



Food Production and Food Insecurity: Lessons from Small Holder Farming in Ugunja Sub County, Kenya

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Abstract: *Food insecurity has been a major global concern since 1940s. The purpose of this study was to examine the level of food production and food insecurity lessons from Ugunja Sub-County in Kenya. Grounded on The High Payoff Input Model, the study adopted a descriptive design while using mixed method of data collection and analysis. The study targeted 21062 households across the Sub-County, from which a sample of 393 households and 7 key informants. Stratified sampling was used to have 131 households per unit while simple random sampling was used to select the 131 household farmers within a ward out of the three wards. On the other hand, purposive sampling was used to pick the 7 key informants were selected. The study used household questionnaires, key informant interviews and Focus group discussions to collect data. The results showed that 46.6% of the respondents considered themselves food insecure. The research revealed that though majority 43% of the respondents applied fertilizer in their farms this did not increase the food production most likely because the right quantity was not applied. Those farmers who combined fertilizers and animal manure or compost manure yield more products. The researchers also noted that NGO- One Acre Fund contributed positively to farm production. The study recommended empowerment of the farmers in terms of knowledge and skills on farming. The study recommends development of a proper stakeholder engagement structure to help in knowledge dissemination among the smallholder farmer to reverse the food insecurity story in Ugunja Sub-County.*

Keywords: Food, Production, Food insecurity, Lessons, Farming, Smallholder

How to cite this work (APA):

Oloo, J., Nalugala, R. & Asatsa, S. (2021). Food Production and Food Insecurity: Lessons from Small Holder Farming in Ugunja Sub County, Kenya. *Journal of Research Innovation and Implications in Education*, 5(3), 38 – 49.

1. Introduction

Food insecurity has been a major global concern since 1940s (Akram-Lodhi, 2009). Food insecurity is considered as a situation where households are, at times, unable or struggling to acquire adequate food for one or more household members due to insufficient money and necessary resources for food (Coleman-Jensen, Gregory, & Singh, 2014). Today we live in a world where approximately 2 billion people (25.9%) of the global population do not have enough food, while approximately 690 million people are undernourished (Herforth et al., 2020). This is the state contrary to the fact that other studies show that worldwide food production exceeds 2,750 kilocalories per person per day (Kc et al., 2018)

which is beyond the standard amount of 2250 recommended by the United nations (Gill et al., 2003). Some of the major global causes of food insecurity have been said to be: disasters, conflicts, high population growth rate, neglect of agriculture and socio-economic inequalities (Gonzalez, 2014). Although increasing food production and affordable market environment has been seen the best solution to food insecurity as well as being the major focus of most government (Tripathi, Mishra, Maurya, Singh, & Wilson, 2019), food security has remained a dream yet to be fulfilled.

2. Literature Review

According to FAO (2012) smallholder can be described as small-scale farmers, pastoralists, forest keepers, fishers

who practice the respective economic activity in an area ranging from less than one hectare to 10 hectares. Smallholder subsistence practices vary in different regions of the world as discussed below.

In India, though the introduction of high valued food and non-food cash crop had impacted on traditional crop landrace, smallholder farming was still dominated by landrace due to its value of diversity and source of valued traditional dishes that the community might not be willing to lose (Bisht et al., 2014). This study applied participatory approach and collection of data through cluster sampling, baseline surveys through structured questionnaire which was carried out in three districts in India. The exact sample size was not indicated though was given as 10% from each district of a population of 1000- 1500 households. The results of the study indicated that smallholder farmers continued engaging in low value subsistence crops – maize, rice and sorghum – livestock and fish farming. However, these traditional farming were affected by land fragmentation in some areas, existing land tenure, lack of local level seed network, market infrastructure and smallholder farming policies. Besides being dependent on farming, the smallholder households also engaged in off-farm activities to boost their income. Bisht and the team in their study recognized the importance of crop diversity which was not only important in contributing to food security of the community but also in preserving cultural values of the community. They also noted the biasness of the government policies that hindered smallholder farming. However, Bisht's work and the team covered a wider scope of farming in general including both cash crop farming, in addition, the study failed to give the exact sample size. Did the study think of combining the modern aspect of high yield seeds with the traditional knowledge on landrace cropping to produce an improved seed that can improve smallholder farming yield? This research work explored better and workable solutions to the smallholder farmers in the sub County.

