's objectives. The questionnaire was divided into three sections: i. Demographic profile, which covered age, gender, education, and household size; ii. Economic information, which included questions on income, farming experience, and land ownership; and iii. Access to resources, focusing on agricultural inputs, training, and support programs. The instrument was adapted from previously validated questionnaires used in similar agricultural studies (Israel 1992; FAO 2016) and customized to align with the local context. The surveys were administered in the local dialect (Cebuano) by trained enumerators over one month to facilitate comprehension and engagement. Both closed-ended and open-ended questions were included. Close-ended questions, such as multiple-choice and Likert-scale items, were used for quantitative analysis (Bryman 2016), while open-ended questions allowed for the collection of additional qualitative insights. Before full deployment, the questionnaire underwent pre-testing with five farmers to ensure clarity and relevance, and necessary adjustments were made to refine ambiguous questions. Ethical considerations were observed, with participants providing informed consent and responses kept confidential, following standard research ethics guidelines (Babbie 2020). Trained enumerators conducted interviews to minimize bias, and data were double-checked for inconsistencies before analysis to ensure accuracy and validity (Groves et al. 2009).

Data analysis

The collected data were encoded and analyzed using descriptive statistics, including frequency distributions and measures of central tendency, which summarized key socio-demographic characteristics. Cross-tabulations examined relationships between variables such as age, gender, education, income, and land ownership. Additionally, comparative analyses were conducted to identify disparities within the farming community. Results were visualized using figures (Figures 2-8) to enhance interpretation, ensuring a comprehensive understanding of the socio-demographic factors influencing agricultural practices in Carcar City.

RESULTS AND DISCUSSION

Based on socio-demographic considerations, the gathering of information is imperative as it significantly contributes to the analysis and interpretation of data. The 50 agricultural producers participating in this study were categorized based on their demographic profiles, economic status, and access to resources. The demographic characteristics of the respondents are detailed in Table 1.

Table 1. Socio-demographic characteristics of the informants per barangay

Socio-demographic profiles	Categories	Buen avista	%	Guadalupe	%	Napo	%	Ocaña	%
Sex	Male	1	5.88	5	62.50	4	44.44	15	93.75
	Female	16	94.12	3	37.50	5	55.56	1	6.25
Age	18-35	2	11.76	2	25.00	0	0.00	3	18.75
	36-55	11	64.71	2	25.00	5	55.56	5	31.25
	56 and above	4	23.53	4	50.00	4	44.44	8	50.00
Educational attainment	Elementary level	8	47.06	3	37.50	4	44.44	8	50.00
	Secondary level	7	41.18	3	37.50	1	11.11	8	50.00
	College level	2	11.76	2	25.00	4	44.44	0	0.00
Role in the family	Husband	4	23.53	5	62.50	4	44.44	14	87.50
	Wife	13	76.47	3	37.50	5	55.56	2	12.50
Household size	1-3 Members	3	17.65	4	50.00	1	11.11	8	50.00
	4-6 Members	7	41.18	2	25.00	6	66.67	5	31.25
	7-9 Members	4	23.53	2	25.00	2	22.22	2	12.50
	10+ Members	3	17.65	0	0.00	0	0.00	1	6.25
Farming experience	1-5 Years	0	0.00	3	37.50	3	33.33	8	50.00
	6-10 Years	7	41.18	2	25.00	0	0.00	1	6.25
	11-20 Years	1	5.88	2	25.00	6	66.67	6	37.50
	21-30 Years	1	5.88	1	12.50	0	0.00	1	6.25
	31+ Years	8	47.06	0	0.00	0	0.00	0	0.00
Income range (PHP)	< 5,000	3	17.65	0	0.00	0	0.00	2	12.50
	5,000-10,000	6	35.29	2	25.00	4	44.44	8	50.00
	10,000-15,000	5	29.41	3	37.50	2	22.22	5	31.25
	15,000-20,000	3	17.65	2	25.00	2	22.22	0	0.00
	> 20,000	0	0.00	1	12.50	1	11.11	1	6.25
Land tenure	Own land	10	58.82	5	62.50	3	33.33	12	75.00
	Tenant	4	23.53	2	25.00	6	66.67	3	18.75
	Sharecropper	3	17.65	1	12.50	0	0.00	1	6.25
Resource/training type	Financial support (Loans)	7	41.18	3	37.50	1	11.11	6	37.50
	Agricultural training	5	29.41	1	12.50	4	44.44	5	31.25
	Access to modern equipment	3	17.65	2	25.00	2	22.22	3	18.75
	Government subsidies	2	11.76	2	25.00	2	22.22	2	12.50

Aging workforce and declining youth engagement

As shown in Figure 2, farmers aged 36-55 form the largest segment, comprising 46% of the respondents, while those aged 56 and above account for 40%. The youngest cohort, aged 18-35, represents only 14% of the population, indicating a significant disengagement among young people. Gender distribution among Carcar's farming population is balanced, with men and women each representing 50% (Figure 2). However, gender roles vary across different age groups. Among middle-aged farmers (aged 36-55), women predominate at 34%, while men account for only 12%.

