

Determinants of Awareness of Good Agricultural Practices (GAP) among Vegetable Growers in Nakuru, Kenya

ABSTRACT

Good Agricultural Practices (GAP) towards ensuring vegetable safety and quality is a new concept for Kenyan farmers. Most vegetable growers are unaware of it and have yet to implement the practices. The study aimed to establish the factors that influence GAP awareness among vegetable growers in Nakuru, Kenya. Simple random sampling was used to select 100 vegetable growers. Multiple regression was used to analyze the effect of the variables on GAP awareness of the vegetable growers. Findings showed that age, gender, education, operational land, land leased, farming experience, and training had a significant effect on the awareness of GAP. Based on the results, emphasis on capacity building of vegetable growers on GAP is suggested as a way of increasing awareness.

Key words: Adoption, Awareness, Determinants, Good Agricultural Practices, Safety

INTRODUCTION

New agricultural practices need prior awareness for their successful adoption, but various conditions and factors may affect this. Socioeconomic characteristics such as age, sex, education, information access, family size, norms of the farm family, extension, and training greatly influence the knowledge and information of new technologies and new practices (David & Asamoah 2011; Bernier *et al.* 2015).

Good Agricultural Practices (GAP) concept has advanced in recent years in the face of a rapidly changing and globalized food economy. Good Agricultural Practices (GAP) decreases food safety risks. However, the poor implementation along the vegetable production chain remains a challenge.

Vegetables are prone to contamination due to the wide use of chemicals, fertilizers, and pesticides. This makes them unsafe for consumption, hence a threat to consumers and vegetable producers. Various studies reveal high usage of chemicals among Kenyan farmers and that few farms follow good agricultural practices (Ndwiga & Kiruki 2018).

Contamination risks can be reduced by the adoption of pre-farm-gate standards as put forward by the Good Agricultural Practices (GAP) program, which is a voluntary codified system of standards that addresses the process of production until the produce leaves the farm. KenyaGAP is a country-specific body benchmarked against GLOBALGAP standards for fruit, vegetables, and flowers. KenyaGAP is voluntary, but certification is restricted to both large and small-scale farmers who are members of the Fresh Produce Exporters Association of Kenya (FPEAK) (Carey 2008). KenyaGAP has brought increased awareness of plant protection products (IIED and NRI 2008) and improved produce quality (UNCTAD 2008); however, many small-scale farmers who have no membership with FPEAK have not benefitted from the standards (RSA 2015).

Nakuru County is one of the leading producers of vegetables in Kenya (Francesco & Hanne, 2019). However, its productive potential is not fully exploited due to different factors that influence successful production, chief among which is their safety and quality. GAP adoption is one way of ensuring the quality standards, but its awareness within the County is

low (Cherotich 2021). This study, therefore, sought to identify the determinants of awareness of GAP among the vegetable growers of Nakuru County, Kenya.

MATERIAL AND METHODS

The study was conducted in Nakuru County in Kenya. An interview schedule was used to investigate the determinants that would influence the adoption of GAP among vegetable growers. The first part of the schedule captured the respondent's general information, age, gender, education level, vegetable growing experience, farm size, income, and training. The second part was an audit checklist developed with reference to FAO recommendations (Poisot *et al.* 2004) which captured farmers' awareness of GAP standards. The checklist had 151 statements categorized into 13 different sections namely: (i) site history (ii) planting material (iii) water usage (iv) fertilizers, manures, bio-solids, and nutrition (v) chemicals (plant protection or other agrochemicals) (vi) integrated pest management (IPM) (vii) soils and substrates (viii) harvesting and handling (ix) animal and pest control (x) worker health and safety (xi) storage and transport (xii) waste management (xiii) training. Descriptive and inferential statistical analyses such as frequencies, percentages, and multiple regression were carried out to determine farmers' socioeconomic characteristics, awareness, and compliance by use of the statistical package SPSS (version 26). Awareness was measured through rating on a 3- point rating scale ranging from 2 for 'fully aware', 1 for 'partially aware', and 0 for 'not aware'.

