

Information Needs and Sources Used by Urban Vegetable Farmers. A Case of Vegetable Farmers in Morogoro Municipality

*Yasin, Yasin¹, Dr. HAULE, S.C., (Ph.d)¹, Prof. Mvena, Z. S. K.¹, Dr. Gosbert Lukenku Shausi²

¹Department of Agricultural Extension and Community Development, Sokoine University of Agriculture, P.O. Box 3002 Morogoro, Tanzania.

²Sokoine University of Agriculture, Department of Agricultural Extension and Community Development, P.O. Box 3002, Morogoro, Tanzania

*Corresponding Author

DOI: <https://dx.doi.org/10.47772/IJRISS.2024.806218>

Received: 09 June 2024; Revised: 20 June 2024; Accepted: 24 June 2024; Published: 22 July 2024

ABSTRACT

While the role of information in improving vegetable farming in urban areas is widely acknowledged in the literature, its potential cannot be realized unless the information needs that enlighten the stakeholders about appropriate information sources are known. This is because vegetable farming is an information-intensive endeavor full of uncertainties. The study investigated information needs, and sources used by vegetable farmers in Morogoro urban Tanzania. A quantitative method research design was used to collect data from 60 respondents. A questionnaire was used in the data collection process. Descriptive analysis was used for analyzing quantitative data. The findings show farmers needed information on pest and disease control, amount and type of fertilizer to apply, produce market, and storage. Fellow farmers (friends and colleagues) ranked as an important source of information followed by public extension officers, researchers, NGOs, input suppliers, Nanenane exhibitions, personal experience, social media, books and fliers, and hired extension officers. Recommendations have been provided that, equip vegetable farmers with the up-to-date knowledge and skills to shape farmers' knowledge through various extension trainings in their localities, by doing this, farmers will increase awareness of multiple challenges about vegetable production. Employing more skilled extension officers with expertise in vegetable crops and use of modern ICT facilities to improve vegetable farmers' access to information.

Keywords: Extension services, Information, Sources, needs, Vegetable production, urban agriculture.

INTRODUCTION

Agriculture in and around cities contributes to urban sustainability in ways that extend beyond more traditional understandings of agriculture. Urban vegetable production is a critical component of urban agriculture, contributing to food security and livelihoods in many urban areas worldwide (Nigussie et al., 2021). In the context of urban vegetable farming in Tanzania, as urban populations continue to grow, the demand for fresh, locally-grown produce is increasing (Wessels & Mgana, 2024). Small-scale vegetable farmers play a significant role in meeting this demand, often operating in limited spaces and facing unique challenges such as land constraints and environmental pollution (Mdegela, 2014). To maximize productivity and sustainability, small-scale farmers require access to relevant information and resources tailored to urban farming contexts.

Information plays a crucial role in addressing the specific challenges small-scale vegetable farmers face in urban areas. For example, access to information on climate-smart agricultural practices can help farmers mitigate the impacts of climate change and extreme weather events (Zhong et al., 2022). The author further argued; that information on integrated pest management strategies can assist farmers in reducing pesticide use

and minimizing environmental risks. Stakeholders can support sustainable and resilient urban vegetable production systems by providing farmers with targeted information and resources.

Small-scale vegetable farmers in urban areas have diverse information needs related to crop selection, cultivation practices, pest management, and post-harvest handling (Yong-mei, 2013). Additionally, farmers may require information on alternative farming techniques suitable for urban environments, such as vertical gardening and hydroponics (Campbell, 2017 ; Specht et al., 2016). Meeting these information needs is critical for enhancing the resilience and productivity of small-scale vegetable farming in urban areas.

However, agricultural information from reliable sources is critical in the operation and management of the farm (Kabir, 2015). Farmers need proper agricultural information in order to make well-informed decisions on, among other things, the type and quantity of inputs to use. In order to improve productivity (Elly & Silayo, 2013 ; Kabir, 2015) suggested that, in order for to make informed decisions and optimizing production, farmers information needs have to be met timely and conveniently from trusted sources because there is a direct relationship between availability of information from reliable sources and agricultural development.

Small-scale vegetable farmers rely on various sources of information to meet their diverse needs. Agricultural information sources include both public (government employed extension officers), private sources of information including family and friends, input suppliers, NGOs, mass Medias and researchers, agricultural publications. However, with the advent of digital technologies, farmers increasingly access information through online platforms, mobile apps, and social media (Sheng Tey et al., 2018). Formal institutions such as research organizations and universities also play a role in providing technical support and research-based information to farmers. Access to a diverse range of information sources is essential for small-scale farmers to stay informed and adapt to changing conditions.

Agricultural extension services in Tanzania are a vital component of the nation's efforts to promote sustainable farming practices and thus improve food security. These services, provided by government, non-governmental organizations (NGOs), and other stakeholders, play a crucial role in disseminating knowledge, technology, and best practices to farmers across various settings, including both rural and urban areas (Maulu et al., 2021; Mohammed and Abdulai., 2022; Wulandari et al., 2021). Extension services ensure that urban vegetable farmers have access to knowledge which will help them make well informed decision so as to improve production (Oluwalana et al., 2019).