Educational attainment and its impact on agricultural practices

Figure 3 illustrates the educational attainment among farmers in Carcar City, highlighting a significant gap in formal education. The majority, 46% (23 farmers), are at the elementary level, followed by 38% (19 farmers) at the secondary level, while only 16% (8 farmers) have reached the college level.

Economic constraints and financial vulnerability

Most farming households in Carcar City earn between PHP 5,000 (89 USD) and PHP 15,000 (267 USD) per month, reflecting their significant economic vulnerability (Figure 4). This income range is insufficient to meet the financial demands of larger households, particularly those with seven or more members, who experience heightened financial strain due to increased living expenses (Figure 5). Conversely, smaller households with one to three members often struggle with labor shortages, which can limit their farming capacity and productivity. Mid-sized households, consisting of four to six members, tend to achieve a more favorable balance between income generation and labor availability.

Land tenure insecurity and its consequences

Land ownership and tenure play a crucial role in determining the number of years farmers till the land and their ability to sustain productive agricultural practices in Carcar City. The results were as follows: 60% of farmers are landowners of the land they cultivate; further, the remaining share is distributed among 30% of farmers who do not own land, and the remaining 10% are sharecroppers (Figure 6). The farmer is, therefore, said to enjoy favorable longevity, as ownership seals long-term investment in sustainable practices that can include crop diversification, soil management, and even infrastructure improvements. The stability also promotes the iteration of generations in the fields, and the farming knowledge passed down with it is passed on to heirs. Thus, landowners comprise the larger experience categories, with the majority having 11-20 years (30%) and 31+ years (16%) (Figure 7), indicating a strong relationship between ownership and years spent farming. In contrast, tenants and sharecroppers face significant challenges related to tenure insecurity, which limits their ability to remain on the same land for extended periods. Tenants, comprising 30% of farmers, are likely concentrated in the 1-10 years of experience range (48%), as short-term agreements and the risk of eviction discourage long-term investments. Sharecroppers, who comprise 10% of the population, are among the most vulnerable due to the unstable nature of their agreements and the obligation to share a portion of their harvest with landowners.

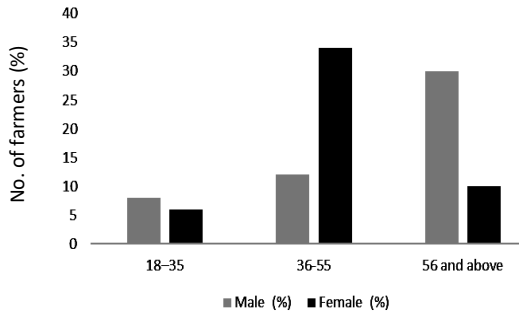

Figure 2. Age and gender distribution of farmers

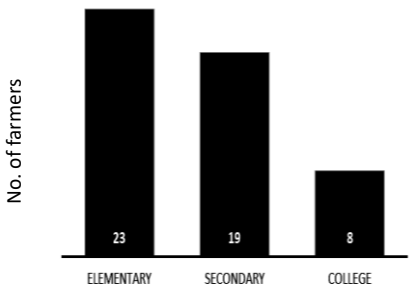

Figure 3. Educational attainment of farmers

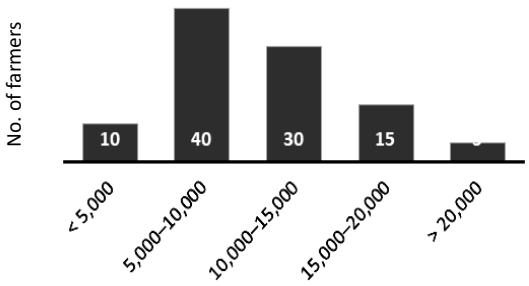

Figure 4. Monthly income range of farmers (in PHP)