RESULTS AND DISCUSSION

Eight socioeconomic characteristics of the vegetable farmers were studied and presented in Table 1. The results show that the majority of the farmers (61 %) were middle-aged, 77 percent were male, and that slightly less than half of them (48 %) had secondary level of education and above. Singh *et al.* (2017) and Mohammad *et al.* (2020) have also reported findings that the majority of farmers in their studies fell into the middle age groups, while Adebayo (2012) and Mohammad *et al.* (2020) found that most of the small scale farmers possess higher education level.

Sixty one percent had low vegetable growing experience, and almost all (97%) were marginal farmers. 53 percent of the farmers had medium to high income from vegetable farming, and half (50%) of the them were trained on improved vegetable production practices. Samra and Kataria (2014) have reported similar findings of higher income from vegetable cultivation among farmers.

Table 1: Smallholder vegetable growers' socioeconomic characteristics n=100

Variable	Category	f (%)
Age (years)	Young (18-30)	26(26.0)
	Middle (31-50)	61(61.0)
	Old (>50)	13(13.0)
Gender	Male	77(77.0)
	Female	23(23.0)
Education	Illiterate	1(1.0)
	Primary	16(16.0)
	Middle	11(11.0)
	Matric	24(24.0)
	Secondary	37(37.0)
	Graduate	11(11.0)
Vegetable growing experience	Post Graduate	-
	Low (< 10 years)	61(61.0)
	Medium (10-20 years)	36(36.0)
	High (> 20 years)	3(3.0)
Operational Land	Marginal (<2.5)	97(97.0)
	Small (2.5-5)	3(3.0)
	Semi-medium (5-10)	-
	Medium (10 -25)	-
	Large (>25)	-
Land leased	Marginal (<2.5)	99(99.0)
	Small (2.5-5)	-
	Semi-medium (5-10)	1(1.0)
	Medium (10 -25)	-
	Large (>25)	-0
Annual income	Low (< 4 lakhs)	47(47.0)
	Medium (4-7 lakhs)	20(20.0)
	High (>7 lakhs)	33(33.0)
Training in GAP	Yes	50(50.0)

* Source: Field survey, 2020

GAP awareness among vegetable growers

Awareness of GAP standards is presented in Table 2. The awareness score of the farmers about GAP standards ranged from 45 to 96 against the possible range of 0 to 151. The Data indicated that 58 percent of vegetable growers in Nakuru were partially aware of site history GAP standards, findings similar to those by Waghmod *et al.* (2020) in their study on GAP adoption among mango farmers. The majority of the respondents (84%) were not aware of the standards for planting material, and 92 percent were not aware of the protocols needed in water usage and conservation, similar to findings by Rochelle *et al.* (2014) on lack of verification of water by farmers before use. Arati *et al.* (2020) and Luquet *et al.* (2005) observed that water-saving is not a priority for most farmers since they rely on subjective judgments based only on their practical experience and observation to make decisions (Knox *et al.* 2012). However, this differed from a study by Rehman (2013), who found that most farmers were aware of water management practices.

The results on awareness of GAP protocols for fertilizer, manures, bio-solids, and nutrition revealed that more than two-thirds of the respondents (64%) were unaware of the

standards and that 57 percent of the vegetable were unaware of the protocols for chemicals. The findings are similar to those by Reeves and Schafer (2003) and Sandesh *et al.* (2021).

The majority of the vegetable growers (91%) were highly aware of IPM GAP standards, and 88 percent of the respondents were unaware of the soils and substrates standards. A majority (88%) of the vegetable growers had partial awareness of GAP standards for harvesting and handling vegetables, and mixed findings were revealed for awareness of animal and pest control GAP standards with partial knowledge by 38 percent of respondents, and 38 percent by those completely unaware. Waghmod *et al.* (2020) have reported similar findings.