A number of studies reveal that, urban vegetable farmers use various information sources, which help them to make decision on production bases. According to Obidike (2011) farmers rely on public extension agents as a source of information. Osei et al. (2017) found that farmers rely more on radio, because radio has become inexpensive nowadays since mobile phones have radio components, which allow farmers to listen while working on their farms. Also studies conducted by (Adesiji & Kehinde, 2013; Hassan et al., 2021; Mahindaratne and Min, 2018; Masele, 2024; Zoundji et al., 2018) found that vegetable growers rely more on fellow farmers, relatives and personal experiences in their farming activities. However, In Morogoro urban and peri-urban areas, vegetable production thrives, with a heightened risk of low quality water and pesticide overuse to meet consumers' demand for visually appealing produce (Mayilla et al., 2017; Mdegela, 2014; Mhango et al., 2014). Additionally, the use of wastewater underscores the necessity for a robust extension system to support urban vegetable producers in delivering high-quality and safe vegetables (FAO, 2015). This research therefore investigates information needs and the information sources used by urban vegetable farmers to meet their information needs. Specifically, the study examines the information needs of vegetable growers; the sources of information for vegetable growers in Morogoro Urban and strategies to enhance vegetable production.

Theoretical Framework

This study is guided by the Information-seeking behavior model. Oluwafemi and Adeniyi, (2013) explained that, information-seeking behavior is the definitely the function of information needs, individuals and resources available. In addition to that Wilson, (1981;1999), depicted that information-seeking behavior is a consequence of one's information needs, the author further indicated that information-seeking behavior is a

subject of perceived information needs of user. Wilson suggested a three-part perspective on information seeking: the seeker's context, the utilized system, and the potential information sources available. Conceptualizing from the model, information seekers context should determine the information needs and the respective type of information to be required. Information providers (sources) should be planned in a way that they can fulfill those needs (Maqbool & Soroya, 2023). Therefore, the model views information seeking as a task of solving problems, making it more suitable for the specific group being studied.

Conceptual Framework

Based on the review of the Information Seeking Behavior model, this study conceptualizes vegetable productivity as a function of small-scale vegetable farmers' access to information sources that meet the small-scale vegetable farmers' information needs, since information needs are context specific, temporally sensitive, and frequently change with time, deployment of information systems that would provide needs-specific and timely information, is important to improve vegetable productivity. The conceptual framework presented in Figure 1 flows with borrowed aspects from the study done by Masele, (2024), along the Sense-making theory combined with attributes from the Information seeking behavior model. The postulated information needs include having better production, having improved post-harvest technique, and having improved access to the market. This will be easily realized (as outcomes) if farmers have access to reliable information sources. Finally, the conceptual model emphasizes that; since information is context specific, and not permanent, a thorough understanding of the specific information needs, sources and means to access them is important for improving small-scale vegetable farming in Morogoro Urban in Tanzania.

