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Original Research Article

Socio-Demographic Characteristics and Potato Production Practices of Smallholder Potato Farmers in Molo Sub-County, Kenya

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Abstract: Potato is the second most valued food crop after maize contributing to national domestic consumption and food needs in Kenya. Despite the ease in cultivation and fewer labor requirements, potato production in Kenya is not yet promising as compared to neighboring countries like Tanzania especially in the major growing areas like Molo Sub-County. Low potato in Kenya is due to several biotic and abiotic stresses. In order to develop appropriate interventions to improve production, it is important to first understand farmers' characteristics, prevailing production practices, potato production constraints, and suggestions for improvement as it is important in providing the basis for addressing the numerous challenges that the farmers face. This study was thus carried out in Molo Sub-County, Kenya with the main objective of analyzing and documenting key information characterizing the socio-demographics of smallholder potato farmers, their production practices, potato production constraints, and their suggestions for improvement in the area. Data was collected from 152 smallholder potato farmers sampled randomly from the accessible population of 6000 potato growers. Data was collected using a questionnaire. Data was analyzed using descriptive statistics. The results indicate that 44.7% of the land in the study area was self-owned. 62.5 % of the farmers belonged to a farmer group. Majority of the farmers 48 % had 1 -5 years of potato farming experience. Literacy levels in the study area were high with over 92.8 % of respondents attaining formal education. There was a higher percentage of women respondents than men 52.6 % and 47.4 % respectively. In terms of age majority of the respondents were middle-aged. The potato variety most preferred and grown by the respondents was shangi. In terms of potato yields, the majority 78.3% had potato yields less than 5tons/ha. The major potato production constraints were high pests and diseases, high costs of inputs, and market accessibility mentioned by farmers. From the findings it is recommended that there is a need to sensitize farmers more on the importance of using quality farm inputs, encourage farmer commitment to collective action for market power, and utilize extension services promoting potato production more frequently.

Keywords: Smallholder socio-demographic characterization, potato production.

1. INTRODUCTION

Potato is the world's fourth largest food crop in terms of production after maize, rice, and wheat thus the largest non-cereal food crop cultivated in the world (FAOSTAT, 2020).

The crop provides more calories per cultivated area than any other crop and easily substitute's cereals for food consumption with one out of eight people in the world eating it often (Beals, 2019). The potato 's ease of production has made it an important component of agriculture which provides jobs, income and food to approximately 800 million people globally (CIP, 2020). Potato mature in 3-4 months besides can yield about 50 tons/ha and therefore ideally suited to places where land is limited with abundant labor (Tadesse *et al*., 2019). Global annual output of potato is about 388 million metric tons with yield per hectare of 20,110.8 tons/ha (FAOSTAT, 2020). Potato demand is also rising at a greater rate than any other food crop because of its high-industrial value as well as population blast (Food and Agriculture Organization [FAO], 2019).

In Africa annual potato outputs are about 25 million metric tons with yield of 13,215.4 tons/ha and plays an important role in food security and income

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(VIB, 2019). However, this is way below the increasing demand as a reliable source of income, employment, and food for many populations in the region. As a result, a bid to address sustainability on potato adequacy in the region is important especially among smallholder farmers who are predominant in the potato sector (Wasilewska-Nascimento *et al*., 2020). Smallholder farmers in Africa can be categorize depending on; the agro-ecological zones they operate in; their socio-economic status in terms of capital invested and size of land owned; or annual revenue generated from farming activities (Ochola, 2017). The potato sector can help improve the income of smallholder farmers who largely depend on it for their livelihoods (Mengui & Lee, 2019). Furthermore, potato sector may subsequently curb poverty by providing quick income partly because potatoes mature within short period (mostly less than 4 months) compared to major cereal crops (Tadesse *et al*., 2019).

Similarly, in Kenya potato is the second most important food crop after maize and a major staple food among potato growing communities (Kimathi *et al*., 2021). A significant portion of potato is also used in processed products such as finger chips, fry chips, and salad. The average annual potato production in the country have been reported to be an estimate of between 2 to 3 million metric tonnes (Mbego, 2019). This accounts for 23.5% of the country's economy through income generation of almost USD 500 million annually (Kenya Investment Authority [KIA], 2020). The sector also employs about 3.3 million people along the potato value chain (Bolt *et al.*, 2019). Potato equally provides significant income opportunities as well as food for smallholder farmers (Mburu *et al*., 2020). In addition, potato contributes to poverty alleviation through income generation in both urban and rural households.