In terms of level of food produced from smallholder farming globally, smallholder farming is seen as the greatest contributor to food production proportionally as compared to large scale farming. A study done in 83 countries in Latin America, sub-Saharan Africa, and South and East Asia on farmers with averagely less than five hectares of agricultural land revealed that these farmers contributed more than 80% of global rice production, 75% of global production of groundnuts and oil palm, nearly 60% of global production of millet and cassava, and more than 40% of production of cotton and sugarcane (Samberg, Gerber, Ramankutty, Herrero, & West, 2016). This was also supported by a study done in 55 Asian countries which found out that farms less than 2 ha produce 28–31% of total crop production and 30–34% of the food supply on 24% of gross agricultural land (Ricciardi, Ramankutty, Mehrabi, Jarvis, & Chookolingo, 2018)

Regionally, smallholder subsistence farming has been practiced in various ways. A study that was carried in Zimbabwe showed that the smallholder farming majorly depended on rain-fed agriculture leaving it vulnerable to climate change and its effects (Mapfumo, Mtambanengwe, & Chikowo, 2016). In relation to this practice, the decision on farming, farming practices and timing were dependent on weather conditions like presence and timing of rains. The study also revealed that the practice was based on traditional knowledge, and farming was done on traditional land which was limited; the scarcity of farming land due to growing population has minimized the involvement in livestock farming as preference was given to crop production. This study that was being carried out thus explored other factors beyond dependence on weather conditions, traditional technologies and farming practices.

The sector of agriculture in Africa is viewed to have been highly dominated by smallholder farming than any other continent, however, getting the statistics have proven difficult (Issala, 2013). Gollin (2014) also confirmed the dominance of smallholder farming in food production sector in Africa. He could only manage to get the percentage of those employed in agriculture in some countries, for instance, less than 2% of agricultural workforce were employed in Guinea, Ethiopia, Tanzania and Sierra Leone. That meant that almost 98% were self employed in their small farms.

According to FAO smallholder farming in Kenya is characterized by averagely 0.47 hectares of farm land, the size having been on the declining move and an average food production of approximately 63% of the overall country production (Rapsomanikis, 2015). It also confirms that Maize dominate taking almost a half of the crop production, in addition, other crops like sorghum, millet, cassava, potatoes, beans and vegetables are also grown.

Kalungu and Leal Filho (2018) in their study carried out in Kenya found out that beside the challenge of climate change which hit hard the smallholder farming, farmers lacked knowledge of chemical application rates, control of late blight in potatoes, accessing certified seed and identifying the most appropriate crop varieties for a given location. Kalungu and Leal Filho also confirmed that Climate Smart technologies like mixed cropping, zero tillage, mulching, intercropping, conservation agriculture, crop rotation, integrated crop-livestock management, agro-forestry, improved grazing, and improved water management were being adopted, however some farmers were reluctant claiming that the technologies took time before the benefit could be realized.

A study carried out in the neighboring sub-county of Ugenya recognizes that application of fertilizers and improved seed can improve the productivity of smallholder farmers; however the farmers are faced with

the challenge of affordability and accessibility of these (Smollo, Mosi, & Watako, 2017). The study also reveals that land degradation due to inadequate soil and water conservation measures further account for inefficient use of applied fertilizers as most of it is washed away by run-off. The services of extension agents have reduced due to budget constraint. The study however brings in an aspect of farmers association which is said to have improved capacity building among farmers. Ugunja Sub-County is dominated by small farms averaging 1.03 ha. 70% of the households practice rain-fed agriculture for food and income, cultivating maize, bananas, sorghum, potatoes, cassava and beans (Atela, Tonui, & Glover, 2018). However, pests and diseases are the major sources of agricultural stress.

The Study that was done in Ugenya sub-county could give a clear reflection of the farming practices within our area of study given that they are neighbors and thus share a lot in terms of geographical aspects. However the sample size used in the study was 600 beneficiaries of maize input, by use of purposive and random sampling as compared to our study that was carried out which used a sample of 393 households and both stratified and random sampling techniques. The study highlighted the challenge in use of fertilizers and improved seeds, lack of income and at the same time identified opportunity of farmers association, however it failed to use the opportunity of farmers association as a way in which farming activities and inputs could be financed. It is in light of this that this study also explored ways in which the farmers association and community organisations could be used to fund themselves looking at the aspect of table banking among others.

The existing literature described smallholder farming in various ways with an indication of variation in element from different regions globally as well as locally. Some of the common characteristics of smallholder farming practices across the world were; small sizes of farming lands which keeps on declining, dependent on whether condition- rainfed thus the timing of the related activities are tagged on the availability of rain, prone to climatic change impacts like drought and floods. Some of the practices specific to our area of study are maize crop dominance thus many farmers majorly grow maize and beans every season, lack of knowledge on chemical application, majority of farmers practicing without application of fertilizers not certified seeds due to lack of capital. Due to lack of capital the farms were affected by invasion of pest and diseases, labour is family based through the use of Jembes which takes longer, and a few who have ox do the ploughing. Most of the literature reviewed had not shown the theories applied except a few which mentioned collaboration theory. What was very clear from the history according to the literature was that the smallholder sector had been facing changes which would affect it positively or negatively and thus there was the need to strategise to adopt to the changes. The changes

included declining land sizes, changes in climatic and weather conditions, changes in global technology and changes in household sizes among other. This could best be demonstrated by the high pay off model. Major gaps identified were: limited studies have been done in relation to this topic within the same area; many farmers were reluctant to adopt the new technologies, they lacked capital and thus the yield from smallholder production was low. This thus was a ticket for the researcher to continue with the study so as to contribute to the knowledge of research as well as be a solution to food insecurity in the Sub-county.

