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Sugarcane Growing and The Livelihoods of Small-Scale Farmers in Jinja District, Uganda

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Abstract

This study focused on establishing the relationship between sugarcane growing and the livelihood of small-scale farmers in the Jinja District. The study adopted a descriptive research design. The target population of this study was sugarcane growing households' heads and Village Chairpersons of the sugarcane out-growers association. The study employed purposive and simple random sampling techniques—a sample size of 42 respondents from a population of 362 small-scale farmers. The data collection methods included questionnaires, interviewing, focus group discussions, and observation. The study generated both qualitative and quantitative data. The data collected was analyzed by computing percentages, while qualitative data was analyzed by coding and establishing common themes. This study revealed that although women are fully involved in sugarcane growing, ownership of farms is dominated by men. The dominant age group among the sugarcane farmers is between 30 to 60 years, with mainly primary education graduates. The average farm size was 3 acres, and most farmland was devoted to growing sugarcane. There are some positive benefits from sugar growing, though many challenges have been identified. Most smallholder farmers are experiencing food insecurity. Based on the findings of the study, it was recommended that there was the need to encourage people owning land less than five acres to practice mixed farming, use scientific methods of farming such as intercropping crop rotation, and use fertilizers to facilitate better yields and crop diversification to improve both on their earnings and food security.

Keywords: Sugarcane growing, small-scale farmers and household and livelihoods.

1. Introduction

The increasing world demand for sugar and other related products from sugarcanes is forcing farmers in sugarcane growing areas to convert more agricultural land to sugarcane growing at the expense of food crops. As a result, sugarcane has become the major cash crop in those areas. About 80% of world sugar production is from sugarcane grown in tropical areas, and Brazil accounts for a third of the world's sugarcane production. The rest is from sugar beets produced in temperate regions (Oyugi, 2016; FAO, 2017). In Sub-Saharan Africa, the expansion of sugarcane growing has reduced the land available for food crops. Twenty countries in Sub-Saharan Africa produce sugarcane, and South Africa accounts for 35% (Vermeulen, 2011). This means that the composition varies among the participating countries.

Sugarcane is a commercialized crop in agroecological zones where it flourishes. However, the size of the farms varies from large estates to smallholders, and subsistence farmers often exist besides large estates. Large estates (nucleus) generally produce the bulk of sugarcane, but smallholder farmers contribute substantially to some countries' sugarcane growing industry. In Mauritius, for example, 30% of sugarcanes are supplied by smallholder farmers and 12% by South Africa; in Kenya, 92% of the sugarcane supplied to sugar millers is by smallholder farmers (Vermeulen, 2011; Oyugi, 2016).

Sugarcane growing in Uganda and trade in sugar and its related products is increasingly gaining importance as a cash crop with financial benefits to the smallholder farmers with an opportunity to poverty eradication and food security at the household level. About 54,911 hectares of land are under sugarcane growing in Uganda. This accounts for 36000 metric tons of surplus sugar the country can export FAO, 2016; USCTA, 2017). The sugar industry accounts for 6.5% of the industrial growth of the country, providing for twenty thousand (20,000) direct and fifty thousand (50,0000 indirect employment (USCTA, 2017). In Uganda, sugarcane growing and processing was confined to the fertile soils on the Northern shores of Lake Victoria in Busoga and Buganda regions, except for Kinyara in the country's Midwest. Busoga has thirteen thousand smallholder farmers (13000) producing about three hundred thousand (300,000) tons of sugarcane annually. Even those unable to produce sugarcane hire their land from those who can or to the sugar estates to produce them. This has led to limited land left for food production. Hence, limited food access and food utilization are limited to the local people, undermining the food stability system and food availability (UBOS, 2016).

Uganda is ranked number 103 worldwide by the Global Hunger Index, with 32% of its population in a food crisis. About 87% of the households in Sugarcane growing areas are experiencing inadequate nutritious food in their diet. Jinja District had 39.4% of the rural population having chronic food insecurity (FAO, 2017). Even though Uganda's government emphasizes promoting food production through various interventions like the plan to modernize agriculture and Operation Wealth creation, many households in the Busoga region are experiencing food insecurity.