There is an increasing concern in Kenya that potato production can significantly contribute to realizing the nationwide objectives of vision 2030 by generating employment, enhancing food security, improving nutritional security and raising incomes (Devaux *et al*., 2020). Vision 2030 is a long-standing national plan that targets at transforming Kenya into middle-income and industrial country by 2030 (ElMassah & Mohieldin, 2020). For instance, potato contributes to economic development and industrial growth through income of about 50 billion Kenya shillings annually towards the Growth Domestic Product of Kenya, and therefore it is acknowledged as one of the pillars that will significantly contribute to achievement of Kenya vision 2030 because of its substantial contribution to food availability and income in the country (Munene, 2020).This therefore showcase the vital role potato production plays in the country.

Potato production is mostly done twice or thrice a year in Kenya. There are thirteen major counties where potato is produced which include; Bomet, Homa Bay, Bungoma, Elgeyo Marakwet, Kiambu, Meru, Nakuru, Narok, Nyandarua, Nyeri, Trans Nzoia, Uasin Gishu and West Pokot, where it acts as source of food, employment as well as cash income (Ministry of Agriculture, Livestock, and Fisheries [MoALF], 2018). Nyandarua County is the leading potato producer at 29.8 % in the country (Ruto, 2018). Nakuru County is the second largest producer at 18.9 % with Molo Sub-County being one of the main potatoes growing Sub-County hence it was chosen for this study based on magnitude of potato production (Maingi *et al.*, 2020). The potato industry in Nakuru has the high potential of addressing unemployment as well as food security (Mutinda, 2020). Potato production also is a valuable enterprise for smallholder farmers in Molo Sub County contributing positively towards the food and income levels (Kamau *et al*., 2020b).

In spite potato increasing importance in terms of consumption and income, potato production in the country stands at average of between 6–10 tons/ha, much below the potential of over 20 tons/ha (Vlaams Instituut Voor Biotechnologie [VIB], 2019). According to Ebrahim *et al.*, (2018) a number of problems continue to threaten potato production leading to low production. Among the factors attributed to low production include; traditional production systems, shortage of quality seeds, decline soil fertility, poor agronomic practices, a disorganized marketing system, high incidence of pests and diseases, lack of clear policies on packaging, poor technology transfer and low use of quality farm inputs (Gebru *et al*., 2017). This leads to instability of supply and therefore low prices, which leads to low incomes, enormous losses and therefore reduced produce, which transform to low production among potato farmers.

The low production prevents commercialization of potato production and keeps smallholder farmers in subsistence production that leads to slow development of the smallholder potato sector. For example, high incidence of pests and diseases in potato production in Kenya results in estimated 80% reduction in production therefore threatening overall yields (CABI, 2020). Potato is susceptible to numerous pests and diseases reducing its capabilities of providing food and cash (Savary *et al.*, 2019). According to Kamau (2019) diseases such as those caused by bacteria are a major biotic production constraint on potato production. Mburu *et al*. (2020) found out that emergence of new pests and diseases, such as the recently detected potato cyst nematodes (PCNs), Globodera rostochiensis and G. pallida are globally considered as the most important pests and diseases threatening potato production. Low potato production is also contributed by majority of the farmers especially smallholder using low quality inputs such as seeds, poor agronomic practices and poor technology transfer for controlling pests as well as diseases and improving

production. According to Devaux *et al.* (2020) majority of smallholder potato farmers use low quality inputs due to high costs of inputs and also practice poor production practices which are bottleneck for them. These are however, too often overlooked in less developed countries such as Kenya (Niere & Karuri, 2018).

Therefore, is important to solve these problems in order to improve potato production, for instance early detection of pests and diseases problems associated with potato production can greatly help in reducing the loss and reaching the targeted production (Moore *et al.*, 2020). Otieno (2019), noted that for farmers to sustainably manage these constraints, the control must begin right from the initial stage of selection of fields and planting materials- all these must be free of pests and diseases. Maingi and Mbuvi (2020) also suggest that to improve potato production it is important to provide farmers with knowledge and skills on good agronomic practices lower the cost of farm inputs, have an organized market for attracting good potato prices and also improve the way technologies on potato production improvement are being transferred to farmers. It is therefore, important to provide farmers with options that are context-specific to their agricultural conditions and socioeconomic circumstances to address the problems in crop production potato being one of them (Heeb *et al.*, 2019). This is required particularly among smallholder farmers in Molo Sub- County whose potato production is still low compared to their potentials.