3. Methodology

The study was grounded on The High Payoff Input Model which is attributed to T. Schultz who was convinced that the only way of transforming traditional agricultural sector was adoption of external productive factors like hybrids, fertilizer and pesticides (Pisani, 2006). The new high pay-off inputs were classified into three categories: The capacity of public and private sector research institutions to produce new technical knowledge; the capacity of the industrial sector to develop, produce and market new technical inputs and the capacity of farmers to acquire new knowledge and use new inputs effectively (Ruttan, 1977). This would in turn improve food production hence making the model the most appropriate for the study.

The study area was Ugunja Sub County of Siaya County in Kenya. According to the 2019 Census, Ugunja Sub County has a total population of 26328 households (KNB, 2019). Out of this, 80% represents smallholder farmers (County, 2018) thus the target population for the study was 21062 households which represented smallholder farmers. The study applied descriptive design while using a mixed approach method where both qualitative and quantitative data were collected to address the research question. Mixed data collection method has been defined as methodology of research that advances the systematic integration of quantitative and qualitative data within a single investigation or sustained program of inquiry (Wisdom & Creswell, 2013). The researcher applied Taro Yamane formula (Israel, 1992) which resulted to a sample size of 393 households from the target population of 21062 households across the Sub-County. In addition to the household samples, 7 key informants were used to gather in-depth information related to causes of food insecurity. Household questionnaires and Interview schedule were used for quantitative data while Focus group discussions were used for qualitative data. Both Household questionnaires and interview schedules had both closed and open ended questions, this was to allow the interviewee answer the closed questions as per the choices given as well as give their personal views and opinion based on the objectives of the study.

The sample Size of 393 was divided equally among the three wards to have sample size of 131 households per administrative unit. The researcher used 6 field officers who administered the household questionnaires with each ward represented by two field officers. The field officers were identified through administrative leaders of these areas, who helped in identifying either students who were in colleges or the form four leavers who had an experience in data collection. The field officers were trained the first day after which they carried out a mock test. Each field officer administered 22 household questionnaires hence completing by the third or fourth day. The field officers administered the questionnaires to the household farmers through asking them questions one on one while the Key informant questionnaires were distributed to the key informants to complete by themselves. Focus group discussions were guided by Focus group discussion guide which had several questions linked to the main objectives of the study. Four Focus Group discussion sessions were held in the three wards, one with Village elders in Sigomere, another one in Sindindi ward with Sijimbo women group, another one in Ugunja with a group of farmers from Rambula, while the fourth group was with Sigomere Young Adult which is a group within St. Michael Catholic Church Sigomere. During the Focus group discussion, the researcher led the sessions with the assistance of two field officers who were taking notes during the discussion sessions. Moreover, case studies per ward on best practices by successful farmers were also taken. The data from Focus group discussion and case studies were grouped into themes in line with the objective of the study for ease of analysis. General validity was also met by hiring field officers who were fluent in both English and the local language to ensure accuracy in

translation in cases where the interviewee would be comfortable with English language. Before actual collection of data, general accuracy of the instruments was ensured through a pretest. The data was analysed through SPSS and Excel representing results in form of charts, tables and graphs.

4. Results and Discussion

4.1 State of Food Security

In order to understand the level of food production, the researcher found it necessary to first to inquire about the state of food security from the smallholder farmers themselves. The household smallholder farmers were asked to give their view on this matter. It was found out that only 2.5% answered that they were very secure while 14.2 % responded that they were secure, 36.6% said that they were just surviving, 37.7% said they were insecure while 8.9% were found to be very secure as demonstrated in the **Table 1**. The same question was raised to the ward administrators to give the number of people are could comfortably get three meals per day; the result indicated that only between 26 -40% of the population comfortably afford three meals per day. The findings of this study affirmed the results that was given by the Ministry of Agriculture and Livestock concerning the poverty level of Siaya County which was standing at 47.6 % (MoALF, 2016) . This was a clear indication that a large population of the Sub County was still food insecure and that the study came in at the expected time.

