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Original Article

PRODUCTION, POSTHARVEST PRACTICE, MARKETING AND CHALLENGES OF SMALLHOLDER VEGETABLE PRODUCERS IN TANZANIA

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ABSTRACT

Beside staple crops, the fruits and vegetables subsector contribute significantly to domestic and export markets. Yet, this subsector faces a number of challenges that limits its full growth potential. Through 383 randomly selected farmers' interviews in selected districts, the study revealed profound information on the vegetable value chain. Findings show that, there is fair participation of men (58%) and women (42%) in vegetable production. Majority of farmers were between 19 and 49 years old (70%), attained primary education (80%) and had more than 5 years in commercial vegetable production (71.8%). Further, 79.4% of farmers had less than 1 ha of vegetable farmland. Farmers cultivate a wide range of nutritious and commercially valued vegetables including broccoli (50.7%), cauliflower (37.3%), white cabbage (34.7%), crisphead lettuce (24.5%), Chinese cabbage (20.6%), zucchini (20.1%), carrot (18.5%), tomato (14.4%), purple cabbage (10.2%), beetroot (9.4%), African nightshade (8.4%), leaf lettuce (7.6%), green/snap bean (6.8%), snow/sugar-snap pea (5%), leeks (5%), spinach (4.2%), green pepper (4.2%), herbs (parsley, fennel and dill) (4.2%) and celery (2.9%). However, sustainable marketing of fresh vegetables is a challenge leading to most farmers opting to wholesale their produce at the farm gate (70.5%) instead of the marketplace, with the price often being set by the wholesale buyers (78.1%). With the exception of gender, household size, and farming experience; a farmer's location and primary education level had a slightly statistically significant (p = 0.044) influence on opting to use farmgate as the point of sales. The unpredictable market (100%), costly and low-quality inputs (36.4%), pests and diseases (35.2%), and shortage of cold storage facilities (22.9%) were claimed to hamper vegetable production and the producers. In general, vegetables subsector can grow significantly in Tanzania due to the availability of irrigated nutrient-rich land, favorable climate and productive workforce. Thus, good farming practices, marketing and cold chain facilities have the potential to reduce postharvest losses and help realize national sustainable development goals.

Key words: Fresh vegetables, postharvest practices, marketing, constraints, cold chains

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INTRODUCTION

The agricultural sector contributes significantly to the national economy of Tanzania. The sector contributed 26.9% of the National GDP during the year 2020, whereby 15.4% of GDP contribution was from the crop subsector [1]. In addition, 65.3% of households are engaged in agricultural activities. Most householders are smallholder farmers (SHFs) from rural areas, who currently contribute 75-80% of agricultural production [2]. Crop production is the common agricultural activity in the country, accounting for 64.9% of households [1]. The farming activities of rural SHFs provide the bedrock of the food system in sub-Saharan Africa (SSA) [3,4,5] and, hence play a key role in the achievement of the Sustainable Development Goals (SDGs).

Globally, Tanzania is among the top 20 producers of vegetables. The growth of horticulture subsector is estimated at 11% per annum, and is the fastest growing subsector within the agricultural sector in the country [6]. This subsector had an export value of 779 million USD in 2019 and is expected to increase to 3 billion USD by 2025 [6]. Noteworthily, this subsector employs more than 450,000 people with women accounting for 65-70% of employees. Further, vegetable production accounts for the largest percentage of horticulture exports. The commercialization index of fruits and vegetables is 60.8%, more than any other crop, indicating that large quantity of these crops are produced for marketing rather than home consumption [1]. The country grows diversified varieties of traditional and Asian-type vegetables [6,7]. Moreover, vegetable production is dominated by SHFs with less than 2 ha [8] and account for 70% of vegetable producers in the country [1].