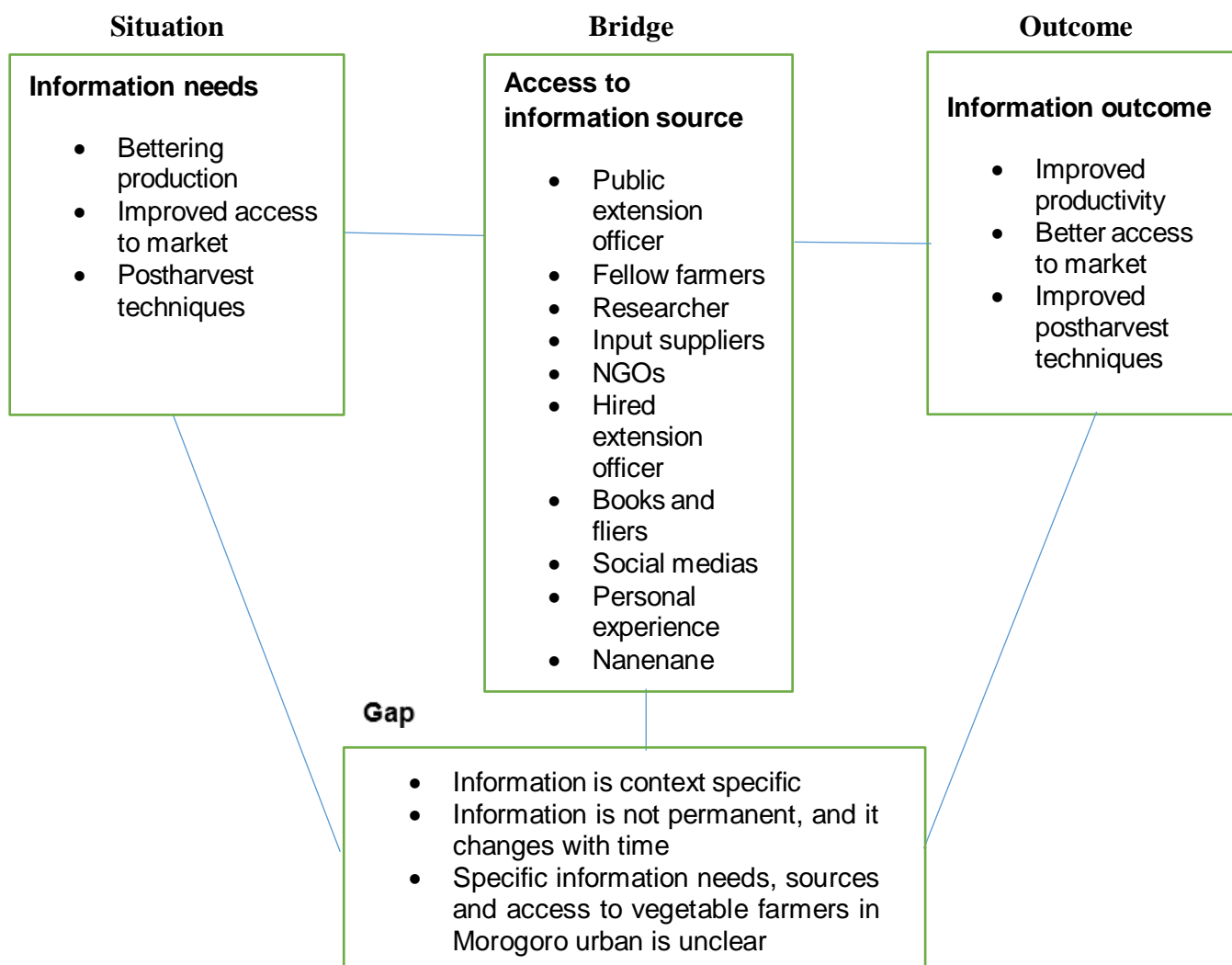


Figure 1: Conceptual framework of the study

METHODOLOGY

This study was conducted in Morogoro Urban district. Morogoro Urban lies at latitude 37 east of the Greenwich meridian and is among six Districts of the Morogoro region of Tanzania. The Morogoro Urban district is divided into 19 wards, namely Mwembesongo, Mjimpya, Kingo, Magadu, Uwanja wa Taifa, Saba Saba, Kiwanja cha Ndege, Mzinga, Mlimani, Mjimkuu, Bigwa, Kilakala, Kichangani, Boma, Sultan Area, Kihonda, Mazimbu, Mafiga and Mbuyuni. Morogoro Urban was selected due to it being Urban and Peri-Urban, practicing small-scale horticultural farming due to limited access to urban land for agricultural activities as compared to significant population increase. Available data indicated that urban agriculture in Morogoro Municipality employed 32% of the population and it accounts for about 2% of the national production of horticulture, with vegetable growing (Masele, 2024). While urban horticulture production is considered a survival strategy in Tanzania (Mhango et al., 2014), Morogoro is advantaged when compared to numerous other regions in Tanzania. Being endowed with fertile land, numerous water sources, irrigable areas and low population density, makes it an attractive area for horticultural investments. In Morogoro urban area, small-scale vegetable farmers are located in the Ngerengere, Kikundi, and Kichangani river basins, making it convenient to distribute and administer questionnaires. The population of this study comprises small-scale vegetable farmers. These were considered information-rich on the topic under study. Based on the nature of a particular problem and on the time and resources available along with the desired degree of accuracy, a quantitative method research design was adopted for data collection. The used methods included questionnaire with both open and close-ended questions. In the study 60 respondents answered the questionnaire. Purposive sampling was used to select the 4 wards, Kichangani, Mazimbu, Kingo and Magadu which are horticultural crop production areas. A convenience sampling technique was used to select a sample of 60 respondents who answered the questionnaires. So, it was easier to be given questionnaires and easy to administer. This technique was also considered cheap and time-saving.

Quantitative data were analyzed using the Statistical Package for Social Sciences (version 20) software whereby descriptive statistics such as frequency, percentages, mean and standard deviation were used to make analysis. The tables for mean were used to show differences across subgroups from which inferences and conclusions were made. To establish the association between urban vegetable farmers' socio-demographic characteristics and sources of agricultural information, a critical examination utilizing statistical analysis is imperative. Chi-square analysis is a pertinent tool for determining the significance of associations between categorical variables.

