GOOD AGRICULTURAL PRACTICES (GAP) DETERMINANTS AMONG SMALLHOLDER VEGETABLE FARMERS: THE CASE OF MAJAYJAY, LAGUNA, PHILIPPINES

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10.15408/saj.v5i2.46720

ABSTRACT

Good Agricultural Practices (GAP) are critical for ensuring food safety, environmental sustainability, and access to competitive markets, but adoption among smallholder farmers in the Philippines remains low. This study assessed the determinants of GAP adoption among smallholder vegetable farmers in Majayjay, Laguna. Survey data from 69 farmers were selected through purposive sampling and analyzed using descriptive statistics and Pearson's chi-square test, and Cramer's V to examine the relationship between adoption and three variables: membership in farmers' organization, awareness on GAP, and communication with agricultural extension workers. Results showed that awareness on GAP and communication with agricultural extension workers were significantly associated with adoption, whereas membership in farmers' organizations was not. These findings highlight the importance of awareness and extension services as key drivers of the respondents' GAP adoption. While membership in farmers' organizations may not be significant, strengthening the role of farmers' organizations can provide institutional and government support and market opportunities that help sustain adoption. This study recommends targeted awareness campaigns, enhanced extension services, and empowered farmers' organizations to promote GAP adoption among smallholder vegetable farmers.

Keywords: *good agricultural practices (gap); smallholder vegetable farmers; adoption determinants; agricultural extension; farmer organizations.*

INTRODUCTION

Vegetable production is an important source of food and livelihood of farmers and their households in the Philippines (Department of Agriculture [DA], 2022, as cited by Department of Science and Technology-Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development [DOST-PCAARRD], 2020). Across the Philippines, the total area allotted for vegetable production in 2019 was approximately 675,726 hectares which contributed to a total of 4.1% of agriculture's share to the Gross Domestic Product (GDP). The vegetable industry faces serious challenges to food security brought about by poor access to high quality inputs, incidences of pests and diseases, distribution losses, and inefficient marketing (DOST-PCAARRD, 2020). In addition to this, there are also challenges in food safety as the inadequate training of farmers on the appropriate use of pesticides has caused significant levels of pesticide residues and microbes in vegetables, soil, and water in the country (WWF, 2025).

Good Agricultural Practices (GAP) is composed of principles, guidelines, and technical recommendations established by the Association of Southeast Asian Nations (ASEAN). GAP is designed to address pressing global concerns like food security, food safety, and climate change, while simultaneously promoting sustainable resource utilization and environmentally sound farming practices. It functions as a framework that aligns conventional farming methods with the increasingly stringent quality and safety standards demanded by the modern markets. According to the Department of Agriculture-Agricultural Training Institute (DA-ATI, 2022), farmers are required to undergo training, assessment, and farm inspection prior to the issuance of a GAP certification which ensures compliance with food safety, environmental management, and worker welfare standards.

This certification has become particularly important as many institutional buyers such as supermarkets, hotels, and food processors, require GAP compliance as a prerequisite for sourcing vegetables. For smallholder farmers, becoming a qualified supplier is crucial, as it provides stable market access and directly impacts their livelihood and long-term income security.

According to the Department of Agriculture-Regional Field Office CALABARZON (2020), there are around 282,746 registered farms in Region IV-A in 2020 but only a total of 81 farms (0.03%) is PhilGAP certified. This aligns to the national trend of low GAP adoption (Bacani,

2021). The low level of adoption poses threats for ensuring food safety and competitiveness in the local market. However, previous studies have suggested pathways to strengthen adoption of agricultural technologies. Membership in farmers' cooperatives or associations has been found to significantly increase the likelihood of adopting technologies such as GAP, as these institutions provide access to information, training, credit, and market linkages (Manda et al., 2020; Zhang et al., 2020; Wang & Xu, 2025). Moreover, several studies found that vegetable farmers are in a better position to adopt agricultural technologies if they are aware of a technology (Ullah et al., 2022) and often communicate with agricultural extension workers (Tran et al., 2025, Alam et al., 2024). Another study by Assfaw Wossen et al. (2017) found that access to extension services and cooperative membership have a positive and statistically significant effect on technology adoption.