To accelerate potato production among smallholder potato farmers in Molo Sub-County, the present study was thus undertaken. There is a little area-specific information on this matter in the study area. The objective of this study was, therefore, to analyze and document key information characterizing socio-demographics of smallholder potato farmers, their production practices, potato production constraints and their suggestions for improvement.

2. MATERIAL AND METHODOLOGY

This study took place in Molo Sub-County, Kenya, which is one of the eleven Sub Counties making up Nakuru County (County Government of Nakuru, 2018). Administratively, Molo Sub County has four wards namely, Mariashoni, Elburgon, Turi and Molo. The Sub County covers a total area of 478.79 KM^2 and a population of 156,732. Molo Sub-County is located in the Rift Valley along the Mau Forest, which runs on the Mau escarpment at 0.25° South latitude, 35.73° East longitude and 2534 meters above sea level (Kenya National Bureau of Statistics [KNBS], 2019). The area is categorized as cold with the average temperatures of 14.1°C and an average rainfall of 1131 millimeters. Its geographical position makes it a suitable place for growing potatoes among other crops. Generally, the main economic activities in this area include dairy, sheep rearing and crop farming with potato being the main crop (Kamau, *et al*., 2020b).

2.1 Sampling Procedure

Molo Sub-County was purposively selected based on its high potential in potato production. The four wards Molo, Turi, Elburgon, and Mariashoni were purposively selected due to their importance in potato production in the Sub County. The sample was distributed among the four wards proportionately (Table 1). Simple random sampling procedure was then used to select respondents with relatively similar characteristics to be involved in the study from each of the four wards. Borg and Gall (2003) define sample size as the number of units, or items in the sample which determines the precision for the accuracy of the inferences made from the sample to be generalized to the population.

2.2 Sample Size Determination

The required sample size of smallholder potato farmers was determined using the formula recommended by Nassiuma (2000) for determining the sample size. This formula is used to determine a study sample for the known population in a survey study. The formula is given by;

$$n = \frac{NC^2}{C^2 + (N-1)e^2}$$

Where:
n**=** is the required sample size,
N=is the population within the study area,
C= is the Coefficient of variation,
E=is the Standard error value

Nassiuma (2000) declares that in most surveys or experiments, a coefficient of variation is in the range of $21\% \leq C \leq 30\%$ and standard error in the range of $2\% \leq e \leq 5\%$ is usually acceptable. Therefore, a coefficient of variation of 25% and standard error of 2% was used for this study. The lower limit of the standard error is selected to ensure low variability in the sample and minimize the degree or error. For this study N=6,000 smallholder potato farmers C =25% and e =2%

$$n = \frac{NC^2}{C^2 + (N-1)e^2}$$

$$n = \frac{6000 \times (0.25)^2}{(0.25)^2 + (6000-1)(0.02)^2} = 152$$

Thus, sample size is distributed per ward as shown in Table 1.

Table-1: Distribution of sample respondents in the study area

Ward	Population Size Distribution	Proportionate (%)	Sample size
Elburgon	1050	17.5	27
Mariashoni	1610	26.83	41
Molo	1340	22.33	33
Turi	2000	33.33	51
Total	**6000**	**100**	**152**

2.3 DATA ANALYSIS

Data were analyzed using the Statistical Package for the Social Science (SPSS, version 22). Descriptive statistical measures such as percentage and frequency were used to summarize and categorize the data. Data were presented in charts and tables.

3. RESULTS AND DISCUSSION

3.1 Socio-Demographic Characteristics

3.1.1 Age bracket of the Respondents

The study results in Table 2 revealed that 22 % of the respondents were age below 35 years, 41 % of the respondents were age between 35 and 60 years while 37 % of the respondents were age above 60 years. Thus, it can be concluded that most of the respondents involved in potato production fall in the age between 35 and 60 years. This implies that most of the smallholder potato farmers in Molo Sub-County were middle aged. Age is a significant socio-economic factor in terms of its influence on the decision-making power of an individual in crop production (Dhraief *et al.,* 2018). It also explains the various roles played by different people in the society especially in the aspect of pursuing a livelihood. Middle aged and young farmers have proved to be active and ready to try new innovations and can provide the needed labor during crop production (Kimaru-Muchai *et al*., 2020). Elderly farmers have more experience, resources and authority that would give them more possibilities for trying new innovations; however receptiveness to new ideas and technologies typically decreases with age as a result of an increase in risk aversion and a decreased interest in farming (Relf-Eckstein *et al*., 2019).

