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Small-scale Farmers' Information Needs and Sources for Improved Oil Palm Production in Kigoma-Ujiji Municipal Council, Tanzania

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Information is an important resource for empowerment of the rural communities. Oil palm small-scale farmers in many countries including Tanzania, need agricultural information for improving agricultural production. Through different sources of agricultural information, oil palm small-scale farmers acquire useful knowledge to alleviate agricultural production challenges. Though many countries including Tanzania have agricultural information infrastructures, still oil palm small-scale farmers do not obtain enough agricultural information. This study was conducted in year 2024, and aimed to determine small-scale farmers' information needs and sources for improved oil palm

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production in Kigoma-Ujiji Municipal Council, Tanzania. Through the use of a structured questionnaire, 120 randomly selected oil palm small-scale farmers from the following three wards were interviewed: Kagera, Businde, and Kibirizi. Checklists of questions were used in conducting key informant interviews. Data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 20 software. Chi-square analysis helped to find the level of association between the information needs and areas of residence at 5 percent significant level. The study found that, majority (95.0%) of the oil palm small-scale farmers needed information on markets and prices, 67.5 percent sourced information from friends and fellow farmers, and 35.0 percent shared information through facial interaction. Chi-square analysis found positive significance with information on weather and climate (X^2=11.862: p=0.003), new technologies (X^2=11.854: p=0.000), and pests and diseases control (X^2=11.381: p=0.003). The study concluded that, a large proportion (above 70%) of the oil palm small-scale farmers needed agricultural information. Information needs, their sources, and means of sharing information were recommended so as to increase oil palm production.

Keywords: Information needs; information sources; oil palm; small-scale farmers; Kigoma-Ujiji.

1. INTRODUCTION

Information has continued to be an important resource for empowerment of the rural communities. The need for information by small-scale farmers for improved agricultural production has remained high. Small-scale farmers need agricultural related information in order to make decisions on crop production, alleviating losses and boosting productivity. Several researchers have pointed out the importance of information in agricultural production. For example, (Kalusopa, 2005) postulated that, agricultural development activities are based on the utilization of information. Similarly, (Mishra and Bhatta, 2021) revealed that, information is very important, as modern agriculture is becoming more knowledge intensive. Furthermore, (Harris *et al*., 2001) pointed out that, information is one of the most valuable resources in rural development which can assist small-scale farmers to make informed decisions. These decisions include, selection of input, production timing, land preparation, harvesting, packaging and storing, transportation and selling of crops among others (Babu et al., 2012). Through these decisions, small-scale farmers are able to solve their problems (Kalusopa, 2005).

According to (Fiankor and Adams, 2004), information needs are defined as all relevant information a person or group of person need to accomplish their work, activities, tasks, *etc*. Some studies have identified the information needed by farmers including timing of land preparations, planting, weeding, harvesting, application of herbicides, availability of agricultural credits/loans/subsidy, weather forecasts, marketing place and price of farm produce, availability of improved seeds and fertilizers, effective storage methods, improved agricultural technologies, pests and diseases control (Ajayi et al., 2003). Similarly, (Benard *et al*., 2014) identified the information needs of rice farmers including, weather condition, agricultural credit/loan, new seeds, storage methods, planting methods, pests and diseases control, pesticide availability and its application. Moreover, (Odini, 2014) indicated the information on marketing of produce, pests' control and fertilizer application. However, according to (Adio *et al*., 2016) information needs of rural farmers may be grouped into five classes, namely agricultural inputs, extension education, agricultural technology, agricultural credit, and marketing.

Understanding the importance of information and information needs, it is also instrumental to information sources for farmers' access to relevant information in order to improve crop production. (Adio *et al*.,2016) defined information sources as tools that can possibly meet the information needs of different categories of users and are the information carriers. Similarly, (Koyenikan, 2011) categorized the information sources as formal and informal, where-by, formal information sources include radio stations, local and international print media (such as newspapers, newsletters, and journals) and seminars/workshop, while informal sources involve farmers, family friends and personal assessments and judgment.

The oil palm crop (*Elaeis guineensis*) is one of the highly produced tropical tree crops around the world. The crop is grown mainly for its

industrial production of vegetable oil (URT, 2018). Malaysia and Indonesia are the leading oil palm cultivating countries in the world (Verheye, 2010). In 2018, Indonesia produced 43,000 MT of palm oil, while Malaysia produced 20,700 MT of palm oil (Verheye, 2010). Other countries were Thailand and Colombia with a production of 3,000 MT and 1,680 MT respectively.

Oil palm is cultivated in about 40 percent of African countries located in the tropical belt of the continent from Liberia to Tanzania and extending southwest to Angola (Descals et al., 2021). According to (FAOSTAT, 2021) in 2018, Nigeria, Côte d'Ivoire, Ghana, Cameroon, and Democratic Republic of Congo were the top five palm oil producers in Africa. As the best producer of the crop, in the same year, Nigeria produced about 1,015 MT of palm oil. Other African countries producing oil palm crop include Togo, Senegal, Venezuela, Sierra Leone, Liberia, Guinea, Angola, Benin, Tanzania, DRC Congo, and Cotel D'voire (Verheye, 2010).