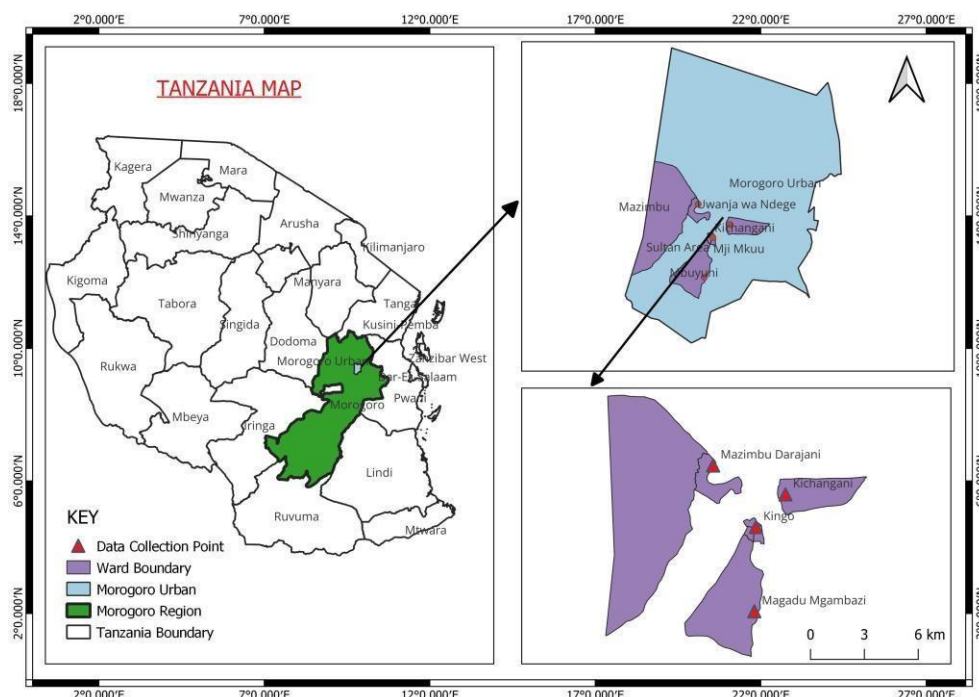


Figure 1: Map of Morogoro Urban district showing the location of the study area

FINDINGS AND DISCUSSION

Demographic information

As shown in Table 1, out of 60 respondents, 6(10.0%) fall under the age group of 18-28; 7 (11.7%) fall under the age group 29-39; 17 (28.3%) fall under the age group 40-50; 20 (33.3%) fall under the age group of 51-61 and 10 (16.7%) fall under the age group of 62 and above. The results show that the number of respondents increasing according to the age group proportional to growing vegetables, the reason remains to be in Tanzania matured people work in agriculture sector than young (Ahmad & Shausi, 2020; Shausi & Ahmad, 2021a). Generally, the engagement of farmers in vegetable production starts to decrease above the age of 61, because vegetable production often involves manual labor, including activities such as planting, weeding, and harvesting, which can become more challenging for older individuals.

In regard to sex of the respondent, 43(71.7%) were males while 17(28.3%) were females. Existence of more male farmers (71.7%) than females may be because males can easily access resources like the land and capital more than females. This is similar to what was reported by Umeh et al. (2018) that men control most of commercial farming.

Considering respondents' education level, the findings indicate that 4 (6.7%) had the non-formal education level, 49(81.7%) had the primary level education while 7(11.6%) had secondary level education. Greater part had primary level of education which shows that the only opportunity for them is to engage in vegetable production as a means to employ themselves and get livelihood. According to Shausi and Ahmad (2021), ability to read and comprehend can enable them to make informed decisions concerning innovations and thus help in increasing farmers' knowledge. According to Zoundji et al. (2018), socio-demographic information such as education is one of the important demographic factors that can contribute to the knowledge of vegetable farmers.

Also, in respondents' farming experience, results show that 20% had an experience between 1 to 5 years, 61.7% had an experience in vegetable farming of 6 to 20 years, and 18.3% had an experience of vegetable farming above 20 years. The fact that 61.7% of the surveyed urban vegetable farmers fall within 6 to 20 years' experience range demonstrates that they have likely encountered various challenges and have practical knowledge related to urban vegetable cultivation which can be harnessed to enhance the effectiveness of extension programs and promote sustainable urban vegetable farming practices (Oluwatoyin, 2014).

Table 1: Socio-demographic characteristics

Social demographic variables		Frequency	Proportion (%)	Mean	S.D
Age group	18-28	6	10	3.35	1.191
	29-39	7	11.7		
	40-50	17	28.3		
	51-61	20	33.3		
	62 and above	10	16.7		
Sex	Male	43	71.7	1.28	0.454
	Female	17	28.3		
Educational level	Non formal education	4	6.7	2.05	0.429
	Primary education	49	86.7		
	Secondary education	7	11.7		

Farming experience	1-5	12	20.0	2.97	1.438
	6-10	15	25.0		
	11-15	7	11.7		
	16-20	15	25.0		
	>20	11	18.3		

Results and discussion based on objectives

The study findings are presented following the objectives of the study which are to examine the information needs by respondents, sources of vegetable farming information, frequency of association between socio-demographic factors and sources of information accessed, and suggestions on ways to be used to improve access to information on vegetable farming.

Information needs of vegetable farmers

The first objective of the study was to assess information needs of vegetable farmers in the study area. The findings as presented in Table 1 show that 91.7% of the respondents needed information on disease and pest control, followed by 66.7% of the respondents who needed information on storage of harvest, 56.7% of the respondents who needed information on amount and type of fertilizer to apply, while 55.0% of the respondents who needed information on market of the produce. The study results are specifically in line with findings by (Kaske, 2020) on information needs and seeking behavior of farmers in Southern Ethiopia where information about diseases, pests and market information were identified as the top most important types of agricultural information. Provision of information based on these needs is imperative if vegetable productivity is to be improved. In addition to that, (Liefeld et al., 2020) argue that farm gate prices are low since farmers have limited information on available markets and therefore are in a weak position to negotiate prices. According to Fatty et al., (2018), pest and disease is one of the major constraint in vegetable production which consequently may result into increase in cost of production and affect income level of the producers.

Table 2: Information needs by vegetable farmers.