Table 1: The State of Food Security in Ugunja Sub County

State of Food Security	Frequency	Percent	Valid Percent	Cumulative Percent
Very Secure	10	2.5	2.5	2.5
Secure	56	14.2	14.2	16.8
Surviving	144	36.6	36.6	53.4
Insecure	148	37.7	37.7	91.1
Very insecure	35	8.9	8.9	100
Total	393	100	100	

The objective of the study was to examine the level of food production and food insecurity lessons from Ugunja Sub-County in Kenya. To understand the level of food production, there was a need to understand the current

smallholder farming practices used that led to the said level of production. The smallholder farmers and the key informants were asked specific questions in line with the objective; the results were as discussed below.

4.2 Types of farming practiced

Household smallholder farmers were asked about the type of farming they practiced; 59.8% of those interviewed

answered Mixed farming, 35.88% stated Crop farming while 4.34% stated livestock farming. The same question was posed to the key informants whereby the result revealed that mixed farming was the main activities

practiced across the Sub-county as represented in **Figure 1**.

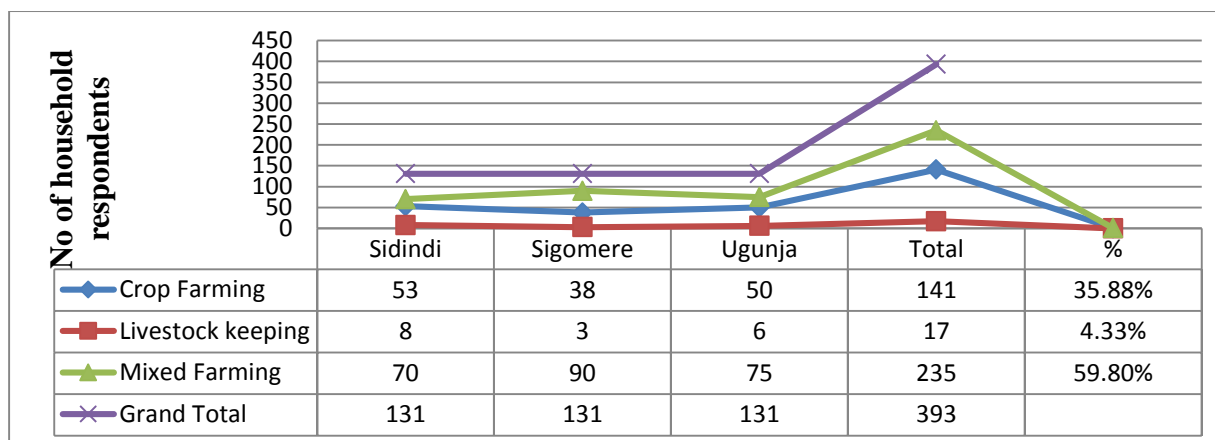


Figure 1: Types of Farming Practiced and the Rate of their Preferences per Ward

Further comparison was done on the type of farming practices within the three wards and the same result was evidenced where mixed farming was the most preferred in each of the three wards as represented in the figure 1. In terms of scale of farming, the result from the key informant interviews showed that the farming was done on small scale and majorly for subsistence. This was also affirmed in the focus group discussions held in the 3 wards.

To further understand the current farming practices carried out in the area, having noted that mixed farming was the

most preferred at 59.8% while livestock was only at 4.33%, further assessment was done to get to know how many household farmers kept at least an animal. The investigation found out that out of the 393 households interviewed only 239 household had at least an animal. The most reared animals from the assessment were chickens and cows as evidenced from the table 2 where it indicated that 63 households reared at least both cows and chickens while 53 households reared only chickens. In the same assessment it was noted that only 9 household were able to rear a combination of cows, goats and sheep.

Table 2: The Number of Household Respondent who at least Keep Domestic Animals

Animals Reared	Livestock Keeping	Mixed Farming	Total
Chickens alone	6	47	53
Cow, Goat and chicken	-	23	23
Cow, Sheep and Chickens	5	22	27
Cows alone	2	45	34
Cows and Chickens	-	63	63
Cows and Goats	-	6	6
Cows and Sheep	4	7	11
Cows Goats and Sheep	-	9	9
Sheep and Chicken	-	13	13
Total	17	235	239

Note: The numbers under the columns marked Livestock keeping and Mixed farming refers to the number of domestic animals kept by the household farmers who practice these type of farming. (-) means nil or no animal reared

During the focus group discussions in the three wards, the researcher inquired from the teams involved the average

number of cows, chickens and goats each household could be having. The response was that 60% of the homestead had cows on average 2 cows and 3 chicken and 1 goats. This affirmed the number of families that had at least an animal which was 239 out of 393 households which represent 60.8%. In the focus group discussion, the researched also inquired about the presence of dairy farmers in the region. The finding was that there were few

that were noted, in Sigomere ward the team mentioned only three dairy farmers who owned one cow each, and in Sidindi Ward the team mentioned four known farmers while in Ugunja only 3. The researcher then raised another question linked to that, on why majority did not practice dairy farming. The major reasons given were that, dairy farming itself was involving, required a lot of capital, many feared the responsibility accompanied by that type of farming. Similar response was noted in one-on-one discussion with the Sub county Agricultural officer who

confirmed that many of the residents feared the responsibility of rearing the dairy cow, the other reason was that the cost of buying a dairy cow was high.