In Tanzania, oil palm crop is mostly cultivated in Kigoma region, followed by Mbeya, Tanga and Pwani. The production of palm oil in year 2017 indicated that, Kigoma produced 61.4 percent, Mbeya 35.7 percent and Pwani 0.9 percent (Verheye, 2010). Nevertheless, the production of palm oil does not meet the domestic demand which is estimated at 3,70,000 MT per annum (Dalberg, 2017). Failure to meet domestic demand was attributed to poor farmers' access to agricultural related information and small land size (2 to 5 acres) owned by small-scale farmers (Verheye, 2010). According to (FAO, 2013) a small-scale farmer has defined by some countries as a one with less than 1 hectare (2.5 acres) of land that is used in production.

Kigoma region has a good environment for cultivation of oil palm crop, specifically in Kigoma-Ujiji Municipal Council, but oil palm production by small-scale farmers has remained inadequate (Verheye, 2010). Moreover, agricultural information needs, sources, and means of sharing information are still the challenges (Verheye, 2010). Other challenges include: small-scale farmers relying on local oil palm variety (Dura), poor agricultural management practices, limited access to capital, market, improper use of fertilizer and pesticides (Verheye, 2010). (Mwatawala *et al*., 2022) emphasized that, improved access to better seeds and other agricultural inputs, as well as access to market and financial service provide a better harvest security for smallholder farmers in Africa, boosting their incomes and increasing food security.

Furthermore, as information is important resource for improving agricultural production, still oil palm small-scale farmers in Kigoma-Ujiji Municipal Council do not obtain enough agricultural information (Verheye, 2010). The information sources, facilities/ infrastructures/ powers like agro-dealers, cell phone towers, and electricity are limited to town, while majority of the small-scale farmers are living in rural community areas. According to URT (2018), (Verheye, 2010) agricultural activities in Kigoma are mostly carried out in Agro-Ecological Zones (AEZ) including the Lake-Shore and Intermediate zones. (Hart *et al*., 2012) and (Matasane and Zaaiman, 2016) defined rural community areas, as areas located outside the towns, surrounded by many factors, which in one way or another, influence or hinder farmers' accessibility to information. These factors include availability of electricity, lack of extension officers, penetration of mobile phones, policy and government support, to mention just a few. The shortage of agricultural information by oil palm small-scale farmers was the reason for conducting this study.

Specifically, this study contributes to the availability of enough agricultural information to oil palm small-scale farmers for increasing oil palm production. Once the findings of this study will be used, will help the policy makers to improve the information infrastructures like electricity, roads, and telecommunications. Improved information infrastructures will significantly contribute to the increased income among oil palm small-scale farmers and Tanzanian country as a whole.

Since the information needs and sources are very important as they help small-scale farmers to obtain the agricultural information, still some studies conducted to investigate them are missing. For this reason, this study intended to determine the small-scale farmers' information needs and sources for improved oil palm production in Kigoma-Ujiji Municipal Council, Tanzania.

2. THEORETICAL AND CONCEPTUAL FRAMEWORKS

2.1 Theoretical Framework

This study is guided by Wilson's revised theory of information seeking behavior (Wilson, 1999).

This theory was modified in 1996 from Wilson's 1981 model of information seeking behavior. According to (Wilson, 1999) information-seeking behaviour is a consequence of one's information needs. Moreover, information seeking behavior refers to the orientation of individuals in finding the different information sources and using the availed information in various circumstances (Kumar, et al., 2022).

Wilson's revised theory, explains the cycle of information activities due to the rise of information need to the stage when information is used. It lists three context related to information seeking including, the context of information seeker, information channel (electronic or manual) and the information resource itself. However, in this theory, the basic framework of Wilson's 1981 model persists, in that a person in context remains the focus of information needs (Wilson, 1999). The user-centered work of some authors like (Dervin, 1992), (Kuhluthau, 1999), and (Belkin, 1978) in the 1970s and 1980s, presented general approaches to understanding information behaviour and laid the foundation for an exploration of the role of "context" in understanding human information behaviour. Moreover, in case of information needs, Wilson suggested that, an "information need" is secondary to a primary need such as food, shelter, and clothing [20]. In order to understand an information need, it is often necessary to understand the context of human needs that created a need for information. (Harter, 1992) later suggested that, information needs are akin to a person's mental state, arguing that they are in a constant state of flux as a person continually acquires new information.