Figure 5. Household size of farmers

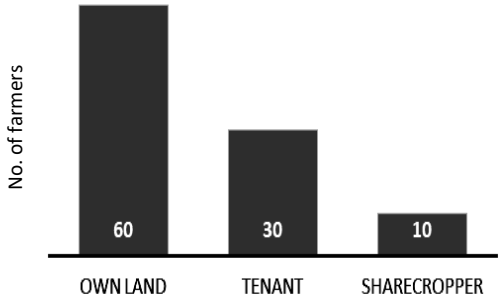

Figure 6. Land ownership and tenure status

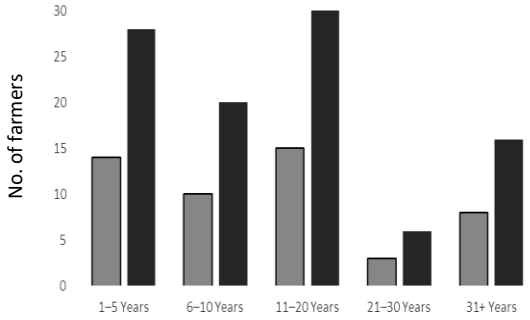

Figure 7. Farming experience (years)

Figure 8. Access to resources

Access to resources

The result highlights limited access to resources as a significant barrier to productivity among Carcar's farmers. Approximately 34% of respondents reported limited financial resources, and only 30% had received agricultural training, as shown in Figure 8. These constraints reduce productivity and resilience, especially in the face of climate variability.

Discussion

The demographic trend of an aging farmer population in Carcar City presents a significant challenge to the long-term sustainability of agricultural practices. The predominance of older farmers in this sector heightens the risk of stagnation due to their potential resistance to adopting advanced technologies and contemporary agricultural methodologies. Palis (2020) found that the average age of Filipino rice farmers is 53 years, and a majority prefer their children to pursue non-agricultural careers, citing the physical demands and economic uncertainties of farming as deterrents. As shown in Figure 2, only 14% of farmers fall within the age range of 18-35, underscoring the limited participation of young people in agricultural endeavors. This limited involvement of young individuals in farming is likely a consequence of the prevailing perceptions that depict agriculture as a physically demanding, financially unstable profession with minimal opportunities for career advancement (Chipfupa and Tagwi 2021). The phenomenon of an aging farmer demographic is increasingly recognized as a global concern. As highlighted by Heide-Ottosen (2014), a discernible pattern exists of rising percentages of older farmers, coupled with a decline in the numbers of younger farmers in rural areas worldwide.

The younger cohorts are progressively inclined toward urban employment, which engenders a labor deficit within the agricultural domain. In contemporary society, younger individuals exhibit considerably greater mobility than their predecessors, resulting in enhanced opportunities for education and skill acquisition. This contributes to a decreased willingness to return to rural settings for agricultural pursuits after completing their educational endeavors (Farrell et al. 2021). Tackling this challenge necessitates the implementation of agricultural curricula in educational institutions, the provision of financial incentives for aspiring young farmers, and increased access to contemporary farming technologies (Gaithuma et al. 2025). The process of modernization possesses the capacity to captivate the interest of younger demographics (Guerra 2018). The integration of innovative practices, such as the use of robotics, drones, farm management software, and more sustainable agricultural techniques, has the potential to motivate the younger generation to take control of agricultural enterprises and enhance their viability (Farrell et al. 2021).

Conversely, the agricultural community in Carcar is undergoing a transformation in labor dynamics, particularly in terms of gender roles. Women are increasingly attaining prominence within middle-aged farmer collectives, thereby demonstrating their dual responsibilities in both agricultural and domestic spheres (Kristjanson 2022). Nevertheless, men continue to play a crucial role in many physically demanding agricultural tasks, particularly among the older demographic. Such disparities in gender roles may necessitate targeted interventions aimed at women farmers to facilitate access to resources, training, and financial support, thereby enhancing their productivity and economic autonomy.

Furthermore, the adoption of mechanization and labor-sharing arrangements could contribute to the equitable distribution of gender roles within agricultural activities. Educational attainment plays a crucial role in shaping agricultural practices, influencing productivity, sustainability, and the adoption of modern techniques. Asfaw and Admassie (2004) found that elevated educational attainment among agricultural producers is correlated with a greater propensity for adopting advanced agricultural technologies, which subsequently leads to enhanced crop yields and economic

resilience. Conversely, Paltasingh and Goyari (2018) found that farmers with limited educational backgrounds tend to exhibit diminished productivity due to their reliance on traditional farming practices and inadequate financial management skills. The data from Figure 3 indicates a significant challenge in adopting modern agricultural practices, which can directly affect productivity, efficiency, and sustainability. With 46% of farmers at the elementary level and only 16% reaching college level, the limited formal education suggests several key implications for agriculture. Farmers with lower educational levels may lack the awareness or technical skills necessary to implement modern farming methods, such as precision agriculture, climate-resilient crops, and mechanization. Traditional knowledge persists among many farmers and remains a valuable resource. Yet, when combined with some technical information, it may not adequately respond to the immediate concerns of agriculture. Farmer education through field schools, workshops, and extension services ought to be a priority if farm productivity is to be enhanced and sustained (Dawe 2018).