The researcher also sought to find out the categories of crops grown by the smallholder farmers in the region. This was analysed both in the Sub County at large as well as within the three wards that make up the Sub-county and the results were presented in figure 2 and figure 3.

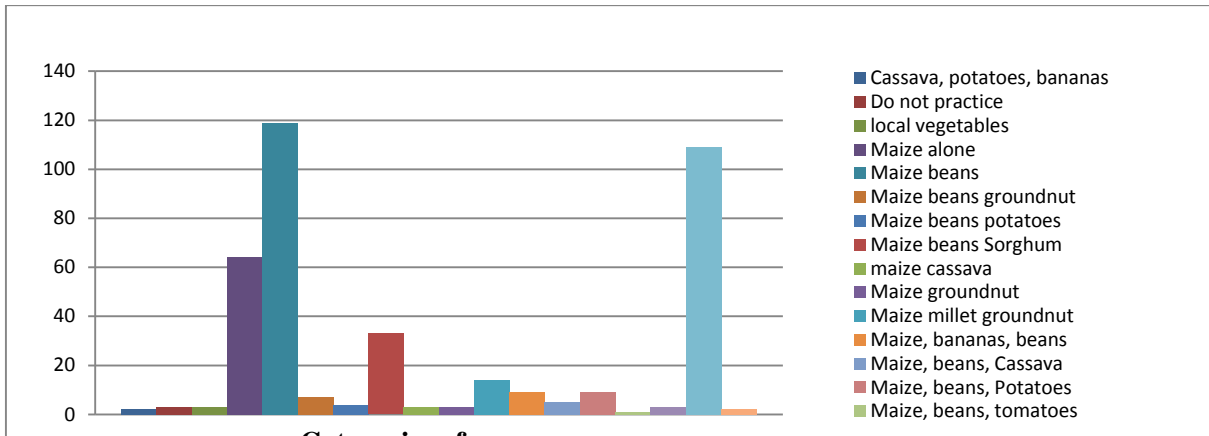


Figure 2 : Major crops grown by households in the Sub-county

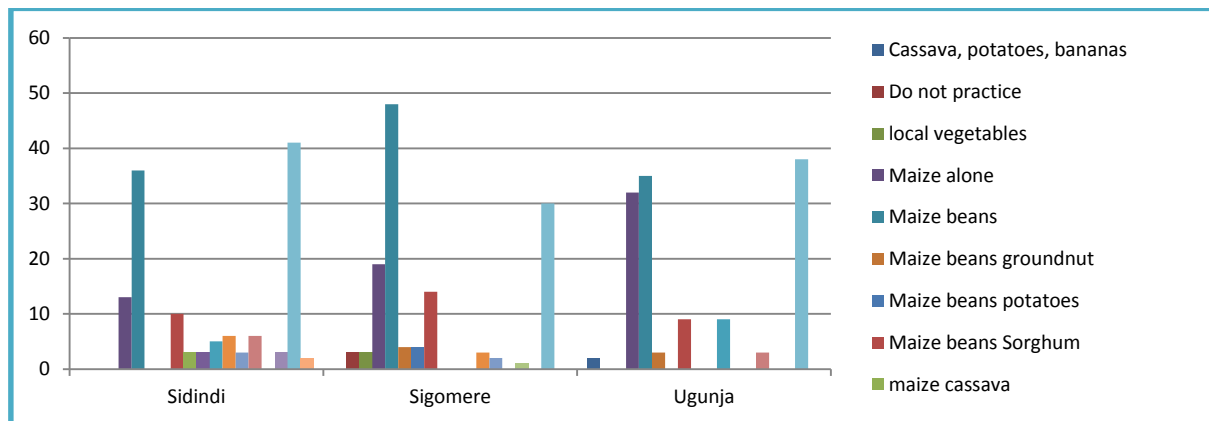


Figure 3: Major crops grown by households per ward

The findings from the household questionnaires indicated that the most predominant crops in the sub-county are Maize and beans as other local crops and vegetables are less preferred. The results showed that 119 respondents grow maize and beans, while 109 respondents grow Maize beans and millet, 64 respondents grow only maize. It was however noted that less than 10 respondents grow either potatoes, cassava, bananas and local vegetables. During the focus group discussions, it was evidenced that those who grow millet and sorghum in the area do it in small quantities because they majorly rely on Maize. This was also supported by the result of crop production given in

the table 3 below with the quantity of sorghum and millet registered as 0.1 and 0.3 bags respectively per annum. Accordingly, the findings from the study putting maize as the most predominant crop in the area was supported by initial FAO report done by Rapsomanikis (2015).

