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Influence Of Sense Of Community On Quality Seed Potato (Solunum Tuberosum) Adoption Among Smallholder Farmers In Kenya

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Abstract
In Kenya, quality seed potato adoption remains a challenge among smallholder farmers. This is despite stakeholder interventions to improve access to quality seed potato based on conventional socioeconomic factors with limited focus on building blocks of a community such as the sense of community (SOC). SOC has four components - membership, influence, integration and fulfillment of needs and shared emotional connection - that have been found to influence community development activities. However, much of the research on SOC has been conducted with Western, educated, industrialized, rich and democratic (WEIRD) populations. Therefore, a study was conducted to explore influence of SOC on quality seed potato adoption among smallholder farmers in Molo Sub County. A correlational research design was adopted for the research. Data was collected from a population of 6,000 smallholder potato farmers in the four wards of Molo Sub County. 152 respondents were sampled using a multilevel sampling procedure. Semi-structured questionnaire was used to collect data from individual respondents. Descriptive statistics and logistic regression analysis were used in data analysis using Statistical Package for Social Sciences (SPSS) version 22 software. Logistic regression determined that SOC influence quality seed potato adoption, especially the membership component (p = 0.012). Therefore, initiatives to promote quality seed potato adoption should prioritize strengthening group identity and fostering a sense of belonging among farmers.

Keywords: *quality seed potato adoption, Molo Sub County, sense of community components, smallholder farmers*

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I. Introduction

The Irish potato, recognized as a global crop, exhibits a highly varied distribution pattern [1]. Potato is cultivated within communities of smallholder families marked by elevated levels of poverty, inequality, hunger, and malnutrition. It provides more calories per cultivated area than any other crop. Potato can easily be used as a substitute for cereals for food consumption since one out of eight people in the world eat it often [2]. The potato continues to be a crucial crop for food security [3]. Primarily considered a local-for-local crop, especially in numerous developing nations, fresh potatoes remain essential due to the challenges posed by their bulkiness and the limited storage capacity of both seed and ware tubers.

Despite its importance, potato yield in Kenya has significantly declined over the years. In 2018, it was recorded at 8.6 tons per hectare, a considerable drop from 21.2 tons per hectare in 2008. By 2022, the yield had stagnated at seven tons per hectare, which is far below the potential of 40 tons per hectare [4]. In Molo, specifically, the average yield of potato between the years 2013 to 2017 was 9.8 tons per acre, against the country's potential of 40 tons per acre.

Research indicates that the potato sector in Kenya faces persistent challenges from seed-borne pests and diseases, including nematodes, late blight, and bacterial wilt [5]. Only 6% of the 800,000 smallholder potato farmers in Kenya use quality seed potato, with the majority relying on farmer-saved seeds [4]. Although the low yields cannot be attributed solely to the use of poor-quality seeds, it remains a significant contributing factor.

Researchers have documented socioeconomic factors that influence smallholder farmers' choice of seed potato and have attributed use of poor-quality seed potato to farmers' low level of education, inadequate resource endowment and limited access to credit, long distance from the source of quality seed potato and household food insecurity [6]. Interventions have also been developed based on these ideas. The conventional experts' opinions have not critically examined the potential for building blocks of community, such as sense of community (SOC).

McMillan and Chavis defined SOC as a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together [7]. McMillan and Chavis characterized SOC in terms of four components: membership, influence, integration and fulfillment of needs and shared emotional connection.

According to McMillan and Chavis, membership involves having a sense of identification with others, sharing common interests, and feeling accepted by the group. Influence refers to the ability to have a say in the decisions that affect the community. It involves feeling that one's opinions and actions can make a difference, and that one has some control over the group's direction. Integration and fulfillment of needs refers to the extent to which the community provides its members with the resources they need to meet their individual needs, such as emotional support, material resources, or opportunities for personal growth. Shared emotional connection component refers to the shared emotional experiences that bind members of the community together. It involves feeling a sense of trust, caring, and commitment to the group, and experiencing a sense of shared history, values, and traditions.