In past years, policy responses to food security challenges in Africa were mainly focused on increasing food production [9]. The investments in tackling postharvest loss of fruits and vegetables were less than 1% of agricultural development fund. Due to poor fund allocation to postharvest management, the majority of SHFs lack basic knowledge and techniques to properly handle fresh produce leading to huge losses. Globally, horticultural subsector suffers high rates of loss ranging from 30-50% [6]. In Tanzania, fresh-food loss at domestic and export markets is estimated at 40% and 10%, respectively. The observed high rate of losses at domestic market is due to low-quality produce, lack of cooling infrastructures, poor traceability systems and unreliable transportation services which results in long wait times [6].

The effort to improve profitability for SHFs is of paramount importance. In most countries, poor food systems limit SHFs to grow, preserve, transport and sell their produce in formal marketplaces. Approaches to support SHFs' profitability include providing innovative market access such as online markets, improving

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roads/market infrastructures, creating SHFs organizations to improve their access to information and innovative farming practices, and distributing low-cost cooling solutions to reduce postharvest losses [10]. It is estimated that the 600 million SHFs globally account for 28-31% of overall crop production and 30-34% of the world's food supply on 24% of gross agricultural area [8]. In this regard, it is imperative to acknowledge that SHFs are key to achieve food security and SDGs.

This study is part of a larger effort aimed to address the vegetable value chain and postharvest loss management through the investigation and eventual deployment of cooling facilities. The emphasis of the research in this paper is on vegetable production, postharvest management, marketing and value chain challenges. Smallholder farmers from major vegetable producing districts in Tanzania were interviewed to better understand the challenges and their perspectives in order to form a basis for government and other stakeholders to increase investment in vegetable value chains to improve the incomes and livelihoods of small-scale vegetable farmers.

MATERIALS AND METHODS

Description of study areas

The present study was conducted in two districts, namely: Lushoto district (4°39′ S, 38°17′ E) in Tanga region and Arumeru district (3°19′ S, 36°44′ E) in Arusha region in Tanzania. Lushoto District is characterized by higher attitudes ranging from 1780 to 1850 meter-above-sea-level (m.a.s.l). The high rain season from March to May and the short rains from October to December. On the other hand, the Arumeru district lies in the eastern-south of the equator on the slopes of mount Meru. The highest peak of mount Meru rises to 4566 m.a.s.l. Arumeru district experiences two rainfall seasons: the short rains normally from November to January and long rains, from March to June. Usually there are small streams providing water for irrigation in both districts.

Sampling procedure and data collection

A cross-sectional design was adopted in this study to obtain information from the respondents in Lushoto and Arumeru districts. From each district, four villages were purposively selected based on their vegetable production potential. The villages in their respective districts were: Bangata, Midawe, Olkung´wadu and Loita nkoamara in Arumeru district, and Lukozi, Kinko, Ndabwa and Mgwashi in Lushoto district. The regions and their corresponding districts and villages were purposively selected because they are the leading commercial vegetable producers in Tanzania.

Primary data were randomly collected from individual vegetable farmers and key informants, and through researchers' observations. A total of 383 respondents

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were interviewed in the selected districts: 193 from Arumeru and 190 from Lushoto districts. Key informants included Agricultural Extension Officers, District Agricultural Irrigation and Cooperatives Officers, Ward and Village Executive Officers. A semi-structured questionnaire, Key Informant Interview (KII) and Focus Group Discussions (FGDs) were employed to gather information on vegetable cultivation, postharvest practices, marketing aspects, and constraints from the respondents. Trained enumerators conducted in-person interviews with respondents using a pretested semi-structured questionnaire in Swahili language. Enumerators' selection was based on their gender, study-area familiality, college degree, and personality. Two FGDs in each village was conducted. Each FGD consisted of 10-15 individuals. Both FGDs and KII were conducted to validate and gain more insight on the information given by individual vegetable farmers. Secondary data were obtained from online resources and local government offices.

Ethical considerations

The ethical approval to conduct the study was obtained from the National Institute for Medical Research (NIMR/HQ/R.8a/Vol.IX/3895) and down to regional, district, and ward administrative level of Arusha and Tanga. Moreover, consent to participate in the study was sought from all the respondents by signing the consent form after they thoroughly understand the study.