Information needs	Frequency	Percentage	Total
Pest and disease control	55	91.7%	60 (100.0%)
Amount and type fertilizer to apply	34	56.7%	60 (100.0%)
Market of harvest	33	55.0%	60 (100.0%)
Storage of produce	40	66.7%	60 (100.0%)

Information sources

This sub section describes the sources of agricultural information which contribute to the vegetable production in Morogoro municipality. Several sources of agricultural extension services which contribute vegetable production such as Non-Government Organization (NGOs), radio, input supplier and hired extension officer described by other scholars (Feder et al., 2011; Haumba & Kaddu, 2021). Fellow farmers (friends and colleagues) ranked as an important source of information followed by public extension officers, researchers, NGOs, input suppliers, Nanenane exhibitions, individual farmers, social networks, books and fliers, and hired extension officers. This study agree studies conducted by (Adesiji and Kehinde, 2013; Gebru et al., 2017 ;Hassan et al., 2021; Mahindarathne and Min, 2018 ;Masele, 2024;Zoundji et al., 2018) found that vegetable growers rely more on fellow farmers, relatives and personal experiences in their farming activities. According to Alhafi et al., (2021) further argued that the more credible the source in the eyes of the farmer the more likely the information will be considered and/or used. The author further explained that, there are two concepts that contribute to source credibility trustworthiness and expertise. For farmers, relevant experience and occupation

are important factors that convince them regarding reliability of the information. Given that interpersonal networks are the primary information channels, it's crucial for farmers in Morogoro Urban to have access to accurate information relevant to vegetable farming. Without ensuring that fellow farmers are equipped with correct information, the exchange within these networks could lead to misinformation, posing risks to vegetable productivity. Increasing the frequency of educational offerings such as training sessions, seminars, and workshops is necessary to update farmers' knowledge and skills regularly. These initiatives not only shape farmers' perspectives, knowledge, and attitudes but also enhance their awareness of available information sources like mass media, public libraries, and exhibitions. Furthermore, they equip farmers with the necessary skills to effectively utilize these resources for optimal results. Furthermore results contradicts with (Obidike,2011; Osei et al.,2017) who argued that extension agents constitute a good source of information and farmers only rely on radio, because radio has become inexpensive nowadays since mobile phones have radio components, which allow farmers to listen while working on their farms. Interestingly the study done by Kaske (2020) found that local leaders and development agents were the top sources of agricultural information.

Table 3: Source of Information

Sources of Information	Yes	No	Total
Public extension officer	34 (56.7%)	26 (43.3%)	60 (100.0%)
Fellow farmers	55(91.7%)	5(8.3%)	60 (100.0%)
Researcher	33(55.0%)	27(45.0%)	60 (100.0%)
Input suppliers	18(30.0%)	42(70.0%)	60 (100.0%)
NGOs	20(33.3%)	40(66.7%)	60 (100.0%)
Hired extension officers	2(3.3%)	58(96.7%)	60 (100.0%)
Books and fliers	3(5.0%)	57(95.5%)	60 (100.0%)
Exhibition(Nanenane)	17(28.3%)	43(71.7%)	60 (100.0%)
Social medias	7(11.7%)	53(88.3%)	60 (100.0%)
Personal experience	15(25.0%)	45(75.5%)	60 (100.0%)

Association between the demographic characteristics and sources of information

Table 5 shows that there is association between demographic characteristics and the accessed sources of agricultural information to urban vegetable farmers at 5% significance level. Research indicates a multidimensional relationship between socio-economic and demographic factors with sources of agricultural information, including public extension officers, input suppliers, researchers, and personal experience(Gebremariam et al., 2021 ; Shausi & Ahmad, 2021b).The finding shows that ward (farmers' locality) has a significant association with information sources like, public extension officers ($P=0.021$), fellow farmers ($P= 0.017$), input suppliers ($P= 0.020$), researchers ($P= 0.000$) and personal experience ($P=0.003$).Studies by Gebremariam et al. (2020); Manteaw et al., (2023) reveal that while formal sources like public extension officers and researchers are recognized for their technical expertise, urban farmers often rely heavily on input suppliers for practical advice and access to agricultural inputs due to their proximity and familiarity.

Moreover, the finding further indicates that marital status of the respondents has a significant association with agricultural information sources like, public extension officers ($P= 0.043$) and fellow farmers ($P= 0.017$).Marital status can influence the social networks and information channels available to individuals, potentially impacting their access to agricultural knowledge. Studies by Masanja et al. (2023) and Osei et al. (2017)found that married farmers were more likely to engage in information-sharing activities within their communities compared to unmarried individuals, suggesting that marital status could influence access to agricultural information from fellow farmers.

Table 4: Association between demographic characteristics and the common sources of information