Table-2: Age bracket of the respondents (n=152)

Age	Percent
Below 35 years (Youth farmers)	22
35-60 years (Middle aged farmers)	41
Above 60 years (Elderly farmers)	37
Total	**100**

3.1.2 Gender of the Respondents

The largest number of the respondents were female at 52.6 percent while men at 47.4 percent as presented in Figure 1.

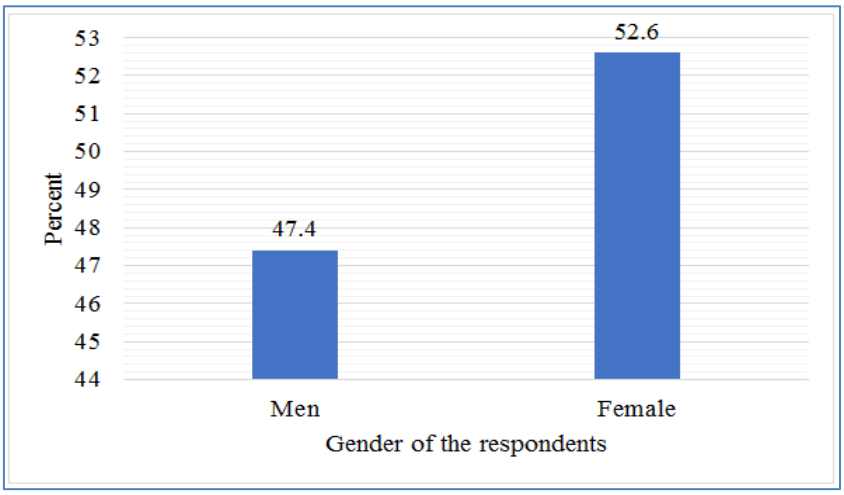

Fig-1: Gender of the Respondents

The findings in Figure 1 infer that number of women involved in potato production was higher compared to men. Gender influences an individual's attitude, behavior, interaction, status and participation in the decision-making processes. According to Doss (2018), in most African societies, gender accredits certain roles that are established by society and allowed by customs. A study by Sachs (2018) found that women especially in the developing countries reside in rural areas and are greatly involved in the agricultural production; this may explain the high percent of female smallholder farmers in potato production in Molo Sub County.

3.1.3 Highest Level of Formal Education Attained by Respondents

The respondents' findings on the highest level of education attained are shown in Table 3.

Table-3: Highest Level of Education Attained by Respondents (n=152)

Education level	Percent
No formal education	7.2
Primary	32.9
Secondary	38.2
Post-secondary education	21.7
Total	**100.0**

Results in Table 3 shows that only 7.2% of the respondents never attended any formal education, 32.9 % of the respondents completed primary level of education, 38.2% of the respondents had attained secondary school education, 21.7 % had attained post-secondary education. The study revealed that majority of the respondents had attained basic up to post-secondary education. Therefore, it can be concluded that literacy levels in the study area were high with over 92.8 % of respondents attaining formal education and can thus read and understand information about potato production practices. Communication is therefore unlikely to be a barrier to these farmers when using information and services that promote crop production. Education has been describe as the process that is meant to equip individuals with desirable knowledge, skills and attitudes which are basic in preparing individuals in pursuit for economic survival (Kemmis & Edwards-Groves, 2018). According to Mahmood and Zubair (2020), literate farmers are more likely to understand the crop production practices compared to the illiterate ones.

3.1.4 Potato Farming Experience

The respondents' responses on potato farming experience are shown in Table 4.