Statistical analysis

Statistical package for social sciences (SPSS) version 25 was used to analyze data. Comparative analysis was performed by using Chi-square test at $p < 0.05$ to compare group differences for categorical variables. Binary logistic regression test [11] at $p < 0.05$ was employed to test for the relationship between the farmers' sociodemographic characteristics and point of sales for fresh vegetables.

RESULTS AND DISCUSSION

Socioeconomic demographic characteristics of respondents

The study revealed that, out of 383 farmers, 58.0% were male (Table 1). Another study revealed the same about male dominance among the SHFs in Tanzania [12]. At national level, 76.9% of agricultural households are male-headed [1]. On contrary, 80% of SHFs in Africa are women [13]. The majority 71.6% and 67.9% of respondents was between the ages of 19-49 years age group in Lushoto and Arumeru districts respectively. At national level, 15-64 years age group accounted for 50.8% of agricultural population who participate most in production [1]. Furthermore, 20-50 years age group constitutes the major productive work force who have greater potential to withstand stress and risk as well as more strength to face tedious task associated with vegetables production and marketing. Majority 81.1% and 75.7% of respondents had primary school education in Lushoto and

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Arumeru districts respectively. Also, 88.4% of respondents in Lushoto and 93.7% in Arumeru were able to read, write and count.

Moreover, 86.7% of vegetable producers were married and had more than 5 individuals (42.0%) in their household (Table 1). In Tanzania, the agricultural household has an average of 5.2 persons, with Arusha and Tanga having 5.1 and 5.0 persons respectively [1]. Household size, among others was reported to influence food insecurities in rural households in South Africa [14]. Further, vegetable production (92.7%) was highly claimed to be the main source of income (Table 1). As a matter of fact, 71.8% had the experience of more than 5 years in vegetable farming.

A high percentage of farmers across the surveyed districts own a total of 0.5-1.0 ha (36.6%) of land for crop production, followed by those with 1.1-2.0 ha (30.0%) (Table 2). Additionally, 55.9% of farmers had 0.5-1.0 ha reserved for vegetable farming and 83.3% of farmers own those farms. It is common for most SHFs in SSA to cultivate less than 1 ha of land for a particular crop [1,12,15,16]. The key informants claimed that producers frequently rely on orders from the buyers, and thus they prefer spreading the risks in production by cultivating several varieties of vegetables in small-land plots. However, SHFs has the potential to produce more food per hectare than large farms [17]. On the contrary, other studies argued that small farm sizes limit the incomes of SHFs [18] and that 2.1 ha is a viable farm size specifically in Lushoto [19]. Further, vegetable farming during wet and dry seasons is possible due to the presence of valleys and/or small water streams from upstream rivers and springs [12,20].

Vegetable production and postharvest practices

Crop farming employs the majority of agricultural population in Tanzania [1] and the present study revealed the same. Vegetables (93.0%) were mostly claimed as the main crop cultivated across the surveyed districts (Table 3), and it is the major source of income, employment opportunities and food. The large adoption of vegetable farming as the main source of income could be attributed to the availability of arable land, productive workforce and irrigation opportunities, amongst others.

Generally, SHFs in the study areas grew a wide range of vegetables several times per year during both dry and wet seasons including (*Multiple response frequencies*, *n*=383): broccoli (50.7%), cauliflower (37.3%), white-cabbage (34.7%), crisphead-lettuce (24.5%), Chinese-cabbage (20.6%), zucchini (20.1%), carrot (18.5%), tomato (14.4%), purple-cabbage (10.2%), beetroot (9.4%), African-nightshade (8.4%), leaf-lettuce (7.6%), green/snap bean (6.8%), snow/sugar-snap pea (5%), leeks (5%), spinach (4.2%), green-pepper (4.2%), herbs (parsley, fennel and dill)