	Public extension officers	Fellow farmers	Input suppliers	Hired extension officers	Researchers	Personal experience
Ward						
Magadu	10(29.4%)	12(21.8%)	0(0%)	2(100%)	1(3%)	1(6.7%)
Mazimbu	8(23.5%)	17(30.9%)	6(33.3%)	0(0%)	14(42.4%)	1(6.7%)
Kingo	0(0%)	4(7.3%)	2(11.1%)	0(0%)	3(9.1%)	2(13.3%)
Kichangani	16(47.1%)	22(40%)	10(55.6%)	0(0%)	15(45.5%)	11(73.3%)
Age of the Respondents						
18-28	2(5.9%)	5(9.1%)	1(5.6%)	0(0%)	2(6.1%)	1(6.7%)
29-39	4(11.8%)	6(10.9%)	1(5.6%)	1(50%)	2(6.1%)	1(6.7%)
40-50	7(20.6%)	17(30.9%)	5(27.8%)	0(0%)	10(30.3%)	4(26.7%)
51-61	16(47.1%)	17(30.9%)	7(38.9%)	1(50%)	12(36.4%)	7(46.7%)
62 and above	5(14.7%)	10(18.2%)	4(22.2%)	0(0%)	7(21.2%)	2(13.3%)
Respondents sex						
Male	27(79.4%)	38(69.1%)	14(77.8%)	2(100%)	26(78.8%)	12(80%)
Female	7(20.6%)	17(30.9%)	4(22.2%)	0(0%)	7(21.2%)	3(20%)
Respondents marital status						
Single	3(8.8%)	11(20.1%)	4(23.3%)	0(0%)	6(18.2%)	2(13.4%)
Married	31(91.2%)	44(80%)	14(77.8%)	2(100%)	27(81.8%)	13(86.7%)
Respondents education level						
Non-formal	1(2.9%)	3(5.5%)	2(11.1%)	0(0%)	2(6.1%)	3(20%)
Primary	29(85.3%)	46(83.6%)	13(72.2%)	1(50%)	26(78.8%)	11(73.3%)
Secondary	4(11.8%)	6(10.9%)	3(16.7%)	1(50%)	5(15.2%)	1(6.7%)
Respondents experience in vegetable farming						
1-5	9(26.5%)	11(20%)	2(11.1%)	1(50%)	2(6.1%)	4(26.7%)
6-10	7(20.6%)	13(23.6%)	5(27.8%)	1(0%)	9(27.3%)	4(26.7%)
11-15	4(11.8%)	7(12.7%)	4(22.2%)	0(0%)	5(15.2%)	2(13.3%)
16-20	7(20.6%)	15(27.3%)	3(16.7%)	1(50%)	10(30.3%)	3(20%)
20 and above	7(20.6%)	9(16.4%)	4(22.2%)	0(0%)	7(21.2%)	2(13.3%)

Table 5: Chi square test

	Ward	Age	sex	marital status	level of education	experience in vegetable farming
Public extension officers	9.71**	7.61	2.32	9.859**	1.761	3.083
Fellow farmers	10.255**	4.49	2.16	12**	2.093	3.888
Input suppliers	9.824**	2.05	0.47	2.619	1.594	4.477
Hired extension officers	5.69	3.92	0.82	0.517	2.998	2.586
Researchers	22.098**	4.33	1.83	2.037	0.878	9.196
Personal experience	14.247**	1.87	0.68	5.889	5.932	0.987

Suggested ways to enhance vegetable production

This study also sought to get the views of the respondents on ways of enhancing their access to and use of information. The findings presented in Table 6, indicate that the majority (45%) opined that Agricultural extension officers should be capacitated with knowledge and skills regarding various challenges on vegetable production, followed by 33.3% of respondents mentioned that seminars to sensitize farmers should be organized more frequently, while 30% of respondents who mentioned that the number of Agricultural Extension Officers should be increased. These results are in line with Masele, (2024) on suggested ways to enhance horticultural farmers in Morogoro urban, strategies like seminars to sensitize farmers, increasing number of agricultural extension officers were among the top findings.

Table 6: Ways to enhance vegetable production

Suggestion on how to enhance vegetable production	Frequency	Percent
Agricultural extension officers should be capacitated with knowledge and skills regarding various challenges on vegetable production	27	45%
Seminars to sensitize farmers should be organized more frequently	20	33.3%
Number of Agricultural Extension Officers should be increased.	18	30%

CONCLUSION AND RECOMMENDATIONS

This study has examined information needs, sources, and ways to enhance vegetable farmers' use of information in Tanzania. The findings have shown that vegetable farmers rely on fellow farmers (friends/colleagues) as their most important sources of information. Other sources, such as public extension officers, researchers, and NGOs scored low in the respondents' list of used information sources. This implies that the more colleagues/peers/family members have access to proper information on a phenomenon, including that related to vegetable farming the better. While the public extension officers were expected to play a front role as providers of information to vegetable farmers, the study results have however shown several factors hinder farmers' access to public extension officers, including inadequacy in their number which limit frequent visits to the farmers and lack of up-to-date skills and training on relevant horticultural production related problems. Since the main source of information is interpersonal networks, farmers in Morogoro Urban must be accessible to proper information useful enough for vegetable farming. Unless the colleague farmers have the right information, the shared information through interpersonal networks can be a source of misinformation, and risky for vegetable farming productivity and the criticism also emerged on role of agricultural extension in this regard. Education provision through training, seminars, workshops and symposium to sensitize farmers with more up to date knowledge and skills should be organized more frequently to shape the farmers' thinking, knowledge and attitude. The training will also improve farmers' awareness of the available information such as mass media; public libraries and exhibitions including user skills for optimal utilization of these resources.

Further, the study suggest more emphasize on the use of modern ICT facilities to improve vegetable farmer's access to information. This study also recommends to the future researchers to investigate the role of fellow farmers in information delivery and how it can be improved or mainstreamed.

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my supervisors for their valuable contribution and support during the research and publication of this paper. Their guidance and assistance have been instrumental in shaping the outcome of this work.

REFERENCES

1. Adesiji, G. B., & Kehinde, F. B. (2013). Women Farmers' Attitudes Towards Agricultural Extension Services in Southwestern Nigeria. 7(June).