SOC, is a key building block of a community [8]. It creates the environment where adoption takes place, and has proved to contribute positively on other community development sectors, such as health and education [9], [10]. Literature also notes that evidence on the influence of SOC on community development is majorly from Western, educated, industrialized, rich and democratic (WEIRD) nations [11]. Therefore, the study sought to explore the potential influence of SOC on quality seed potato adoption among smallholder farmers in Molo Sub County, Kenya.

II. Methodology

Research design

The research adopted a correlational research design. This research design is suitable for investigating relationships between variables without manipulation of the study cases [12]. Specifically, a cross-sectional survey was conducted to collect information from the sample population at a particular point in time without manipulation of the study cases.

Area of study

The study was conducted in Molo Sub County. Molo Sub County is located in Nakuru County, Kenya. It has four wards namely; Turi, Molo, Elburgon and Mariashoni**.** Located in the Mau Escarpment, Molo Sub County has favourable climatic conditions for potato growing. However, the use of poor-quality seed potato has been a major challenge in the area leading to low yields despite being a host of Molo Agricultural Development Corporation, which enhances access to quality seed potato to farmers.

Sample and sampling procedure

The study was conducted among a population of 6,000 smallholder farmers in Molo Sub County. Molo Sub County was purposely selected because of the vibrant potato growing, majorly by smallholder farmers. Using proportionate stratified sampling, 152 respondents were selected to participate in the research from the four wards of Molo Sub County. The sample size was determined using the Nassiuma [13] sample size formula. Table 1 shows the distribution of farmers and sample size per ward.

Table 1: Sample Sizes per Ward

Ward	Number of potato farmers	Proportion (%)	Sample size
Elburgon	1,000	16.67	25
Mariashoni	2,500	41.67	63
Molo	500	8.33	13
Turi	2,000	33.33	51
Total	6,000	100	152

Data collection and analysis procedure

Data was collected using semi-structured questionnaire containing close-ended and open-ended questions. To assess SOC, the questionnaire contained a scale adapted from SOC Index 2 (SCI-2) developed by Chavis based on the theory of SOC by McMillan and Chavis [7]. The questionnaire was pretested and produced a Cronbach Alpha reliability coefficient of $\alpha = .803$ at the cut-off point of 0.70 for social statistics. Informed consent from all the participants was sought prior to data collection. Collected data was cleaned and coded. With the aid of SPSS version 22, the data was then analysed using descriptive and inferential statistics. Descriptive statistics was used to provide insights on the population of study in form of percentages, charts and tables. Logistic regression model was used to determine the influence of SOC components in Molo Sub County on quality seed potato adoption.

III. Results And Discussions

Age and gender distribution of the respondents

The age of the respondents was classified in three groups; 18-35 years, to represent the youth, 36-60 to represent the middle-aged farmers and above 60 years to represent farmers with advanced age. Table 2 presents a crosstabulation summarizing the age distribution of the smallholder farmers by gender.

Table 2: Age Distribution of Respondents

Age groups	Male	Female	Total	% of the total
18-35	50	23	73	48.0%
36-60	35	23	58	38.2%
Above 60	9	12	21	13.8%
Total	94	58	152	100%

Generally, the survey results shows that a majority of the smallholder farmers were aged between 18-60 years represented by a cumulative percentage of 86.2% (n= 131). Findings from this study are contrary to the view of small-scale agriculture in literature, where smallholder farmers are commonly categorized as predominantly composed of elderly individuals aged over 60 years [14]. However, Osinowo and Tolorunju [15] noted in their research that people working in agricultural production were in their prime years of life. This is consistent with the results of this survey, where almost half (48%) of the respondents were youth farmers. This can be explained by the fact that youth entrepreneurship in agriculture has grown out of the need to find an alternative sustainable solution to poverty and unemployment among rural youth in Kenya [16].