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(4.2%) and celery (2.9%). Notably, these vegetables are normally perishable, nutritious and have export value [21]. This study revealed that, 95.3% of farmers do not store vegetables before consumption or selling to the market, while 84.3% of farmers were not ready to establish a vegetable processing/storage unit. Furthermore, there is only one small cooling facility (charcoal cooling room as shown in Fig. 1) in Arumeru and none in Lushoto. In this regard, under market uncertainty, most vegetables remain to rot at the farm or harvested for livestock feeding. Therefore, reliable and cost-effective postharvest cooling facilities should be installed. Several options of cooling technologies suitable in SSA are available [21]. Notably the use of a walk-in, modular, solar-powered cold storage unit 'ColdHubs' in Nigeria to store fresh vegetables from SHFs. To this end, Brunel University in collaboration with NM-AIST under SOL-TECH Project developed similar technology (Fig. 1) to be used by SHFs in Tanzania context.

Figure 1: A charcoal cooling room (left) and a walk-in, mobile, solar-powered cold storage unit (right) for storing fresh vegetables
(Source: Authors)

Marketing aspects of fresh vegetables by the smallholder vegetable farmers

Access to market information

The results showed that, 78.6% of respondents are actively engaged in seeking vegetable market information across the surveyed districts (Table 4). The mostly claimed sources of market information (*Multiple response frequencies*, *n*=383) were from the fellow vegetable producers (97.3%), market personnel with exclusion of officials (93.4%), market officials (9.7%) and extension workers (3.1%). Similar findings were reported by Hoang [22], that fellow vegetable producers (100%) and local markets (78.4%) were the likely source of information compared to extension workers (0.4%). Further, 96.4% of farmers obtain market

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information without paying money from any of the sources in both districts. In addition, the received information was claimed to be reliable (82.7%), adequate (81.9%) and timely (84.1%).

Price determination strategies, main buyers and access to loans

The majority of respondents relied on the prevailing market price (97.1%) and bargaining (48.9%) as the price determination strategies to sell their vegetables after harvest (Table 4). Few vegetable farmers (3.4%) compute the cost of production in order to maximize profit. Wholesalers (78.1%) were mostly claimed as the main buyers, followed by the commission agents (13.1%) (Table 4). Noteworthily, whoever the buyer, farmers rarely sell their vegetables at marketplace (Table 5) in order to reduce the risks associated with poor road infrastructures and unreliable market. Consequently, the buyers become dominant in determining the price of produce from SHFs.

In the present survey, 93.5% of respondents conduct their vegetable production activities without taking loans from other individuals or institutions. Respondents claimed that the terms and conditions attached to the loan are difficult to be implemented. In that case, some of the profit gained after selling vegetables is rotated back to vegetable production. Other barriers faced by the SHFs to access loan services included: no availability or imperfect service [23] and high transactional cost or interest rates [24] from the financial institutions. Further, the national government has the responsibility to ensure access to land, water, as well as appropriate credit to SHFs [25].

Point of sales for fresh vegetables in study areas

More than 65% of farmers (74.7% and 66.3% in Lushoto and Arumeru, respectively) in this study sell their fresh vegetables at the farmgate to wholesale buyers and thus do not participate themselves in local marketplace (Table 5). In binary logistic regression analysis (Table 6), the model including the farmers' sociodemographic characteristics as explanatory variables and selling of vegetable at the farmgate as a dependent variable is a good fit with the data as $p = 0.45 > 0.05$ (Hosmer and Lemeshow Test [11]). Only farmers' location and one of the education level dummy variables had significant partial effects. Though according to Omnibus Tests of Model Coefficients [11] ($\chi^2 = 21.1$, df = 20, $p = 0.39$), adding location, gender, age group, family size, education level and farming experience variables to the model has not significantly increased our ability to predict the decisions made by our subjects. Further, farmers' location has slightly statistically explanatory power ($p = 0.04$) in explaining variation in selling vegetables at farmgate, and that farmers from Lushoto district are 1.66 times as likely to sell their produce at farmgate than those from Arumeru districts. In the same vein, the primary education level has slightly statistically significant relationship ($p = 0.04$) to