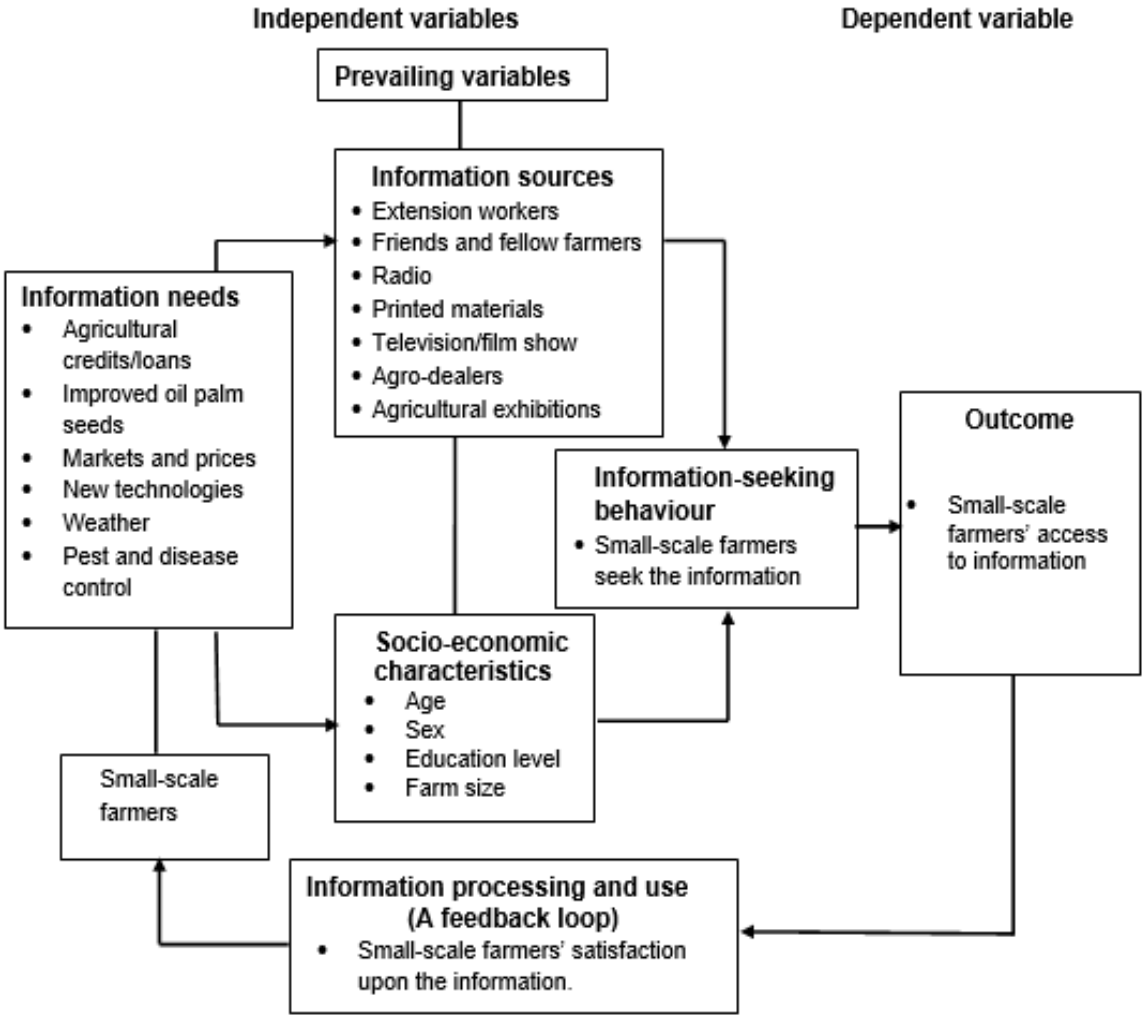

Fig. 1. The study conceptual framework

The revised theory of Wilson has two phases, which are "Information acquiring phase" and "Information processing and use phase". These phases, provide a robust framework for determining oil palm small-scale farmers' information needs and sources for improved oil palm production in Kigoma-Ujiji Municipal Council, Tanzania. The information acquiring phase means that, a person in context is able to obtain the information needed from different information sources in either passive attention, passive search, active search and ongoing search, while the information processing and use phase (feedback loop), the information obtained by a person is processed and used to influence the environment for creating new information needs (Wilson, 1999). In context to this study, oil palm small-scale farmers interact with various information sources so as to obtain agricultural information. Wilson had various suggestions that, information seeking behaviour is influenced by information needs, intervening/prevailing variables and activating mechanisms. The prevailing variables include the demographics, individual, sources of information and environment. Some barriers to information use have been represented by the activating mechanisms like psychological stress, which may hinder the information seeking process.

2.2 Conceptual Framework

This study has utilized the concepts of Wilson's revised theory of information seeking behaviour to modify the study conceptual framework, represented in Fig. 1. A person in context of information need, is oil palm small-scale farmer. Moreover, the conceptual framework of study represents the information needs, two selected prevailing variables (information sources and socio-economic characteristics) which influence the information seeking behaviour and later, influence the small-scale farmers' access to information and oil palm production (outcome). The context of information need, prevailing variables and information seeking behavior were considered as independent variables, while the farmers' access to information and increased oil palm production (outcome), considered as dependent variables.

3. METHODOLOGY

3.1 The Study Area

This study was conducted in Kigoma-Ujiji Municipal Council, one of the eight councils in the Kigoma region of Tanzania. The council is located at the Northeastern shore of Lake Tanganyika, the second deepest lake in the world, at the latitude of 4.52^0 South and longitude of 29.35^0 East. It has a total area of 128 km^2 of which 127.85 km^2 is land and 0.15 km^2 is covered with water (Verheye, 2010).

According to the Tanzania National Bureau of Statistics Reports, (NBS, 2022), Kigoma-Ujiji Municipal Council has a population of 2,32,388 people (1,09,188 male, 1,23,200 women). It has two divisions, which are Kigoma North and Kigoma South with 19 Wards and 68 Streets/Hamlets. In the western part, the Municipal borders the Democratic Republic of Congo (DRC), to the South, East and North it borders Kigoma District council (Verheye, 2010). The study was conducted in three wards of Kagera, Businde and Kibirizi because, these are best wards producing oil palm crop in the municipality (Verheye, 2010).

The major crops which were grown in the study area, included the oil palm itself as a major cash crop, maize, common beans, cassava, plantains, sweet potatoes, yams and paddy. Similarly, some horticultural crops were grown including, tomatoes, cabbages, African egg plants, pepper, and amaranths.