While national and regional reports emphasize low GAP certification among smallholder farmers, there is limited empirical evidence explaining the specific factors influencing GAP adoption in Majayjay, Laguna itself. Results of this study are necessary for designing targeted interventions at the municipal level. Moreover, identifying the key determinants of GAP adoption can also guide farmer organizations and extension workers in strengthening training and support programs, thereby improving farmers' readiness to meet the certification requirements of institutional buyers and access higher-value markets.

This study aims to: 1) to describe the socio-demographic characteristics of the smallholder vegetable farmers in Majayjay, Laguna, Philippines; 2) to determine their key factors (membership in a farmers' organization, awareness on GAP, communication with agricultural extension workers) in adopting GAP; 3) to identify their GAP adoption; 4) to assess the determinants influencing their GAP adoption; and 5) to formulate recommendations to enhance GAP adoption based on its determinants.

METHOD

The study utilized a quantitative research design to identify the determinants of Good Agricultural Practices (GAP) adoption among smallholder vegetable farmers in Majayjay, Laguna, Philippines. Specifically, the analysis focused on the association between GAP adoption and three key factors: 1) membership in a farmers' organization, 2) awareness on GAP, and 3) communication with agricultural extension workers.

The researchers attempted to interview the total population of smallholder vegetable farmers in Majayjay, Laguna. However, not all farmers were available or were willing to participate in the survey. As a result, there were 69 farmers successfully interviewed. The sampling procedure is therefore characterized as purposive sampling.

Primary data were collected through a structured survey questionnaire which included the farmers' socio-demographic characteristics, membership in farmers' organization, awareness on GAP, communication with agricultural extension workers, and adoption of GAP.

The dependent variable in this study was the adoption of GAP which was measured based on farmers' self-reported implementation of GAP-related practices in vegetable production. Respondents were asked to indicate the extent of their adoption using three categories: did not adopt, sometimes, and always. The independent variables were operationalized as follows: membership in a farmers' organization (0=non-member, 1=member), awareness on GAP (0=unaware, 1=aware), and communication with agricultural extension workers (0=without communication, 1=with communication). In addition to this, socio-demographic characteristics such as age, sex, highest educational attainment, and monthly income were also recorded to describe the respondents' profile.

Descriptive statistics such as frequencies and percentages were used to summarize the respondents' socio-demographic characteristics. Data were analyzed using SPSS (Statistical Package for the Social Sciences). Pearson's chi-square test of independence was used to examine the association between GAP adoption and the three independent variables: membership in a farmers' organization, awareness on GAP, and communication with agricultural extension workers. To measure the strength of association, Cramer's V was computed. Statistical significance was determined at the 5% level ($p<0.05$).

RESULT AND DICUSSIONS

The study examined the relationship between the adoption of Good Agricultural Practices (GAP) and three factors: membership in farmers' organization, awareness on GAP, and communication with agricultural extension workers.

Socio-demographic characteristics of the smallholder vegetable farmers

Table 1 presents the socio-demographic characteristics of the smallholder vegetable farmers in Majayjay, Laguna. Results show that most of the respondents belong to the 45-64 years old age range (50.72%), followed by the 25-44 years old group (34.78%). A smaller proportion comes from the 65 years old and above (11.59%), while only 2.90% fall within the 15-24 age range. No respondents were recorded in the 14 years old and below.

The results highlight the aging structure of the farming population in the municipality, which reflects the broader trend in the Philippine's agriculture sector. According to the Philippine Statistics Authority (PSA, 2024), the median age of farmers in 2022 was 49.7 years old, proving that the younger generation is less inclined to engage in agriculture as a livelihood. As the farming population ages, agricultural production efficiency declines due to older farmers' limited financial capacity, risk aversion, and reluctance to adopt new technologies (Li & Sicular, 2013).