More than 80% of households growing Sugarcane in Eastern Uganda do not have adequate nutritious food to meet their dietary needs (FAO, 2017). Jinja District is estimated to have 39.4% of the population having food insecurity chronically. This percentage is higher than that at the national level. Uganda is ranked at position 103 worldwide, with 32% of the population in a massive food crisis by the Global Hunger index. Despite the intention and great emphasis on the food production sector, food insecurity remains a persistent problem in rural Jinja. As a result, the number of hungry and malnourished people increased drastically, yet agricultural activities are still the major economic activities in the area. Among the notable agricultural activity is sugarcane growing. This study intends to establish whether sugarcane growing by smallholder farmers has improved their livelihoods at the household level.

2. Research Method

2.1. Description of the study area

Jinja District is located in Eastern Uganda, at Latitude and Longitude 0.500N and 33.200E (Figure 1). It covers approximately 678.7 square kilometers, and 19 square kilometers are covered by water bodies (Sengendo, 2016). In terms of topography, the district has the highest elevation of 1342 meters at Kisuriji to the northeast, with an average height above sea level of 1200 meters dotted with several isolated flat-topped hills. The landscape is generally rolling and undulating with vertical gully heads and flat valley bottom swamps, including streams flowing to the River Nile, resulting from several ancient denudation processes that have left a series of old erosion levels. The area has gentle slopes in the eastern and southern parts of the district. The geological formation consists of mainly the oldest basement complex system overlain by a succession of sedimentary strata, which have undergone a variable degree of metamorphosis (NEMA, 1997). The soils are mainly Nitosols and Ferrasol (Jameson, 1970), dark and fertile clay, and red laterite with a well-defined profile, stable structure, and low erodibility.

The area experiences a tropical climate being modified by relief, vegetation, and nearness to water bodies such as Lake Victoria and River Nile. The rainfall pattern is bimodal, having two seasons. The annual average rainfall received is 1250mm to 1500mm. The average annual maximum temperature does not exceed 30^{o}C. (Sengendo, 2016). The tropical rain forests dominated the area though they disappeared entirely and were replaced by cultural vegetation such as small-scale farmland within the Northern and Eastern parts of the district except in a few areas. The population of Jinja District was estimated at 394,054 people, with 85,867 households. The area's population density is 745 people per square kilometer, with an annual population growth rate of 3.1%, slightly below the national growth (UBS 2017 & NPHC 2014).

2.2. Research design

The study adopted a descriptive research design that generates data based on the situation at that time, and the conclusion is as per that situation. The study population was the rural house-holds of small sugarcane growers in the Jinja District. About 2349 households were engaging in agriculture (UBOS, 2019). A sample of 120 household heads of sugarcane growers was randomly selected to participate in the study. Five community leaders were purposively selected for interviews. Mafubira sub-county was purposively selected from five rural sub-counties that constitute the rural Jinja District. It is one of the sub-counties with a high level of sugarcane registered smallholder farmers' cooperatives in the district. Simple random sampling was used to select 4 out of the seven parishes, and 12 villages were randomly selected from the 42 rural villages. One hundred twenty smallholder farmers were randomly selected from 1570 smallholder farmers in the sub-county. Data collection methods included interviews with the local leader, questionnaire interviews with household heads, and focus group discussions with the farmers. The observation was used to collect and document the data on the characteristics of the farms at household levels. The qualitative data were transcribed, translated, analyzed, categorized, and organized according to themes. The quantitative data were presented in tables of frequencies and percentages.