In an effort to understand the level of food production in Ugunja Sub County, the researcher asked the smallholder farmers to state the quantity of each crops they yield from farming. The result of average quantity of each crop and vegetables grown was represented in table 3 .

Table 3: The Quantity of Food Produced Per Crop Grown in the Sub-County

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
Size of the households - number of the household members	393	1	17	2271	5.78	2.871
Quantity of Maize in bags	393	0	30	1758.45	4.4744	4.37617
Quantity of Beans in bags	393	0	12	254.69	0.6481	1.24944
Quantity of Millets in bags	391	0	3	142.25	0.3638	0.64413
Quantity of Sorghum in bags	391	0	2	40.75	0.1042	0.35829
Quantity of Sorghum in bags	393	0	2	24.5	0.0623	0.29112
Kg of Sweet potatoes	393	0	100	550	1.3995	9.86261
Kg of Cassava	393	0	150	673.75	1.7144	13.66585
Kg of Banana	393	0	100	546	1.3893	11.11781
Kg of Tomatoes	393	0	0	0	0	0
Kg of Local Vegetables	393	0	1000	3030	7.7099	87.14489
Kg of Kales	393	0	100	394	1.0025	7.05065
Kg of Arrow roots	390	0	12	36	0.0923	1.04976
Valid N (listwise)	386					

The findings on the quantity of crops produced per season showed that averagely a household has 6 members. Average crop production per household every season showed that 4.47 bags of maize, 0.6 bags of beans and 0.36 bags of millets given that these are the major food crops the household farmers depend on. Given the size of household of 6 members by household depending on 4.74 bags without additional source of income to supplement, the farmers are still under food insecurity. This study realized almost similar findings to the one done by Obonyo, Otieno and Angawa on Land Fragmentation and food security in the same area which showed that farmers got 4 bags or less per season (Obonyo, Otieno, & Angawa, 2016). A worsening image was also seen on other local foods like cassava (1.7kg), sweet potatoes (1.3kg) and arrow roots (0.09kg). The average production of the local food crops were found low since most households do not grow them. During the focus group discussion, an additional question on why the householder farmers were no longer growing local crops like cassava, sweet potatoes and bananas, was raised. There were various reasons given behind that: for cassava one lady said that some time in the

past there was a species of cassava *Nyakatanegi* which was dangerous and deadly thus discouraged many from growing it, however by the time the research was been done the farmers confirmed that there was another species which was safe for consumption and doing well. The reason given for bananas, sweet potatoes and arrow roots was that the soils were not doing well. However it was noted that laziness among the current farmers was a major contributing factor.

On preparation of land, a question on the type of manure the household farmers used was raised, 43% of the respondents said they use manure, 16% use both compost manure and fertilizer, 15.8% use both animal manure and fertilizer, 10.7% use animal manure only, 8.1% do not use manure at all while 6.4% uses compost manure. Nearly similar response on the same question was realized from the key informant questionnaires with 40% using fertilizer 15% using both compost manure and fertilizer while 15.5% using animal manure and fertilizer, 12% using compost manure alone, 9.5 % do not apply any manure while 8% use purely animal manure.

Table 4 : Type of Manure used in Farming by Various Household Farmers in Ugunja Sub-County

Type	Frequency	Percent	Valid Percent	Cumulative Percent
Compost Manure	25	6.4	6.4	6.4
Fertilizer	169	43	43	49.4
Animal manure	42	10.7	10.7	60.1
Both Animal and fertilizer	62	15.8	15.8	75.8
Both Compost and Fertilizer	63	16	16	91.9
Do not use Manure	32	8.1	8.1	100
Total	393	100	100	

Interestingly, the findings on the use of manure put the application of fertilizer higher than other types of manure, contrary to the food production. This prompted further queries and further analysis. When the researcher compared the use of manure against the food production and state of food security, the finding revealed that those households that produce enough food and consider themselves food secure, only a few depend on fertilizer

alone (1 household) while 12 of the responded apply both fertilizer and animal manure while 15 of the respondents applied both compost and fertilizer as illustrated in Figure 4. It was also noted that those households who considered themselves very secure and produced enough food fell in the category that used either both fertilizer and compost manure (4) or both animal manure and fertilizer.