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the mode of selling vegetables at the marketplace. With gender, there is no significant association with the option to sell vegetables at the farmgate instead of marketplace (Wald = 1.264, df = 1, p = 0.26). However, female farmers are slightly more likely to sell vegetables at the farmgate than males (that is, Exp(B) = 1.325). Further, no significant relationship existed between the overall farmers' age groups (p = 0.96), household size (p = 0.65), farming experience (p = 0.68) and education level (p = 0.29) variables and selling of vegetables at the farmplace, instead of using the local formal marketplace.

While 70.5% of SHFs opt to sell their vegetables at farmgate, others (29.5%) harvest, transport and sell their fresh produce to a marketplace (Table 5). Access to market information, distance from marketplace and education level had influence on vegetable farmers' participation in marketplace in Ethiopia [26]. Establishing and strengthening of farmers' organization could have a positive impact on transport cost reduction and market access by SHFs in Tanzania [22,27]. Smallholder farmers are entrepreneurs by nature in that they produce more than they can eat and sell their excess organic crops on informal markets/ roadsides for profits [28,29]. This entrepreneurial attitude can effectively be leveraged by national government to increase yield quality and quantity.

Challenges faced by the smallholder vegetable farmers

Among the main challenges faced by vegetable farmers (Fig. 2) in surveyed districts were: the unreliability of the market (100%), costly inputs (seeds, fertilizers and pesticides) (39.5%), low quality of inputs (36.4%), pests and diseases (35.2%) and the lack of cooling storage facilities to increase the shelf life of harvested vegetables (22.9%). The aforementioned challenges and others were claimed to contribute heavily on postharvest losses of vegetables. Several reports in Tanzania [1,12,20] and the rest of SSA [3,4,22,28,30] documented similar challenges facing SHFs.

Without proper and effective support, poor SHFs are unable to turn agriculture into an income-generating enterprise. Smallholder farmers are potential engine for poverty reduction, economic growth and food security in developing countries. Since SHFs constitute a majority of agricultural population in Tanzania, strong emphasis on smallholder farming including vegetable cultivation could assist a nation achieving the SDGs [6].

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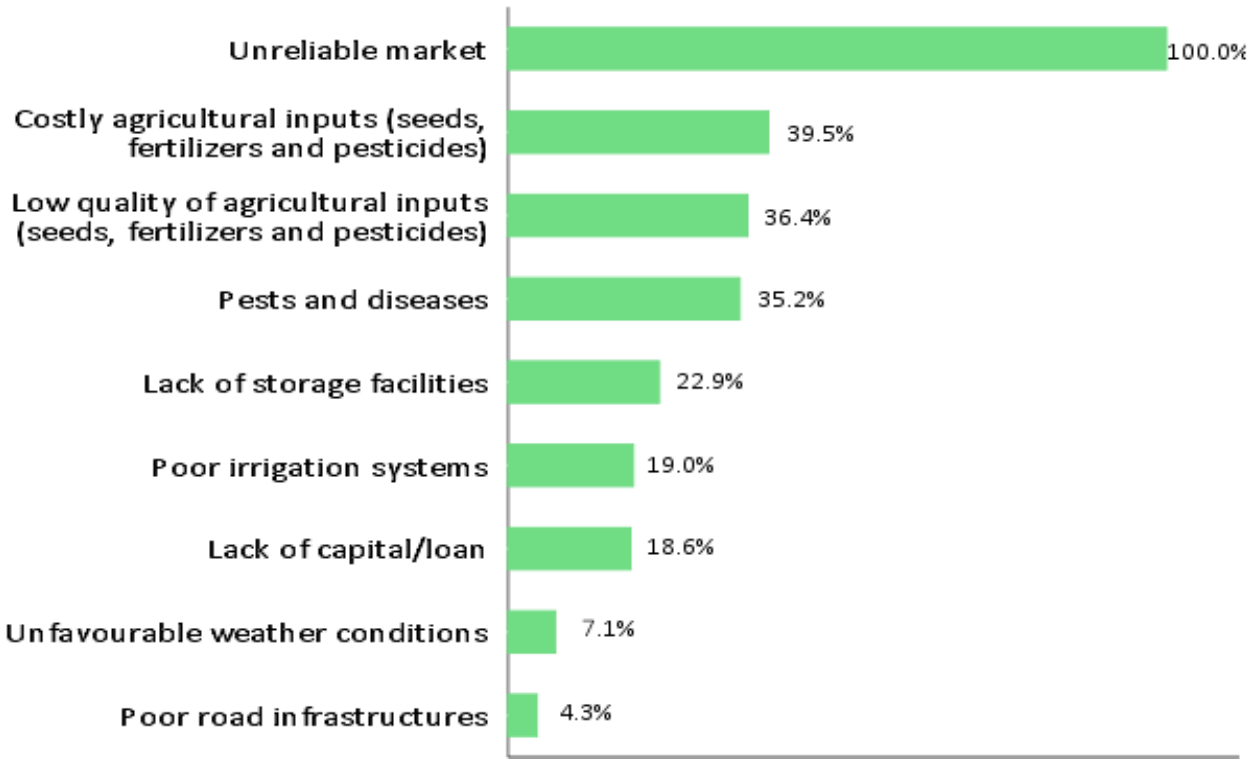