2. Ahmad, A. K., & Shausi, G. L. (2020). Maize farmers ' knowledge and perception of improved postharvest storage technologies in Kilolo. *Journal of Stored Products and Postharvest Research*, 11(December), 28–36. <https://doi.org/10.5897/JSPPR2020.0302>
3. Alhafi, B., Yoder, E., Brennan, M. A., & Kassem, H. S. (2021). Saudi Journal of Biological Sciences Perception of organic farmers towards organic agriculture and role of extension. *Saudi Journal of Biological Sciences*, 28(5), 2980–2986. <https://doi.org/10.1016/j.sjbs.2021.02.037>
4. Campbell, N. (2017). *Farming Cities: the Potential Environmental Benefits of Urban Agriculture*. Duquesne University, 2(1), 5–12. <https://dsc.duq.edu/duquark/vol2/iss1/1>
5. Elly, T., & Silayo, E. E. (2013). Agricultural information needs and sources of the rural farmers in Tanzania: A case of Iringa rural district. *Library Review*, 62(8), 547–566. <https://doi.org/10.1108/LR-01-2013-0009>
6. FAO. (2015). *The Sustainable Development Goals At*. FAO Regional Office for Asia and Pacific, 70.
7. Fatty, L. K. M., Idu, P., & Ode, O. (2018). The Impact of Agricultural Extension Service in Improving Vegetable Production in the West Coast Region of the Gambia. January. <https://doi.org/10.5296/jas.v6i1.12559>
8. Feder, G., Birner, R., & Anderson, J. R. (2011). The private sector ' s role in agricultural extension systems : potential and limitations. 1(1), 31–54. <https://doi.org/10.1108/20440831111131505>
9. Gebremariam, Y. A., Dessein, J., Wondimagegnhu, B. A., Breusers, M., Lenaerts, L., Adgo, E., Ayalew, Z., Minale, A. S., & Nyssen, J. (2021). Determinants of Farmers ' Level of Interaction with Agricultural Extension Agencies in Northwest Ethiopia. 1–24.
10. Gebru, B., Yared, M., & Gebremichael, N. (2017). Sources of information and information seeking behavior of smallholder farmers of Tanqa Abergelle Wereda, central zone of Tigray, Ethiopia. *Journal of Agricultural Extension and Rural Development*, 9(4), 47–52. <https://doi.org/10.5897/jaerd2016.0850>
11. Hassan, G., Ashraf, I., Hassan, N., Ali, M., Khalid, I., Ashraf, E., Raza, H., Husnain, R. T., Zia, S., & Asghar, S. (2021). *International Journal of Agricultural Extension*. 09(01). <https://doi.org/10.33687/ijae.009.01.3494>
12. Haumba, E. N., & Kaddu, S. (2021). Information seeking behaviour patterns of family farmers and house-hold food security in Kisoga B village , Ntenjeru sub county in Mukono district , Uganda. 16(1), 21–37.
13. Kabir, K. H. (2015). Attitude and Level of Knowledge of Farmers on ICT based Farming General Background changing world has been recognized as an essential mechanism the door step of the farmers . productive and profitable than they could be . The reasons at the right time and. II(10), 13177–13196.
14. Kaske, D. (2020). *DigitalCommons @ University of Nebraska - Lincoln INFORMATION NEEDS AND SEEKING BEHAVIOR OF FARMERS IN*. October.
15. Liefeld, J., Murdock, L., & Hall, P. P. (2020). *BACHELOR OF BUSINESS ADMINISTRATION-HONOURS PROGRAM DIPLOMA IN BUSINESS ADMINSTATION FALL 2007 BADM 2020 Calendar Description* : 1–6.
16. Mahindaratne, M. G. P. P., & Min, Q. (2018). Information Needs and Seeking Patterns of Farmers within the Changing Information Environment : A Case of Sri Lankan Vegetable Farmers. 8(4), 37–49.
17. Maqbool, R., & Soroya, S. H. (2023). Determinants of agriculture information utilization among farmers: Contextualization of Wilson's information behavior model. *Information Development*, 1–15. <https://doi.org/10.1177/02666669231215809>
18. Masanja, I., Shausi, G. L., & Kalungwizi, V. J. (2023). Factors Influencing Rural Farmers' Access to Agricultural Extension Services Provided by Private Organizations in Kibondo District, Tanzania. *European Journal of Agriculture and Food Sciences*, 5(5), 115–122. <https://doi.org/10.24018/ejfood.2023.5.5.722>
19. Masele, J. J. (2024). Information needs and sources used by small-scale horticulture farmers in