Table-4: Potato Farming Experience (n=152)

Farming experience (Years)	Percent
0-5 years	48.0
6-10 years	28.3
11-15 years	7.2
over 16 years	16.4
Total	**100.0**

The majority of smallholder potato farmers (48 %) stated having been in potato farming for 0-5 years, 28.3% have been in potato farming for 6-10 years. 7.2% have been in potato farming for 11-15 while 16.4 % have been in potato farming for over 16 years. From the results in Table 4 it was established that more households are taking up potato farming as one of their sources of livelihoods in the study area. This information is informative to development partners and extension staff in that they need to put more efforts in helping farmers to improve potato production considering its contribution towards income and food security. As pointed out by Salau *et al.* (2014) the experience in farming is important for effective day-to-day running of farming activities and therefore determines the farmer ability to address issues of crop production.

3.1.5 Membership in Farmer Group

The findings in this study in membership to a farmer group and main activities carried out within those groups are given in Figure 2 and Figure 3.

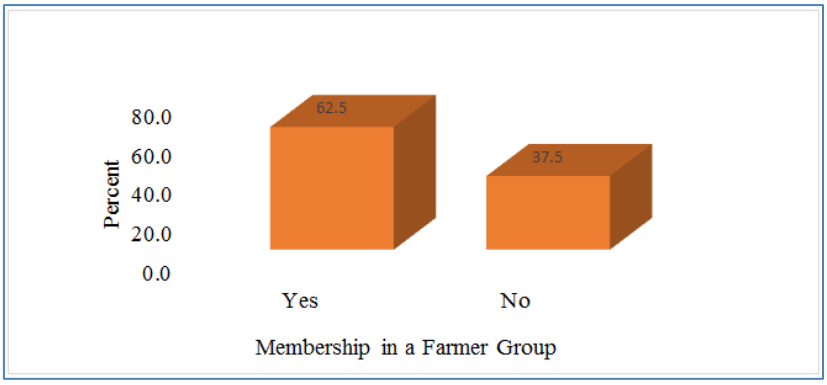

Fig-2: Membership in Farmer Group

Study results in Figure 2 revealed that 62.5 % of the respondents belonged to a farmer group whereas 37.5 % of the respondents did not belong to any farmer group in the region. Belonging to farmer groups have the potential to enhance information sharing, networking, exchange of new ideas and increased access to production and marketing information among potato producers in the study area due to collective action. Tolno *et al.* (2016), found that membership in a farmer group is likely to increase producers 'income earning capabilities due to skills and joint learning among them as opposed to individual farmers who do not belong to a farmer group. As stated by Bourne *et al.* (2021) the Kenya government through the county government, Non- Governmental Organizations, private sectors use farmer groups as a strategy to maximize efficiency in agricultural production by spreading newly developed technologies to farmers, training farmers and information dissemination through extension services. These bodies find it easy to work and conduct activities

like training, advisory services with farmers who are already organized in groups compared to those who are individuals (Eidt *et al*., 2020).

Further analysis in Figure 3 revealed that there were 5 main activities carried within a group in the study area which include; farming, social welfare, table banking, marketing and merry go round.

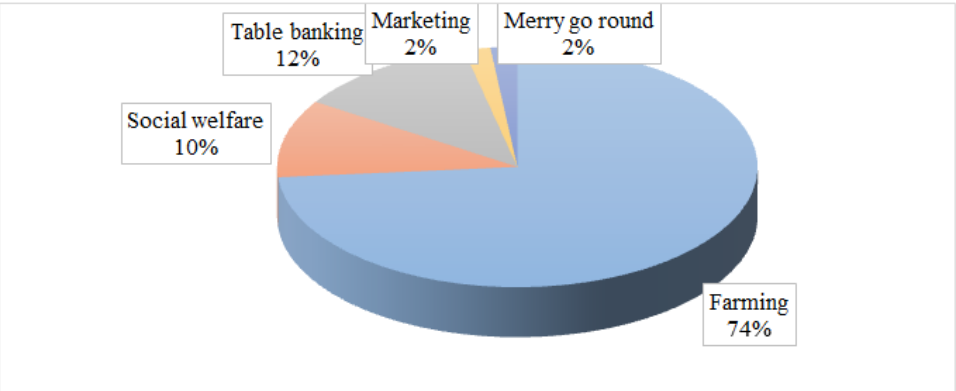

Fig-3: Activities done in the farmer groups

About 74% of the respondents indicated farming as the main activity, 10% indicated social welfare as the main activity within the group,12% of the respondents identified table banking as the main activity within the group, 2% of the respondents indicated marketing as the main activity within the group, while 2.2% indicated merry go round. Activities carried out in farmer groups are ambition towards farming improvement and development among farmers (Wulanjari *et al.,* 2021). Merry go round and table banking for instance are strategic activities that enable farmers save, access finances and other contributions in terms of pool of funds through loans (Suswati *et al*., 2020). Farming, social welfare and marketing activities leverage collective action to access certain services, including the exchange of information, providing representation and voice to members, the marketing of produce and the buying of inputs (Ingutia & Sumelius, 2021).