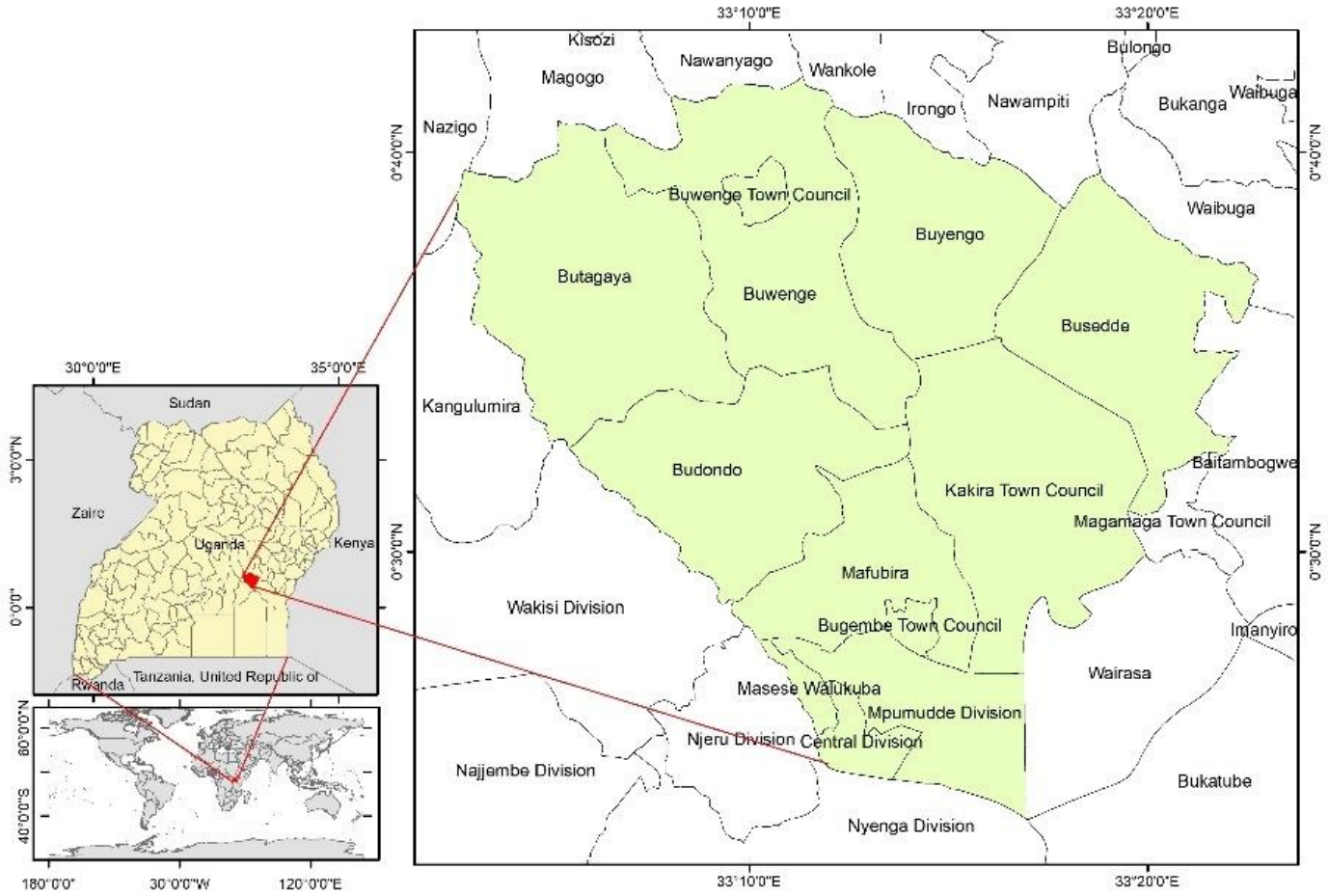

Figure 1. Location of Jinja District and its Sub Counties.

3. Results

3.1. Characterization of the smallholder farmers and farms in Jinja

The majority of smallholder farmers (86%) in the study area were male, as observed in Table 1. The dominant land tenure system is customary in this area, where male children inherit the land. The ownership of productive resources is in the hands of men, and therefore they are the ones that decide on the allocation of land to different productive activities. This has severe implications for gender equality and equity. It also affects poverty and food security at household levels.