Three types of oil palm crop exist in the area. These include, Dura, Tenera and Pisifera. Dura is a local variety characterized by producing a little amount of palm oil, while Tenera is an improved variety as a result of breeding Dura (female flowers) and Pisifera (male flower/pollen). Dura produces about 1 to 1.6 tons of palm oil per hectare per year, while Tenera produces about 4 to 4.5 tons (Verheye, 2010).

Some important stakeholders of oil palm crop in the study area in 2024, were Tanzania Agricultural Research Institute (TARI-Kihinga) for production of improved oil palm seeds (breeding), Farming for Energy for better Livelihoods in Southern Africa (FELISA), a company for production of improved oil palm seedlings, Luiche Basin Agricultural Marketing Co-operative (LUBAMACO) for production of improved oil palm as well as Yangumacho group for breeding and raising improved oil palm seeds and seedlings.

3.2 Research Design

The study applied both descriptive and explanatory research designs. The reasons for applying the two research designs were because, descriptive research design focuses on providing descriptions and characteristics of a

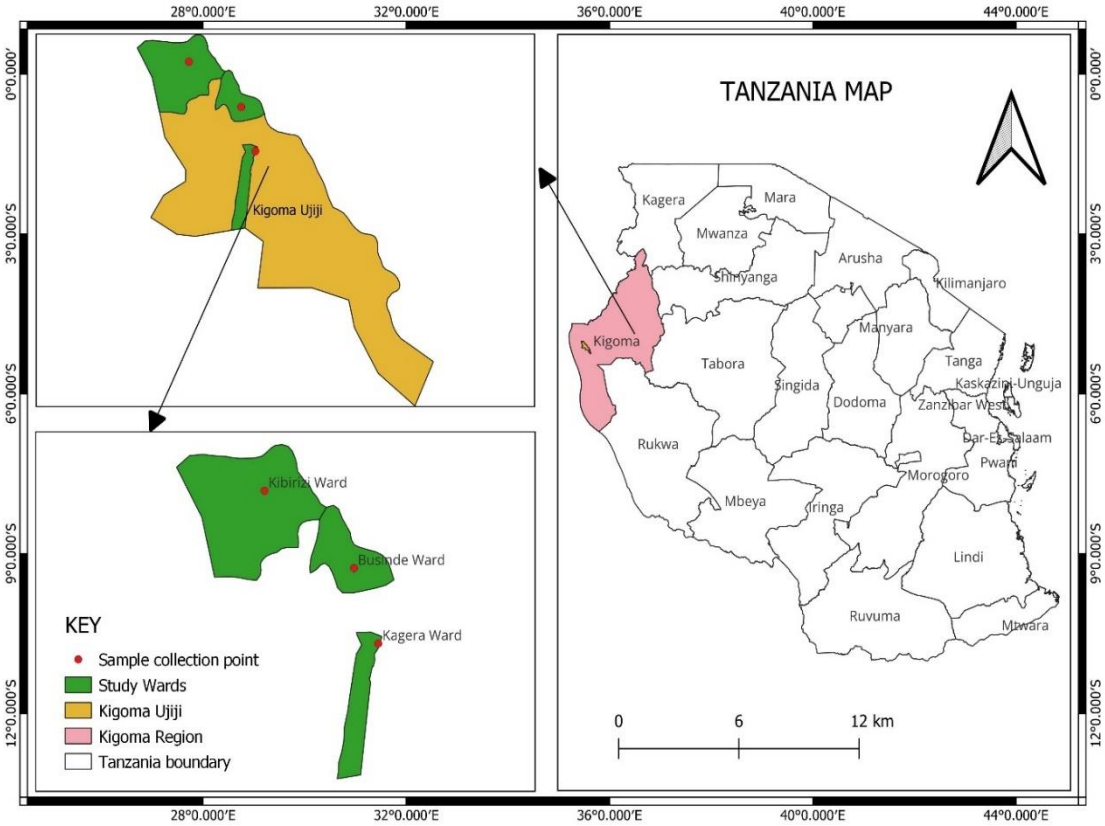

Fig. 2. A map showing the study area

given phenomenon (Babbieet al., 2010). Explanatory research design helps to a better understanding of how and why something occurs when only small amounts of information is available pertaining to the topic (Akhta, 2016).

3.3 Population Size, Sampling Procedures, and Sample Size

The target population for this study comprised of all oil palm small-scale farmers in Kigoma-Ujiji Municipal Council. According to agricultural information provided by ward extension officers through key informant interviews in year 2024, the study wards had a population size of 897 as indicated in Table 1. The sampling frame in the study area included all oil palm small-scale farmers in the three wards, while the sampling unit was an individual oil palm small-scale farmer. A purposive sampling technique was used to select the Kigoma-Ujiji Municipal Council due to large production of oil palm crop. Thereafter, a random sampling technique was used to select the three wards out of nineteen to minimize the over representative of homogeneity population. Three agricultural extension officers (key informants) were also randomly selected.