Such programs would, therefore, be based on relevant on-the-job training to make them accessible and credible to less formally educated farmers. Any new vision for agricultural extension must bridge the existing educational gaps between the relatively small number of formally educated farmers and traditionalists who are often distracted. Economic constraints and financial vulnerability pose significant challenges to farmers, particularly those with lower educational attainment and income levels. Farms managed by less-educated farmers may experience lower yields and reduced profitability, which can contribute to economic instability in rural areas.

The data from Figure 4 indicates that most individuals earn a subsistence income, ranging from PHP 5,000 to PHP 15,000 (89 to 267 USD), with very few exceeding PHP 20,000 (348.59 USD). This trend has a direct impact on agricultural sustainability, investment capacity, and overall livelihood security among low-income individuals. Farmers with low incomes struggle to afford essential agricultural inputs, including seeds, fertilizers, and equipment. Odhiambo et al. (2004) concluded that farmers with larger families allocate a greater proportion of their income to household needs rather than reinvest in farm productivity, leading to stagnation in agricultural development. The larger households contend with heavy financial burdens, while their smaller counterparts confront dwindling farm capacities. Financial assistance from the government, cooperative farming programs, and market access enhancements are necessary steps to balance these imbalances and establish a floor for household incomes (Villanueva 2019). Access to microfinance programs and cooperatives would enable farmers to pool resources, procure modern equipment, and enter more lucrative markets. Many farmers will continue to remain poor, unable to make any investments in farming, and therefore, likely to experience even reduced productivity without outside help. Land tenure insecurity presents significant challenges to agricultural productivity, limiting farmers' ability to make long-term investments and adopt sustainable practices. Farmers who own their land are more likely to invest in infrastructure, soil conservation, and mechanized farming, ensuring long-term productivity and sustainability. In contrast, tenants and sharecroppers face uncertainties that discourage improvements and the adoption of technology (Sumalde and Francisco 2021). Without secure tenure, farmers may hesitate to implement sustainable techniques such as crop rotation, soil conservation, and mechanized activities, as they lack assurance over the long-term benefits of their investments (de Janvry and Sadoulet 2022). Strengthening land tenure policies-whether through more secure lease agreements or land ownership programs for tenant farmers-can serve as a strong incentive for sustainable agriculture. Additionally, increasing access to financial resources, improving infrastructure such as irrigation and farm-to-market roads and fostering cooperative farming models can significantly enhance agricultural resilience. Investments in rural infrastructure not only lower production costs but also improve market competitiveness, ultimately empowering farmers to achieve greater economic stability and sustainability (Pingali et al. 2019).

In conclusion, the aging farming population in Carcar City presents significant obstacles to agricultural sustainability. The challenges associated with this demographic trend include limited youth participation, educational gaps, economic constraints, gender disparities, and insecurity of land tenure. Addressing these issues requires a multi-faceted approach involving modernization, targeted education programs, financial assistance, and enhanced infrastructure. Encouraging youth involvement through technology-driven initiatives and financial incentives is crucial for ensuring the long-term sustainability of the agricultural sector. Moreover, improving land tenure security and providing targeted support for women farmers will contribute to a more resilient and equitable agricultural system. By implementing these strategies, Carcar City can foster a more sustainable and productive agricultural future.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the Department of Budget and Management (DBM) for considering and approving our proposal and allocating the necessary budget for this study. We extend our appreciation to Cebu Technological University-Argao for its unwavering support in facilitating this research and for granting the team the opportunity to conduct the study. Our heartfelt thanks go to Carcar City Mayor Mario Patricio P. Barcenas and the barangay captains for their assistance in coordinating the research activities within the study area. Most importantly, we are deeply grateful to the People's Organization (PO) and the farmers who generously shared their time and insights, making this study possible.