The farmers and their farms were characterized according to gender, age, education, farm size, land allocated for sugarcane production, and incomes from farms. They are presented in Table 1. The majority of the farmers were in the age brackets of 30 – 39, 40 – 49, and 50-59. These age brackets constitute 81% of the total population of the farmers. This is the most productive age. The majority of the farmers (66%) were mainly primary graduates. The majority of the respondents (95%) were active members of the farmers' groups that helped them negotiate prices and voice their concerns to the estate growers who buy their sugarcane. On average, all farmers allocated more land to sugarcane growing than to food crops. Smallholder farmers with relatively large pieces of land up to 10 acres allocate up to three-quarters of their land to sugarcane growing, including hiring out to the sugar estate. Farmers with four or fewer acres of land allocate up to 2.5 acres for sugarcane growing, while those with more than 10 acres allocate 11 acres of their land to sugarcane production. An interview with a community leader in Nakabongo village revealed, " *Most farmers in the area had allocated land to sugarcane growing up to their doorsteps and have not provided for the courtyard for the children to play. This was proving dangerous for the security of family, domestic animals, and birds*". In the focus group discussion held at the Mafubira sub-county, the farmers agreed that generally, farmers with less than 4 acres of land

allocated most of it to sugarcane growing to have big harvests and substantial income from the sale of the sale Sugarcane. The majority of the farmers (79%) belonged to farmer groups that managed the marketing of the sugarcanes and depended on family labour to produce the sugarcane.

Table 1. Characteristics of Farmers and Their Farms.

Gender	Number (n)	Percentage
Male	103	86
Female	17	14
Age		
20 – 29	03	5
30 – 39	37	31
40 – 49	31	26
50 – 59	29	24
60 +	17	14
Education level		
Primary	66	55
Secondary	30	25
Tertiary	24	19
Average Farm size (acres)		
1 – 4	80	67
5 – 9	35	28
10 – 14	5	5
Membership to farmer organizations		
Member	95	79
Non-members	25	21
Labour used on the farm		
Family	105	87.5
Hired	15	12.5
Mode of land acquisition		
Customary (Inherited)	86	71.6
Bought	23	19.2
Rent	11	9.2

3.2. Benefits of sugarcane growing to smaller holder farmers in Jinja

The farmers were asked to state the benefits of sugarcane growing. They were able to identify several benefits. Among them included buying food staffs that they could not produce on their farms, buying more land, building better houses, educating their children, meeting health care costs, and many others, as presented in Table 2.

Table 2. Benefits from Sugarcane Growing on Household Food Security.

Benefits of sugarcane growing	Frequency	Percentages
Earn income to buy food not produced on the farm	103	85.7%
Buy more land for both sugarcane and food crop growing	86	71.4%
Have time to cultivate other food crops	80	66.7%
Sugarcane growing improves farmers' access to agricultural loans high yield varieties	74	61.9%
Able to educate their children and pay for health care	77	64.3%
Improve housing conditions	63	52.4%

The results in Table 2 indicate that the majority of the farmer (85.7%) could supplement the local diet by buying what they could not produce or to meet the deficit gap in food production. It should be noted that many smallholder farmers have allocated most of their land to sugarcane production. Also, 71.4% of the farmers could buy more land to expand on sugarcane growing and plant some food crops. In addition, farmers reported having enough time to grow other crops (66.7%). An

interview with a critical informant made the following remarks:" *Little portions of land are left for food crop growing by sugarcane farmers, but this is about his size*".

Sugarcane farmers have access to loans to invest high yielding varieties (61.9%) through their farmer groups compared to those not growing sugarcane. This was also supported by some key informants who indicated that:

> "*Sugarcane farms are near to cash because farmers can access loans, including loans from money lenders. This money can be used for development, and there is high cash flow used to access social amenities and have improved in the area*".