Table 1. Profile of the smallholder vegetable farmers in Majayjay, Laguna

Characteristics	Frequency (n=69)	Percentage (%)
Age		
14 years old and below	0	0.00
15-24 years old	2	2.90
25-44 years old	24	34.78
45-64 years old	35	50.72
65 years old and above	8	11.59
Sex		
Female	21	30.43
Male	48	69.57
Highest Educational Attainment		
Elementary Graduate	25	36.23
High School Graduate	30	43.48
College Graduate	14	20.29
Vocational Graduate	0	0.00
Estimated Monthly Household Income	59	85.51
Less than PHP 10,957.00	9	13.04
PHP 10,958.00-PHP 21,193.00	1	1.45
PHP 21,194.00-PHP 43,827.00	0	0.00
PHP 43,828.00-PHP 76,668.00		

Out of the 69 respondents, the majority are male (69.57%) while only 30.43% are female. This suggests that vegetable farming in Majayjay, Laguna is predominantly a male-dominated activity. In terms of their educational attainment, most of the respondents have completed their secondary education (43.48%) and primary education (36.23%) while only 20.29% completed tertiary education and none on vocational training. This may have an effect on their access to information, training, and adoption of GAP, as more farmers who have higher educational attainment are generally more willing to adopt new technologies (Sehrawat, Sindhu, & Glick, 2022). In terms of their household income, the majority of the respondents (85.51%) earn less than PHP 10,957.00, below the monthly poverty threshold for a family of five of PHP 12,523.00 (PSA, 2024). Only a small proportion reported incomes between PHP 10,958.00 to PHP 21,193.00 (13.04%), PHP 21,194.00 to PHP 43,827.00 (1.45%), and none fell within the higher-income category. Given that majority of the respondents belong to the poor category, they may lack resources and financial capacity to invest in the requirements needed for GAP adoption (Gichuki, Han, & Njagi, 2020).

Key factors on GAP adoption

Findings reveal that the majority of the respondents (78.26%) are members of a farmers' organization, while only (21.74%) reported otherwise (Table 2). This indicates that most respondents are formally engaged in collective groups, which may serve as an avenue for information sharing, resource access, and collaboration. According to a study of Katung and Akankwasa (2008), the likelihood of farmers adopting a technology increase if they are more actively participating in community-based organizations.

Table 2. Key factors on GAP adoption of the smallholder vegetable farmers in Majayjay, Laguna

Characteristics	Frequency (n=69)	Percentage (%)
Membership in Farmers' Organization		
Yes	54	78.26
No	15	21.74
Awareness on GAP		
Aware	56	81.16
Not Aware	13	18.84

Communication to Agricultural Extension Workers		
Yes	59	85.51
No	10	14.49
Adoption of GAP		
Did Not Adopt	17	24.64
Sometimes	18	26.09
Always	34	49.28

With regard to their awareness on GAP, most respondents (81.16%) indicated that they are aware of GAP, while 13 farmers (18.84%) have no awareness at all. This suggests that GAP is a familiar concept to the respondents. A significant majority (85.51%) reported having communication with agricultural extension workers while 10 farmers (14.49%) do not. This reflects a relatively high engagement of the respondents with agricultural extension workers in the municipality. Agricultural extension services are vital in encouraging farmers to adopt technologies on sustainable farming practices (Inutan, Dujali, Bacus & Quijano-Pagutayao, 2025) by providing timely information and facilitating linkages with key stakeholders such as farmer organization leaders, policymakers, input suppliers, logistics providers, and market traders (Naika et al., 2021).

GAP adoption

The highest proportion of respondents (49.28%) reported that they always adopt GAP in their farming activities, followed by 26.09% who indicated that they sometimes adopt GAP, and 24.64% stated that they have not adopted GAP at all (Table 3). Those respondents who answered "sometimes" perform some activities related to GAP on an occasional basis. The results indicate that while there is awareness on GAP, there is still a varying level of its adoption. There remains a significant proportion of respondents who have yet to fully integrate GAP into their farming practices.

Table 3. GAP adoption of the smallholder vegetable farmers in Majayjay, Laguna

Characteristics	**Frequency (n=69)**	**Percentage (%)**
Adoption of GAP		
Did Not Adopt	17	24.64

Sometimes	18	26.09
Always	34	49.28

Most of those who did not adopt GAP belong to the 45-64 years old age group, are male and have attained primary and secondary education. Previous studies show that older farmers tend to be more risk-averse and learn new technologies more slowly (Mwangi & Kairuki, 2015) and require greater effort to adapt to innovations (Sharit, Moxley, & Czaja, 2021). Majority of the respondents who "always" adopt GAP still belong to the 45-64 years old age group, but notably, there are also several from the 25-44 years old age group.