The formula proposed by (Kothari, 2004) was used to find the sample size which was 120 respondents for the study. This formula was used because, the study wards had finite population. Thereafter, the sample size was computed as follows:

$$n = \frac{Z^2.p.q.N}{e^2(N-1) + Z^2.p.q}$$

Where n=sample size, Z = confidence level 95% score which is 1.96, p=sample proportion (0.1), q = 1-p where q= 0.9, e= tolerable sampling error (0.05), and N=size of the sampling population. For this study, the sampling population (897), once computed using Kothari formula, gives the sample size (n) = 119.9413, approximated to 120.

$$\mathrm{n} = \frac{1.96 \text{ X } 1.96 \text{ X } 0.1 \text{ X } 0.9 \text{ X } 897}{0.05 \text{ X } 0.05(897 - 1) + 1.96 \text{ X } 1.96 \text{ X } 0.1 \text{ X } 0.9}$$

$$\mathrm{n} = \frac{310.1323}{2.5857}$$

n= 120

Table 1. Sampling distribution per ward

	Oil palm small-scale farmers				
Ward	**Male**	**Female**	**Total**	**Sampling Proportionate to Size Method**	**Sample Size**
Kagera	336	113	449	449/897 X 120	60
Businde	205	57	262	262/897 X 120	35
Kibirizi	154	32	186	186/897 X 120	25
Grand Total	**695**	**202**	**897**		**120**

Thereafter, a sampling proportionate to size method (Atsiaya *et al*., 2022) was used to get the sample size distribution (both male and female) per ward.

3.4 Data Collection

Primary data were collected directly from oil palm small-scale farmers and key informants. A questionnaire with both open and close-ended questions was used for interviewing the oil palm small-scale farmers, while a check-list of questions were used for key informant interviews.

3.5 Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 20 software, which helped to get quantitative information frequencies and percentages of respondents. Moreover, a Chi-square analysis helped to find the level of association between the information needs and areas of residence. A content analysis method also helped to analyze the data from key informants.

4. RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics of Farmers

Findings in Table 2 show the socio-economic characteristics of respondents by their areas of residence. In regard to gender, the findings show that, majority (85.8%) of the respondents were males which is an indication that, men are dominant to oil palm crop. These findings agree with (Villamor *et al*., 2015) that, oil palm is a cash crop that is typically dominated by men in the Indonesian context. Moreover, (Onasis *et al*., 2009) discovered that, oil palm production in Nigeria is male dominated in very small plots of farm holdings less than one hectare. On the contrary, a small proportion (14.2%) of the respondents cultivating oil palm crop were women. The reason for this could be that, majority of the women were engaging in other agricultural activities of oil palm value chain. At the local level, women are in charge of boiling, milling and selling oil palm products including palm oil and soap (Verheye, 2010).

The findings also indicate that, a proportion (45%) of the respondents were between 41-50 years old. People aged 20 years and above have family responsibilities such as raising and providing education for their children (World Bank, 2003). In this case, they are likely to engage in perennial crop production. Regarding age, the findings corroborate with (Bello *et al*., 2017) who assessed the information needs of farmers on oil palm processing in Ondo State, Nigeria and found that, majority 75 (50%) of the respondents were aged between 41-50 years.

In regard to education level, the findings reveal that, majority (96.7%) of the respondents had no formal education and had primary education. The view by (Quisumbing and Meinzen – Dick, 2001) indicated that, many countries in sub-Saharan Africa have low level of education and that improving their education would probably increase agricultural productivity and reduce poverty. Therefore, these findings agree with (Mwatawala *et al.,* 2022) in Kigoma Rural District, Tanzania who discovered that, majority (92.2%) of the oil palm small-scale farmers had primary and no formal education.

Moreover, the findings indicate that, majority (81.7%) of the respondents depended on agriculture as the main source of their income. Oil palm crop delivers higher income avenues for smallholder famers and creates jobs for landless rural families, while making them more competitive in global agricultural supply chains (Dib et al., 2018, Gatto et al., 2017). The income findings, agree with (Sebatta *et al*., 2016) who revealed that, about 80 percent of the population in Zambia, were supported by agricultural sector and part of the population that is exclusively dependent on agriculture related livelihoods are significantly poor and live in rural country side.

Table 2. Respondents' socio-economic characteristics (n = 120)

Socio-economic data	Ward						Overall	
	Kagera		Businde		Kibirizi			
	n	%	n	%	n	%	N	%
Respondent Gender								
Male	51	85.0	33	94.3	19	76.0	103	85.8
Female	9	15.0	2	5.7	6	24.0	17	14.2
Respondent Age Groups								
≤ 30 years	1	1.7	0	0.0	0	0.0	1	0.8
31-40 years	5	8.3	2	5.7	1	4.0	8	6.7
41-50 years	22	36.7	16	45.7	16	64.0	54	45.0
51-60 years	17	28.3	14	40.0	4	16.0	35	29.2
> 60 years	15	25.0	3	8.6	4	16.0	22	18.3
Education level								
Primary	40	66.7	28	80.0	10	40.0	78	65.0
Secondary	1	1.7	2	5.7	1	4.0	4	3.3
No formal education	19	31.7	5	14.3	14	56.0	38	31.7
Sources of income								
Farming	51	85.0	30	85.7	17	68.0	98	81.7
Livestock	3	5.0	2	5.7	1	4.0	6	5.0
Business	5	8.3	2	5.7	3	12.0	10	8.3
Salary	1	1.7	1	2.9	4	16.0	6	5.0
Farm size								
≤ 1 acre	19	31.7	12	34.3	10	40.0	41	34.2
1-3 acres	37	61.7	22	62.9	15	60.0	74	61.7
> 3 acres	4	6.7	1	2.9	0	0.0	5	4.2

Table 3. Information needed by oil palm small-scale farmers (n=120)