The farmers have educated their children and paid medical expenses (64.3%). One of the key informants supported this:" *Growing Sugarcane has helped me educate all my six children to the University level, and I can afford to buy all basics I need, including health care*". Quite a number (52.4%) of the respondents indicated improved housing conditions by building permanent houses, as observed in Figure 1. They have also been able to buy other household properties like motorcycles, bicycles, Television sets and even cars. It implies that generally, farmers that grow sugarcanes have better livelihoods than those not involved in sugarcane growing. An interview with a leader of farmers had this to say: "*I do not need to go to the mines or fishing to work. This soil has whatever I want in terms of money/income. This is where I can earn a living to support my family and do other useful things*". *Another key informant stated:" sugarcane provides money used to buy food, obtain more land and construct good houses*".

3.3. Sugarcane growing and average income at household levels

It has been concluded that generally, growing sugarcane, whether on the estate or small-scale, is associated with a general improvement in the income of the farmers and workers employed on the estate. In this study, we were interested in establishing the general contribution of sugarcane growing on the average income of smallholder farmers. The findings are in Table 3.

Table 3. Average Annual Income in U.S. Dollars (USD) of Sugarcane Farmers in Jinja District.

Land (acres) for sugarcane	No (n) of respondents	Percentage	Average Income
Less than 5 acres	80	66.7	2,083
Less than 10 acres	34	28.6	5,416
Less than 15 acres	06	04.7	9,166
Total	120	100.0	

Source: field data

Table 3 shows that the majority of the respondents (66.7%) owning less than 5 acres were earning an average of 2,083 dollars annually. This was more than twice the national GDP per capita which was USD 912. Also, 28.6 per cent of the respondents who owned land less than 10 acres were earning an average of 5,416 U.S dollars annually. An interview with the key informants pointed out that most farmers have increased their farm size for better incomes. The establishment of more sugarcane factories in the area and the free movement of sugarcanes, including export to Kenya, have provided enough market. However, the recent closure of the Kenya border has affected their income and livelihood. Most of the income is spent meeting household needs like educating children in good private schools. They can also buy food from shops to supplement the little produced on their small farms. This has also been compounded by variable harvests caused by the outbreak of pests and diseases, volatile market prices, sugarcane spoilage in the garden and poor-quality seeds provided.

Table 4 shows a tendency of unequal Management of the money from sugarcane selling. In this case, the majority of the respondents from the categories of farmers owning less than 10 acres feel that income is not equally managed at the household level. Men dominate in managing income from the sugarcane sale, yet the women do most of the production work. They are involved in land preparation, planting maintenance and even harvesting. Despite all the work they do, they are never involved in the marketing of harvests. There is gender inequality when it comes to owning resources from sugarcane production. An interview with the sub-county community development officers indicated that in most cases, farmers mortgage the sugarcanes to money lenders before harvesting, and women realize this when a different person is harvesting the sugarcanes.

Figure 2. An Example of House Constructed and Electricity Installed in The Homestead of a Sugarcane Farmer.

3.4. Income distribution at the household level

The study intended to establish income distribution at the household level. Therefore, the respondents were asked about the ownership and Management of income obtained from sugarcane. The results are as presented in Table 4.

Table 4. Responses on Ownership and Management of Income from Sugarcane.

Farm size	Managed by men	Percentage	Managed together	Percentage
Less than 1acre	58	72.5	22	27.8
Less than 10 acres	22	64.7	12	35.3
Less than 15 acres	3	50	3	50

As indicated in Table 4, most respondents (72.5 and 64.7) of the farmers with land size less than one acre and less than 10 acres indicated that the money obtained from sugarcane is managed by men (Husbands) they have limited access to it. This shows that despite the much labour provided by females, the proceeds are men's hands. Therefore, the activity does not promote gender equity. The respondents were asked to indicate whether sugarcane growing affects women's access to land. The responses indicated that most respondents (66.7%) agreed that Sugarcane growth affects women's access to land. In a focus group discussion held at Nawanyago village, a woman narrated how she had lost land allocated to her as follows:

> "*I was allocated an acre of land for food production, but when I stopped producing children, my husband declared that we should allocate it to the cultivation of sugarcane. That is what we are doing, and all the money is with him*".