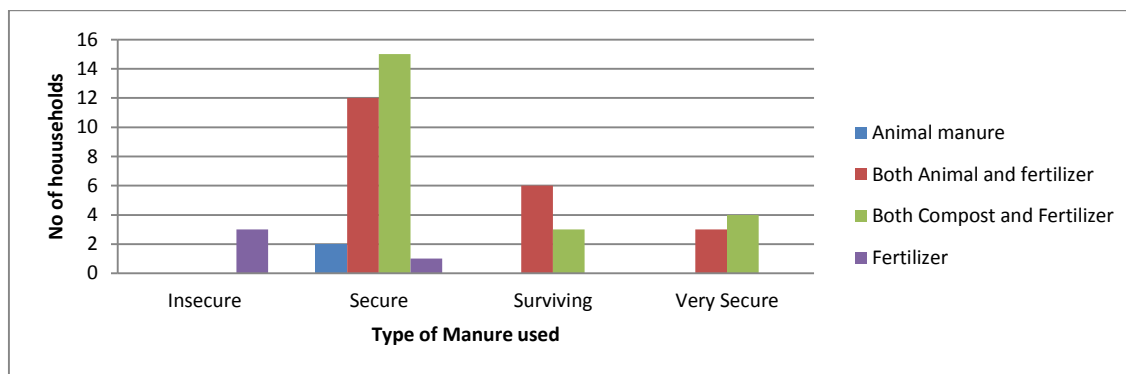


Figure 4: Household that Consider themselves producing enough from the farm in comparison to manure used.

Coincidentally, all the households who considered themselves insecure had been applying fertilizer. Then the question would be if they used the right fertilizer, the right quantity and in the right soil. The dilemma was never resolved and still stands.

Further questions were raised during the focus group discussions on the use of fertilizers, their benefits and the reason why despite the use of fertilizer farmers registered low food production. Some of the reasons given during discussion were; first, it was noted that after solely using

the fertilizer for a long term, the soil would lose its fertility and thus resulting to low food production. Secondly, excessive use of Fertilizer was also noted to give rise to one of the feared weed known by the local name *hayongo*. The other reason that was given on the use of fertilizer was that the community lacked knowledge on the right fertilizer and seeds to use at a particular season that could be more productive within the type of soil in their locality, no extension officers teach except those who are registered by One Acre Fund as seen in the Figure 4.10. On other types of manure which were found to be doing well

especially compost manure and the animal manure when combined with a little amount of fertilizer, it was noted that most farmers are not willingly to transfer the manure from the area of storage to their farms, it was involving.

One of the participants narrated:

In this our area people have just become lazy of work, if I compare during our young age, our parents used to prepare their farms early, ferry enough animal manure to their farm early enough to be used for planting and we used to get many bags of maize. However, these days, people just want to go to the farm till 9:30 am then come back and rest. Some of the farmers who have cows do not prepare the cow dung for the manure, the young families do not want to work hard on farms then what do you expect? (Respondent 1, 2020).

Another respondent had this to say:

When I was young, I used to see people from agriculture (extension officers)

coming to teach our parents on new skills of farming, I don't know whether they still exist. Lastly, our parents used to grow sweet potatoes, arrow, roots, cassava, millet, traditional local vegetables like – (muto, akeyo, boo,) - and others, nowadays how many mothers grow these. We have become lazy to a point we need to buy everything, if we wait everything to be transported from central, even the local vegetables that we used to grow, which miracles will we then do to be food insecure? (Respondent 3, 2020).

Evidently, the findings revealed that majority of the smallholder farmers relied on family members to provide labour with 80.4% sourcing labour from family members, 14% using own or hired OX plough, 4.8% seeking services from private tractors and 0.8% from the County government tractors as illustrated in table 4. This resonated to FAO's report that showed that majority of subsistence farmers source their labour from family member (FAO, 2012).

Table 5: Source of labour for the household farming activities

Source of Labour	Frequency	Percent	Valid Percent	Cumulative Percent
Family members	316	80.4	80.4	80.4
OX plough and hired labourers	55	14	14	94.4
Private tractors	19	4.8	4.8	99.2
County Government tractors	3	0.8	0.8	100
Total	393	100	100	

The results from the Focus group discussion revealed that, though most household farmers sourced labour from family members, the youths even above 18 years of age were always reluctant to participate on farming activities considering it as of low status and always took the peripheral role as was also revealed by Ripoll and his team in their study (Ripoll et al., 2017).. The gender issues also came in during discussion. It was revealed that women do the major bulk of the work. The cooperation of men and women was always seen from tillage until harvesting. Further preparation of the final products after harvesting was left for women, however, on decision on use of the final products the men had to be involved. It was also noted that the decision on what crop to plant on which piece of land was solely the role of men, however the preparation of pieces of farm land for special crops like sweet potatoes, cassava and vegetables was the work of women. There were instances where it was evidenced that

for vegetables planted for sale, despite the fact that preparation were mostly done by women, the decision on the use of the profit was decided by men, or men were fully involved in decision. This was a clear show of gender biasness in term of roles and decision making in farming activities.