		Ward			
Information needed	Kagera		Businde	Kibirizi	Overall
Agricultural loans/credits/subsidy	Yes	55 (91.7%)	32 (91.4%)	20 (80%)	107 (89.2%)
	No	5 (8.3%)	3 (8.6%)	5 (20%)	13 (10.8%)
Weather and climate	Yes	52 (86.7%)	27 (77.1%)	13 (52.0%)	92 (76.7%)
	No	8 (13.3%)	8 (22.9%)	12 (48.0%)	28 (23.3%)
Markets and prices	Yes	58 (96.7%)	34 (97.1%)	22 (88.0%)	114 (95.0%)
	No	2 (3.3%)	1 (2.9%)	3 (12.0%)	6 (5.0%)
Improved seeds and fertilizers	Yes	57 (95.0%)	31 (88.6%)	23 (92.0%)	111 (92.5%)
	No	3 (5.0%)	4 (11.4%)	2 (8.0%)	9 (7.5%)
Storage methods	Yes	38 (63.3%)	27 (77.1%)	16 (64.0%)	87 (72.5%)
	No	22 (36.7%)	8 (22.9%)	9 (36.0%)	39 (32.5%)
New technologies	Yes	36 (60.0%)	31 (88.6%)	24 (96.0%)	91 (75.8%)
	No	24 (40.0%)	4 (11.4%)	1 (4.0%)	29 (24.2%)
Pests and diseases control	Yes	52 (86.7%)	30 (85.7%)	14 (56.0%)	96 (80.0%)
	No	8 (13.3%)	5 (14.3%)	11 (44.0%)	24(20.0%)

Furthermore, the findings indicate that, majority (95.9%) of the respondents had less than 3 acres of land. According to (FAO, 2013), a small-scale farmer has defined by some countries as a one with less than 1 hectare (2.5 acres) of land that is used in production. This implies that, majority of the farmers in the study area were small-scale farmers. This links with the view by (Erie, 1996) that, small farm holdings constitute more than 70 percent of all farming activities in Nigeria. The findings also, concur with (Mwatawala *et al*., 2022) that, majority (79.5%) of the farmers in Kigoma Rural District, Tanzania, were small-scale farmers with farm sizes ranging from 0.25-2.0 hectares.

4.2 Information Needed by Small-scale Farmers

Findings of the study (Table 3) reveal that, majority (95%) of the respondents needed information on markets and prices, followed by improved oil palm seeds and fertilizers (92.5%), agricultural credits/loans/subsidy (89.2%), pest and disease control (80%), weather and climate (76.7%), new technologies for oil palm production (75.8%) and storage methods (72.5%). This means that, above 70 percent of the respondents needed agricultural information. (Bello *et al*., 2017) reporting on the assessment of information needs of oil palm farmers in Nigeria, found that, majority 126 (84.0%) of the respondents were not having adequate information on agricultural input, marketing and oil palm sales. The results also support the findings by (Ajayi *et al*., 2010) who assessed the information needs of oil palm farmers in Esan Central Local Government Area of Edo State, Nigeria, and discovered that, information needs on, improved oil palm varieties, improved processing methods, fertilizer application, and nursery practices were very important to farmers in order to get better productivity from their farms. (Mishra and Bhatta, 2021) in Chitwan District, Nepal found that, majority of the smallholder farmers needed agricultural information on input market and prices. (Samarakoon and Shamil, 2010) in Sri Lanka discovered that, information on agricultural inputs and outputs prices, seeds and fertilizers, were needed by smallholder farmers.

4.3 Sources of Information

The findings in Table 4 indicate the respondents' sources of information on oil palm production. The findings indicate that, majority 81 (67.5%) of the respondents were obtaining the agricultural information from friends and fellow farmers often, followed by 60 (50%) who obtained the information from radio. This means that, friends and fellow farmers were major sources of information, followed by radio. Therefore, these findings agree with (Ajayi *et al*., 2010) who found that, majority of the respondents in Nigeria, obtained their information always from fellow friends and radio. Moreover, the evidence by (Mkenda *et al.,* 2017) shows that, majority (>60%) of the smallholder farmers depended on family members, friends, and neighbours as main sources and channels of agricultural information and knowledge. Similarly, (Masele, 2023) in Morogoro Urban, Tanzania, revealed that, almost half (52%) of the respondents depended on their friends and peers as sources of information for horticultural farming.

On the contrary, the findings indicate that, majority 113 (94.2%) of the respondents never obtained information from agricultural exhibitions, followed by 91 (75.8%) from printed materials, 82 (68.3%) from agro-dealers, and 71 (59.2%) from television/film show. This could be due to the reasons that, majority of the respondents in the study area, had no formal education which could help them to read, not effectively involved in agricultural exhibitions, and were faced by poor information infrastructures like electricity. The study by (Yahaya, 2003) in Ibadan viewed that, people with better education take more advantage of new sources of information than those less educated. Moreover, agricultural exhibitions are important because, productivity in agriculture depends on the generation and application of scientific knowledge and technologies, and effectively applying them in the production system (Davenport, 1998). The study by (Atsiaya *et al*., 2022) in Busia County Kenya, accessed the factors influencing access to agrometeorological information among sorghum farmers and pointed out that, location of the farmers is important due to access to key infrastructure used to relay the information, such as electricity, roads, and telecommunications like radio, television, and telephones.