The other account one woman gave was:

> "*She was digging in the garden with her children when a tractor came, and they were told to stand aside. They watched as their food crops were destroyed and her master (husband) planted sugar cane in its place*".

Also, another woman had this to say:

"*My husband died and left me with 14 acres of land, but the children have taken all of it and planted sugarcane*".

3.5. Sugarcane Growing and household food security in Jinja District

Growing literature confirms the relationship between the increasing cultivation of cash crops with the reduction in food production, primarily where industrial crops like sugarcane are grown in the Sub-Saharan region. Most farmers offer more hectares of land for industrial crops at the expense of food crops. Growing perennial crops like sugarcane affects women's access to land, leading to increased food insecurity. The results from this study are not far from the above assertion. Dimensions of food security include; food availability through domestic production and procurement, food access in terms of household capacity and entitlements to acquire food, food utilization in terms of nutrition security, which is measured by anthropometric parameters, and food stability, which is defined as the ability of households have an adequate and constant food supply at all times (FAO, 2017). This study adopted the concept of food security using food stability measures because it covers availability, access, and utilization to a great extent. The findings are as in Table 5.

Table 5. The Status of Food Security in The Research Area.

Land size	Status of food security at the household			
	Food insecure		Food secure	
	Respondents (n)	Percentage	Respondents (n)	percentages
Less than 5 acres	53	66	27	44
5- 10 acres	15	68	7	32
11- 15 acres	6	100	-	00

Table 5 shows that generally, farmers having land less than 5 acres are experiencing food insecurity. The food insecurity in this study was established using Household Hunger Scale (HHS) which measures food insecurity using the food stability model. It was also classified as severe food insecurity, moderate and mild. The findings in Jinja are as in Table 6.

Table 6. Classification of Food Insecurity.

S/N	Status of food insecurity	Respondents (n)	Percentage (%)
1	Mild	25	47.2
2	Moderate	18	34
2	Severe	10	18.8
	Total		100

The majority of the respondents (47.2%) that were categorized facing food insecurity were in the mild class of food insecurity, 34% were in the moderate food insecurity class, and 18.8% were in the class of severe food insecurity.

4. Discussion

The study found out that even though the sugarcane industry is dominated by males, the labour supply on the sugarcane farms is by women, as confirmed by Emmanuel and Helen, 2020; Mwavu *et al.*, 2018, Rocca, 2016; Sanghera and Sharma, 2015, Zaidi and Munir, 2014). Women's participation as out-growers in the sugarcane industry is generally lower in Sub-Saharan Africa than men. This is caused by the existing land tenure system, especially the conventional system, which grants rights to inherit the land and other productive resources to male children. In areas like Kilombero, Tanzania, where land was equally allocated to both men and women under the Ujamaa scheme, women's status in the community differs from areas where the conventional system is reigning. The recent awareness and raising of women's rights over land have weakened the strong customary ties over land, especially in the patriarchal social system in rural areas of Jinja District. Despite the improvement in employment opportunities for women in the sugarcane production industry, they have remained as suppliers of labour on sugarcane farms (Emmanuel and Helen, 2020). The majority of the smallholder farmers were 30 to 50 years old and were mainly primary education graduates. This is the most productive age. This level of education is likely to affect the production of sugarcane negatively. A low level of education limits the adaptation and adoption of modern scientific methods of sugarcane production. According to Khan *et al*., (2019), most sugarcane farmers in Africa and Asia are illiterate, limiting production under out-grower schemes. The above situation is not any different from the Jinja district. Economically it was found that

generally, smallholder sugarcane farmers had high incomes above the national GDP per capita. A similar situation was reported in Kenya and Zambia (Wegulo and Obilinji, 1999; Oyugi, 2016; Shumba *et al.*, 2011). It was also established that the average incomes from sugarcane were much higher than from other crops. The farmers in the study area can access loans to fund other activities. This was reported by Govereh & Jayne (2003) that sugarcane farmers could access agricultural loans, which can enable them to produce food crops. However, the long gestation period eroded the high incomes, forcing them to borrow from money lenders before harvest. This, coupled with limited land allocated to food production, makes them spend a substantial part of their income on food purchases. The production costs and fluctuations in prices in most cases affect their income. This is in line with Bharati *et al*. (2018), who established that despite sugarcane growing being profitable in Nawalparasi-Nepal, many costs reduce the farmers' real income.