The findings revealed that close to three-quarters of the vegetable growers were unaware of GAP standards for worker health and safety, and 67 percent of the respondents were partially aware of the standards for storage and transport. The majority of the vegetable growers (92%) were unaware of GAP waste management standards, and 71 percent of the vegetable growers were unaware of GAP standards of worker training. These findings are confirmed by Rochelle *et al.* (2014) and Jackson *et al.* (2007).

Table 2: Distribution of vegetable growers' according to awareness of GAP n=100

GAP standards	Awareness Level	f (%)
Site History	none	28(28.0)
	partial	58(58.0)
	High	14(14.0)
Planting Material	none	84(84.0)
	partial	13(13.0)
	High	3(3.0)
Water Usage and Conservation	none	92(92.0)
	partial	6(6.0)
	High	2(2.0)
Fertilizer, Manures, Bio-Solids and Nutrition	none	64(64.0)
	partial	22(22.0)
	High	14(14.0)
Chemicals (plant protection and other agrochemicals)	none	57(57.0)
	partial	29(29.0)
	High	14(14.0)
Integrated Pest Management	none	3 (3.0)
	partial	6(6.0)
	High	91 (91.0)
Soils and Substrates	none	88(88.0)
	partial	5(5.0)
	High	7(7.0)
Harvesting and handling vegetables	none	2(2.0)
	partial	88(88.0)
	High	10(10.0)
Animal and pest control	none	38(38.0)
	partial	38(38.0)
	High	24(24.0)
Worker health and safety	none	73(73.0)
	partial	25(25.0)
	High	2(2.0)
Storage and transport	none	23(23.0)

	partial	67(67.0)
	High	10(10.0)
Waste management	none	92(92.0)
	partial	-
	High	8(8.0)
Training	none	71(71.0)
	partial	20(20.0)
	High	9(9.0)

* Source: Field survey, 2020

Determinants of awareness to Good Agricultural Practices (GAP)

To find out the relative contribution of independent variables on farmers' awareness towards implementation of GAP, multiple regression analyses were computed and presented in Table 3. The variables statistically significantly predicted awareness in planting material, water usage and conservation, fertilizers, manures, and bio-solids, harvesting and handling, animal and pest control, storage and transport, worker health and safety, waste management, and worker training among the vegetable farmers. Seven variables, age, gender, education level, operational land, land leased, training, and farming experience added statistically significantly to the prediction, $p < .05$.

Table 3: Multiple regression of awareness on socio-economic characteristics

Standards	R²	d.f.	F, α
Site History	.160	(9, 90)	1.903, .061
Planting Material	.260	(9, 90)	3.505**
Water Usage and Conservation	.261	(9, 90)	3.528**
Fertilizers, Manures, and Bio-solids	.201	(9, 90)	2.513**
Chemicals	.137	(9, 90)	1.594, .129
Integrated Pest Management	.106	(9, 90)	1.182, .316
Soils and substrates	.155	(9, 90)	1.830, .073
Harvesting and Handling	.279	(9, 90)	3.879**
Animal and Pest Control	.166	(9, 90)	1.985*
Worker Health and Safety	.190	(9, 90)	2.353**
Storage and Transport	.231	(9, 90)	3.000**
Waste Management	.238	(9, 90)	3.117**
Worker Training	.256	(9, 90)	3.436**

*for significant at 0.05 level of significance ** for significant at 0.001% level of significance

CONCLUSION

The results show a slightly below-average awareness of Good Agricultural Practices (GAPs) among the vegetable growers. Prior information is thus necessary for the adoption of any agricultural technology. The findings also suggest that emphasis on education and training affects the awareness of GAP. In this context, emphasis should be on training and capacity building of vegetable growers regarding GAP. Government should prioritize GAP-related programs for the farmers to benefit in terms of quality and quantity of produce, income and simultaneously maintain a harmonious relationship with the environment. Motivation for GAP adoption by the farmers can be strengthened by focusing on the benefits they can achieve, especially on higher market access and premium price on their produce.

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