Furthermore, the findings indicate that, majority 73 (60.8%) of the respondents, occasionally obtained agricultural information from agricultural extension workers in the study area. This means that, majority of the respondents rarely obtained agricultural information from agricultural extension workers, which could be influenced by shortage of extension services. Therefore, these results agree with (Daniel *et al*., 2013) in Tanzania, who revealed that, access to correct information by smallholder farmers seems to be unsatisfactory due to poor coordination of agricultural extension services. Similarly, (Benard *et al*., 2014) in Morogoro, Tanzania pointed out that, lack of information services, inadequate number of extension agents, inadequate funds, and lack of awareness on information sources were the main factors affecting information delivery to smallholder farmers.

Table 4. Sources of information (n=120)

		Ward			
Information sources	**Frequency of obtaining information**	**Kagera n (%)**	**Businde n (%)**	**Kibirizi n (%)**	**Overall n (%)**
Friends and fellow farmers	Often	37 (61.7%)	24 (68.6%)	20 (80.0%)	81 (67.5%)
	Occasionally	20 (33.3%)	9 (25.7%)	4 (16.0%)	33 (27.5%)
	Never	3 (5.0%)	2 (5.7%)	1 (4.0%)	6 (5.0%)
Extension workers	Often	10 (16.7%)	4 (11.4%)	5 (20.0%)	19 (15.8%)
	Occasionally	32 (53.3%)	24 (68.6%)	17 (68.0%)	73 (60.8%)
	Never	18 (30.0%)	7 (20.0%)	3 (12.0%)	28 (23.3%)
Radio	Often	26 (43.3%)	19 (54.3%)	15 (60.0%)	60 (50.0%)
	Occasionally	21 (35.0%)	11 (31.4)	6 (24.0%)	38 (31.7%)
	Never	13 (21.7%)	5 (14.3%)	4 (16.0%)	22 (18.3%)
Television/film show	Often	2 (3.3%)	9 (25.7%)	8 (32.0%)	19 (15.8%)
	Occasionally	10 (16.7%)	15 (42.9%)	5 (20.0%)	30 (25.0%)
	Never	48 (80.0%)	11 (31.4%)	12 (48.0%)	71 (59.2%)
Printed materials	Often	3 (5.0%)	1 (2.9%)	2 (8.0%)	6 (5.0%)
	Occasionally	14 (23.3%)	6 (17.1%)	3 (12.0%)	23 (19.2%)
	Never	43 (71.7%)	28 (80.0%)	20 (80.0%)	91 (75.8%)
Agricultural exhibitions	Often	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Occasionally	2 (3.3%)	1 (2.9%)	4 (16.0%)	7 (5.8%)
	Never	58 (96.7%)	34 (97.1%)	21 (84.0%)	113 (94.2%)
Argo-dealers	Often	5 (8.3%)	2 (5.7%)	2 (8.0%)	9 (7.5%)
	Occasionally	14 (23.3%)	8 (22.9%)	7 (28.0%)	29 (24.2%)
	Never	41 (68.3%)	25 (71.4%)	16 (64.0%)	82 (68.3%)

4.4 Means of Sharing Information

The results in Table 5 indicate the respondents' distribution by means of sharing agricultural information. A proportion (35.0%) of the respondents shared information through facial interaction, followed by formal group meetings (28.3%), radio (15.8%), digital sharing (9.2%), printed materials (6.7%), and field demonstrations (5.0%). This means that, facial interaction and formal group meetings were the major means of sharing information to respondents. The results regarding facial interaction and formal group meetings, agree with the study by (Malabayabas, 2015) who pointed out that, family units and meetings were effective platforms for farming, knowledge sharing, diffusion and perpetuation in Paoay, Atok, Benguet, Philippines. Moreover, the study by (Yusuf, 2014) revealed that, smallholder farmers can be provided with agricultural information and knowledge through different mechanisms such as agricultural meetings, extension services, fellow farmers, workshops, seminars, print materials including brochures, newspapers, magazine, fliers and posters as well as broadcasting media such as radio and television. Furthermore, the study by (Kommey, 2020) in Ghana, informed that rice farmers largely shared knowledge through face-to-face interactions.

The results also indicate that, a proportion (15.8%) of the respondents shared agricultural information through radio. This means that, radios supported the respondents to share the agricultural information to the minimal. This could be due to their oral nature, low cost of access and operation cost (Bonephace et al., 2022). The study by (Benard *et al*., 2015) in Unguja, Tanzania, found that, the main sources of information to the respondents were, neighbours and friends, followed by radio, family/parents, personal experience, village leaders, agricultural inputs suppliers, television and the least sources were internet and leaflets. (Yusuf, 2014) on rice production in Mbarali District, Tanzania discovered that, about (52.9%) of the smallholder farmers mentioned radio as a dependable mechanism for delivering agricultural information and knowledge electronically to meet the technological advancement.

Furthermore, the results indicate that, the least proportion (5.0%) of the respondents shared agricultural information through field demonstrations. This could be due to the low literacy level and lack of financial resources.

These results agree with (Opara, 2008) in Imo State, Nigeria who pointed out that, delivery of information is limited by a number of factors which include the low literacy level, lack of access to radio and television sets, lack of financial resources, inadequacy of human capacity, and lack of legal frameworks at national and international levels to support information service provision to rural areas. (Benard and Lamtane, 2020) in the Southern Highlands of Tanzania revealed that, the major challenges facing fish farmers in sharing information were poor use of information and communication technology (ICT) including unfavorable radio/television broadcasting time, high cost of acquiring and maintenance of ICT facilities, lack of training on ICT, poor network connectivity and, low levels of literacy. These could cause poor fishing activities and low income to fish farmers.