3.1.6 Land Ownership

The findings on the land ownership status by the respondents in the study area are shown in table 5.

Table-5: Ownership of land

Ownership of land	Frequency	Percent
Self-owned	68	44.7
Family	26	17.1
Rented	58	38.2
Total	**152**	**100.0**

The study (Table 5) discloses that (44.7%) of the land in the study area is self-owned, (17.1%) is family while (38.2%) is rented. This thus gives smallholder potato farmers a free hand in choice of investment and control in potato production. The nature of land ownership has an important contribution to how a farmer utilizes and makes investments on land and intensification of agricultural production in his/her land (Sylvester, 2013). This signifies the importance of documenting the status of the ownership in the study area in order to address issues in potato production.

3.2 Potato Production Practices

3.2.1 Reasons for Growing Potato

The study found that potato is grown for sale for income generation as well as food in Molo Sub County. As indicated in Table 6 majority of the respondents 51.3 % grow potato only for sell, 47.4% grow potato for both selling and home consumption while 1.3 % grow potato only for consumption**.**

Table-6: Reasons for growing potato (N=152)

Reason for growing potato	Percent
Sale	51.3
Home consumption	1.3
Both	47.4
Total	100.0

The results in Table 6 above thus established that potato crop contributes towards farmers' food and income among the respondents. Similar study conducted in Molo and other counties also indicated that farmers in Kenya grow potatoes for both food consumption and cash (Maingi *et al*., 2020).

3.2.2 Types of Potato Variety Grown by the Respondents

The findings in this study on the types of potato variety used by respondents in Figure 3 reveals that majority (96.7%) of the respondents use Shangi, 1.3 % use Dutch, 0.7% use Tigoni, 0.7 % used Sheherekea, while 0.7% use Makis.

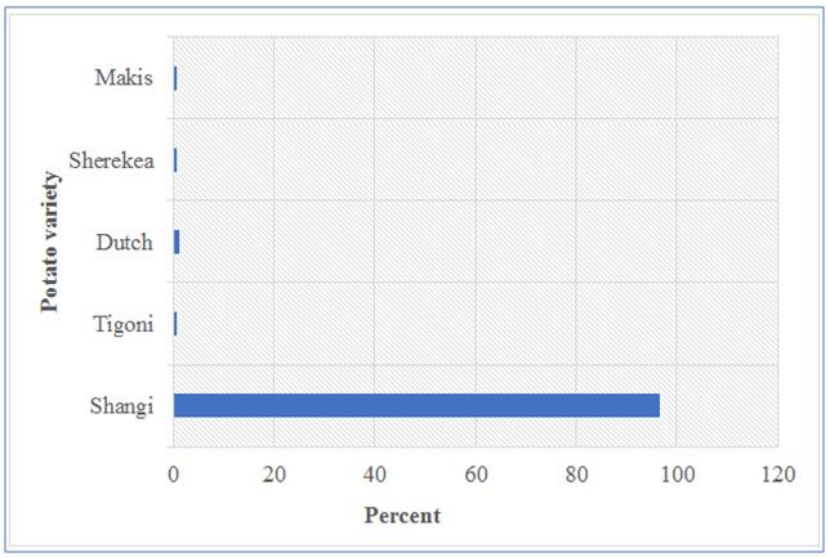

Fig-4: Types of potato seed variety used by respondents in molo sub-county.

According to Okello *et al*. (2016) use of potato varieties which are quality has the potential to increase outputs, food security and incomes of the farmers.

3.2.3 Number of Times Potatoes Are Grown in A Year by the Respondents in the Study Area

As shown in Figure 5 Eighty five percent of these respondents reported to grow potato twice in a year, 11 % grow it thrice in a year and 4% grow it once in a year respectively. This concludes that the potatoes are growing majorly twice a year in the study area.