The results further indicate that there were more men (61.8%) than women (38.2%) in the survey. This trend can be explained by the prevailing male dominance in the field of cash crop farming, where females frequently assume supporting roles [17]. Researchers note that among smallholder farmers in most rural areas, women predominantly focus on crops that are considered food crops whereas men are more involved in production of crops considered cash crops [18].

Membership to community groups/ organizations

Participants were asked if they belonged to any community groups or organizations, and the results revealed a distinction in group/ organization membership among the participants. The results are summarized in figure 1.

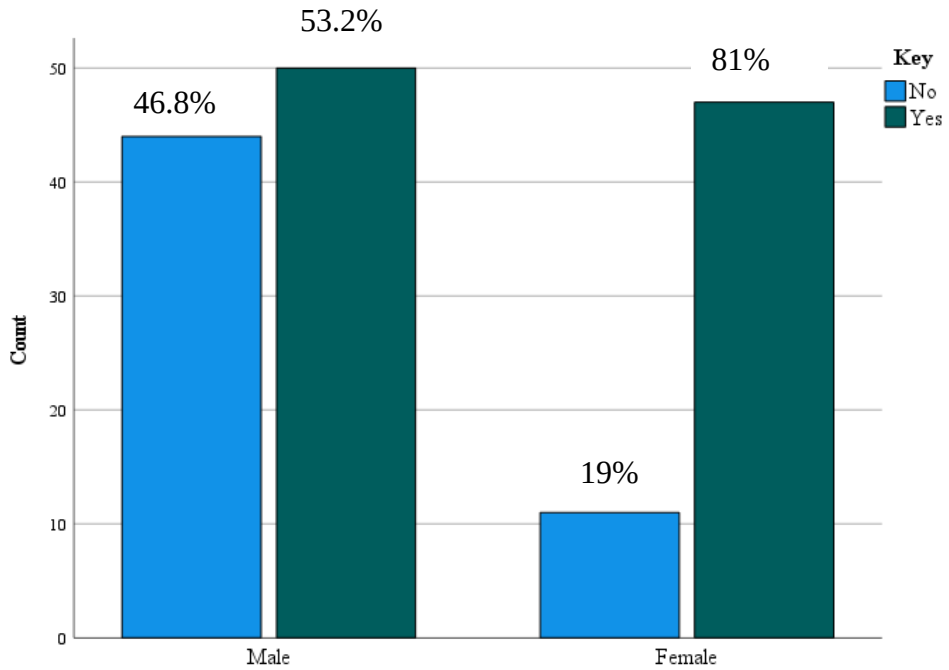

Figure 1: Membership to Community Groups/ Organizations

The results show that 63.8% of the total respondents reported membership to community groups/ organizations with 36.2% indicating no affiliation. The results also indicated a significant gender-based

variability. Among the male farmers, 53.2% of the respondents reported belonging to community groups/organizations. Conversely, among female respondents, 81% reported belonging to community groups. This is in line with literature findings that suggests women are more involved in community groups than men as observed in various settings such as local community organizations and religious groups [19]. This phenomenon may be due to the fact that traditionally, women have played key roles in community building and social support networks [20].

Quality seed potato adoption among smallholder farmers in Molo Sub County

To determine quality seed potato adoption among smallholder farmers in Molo Sub County, two data categories were established; adopters of quality seed potato and non-adopters. Those who in their last three planting seasons acquired seed potato at least twice from Molo ADC and other authorized seed suppliers, and produced seed potato under expert monitoring; and were willing to use pest and disease-free seed potato were considered as adopters, while the rest were considered as non-adopters. The descriptive statistics of quality seed potato adoption are shown in Table 3.

Table 3: Quality Seed Potato Adoption

Category	Frequencies	Percentage
Non-adopters	132	86.8
Adopters	20	13.2
Total	152	100

From the study, a majority of the respondents, 86.8% (n= 132) were non-adopters of quality seed potato while the rest, 13% (n= 20) were adopters. The data shows that quality seed potato adoption was low, although the percentage of adopters was high, (13.2%) compared to the national level of 6% [4].