4.5 The Association between Respondents' Areas of Residence and Information Needs

The findings in Table 6 indicate the association between respondents' information needs and their areas of residence as a result of Chi-square analysis. The findings indicate that, there was a statistical significant association (positive significance) between the respondents' areas of residence and information needs including weather and climate (X^2=11.862:p=0.003), new technologies (X^2=19.864:p=0.000), and pests and diseases (X^2=11.381:p=0.003). This means that, areas of residence (wards) with majority of the respondents needed more agricultural information on weather and climate, new technologies, and pests and diseases as indicated in Table 7. Some studies have pointed out the associations between respondents' areas of residence and variables. For example, (Pauline, 2023) in Tanzania found significant association between the farmers' villages and changes in weather patterns, which could influence the farmers' access to information and view on weather. (Paul, 2022) in United States discovered significant association between rural people and technology where-by, one extra auto-mobile per person worked in farming, increased the likelihood of working by 17 percent. (Damalas, 2009) found significant association between workers located in Asia and pesticide use in agriculture, the use of pesticides had increased significantly leading to adverse effects on the environment and human health.

Table 5. Means of sharing information (n=120)

Means of sharing information	Ward						Overall	
	Kagera		Businde		Kibirizi			
	n	%	n	%	n	%	N	%
Formal group meetings	18	30.0	9	25.7	7	28	34	28.3
Digital sharing	2	3.3	4	11.4	5	20	11	9.2
Facial interaction	27	45.0	11	31.4	4	16	42	35.0
Field demonstrations	3	5.0	2	5.7	1	4	6	5.0
Radio	6	10.0	8	22.9	5	20	19	15.8
Printed materials	4	6.7	1	2.9	3	12	8	6.7

Table 6. Chi-square Analysis indicating the association between respondents' areas of residence and information needs

Information needed (variables)	Chi-square (X^2)	Degree of freedom (d.f)	P-value	Remarks
Weather and climate	11.862	2	0.003 *	Significant
New technologies	16.854	2	0.000 *	Significant
Pests and diseases control	11.381	2	0.003 *	Significant
Agricultural loans/credits/subsidy	2.748	2	0.253	Not Significant
Markets and prices	3.268	2	0.195	Not Significant
Improved seeds and fertilizers	1.328	2	0.515	Not Significant
Storage methods	2.098	2	0.350	Not Significant

** Significant at 5% level*

Table 7. Contingency for information needs against areas of residence

		Areas of residence (Wards)			
Information needed	**Response**	**Kagera**	**Businde**	**Kibirizi**	**Total**
Agricultural	No	5	3	5	**13**
loans/credits/subsidy	Yes	55	32	20	**107**
Weather and climate	No	8	8	12	**28**
	Yes	52	27	13	**92**
Markets and prices	No	2	1	3	**6**
	Yes	58	34	22	**114**
Improved seeds and	No	3	4	2	**9**
fertilizers	Yes	57	31	23	**111**
Storage methods	No	22	8	9	**39**
	Yes	38	27	16	**81**
New technologies	No	24	4	1	**29**
	Yes	36	31	24	**91**
Pests and diseases control	No	8	5	11	**24**
	Yes	52	30	14	**96**
Total		**420**	**245**	**175**	**840**

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study determined the small-scale farmers' information needs and sources for improved oil palm production in Kigoma-Ujiji Municipal Council, Tanzania. Majority of the respondents in the study area, needed agricultural information for increasing oil palm production. This means that, information on agricultural credits/ loans/ subsidy, improved oil palm seeds/seedlings, pests and diseases control, markets and prices, fertilizers, weather and climate, storage methods, and new technologies are very important.

Since the majority of the respondents did not obtain agricultural information from agricultural exhibitions, printed materials, agro-dealers, and television/film show, therefore, these sources of information need to be improved, otherwise oil palm small-sale farmers, will continue to face the challenges of poor oil palm production.

Field demonstration was a least means of sharing agricultural information by respondents. It seems that, there was poor financial resources for establishing field demonstrations, hence the Kigoma/Ujiji Municipal Council through agricultural extension officers should ensure oil palm demonstrations to the respondents.

5.2 Recommendations

- Since the majority of the respondents needed agricultural related information in the study area, there is a need for oil palm stakeholders like TARI-Kihinga, FELISA and agricultural extension agents to work together and ensure the adequate dissemination of agricultural information to oil palm small-scale farmers.
- Further studies on small-scale farmers' information needs and sources for improved oil palm production, are highly encouraged to be conducted in others areas of Tanzania, especially in the regions cultivating oil palm crop like Mbeya, Pwani, and Tanga. This will help the government of Tanzania to discover and solve the challenges impeding the small-scale farmers' information needs and sources.
- The government of Tanzania through its regional authorities, should focus on increasing the use of radio, printed materials, and television as sources of agricultural information, to the remote oil palm small-scale farmers living in Kagera, Businde, and Kibirizi wards. This will help the oil palm small-scale farmers in the study area to obtain and share agricultural information.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author (s) hereby declare that, NO generative artificial intelligence technologies such as Large Language Models and text to image producers have been used for the period of writing or editing of manuscripts.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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