Figure 2: Challenges claimed by respondents that hinder vegetable value chain (*frequencies reflect multiple responses*; *n*=383)

CONCLUSION, AND RECOMMENDATIONS FOR DEVELOPMENT

In the present study, farmers are reported to be productive, literate and experienced enough to benefit substantially in the vegetable subsector. A wide range of nutrient-rich and commercially-valued fresh vegetables including broccoli, cauliflower, peas, green beans, lettuce, cabbage, carrots and herbs can be grown in the study areas. Thus, there is a significant opportunity for this subsector to grow due to the availability of irrigated nutrient-rich land, favorable climate and productive workforce. It is an area where interventions related to production and commercialization of fresh vegetables to access local and export markets will be of great importance. To achieve that, good marketing infrastructures, quality agricultural inputs and cooling facilities should be made available and accessible. Based on current findings, there is huge potential for establishing cold chain facilities in the study areas. With the right support from the government and other stakeholders, SHFs, in a wide range of setting, can substantially increase their vegetable production and commercialization, improving their income and wellbeing. Furthermore, future studies can develop product-specific or generic value chain map, portraying key activities and actors in the chain, identifying critical constraints,

and filled with available information on production, postharvest loss and marketing operations of fresh vegetables in Tanzania.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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Table 1: Socioeconomic demographic characteristics of the respondents (*n*=383)