Influence of SOC on Quality Seed Potato Adoption

The study sought to explore the influence of SOC on quality seed potato adoption among smallholder farmers in Molo Sub County. SOC was explored through the four components, shared emotional connection, integration and fulfillment of needs, membership, and influence. For each component, the respondents scored their perception about a list statement (20) on a scale of 1-5. The respondents' score on the statements was used to estimate their SOC.

To test the influence of SOC on quality seed potato adoption among smallholder farmers in Molo Sub County, a logistic regression was conducted. A logistic regression model is a type of generalized linear model that is employed when dealing with a binary response variable [21].

The first step was to ascertain how well the regression model was fit for the data. Data in table 4 shows the findings.

Table 4: Logistic Regression; Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	7.858	8	.447

The Hosmer and Lemeshow Test indicated that the model was fit for the data, $\chi^2(8) = 7.858$, $p > .05$. When the p-value is greater than .05, the results suggests that there is no significant difference between the observed and expected outcomes, indicating that the model fits the data well [22].

Further, logistic regression results for all the four SOC components are presented in table 5.

Table 5: Logistic Regression Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	104.082a	.090	.166

The results in the model summary indicate that SOC has significance influence on quality seed potato adoption among smallholder farmers in Molo Sub County. This is because The Cox & Snell R Square and Nagelkerke R Square coefficients indicated that the independent variables (SOC components) explain approximately 9% and 17% of the variance in the dependent variable (quality seed potato adoption), respectively (Cox & Snell R Square = 0.090, Nagelkerke R Square = 0.166). Although the logistic regression R-Squared values were small, Adhikari [23] notes that small R-squared values are not always a problem. The author notes that for human behaviour, which is very difficult to predict, a high R-Squared is almost impossible.

The results from the research are therefore in agreement with the initial assumption that SOC may significantly influence adoption of farming technologies, in this case, quality seed potato adoption. The results

are also in support of previous studies that show that SOC positively influences different community development processes [24, 8, 25].

However, the logistic regression indicated that not all SOC components had significant influence on quality seed potato adoption. Table 6 presents a summary of variables in the logistic regression equation.

Table 6: Summary of Variables in the Logistic Regression Equation

SOC component	B	Wald	df	p-value	Exp (B)
Shared emotional connection	.189	.099	1	.754	1.208
Integration and fulfillment of needs	-.749	2.521	1	.112	.473
Membership	1.738	6.368	1	.012	5.684
Influence	.482	1.483	1	.223	1.620
Constant	-9.441	10.657	1	.001	.000

The results indicate that only membership had a statistically significant influence on quality seed potato adoption ($p = 0.012$). This suggests that individuals with a higher sense of membership in their community are approximately 5.684 times more likely to adopt quality seed potato compared to those with a lower sense of membership ($Exp(B) = 5.684$). On the other hand, the remaining SOC components - shared emotional connection ($p = 0.754$), integration and fulfillment of needs ($p = 0.112$), and influence ($p = 0.223$) - did not demonstrate statistically significant influence on quality seed potato adoption. The results imply that sense of belonging and shared identity within the community plays a pivotal role in shaping agricultural practices. These results are in line with findings by Iles *et al* [26] who notes that small-scale farming has more to do with lifestyle, sense of belonging and connection to others.

IV. Conclusion

Irish potato is one of the important food crops in the world that has a potential for ensuring food security. For proper production, potato requires use of quality seeds - free from pests and diseases. Quality seed potato adoption has remained to be a challenge among many smallholder farmers. This is one of the major contributing factors to low potato yields in Kenya. Researchers have explored the conventional factors that influence quality seed potato adoption such as distance to the source, credit availability, level of education, resource endowment, and household food insecurity, and interventions have been developed based on these factors. There has been limited attention on community building blocks such as SOC. The results from the study conducted indicate that SOC is a factor that influence quality seed potato adoption among smallholder farmers. Despite the fact that not all SOC components had influence on quality seed potato adoption, the study provides insights into the important role of SOC in designing targeted strategies for sustainable agricultural development.

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