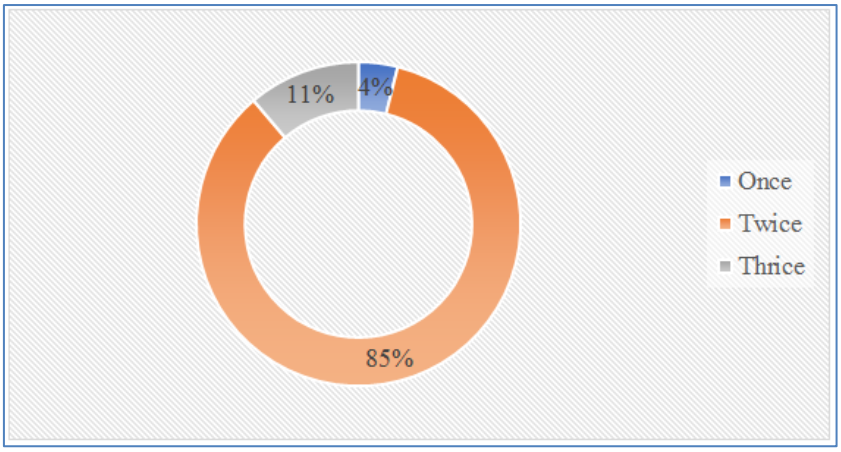

Fig-5: Number of times growing potatoes in a year

3.2.4 Size of The Farm Use for Potato Production in Acres by the respondents

The size of farm owned by the farmers is important natural asset that determines the farming system that can be utilized, farmer's adoption of new technologies and output that can be obtained from the land. The results showed that majority of the respondents 42.8% and 40.8 % farmed their potatoes on land below 2.0 acres and 2.1- 3 acres respectively, 11.8 % farmed their potatoes on a land ranging between 3.1 - 4 acres, while 4.6 % farmed their potatoes on a land ranging between 4.1 – 5.0 acres (Figure 5). From the study, most respondents farmed their potatoes on land less than five acres. This confirms the general observation that most potato in Kenya are predominantly grown by smallholder potato farmers whose farm size is less than five acres (MoALF, 2016).

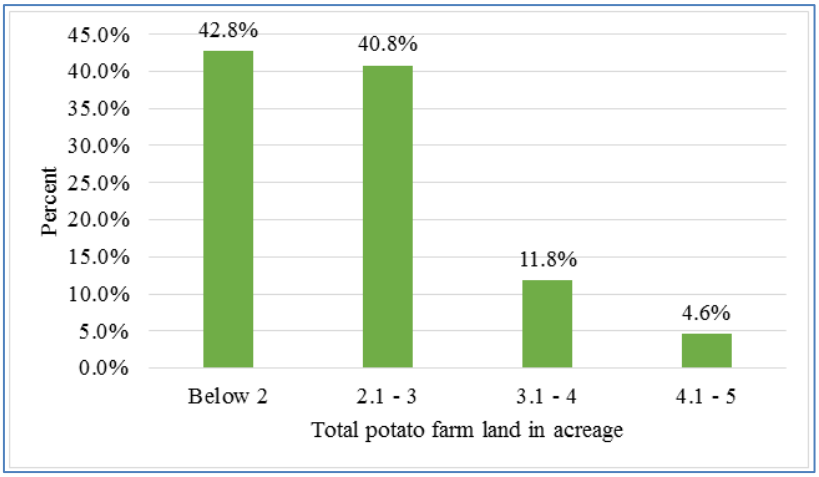

Fig-5: Distribution of Farm size of the respondents

3.2.5 Level of Potato Production

Improvement of agricultural production such as potato production among smallholder farmers is an important factor in achieving household income, food nutrition and security. In order to achieve improved agricultural production determination of production levels is instrumental. Following the analysis, the study revealed three production levels based on the amount of potato yield per ha from the potato farmer field. These levels are as follows; low level, which refers to the potato yield of less than 5 tons/ha; medium level, which refers to potato yield between 5-10 tons/ha; and high level, which refers to potato yield of above 10 tons/ha as illustrated in Table 7.