REFERENCES

Asfaw A, Admassie A. 2004. The role of education on the adoption of chemical fertilizer under different socioeconomic environments in

Ethiopia. Agric Econ 30 (3): 215-228. DOI: 10.1111/j.1574-0862.2004.tb00190.x.
Babbie E. 2020. The Practice of Social Research (15th ed). Cengage Learning.
Bryman A. 2016. Social Research Methods (5th ed). Oxford Univ Press, Oxford.
Creswell JW. 2014. Research design: Qualitative, Quantitative, and Mixed Methods Approaches (4th ed). SAGE Publ, London.
Chipfupa U, Tagwi A. 2021. Youth's participation in agriculture: A fallacy or achievable possibility? Evidence from rural South Africa. S Afr J Econ Manag Sci 24 (1): 1-12. DOI: 10.4102/sajems.v24i1.4004.
Dawe D. 2018. Strategies for Sustainable Agriculture in Asia: Addressing Financial and Technological Challenges. FAO, Rome, Italy.
de Janvry A, Sadoulet E. 2022. Agriculture for development: Analytics and action. Annu Rev Resour Econ 14 (1): 1-16. DOI: 10.1146/annurev-resource-090921-045011.
FAO. 2016. A Field Guide to Socio-Economic and Gender Analysis (SEAGA) for Agricultural Development. Food and Agriculture Organization of the United Nations, Rome, Italy.
FAO. 2021. The State of Food and Agriculture 2021: Making Agrifood Systems More Resilient to Shocks and Stresses. FAO, Rome, Italy.
Farrell M, Murtagh A, Weir L, Conway SF, McDonagh J, Mahon M. 2021. Irish organics, innovation and farm collaboration: A pathway to farm viability and generational renewal. Sustainability 14 (1): 93.
Gaithuma J, Chor S, Natukunda A, Shahleen P, Kavle JA. 2025. Empowering youth as agents of change: Gaps and opportunities for Meaningful Youth Engagement (MAYE) for sustainable nutrition, climate, and public health programmes. Maternal Child Nutr 21 (1): e13730. DOI: 10.1111/mcn.13730.
Groves RM, Fowler FJ Jr, Couper MP, Lepkowski JM, Singer E, Tourangeau R. 2009. Survey Methodology (2nd ed). John Wiley & Sons, United States of America.
Guerra AI, Lopes JC. 2018. Young Farmers as Innovation Enablers in Rural Areas: The Role of Eu's Support in a Portuguese Peripheric Region, Trás-Os-Montes. [Doctoral Dissertation]. Universidade de Lisboa, Lisboa, Portugal.
Heide-Ottosen S. 2014. The Ageing of Rural Populations: Evidence on Older Farmers in Low- and Middle-Income Countries. HelpAge International, London, UK.
Israel GD. 1992. Program Evaluation and Organizational Development, IFAS, University of Florida. PEOD-6. Determining Sample Size.
Kristjanson P. 2022. Gender, Tenure Security, and Landscape Governance: Synthesis of Studies of PIM's Governance of Natural Resources flagship program, 2013-2020. International Food Policy Research Institute, Washington DC.
Oakeshott J. 2016. Sustainable smallholder farming clusters in the Philippines. Acta Hortic 1128: 339-346. DOI: 10.17660/ActaHortic.2016.1128.52.
Odhiambo W, Nyangito HO, Nzuma J. 2004. Sources and Determinants of Agricultural Growth and Productivity in Kenya. Kenya Institute for Public Policy Research and Analysis.
Palis FG. 2020. Aging filipino rice farmers and their aspirations for their children. Philippine J Sci 149 (2): 321-331. DOI: 10.56899/149.02.10.
Paltasingh KR, Goyari P. 2018. Impact of farmer education on farm productivity under varying technologies: Case of paddy growers in India. Agric Food Econ 6 (7): 1-19. DOI: 10.1186/s40100-018-0101-9.
Philippine Statistics Authority. 2022. Employment situation as of December 2022. https://psa.gov.ph/statistics/labor-force-survey/released/2022?utm.
Pingali P, Aiyar A, Abraham M, Rahman A. 2019. Transforming Food Systems for a Rising India. Springer Nature, New York. DOI: 10.1007/978-3-030-14409-8.
Rola AC, Pulhin JM, Hall RA. 2016. Climate change and agriculture in the Philippines: Impact and adaptation. SEARCA, University of the Philippines Los Baños, Los Baños, Philippine.
Serrat O. 2017. Knowledge Solutions: Tools, Methods, and Approaches to Drive Organizational Performance. Springer Nature, Singapore. DOI: 10.1007/978-981-10-0983-9.
Sumalde ZM, Francisco HA. 2021. Land tenure and sustainable farming: Impacts on agricultural productivity in the Philippines. Agricultural Systems.
United Nations, Department of Economic and Social Affairs, Population Division. 2022. World Population Prospects 2022: Summary of Results. United Nations, New York.
Villanueva M. 2019. Rural Livelihood Challenges in the Philippines: Income and Productivity Gaps in Agriculture. J Rural Dev Res.
World Bank. 2020. Transforming Philippine Agriculture: During COVID-19 and Beyond. World Bank, Washington, DC.