Characteristics (%)		Districts			
Variable	**Category**	**Lushoto**	**Arumeru**	**Mean %**	**Chi-Square (χ^2)**
Gender	Male	63.2	52.8	58.0	$\chi^2 = 4.17$; df = 1; $p = 0.04$
	Female	36.8	47.2	42.0	
Age	≤ 19	1.1	2.1	1.6	$\chi^2 = 6.49$; df = 5; $p = 0.26$
	20 – 29	22.6	18.1	20.4	
	30 – 39	21.1	21.8	21.4	
	40 – 49	26.8	25.9	26.4	
	50 – 59	15.8	23.8	19.8	
	≥ 60	12.6	8.3	10.4	
Education level	Never attended school	4.2	4.1	4.2	$\chi^2 = 28.72$; df = 6; $p = 0.001$
	Attended but did not complete standard 7	8.4	1.0	4.7	
	Completed standard 7	65.8	67.9	66.8	
	Attended but did not complete secondary school (form 4/ 6)	15.3	7.8	11.5	
	Completed secondary school	5.3	14.0	9.7	
	Attended but did not complete college/university	0.0	0.5	0.3	
	Completed college/university	1.1	4.7	2.9	
Literacy status	Read and write	6.3	4.7	5.5	$\chi^2 = 4.65$; df = 2; $p = 0.09$
	Read, write and counting	88.4	93.8	91.1	
	None	5.3	1.6	3.4	
Marital status	Single	3.7	14.5	9.1	$\chi^2 = 14.84$; df = 3; $p = 0.002$
	Married	92.6	80.8	86.7	
	Divorced	0.0	0.5	0.3	
	Widowed	3.7	4.1	3.9	
Household size	≤ 2	7.4	3.1	5.2	$\chi^2 = 15.91$; df = 4; $p = 0.003$
	3	21.1	10.9	15.9	
	4	15.8	24.4	20.1	
	5	13.2	20.2	16.7	
	> 5	42.6	41.5	42.0	
Source of income	Vegetable production	93.2	92.2	92.7	$\chi^2 = 9.713$; df = 4; $p = 0.046$
	Livestock keeping	1.6	6.2	3.9	
	Employed	1.1	0.5	0.	
	Business	3.2	1.0	2.1	
	Artisan	1.1	0.0	0.5	
Farming experience in years	< 1	1.6	1.0	1.3	$\chi^2 = 1.85$; df = 3; $p = 0.604$
	1 - 3	8.9	13.0	11.0	
	3 - 5	16.8	15.0	15.9	
	> 5	72.6	71.0	71.8	

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Table 2: Land and housing characteristics of the respondents (*n*=383)

Land (ha) and housing characteristics (%)		Districts			
		Lushoto	Arumeru	Mean %	Chi-Square (χ^2)
Total land size for crops production	< 0.5	6.3	2.6	4.4	χ^2 = 20.55; df = 6; *p* = 0.002
	0.5 – 1.0	28.4	44.6	36.6	
	1.1 – 2.0	28.4	31.6	30.0	
	2.1 – 3.0	17.9	13.0	15.4	
	3.1 – 4.0	7.9	4.1	6.0	
	4.1 – 5.0	4.7	1.0	2.9	
	> 5.0	6.3	3.1	4.7	
Land size for vegetable production	< 0.5	28.4	18.7	23.5	χ^2 = 7.24; df = 5; *p* = 0.203
	0.5 – 1.0	53.7	58.0	55.9	
	1.1 – 2.0	12.6	16.6	14.6	
	2.1 – 3.0	4.7	5.2	5.0	
	3.1 – 4.0	0.5	0.5	0.5	
	4.1 – 5.0	0.0	1.0	0.5	
Ownership of land for vegetable production	Own land	84.7	81.9	83.3	χ^2 = 4.49; df = 3; *p* = 0.213
	Hired land	6.8	11.4	9.1	
	Neighbor/relative	4.7	2.1	3.4	
	Partly owned/hired	3.7	4.7	4.2	
	Inherited	4.3	3.6	4.0	
	Rented	3.2	1.0	2.1	
	Relative	2.7	2.1	2.4	

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Table 3: Main crops cultivated by the respondents (*n*=383)

Type of crops (%)	Districts			
	Lushoto	Arumeru	Mean %	Chi-Square (χ^2)
Vegetables	92.1	93.8	93.0	$\chi^2 = 4.60$; df = 4; $p = 0.331$
Cereals	6.8	4.1	5.5	
Legumes	1.1	0.5	0.8	
Irish potatoes	0.5	0.5	0.5	
Fruits	0.0	0.5	0.3	

Table 4: Marketing information characteristics and main buyers of fresh vegetables (*n*=383)