Table-7: Distribution of potato yield levels in year 2020/21 production seasons (n=152)

Respondent's Potato production levels	Frequency	Percentage
Low (< 5tons/ha)	119	78.3
Medium (5 < >10 tons/ha)	27	17.8
High (10 > tons/ha)	6	3.9
Total	**152**	**100.0**

The findings on the potato yields (Table 7) among the respondents show that majority of them 119 (78.3%) have potato yields less than 5tons/ha and 27 (17.8%) of the respondents had potato yield of between 5 and 10 tons/ha and only 6 (3.9 %) potato farmers produced above 10 tons/ha. This indicates that potato yields are still low in the area as compared with optimum yield which is 20 - 30 tons/ha (Gitari *et al*., 2018).

3.3 Problems Facing Smallholder Potato Farmers

This present study finds out which constraints that are the major challenges facing the potato industry that inhibit the growth and development of the potato sector as perceived by the respondents. The study found that these challenges reduce the performance of smallholder potato farmers in Molo Sub County as shown in Table 9.

Table-9: Descriptive statistics for Problems facing smallholder potato farmers

Problem faced	Frequency	Percent
Highest pests' infestation	130	85.5
High Diseases infestation	131	86.2
Lack of market accessibility	101	66.4
Lack of quality potato seeds	100	65.8
Soil related problems	93	61.2
Unfavorable weather conditions	94	61.8
Poor storage facilities	99	65.1
High costs of inputs	108	71.1

As indicated in the Table 9, majority of smallholder potato farmers were facing challenges such as high pest and disease infestation, lack of market accessibility and quality potato seeds, soil related problems, unfavorable weather conditions, poor storage facilities and high cost of inputs. The findings of the study are in line with the study conducted by Wassihun et al. (2019) who cited that high pest and disease infestation, lack of market accessibility and lack of quality potato seeds were problems facing potato production in Ethopia. Otieno (2019) cited that high pest and disease were the most important challenges

affecting potato production in East Africa Region. Majeed *et al.* (2018) further cited that among various challenges facing potato production were high cost of inputs such as high cost of fertilizers, agro-chemicals and seeds in Pakistan. Chamedjeu (2018) observed that diseases like late blight and bacterial wilt were the main challenges facing potato production in Nakuru County.

Additional challenges include poor storage facilities, high cost of inputs, unfavorable weather conditions and soil related problems. Mosota (2018) cited that high cost of fertilizer and ago-chemicals, poor storage facilities, soil related problems and unfavorable weather conditions were among the various challenges facing potato production in Kenya. According to Tolno *et al*. (2016) main production challenges facing smallholder agricultural production include high pests and diseases infestation, unfavorable weather conditions, lack of market accessibility, high cost of inputs, poor storage facilities and soil related problems in Guinea. Eliya *et al*. (2019) stated that low quality seeds and lack of cold storage facilities were main challenges affecting potato production in Malawi.

3.4 Suggested Solutions for Improvement of Potato Production the Area by the Respondents

Results from the findings (Table 10) indicated that sensitization of farmers on importance of using quality farm inputs (63%) in potato production and intensification of research on potato production improvement (39%) were various suggestions given out by the respondents as significant for improving potato production in the study area. Other suggestions were subsidies of farm input and farmer commitment in collective action at 87% and 66 % respectively.

Table-10: Suggested solutions for potato production improvement by smallholder farmers

Suggested Solutions	Frequency	Percent
Encourage farmer commitment in collective action for market power and services supporting potato production	100	66
Sensitize farmers more on importance of using quality farm inputs	95	63
Government through trusted input sellers to subsides farm input	132	87
Intensify research on potato production improvement	60	39

4. CONCLUSION AND RECOMMENDATIONS

Majority of smallholder potato farmers were facing challenges such as high pest and disease infestation, lack of market accessibility and quality potato seeds, soil related problems, unfavorable weather conditions, poor storage facilities and high cost of inputs. Smallholder potato farmer's yields are still low as majority 78.3% recorded less than 5 tons per hectare. These challenges can be solved to enable farmers realized the potential of potato production. Potato crop matures within a short period of time and this enables the smallholder farmers to grow it in two or more seasons in a year unlike other cereals such as wheat or maize which take more than 5 months or one year to mature in Molo Sub-County.

This study recommends that farmers should be educated and empowered to be committed in collective action for market power and services supporting potato production which enables them access information that improve potato production. Smallholder potato farmers should sensitize more on importance of using quality farm inputs. Government through trusted input sellers to subsides farm input prices to enable farmers affordable them. Conduct trainings more frequently on pests and diseases control and management. Intensify research on potato production improvement to establish ways of boosting production.

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