Given that some of the households were registered members of NGOs, specifically One Acre Fund, the researcher examined the impact of One Acre Fund on the level of food production. The participants noted that those farmers who had registered with one Acre Fund, which was one of the most dominant NGO in the area, were better off since they were empowered through trainings. This was evidenced when the quantities of crop produced by the farmers who registered with NGO were almost double of those farmers who were not registered by an NGO as demonstrated in Figure 5. The proposal from the

Focus group discussion was that all the NGOs, CBO's and other registered groups, together with the local and national government could work together to come up with a structured way of empowering the whole community. The issue of the availability of extension officers, who were meant to spearhead the empowerment fora was also

raised. The sub county agricultural officer confirmed that there were only 5 extension officers in the whole sub-county- this called for government action- to increase their number and provide them with the necessary tools to allow them reach out to the local farmers.

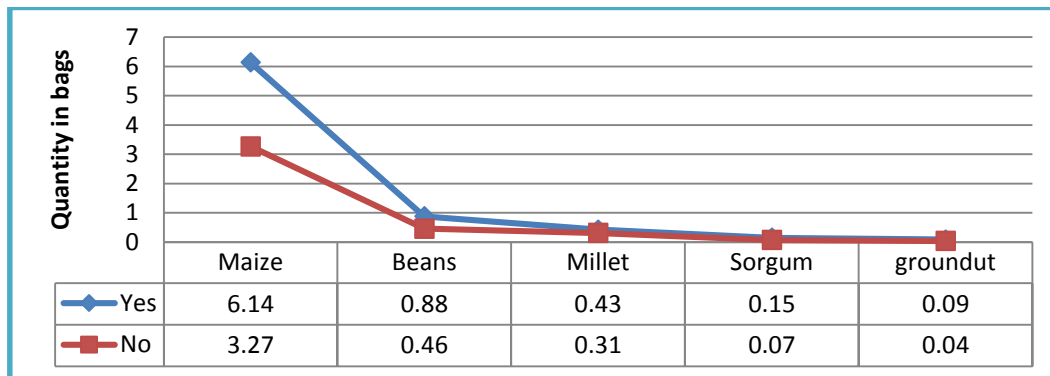


Figure 5 : Comparison of crop production between NGO and none NGO Farmers

Note: NGO farmers here means those farmer that are members of an NGO and benefit due to their membership Analysis

5. Conclusion and Recommendations

5.1 Conclusions

According to the findings of the research, the quantity of food produced by smallholder farmers is less than what they consume thus leading to food insecurity. This was influenced by the farming practiced by the smallholder in the Sub County engage in. It was noted that the most preferred type of farming among the smallholder farmers was mixed farming. This involved growing of crops on higher percentage with rearing of animals which were majorly cows, goats and chicken. The average number of cows, chicken and goats for those households that have were one and three respectively. In terms of the crop production, the most commonly grown crops were maize and beans. The average annual crop production was also noted to be low with maize, beans and millet producing 4.47, 0.6 and 0.36 bags respectively. Other supplements crops, vegetables and other drought resistant crops are either grown in very minimal quantities or no longer grown at all.

The finding on use of manure indicated that most smallholder farmers use fertilizer as compared to compost and animal manure, however, it was also noted that the fertilizer used in small quantities because of lack of capital for purchase. It was also noted that a good number of smallholder farmers grew crops without use of fertilizer or any manure. It was clear that a mere application of fertilizer does not lead to increased food production.

Majority of the households depended on family members as source of labour, however, only a few could afford to hire private tractors or from the county government while a few who had bulls do supplement by Ox plough. It was also noted that the sector of smallholder farming has received limited support from different stakeholders like extension service providers and NGO's within the region. Finally the study revealed that the presence of NGO in the Sub-County registered positive impact on production as the smallholder farmers benefited from training and farm input acquired on credit.

5.2 Recommendation

The smallholder farmers needed to be empowerment on sustainable farming practices which would transform smallholder subsistence production sector in Ugunja Sub-County. In order to achieve this, the researcher recommended that an advocacy model could be developed to be used as an advocacy tool. This would help improve the knowledge and skills of the smallholder farmers on sustainable farming practices and techniques that will in the long run contribute to food security.

The study found that there were several stakeholders working independently towards a single goal of achieving food security among smallholder farmers, in order to avoid duplication of efforts and ease of exchange of information among different stakeholders, the researcher

recommended that a proper collaboration structure of all the stakeholders be put in place. This would be supported by coming up with Stakeholders' Advocacy Engagement Flow Chart and Stakeholder Advocacy Matrix — to help as a guide in enhancing stakeholders' engagement. In the same spirit of engagement and collaboration, The

National, County governments and research institutions should support research on the soil, the most appropriate crop, seed for the soil and the suitable fertilizers, manure. With research the introduction of the best climate smart technologies can be applied.

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