Marketing information and main buyers (%)		Districts			
		Lushoto	Arumeru	Mean %	Chi-Square (χ^2)
Actively seek information	Yes	72.1	85.0	78.6	$\chi^2 = 9.42$; df = 1; $p = 0.002$
	No	27.9	15.0	21.4	
Pay for information	Yes	4.4	3.1	3.6	$\chi^2 = 0.33$; df = 1; $p = 0.56$
	No	95.6	96.9	96.4	
Reliability of the received information	Very reliable	9.6	1.8	5.1	$\chi^2 = 8.92$; df = 2; $p = 0.012$
	Reliable	77.2	86.5	82.7	
	Not reliable	13.2	11.7	12.3	
Adequacy of the received information	Very adequate	7.0	2.5	4.3	$\chi^2 = 4.36$; df = 2; $p = 0.113$
	Adequate	77.2	85.3	81.9	
	Not adequate	15.8	12.3	13.7	
Duration of the received information	Very timely	4.4	2.5	3.2	$\chi^2 = 2.95$; df = 3; $p = 0.398$
	Timely	80.7	86.5	84.1	
	Not timely	14.0	11.0	12.3	
Main buyers (*frequencies reflect multiple responses)*	Wholesalers	76.3	79.8	78.1	$\chi^2 = 7.53$; df = 4; $p = 0.110$
	Commission agents	15.8	10.4	13.1	
	Consumers	5.3	9.3	7.3	
	Retailers	2.7	0.5	1.5	

Table 5: Point of sales for fresh vegetables in study areas (*n*=383)

Point of sales	Districts				
	Lushoto		Arumeru		
	Frequency	Percentage (%)	Frequency	Percentage (%)	Mean %
Local market area	48	25.3	65	33.7	29.5
Farmplace	142	74.7	128	66.3	70.5

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Table 6: Binary logistic analysis results (*n*=383)

Variables in the Equation									
		B	Standard Error (S.E)	Wald	df	Sig. (*p*-value)	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1 [a]	**Location (1)**	-.505	.251	4.040	1	.044	.603	.369	.987
	Gender (1)	.281	.250	1.264	1	.261	1.325	.811	2.164
	Age_group			1.061	5	.957			
	Age_group (1)	-.766	1.199	.408	1	.523	.465	.044	4.876
	Age_group (2)	-.493	1.199	.169	1	.681	.611	.058	6.397
	Age_group (3)	-.515	1.201	.184	1	.668	.597	.057	6.291
	Age_group (4)	-.704	1.213	.336	1	.562	.495	.046	5.334
	Age_group (5)	-.539	1.240	.189	1	.663	.583	.051	6.624
	Household_size			2.467	4	.651			
	Family_size (1)	-1.196	.813	2.166	1	.141	.302	.061	1.487
	Family_size (2)	-1.247	.808	2.380	1	.123	.287	.059	1.401
	Family_size (3)	-1.156	.812	2.030	1	.154	.315	.064	1.544
	Family_size (4)	-1.195	.785	2.314	1	.128	.303	.065	1.412
	Education_level			7.316	6	.293			
	Education_level (1)	-1.657	.822	4.061	1	.044	.191	.038	.956
	Education_level (2)	-.575	.684	.708	1	.400	.562	.147	2.148
	Education_level (3)	-.676	.781	.749	1	.387	.509	.110	2.352
	Education_level (4)	-.275	.790	.121	1	.728	.760	.161	3.576
	Education_level (5)	-22.777	40192.970	.000	1	1.000	.000	.000	.
	Education_level (6)	-1.328	.961	1.911	1	.167	.265	.040	1.741
	Farming_experience			1.502	3	.682			
	Farming_experience (1)	-.100	1.287	.006	1	.938	.905	.073	11.271
	Farming_experience (2)	-.352	1.267	.077	1	.781	.703	.059	8.429
	Farming_experience (3)	-.603	1.264	.227	1	.634	.547	.046	6.520
	Constant	3.911	1.942	4.054	1	.044	49.931		

[a]Variable(s) entered on step 1: Location, Gender, Age_group, Household_size, Education_level, Farming_experience. B: represent the values for the logistic regression equation for predicting the dependent variables from the independent variables; df: Degree of freedom for each of the tests of the coefficients; EXP(B): Exponentiation of the coefficients (odds ratio); C.I.: Confidence Interval

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