Determinants influencing their GAP adoption

Pearson's chi-square test of independence was conducted to examine the relationship of GAP adoption with the respondents' membership in farmers' organization, awareness on GAP, and communication with agricultural extension workers. Table 4 presents the summary of results. It revealed that there is no significant association between GAP adoption and membership in farmers' organizations. While the majority of the respondents were members of an organization, this did not appear to influence whether or not they adopted GAP. This finding differs from the studies mentioned above that have highlighted the positive role of organizations in technology adoption. In the case of the respondents, membership in farmers' organizations alone may not have translated into the necessary support systems, training, or incentives to encourage consistent adoption of GAP. Upon the data validation with key informants, it was revealed that some farmer-members do not actively participate in the activities of their respective organizations.

Table 4. Result of Pearson's chi-square test of independence between GAP Adoption and Selected Factors

Variable	X^2 Value	df	p-value	Cramer's V
Membership in Farmers' Organization	0.420	1	0.837	0.025
Awareness on GAP	17.155	1	0.000***	0.499
Communication with Agricultural Extension Workers	4.052	1	0.044*	0.242

*Significant at $p<0.05$; ***Significant at $p<0.001$

In contrast, awareness on GAP showed a strong and highly significant association with adoption. Farmer-respondents who were aware of GAP were more likely to adopt its practices. The results reinforce the critical role of awareness in promoting adoption, consistent with past findings that knowledge and access to information are important determinants of adopting agricultural technologies (Bacani, 2021; Ullah et al., 2022; and Shehrawat et al., 2024). In addition to this, communication with agricultural extension workers was found to be significantly associated with GAP adoption, but with weaker effect in comparison to the awareness on GAP. Farmer-respondents who engaged with agricultural extension workers were more likely to practice GAP compared to those who did not. This complements previous literature that suggest communication with extension workers enhances the capacity of farmers to adopt new practices. Overall, the results suggest that awareness on GAP and communication with agricultural extension workers are some of the key determinants of GAP adoption of the respondents while membership in farmers' organization alone does not significantly influence adoption.

RECOMMENDATIONS

Building on these insights, the following recommendations are proposed to guide policymakers, extension workers, and farmers' organizations in promoting wider adoption of GAP among smallholder vegetable farmers in Majayjay, Laguna, Philippines. Since awareness on GAP showed the strongest and highest significant association with GAP adoption, the local government unit (LGU), the Department of Agriculture (DA), and non-government organizations (NGOs) should intensify information campaigns and training activities. Support mechanisms such as subsidies for GAP-compliant inputs and provision of localized training manuals may lower the barriers to adoption.

Communication with agricultural extension workers was also found to be significantly related to adoption. Through consistent visits, farmer consultations, and technical guidance, farmers could further be encouraged to adopt GAP. While previous studies have shown membership in farmers' organizations to have a significant effect on technology adoption, the results of the study did not show a significant relationship with GAP adoption. However, organizations can still serve as important channels for collective action. Further, farmers may also consider forming a cooperative, which can provide greater institutional and government support, market linkages, and access to inputs and services.

Future research may build upon the findings of this study by examining in greater depth the constraints that hinder smallholder vegetable farmers from fully processing their PhilGAP certification. Future studies may also consider adding more respondents and other determinants of adoption such as input availability, risk perceptions, and market access, among others.

CONCLUSION

This study examined the determinants of GAP adoption among smallholder vegetable farmers in Majayjay, Laguna, Philippines. Results showed that awareness of GAP and communication with agricultural extension workers significantly influenced adoption, while membership in farmers' organizations did not exhibit a significant effect. Despite relatively high awareness and extension contact among respondents, GAP adoption remains modest, reflecting the broader national trend of low certification and practice. These results suggest that strengthening awareness campaigns and extension services, along with empowering farmers' organizations to take on a more active role, can encourage a wider adoption of GAP in the municipality.

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