- Morogoro urban, Tanzania. University of Dar Es Salaam Library Journal, 18(2), 115–135. <https://doi.org/10.4314/udslj.v18i2.9>
20. Maulu, S., Hasimuna, O. J., Mutale, B., Mphande, J., Siankwilimba, E., Maulu, S., Hasimuna, O. J., Mutale, B., Maulu, S., Hasimuna, O. J., Mutale, B., & Mphande, J. (2021). Cogent Food & Agriculture Enhancing the role of rural agricultural extension programs in poverty alleviation : A review FOOD SCIENCE & TECHNOLOGY | REVIEW ARTICLE Enhancing the role of rural agricultural extension programs in poverty alleviation : A revie. Cogent Food & Agriculture, 7(1). <https://doi.org/10.1080/23311932.2021.1886663>
 21. Mayilla, W., Keraita, B., Ngowi, H., Konradsen, F., & Magayane, F. (2017). Perceptions of using low-quality irrigation water in vegetable production in Morogoro, Tanzania. Environment, Development and Sustainability, 19(1), 165–183. <https://doi.org/10.1007/s10668-015-9730-2>
 22. Mdegela, S. (2014). Assessment of consumers' knowledge on the safety of vegetables produced in morogoro urban using low quality water.
 23. Mhango, S., Sewando, P., & Magesa, R. (2014). Urban vegetable production as a survival strategy in Tanzania : A case of Morogoro municipal Urban vegetable production as a survival strategy in Tanzania : A case of Morogoro municipal. International Journal of Innovation and Scientific Research, 2(September), 177–189.
 24. Mohammed, S., & Abdulai, A. (2022). Impacts of extension dissemination and technology adoption on farmers' efficiency and welfare in Ghana : Evidence from legume inoculant technology. Frontiers in Sustainable Food System.
 25. Nigussie, S., Liu, L., & Yeshitela, K. (2021). Urban Forestry & Urban Greening Towards improving food security in urban and peri-urban areas in Ethiopia through map analysis for planning. Urban Forestry & Urban Greening, 58 (May 2020), 126967. <https://doi.org/10.1016/j.ufug.2020.126967>
 26. Obidike, N. A. (2011). Rural Farmers' Problems Accessing Agricultural Information : A Case Study of Nsukka Local Government Area of Enugu State , Rural Farmers' Problems Accessing Agricultural Information : A Case Study of Nsukka Local Government Area of Enugu State , Nigeria.
 27. Oluwafemi, E. S., & Adeniyi, A. N. (2013). Information Seeking Behaviour of Graduate Students of University of Agriculture , Abeokuta , Nigeria : A Qualitative Approach. 3(12), 90–96.
 28. Oluwalana, T., Akinbosoye, T. B. S., & Okeleke, S. O. (2019). Effects of Agricultural Extension Services on Vegetable Farmers Production in Ifon Orolu Local Government of Osun State. Direct Research Journal of Agriculture and Food Science, 7(December), 436–444.
 29. Oluwatoyin, O. J. (2014). Vegetable farmers attitude towards organic agriculture practices in selected states of South West Nigeria. Journal of Agricultural Extension and Rural Development, 6(7), 223–230. <https://doi.org/10.5897/jaerd2013.0572>
 30. Osei, S. K., Folitse, B. Y., Dzandu, L. P., & Obeng-Koranteng, G. (2017). Sources of information for urban vegetable farmers in Accra, Ghana. Information Development, 33(1), 72–79. <https://doi.org/10.1177/0266666916638712>
 31. Shausi, G. L., & Ahmad, A. K. (2021a). Attitude of Crop Farmers towards Public Agricultural Extension Services : Implication for Extension Programming in Tanzania. The Sub Saharan Journal of Social Sciences and Humanities, 1(1), 40–47.
 32. Shausi, G. L., & Ahmad, A. K. (2021b). Attitude of Crop Farmers towards Public Agricultural Extension Services : Implication for Extension Programming in Tanzania. 1(1), 40–47.
 33. Sheng Tey, Y., Brindal, M., Li, E., Gill, G., Bruwer, J., Abdullah, A. M., Radam, A., Ismail, M. M., & Darham, S. (2018). Factors Affecting the Selection of Information Sources of Sustainable Agricultural Practices by Malaysian Vegetable Farmers. Journal of Agricultural and Food Information, 19(2), 162–175. <https://doi.org/10.1080/10496505.2017.1328310>
 34. Specht, K., Weith, T., Swoboda, K., & Siebert, R. (2016). Socially acceptable urban agriculture businesses. Agronomy for Sustainable Development, 36(1), 1–14. <https://doi.org/10.1007/s13593-016-0355-0>

35. T.D. Wilson. (1999). Models in information behavior. *Journal of Documentation*, 55(3), 266–268.
36. Umeh, O. J., Igwe, K. C., & Anyim, A. (2018). Farmers Knowledge of the Role of Extension Services in Akwa-Ibom State Nigeria. *Journal of Agricultural Extension*, 22(1), 157–174.
37. Wessels, M. T., & Mgana, S. M. (2024). Persist or Perish . The Dynamics of Irrigated Agriculture. *Urban Forum*, 35(2), 277–295. <https://doi.org/10.1007/s12132-024-09511-8>
38. Wilson, T. . (1981). ON USER STUDIES AND INFORMATION NEEDS. *Journal of Documentation*, 37(1), 243–244.
39. Wulandari, R., Witjaksono, R., & Wati, R. I. (2021). The Role of Agricultural Extension Workers in Urban Agriculture Development During the Covid-19 Pandemic in Yogyakarta City , Indonesia. *199(Icsasard)*, 20–30.
40. Yong-mei, Y. Z. W. (2013). Farmers ’ Safe Vegetable Production and Information Behavior : An Empirical Analysis for Supervision Improvement. *International Conference on Management Science & Engineering*, 2216–2222.
41. Zhong, B., Wu, S., Sun, G., & Wu, N. (2022). Farmers’ Strategies to Climate Change and Urbanization: Potential of Ecosystem-Based Adaptation in Rural Chengdu, Southwest China. *International Journal of Environmental Research and Public Health*, 19(2). <https://doi.org/10.3390/ijerph19020952>
42. Zoundji, G. C., Okry, F., Vodouhê, S. D., Bentley, J. W., Zoundji, G. C., Okry, F., Vodouhê, S. D., & Bentley, J. W. (2018). Towards sustainable vegetable growing with farmer learning videos in Benin. 5903. <https://doi.org/10.1080/14735903.2018.1428393>