The sugarcane farmers were able to educate their children, afford better health care services, improve housing conditions, and acquire other property, hence improving their livelihoods. This was also observed by Waibi (2019), Waswa *et al*. (2012), Madhanapall (2012), and Oyugi (2016) that sugarcane farmers had been able to raise income for the education of their children, acquire additional property, notably land and construct decent shelters. However, smallholder sugarcane farmers have prioritized growing sugarcanes at the expense of food crops. Sugarcane growing is male-dominated; it affects food security in homes with limited land. This had led farmers to spend more on food purchases and little on the subsistence gardens, which depended less on other household needs. Studies about the relationship between sugarcane growing and food insecurity had been highlighted by Chebii (2009), Jelsma *et al*. (2010), Wiggin *et al*. (2015), and Mwavu *et al*. (2016), even though sugarcane farmers earn money which can be used to purchase food, the reality on the ground is different. There are clear indicators and reports of food insecurity ranging from severe in cases where the majority of the farmers have land less than 4 acres to moderate in cases of farmers having less than 9 acres of land

4. Conclusion

Given the findings of this study, the following conclusions were made: The ownership of sugarcane farming in Jinja District is dominated by men, although most of the work is done by women. Women are the major suppliers of labour to the farms. It is dominated by productive age with low levels of education, which has limited science and technology diffusion. Although there was no comparative analysis between sugarcane farmers and those not growing sugarcane in terms of their livelihood, generally, they have better livelihoods than that not growing sugarcane. Sugarcane growing negatively affected food security among people in Jinja District, especially those with less than 5 acres of land. Much of the land is devoted to sugarcane growing, leaving a very small section for food crops. It was also concluded that cash income from sugarcane farming was insufficient to meet household food needs. Therefore, there is a need to sensitize farmers to grow more food.

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Author Contributions

All authors contribute equally. All authors have read and agreed to the published version of the manuscript.

References

Bharati, B., Panta, R., & Khanal, K. (2018). Assessing socio-economic condition of sugarcane producers in Nawalparasi District of Western Nepal. *Biomedical Journal*, 1, 3.

Chebii, K. (2009). The impact of sugarcane growing on household food security in Belgut Division. A thesis submitted in partial fulfilment for the Master of Arts (Planning) degree at the University of Nairobi.

Emmanuel, S. and Helen, D. (2020). Gender Politics and Sugarcane Commercialisation in Tanzania. *Journal of Peasant Studies*. Vol.47:5.974-992. Doi 10.1080/3066150.2019.1632294

Food Agriculture Organization. (2009). Declaration of the world food summit on food security. FAO, Rome.

Food Agriculture Organization. (2017). Africa Regional Review of food security and Nutrition. FAO, Rome.

Gregory. P.J.S Ingram and Lacich, M. (2005). Climate change and food security Philosophical Transaction of the Royal Societies. *Biological Sciences*. 360(1463)2139-2148

Govereh, J., & Jayne, T. S. (2003). Cash cropping and food crop productivity: synergies or trade-offs? *Agricultural economics*, 28(1), 39-50.

Hess, T. M., Sumberg, J., Biggs, T., Georgescu, M., Haro-Monteagudo, D., Jewitt, G., ... & Knox, J. W. (2016). A sweet deal? Sugarcane, water and agricultural transformation in Sub-Saharan Africa. *Global environmental change*, 39, 181-194.

J.D. (ed.). (1970). Agriculture in Uganda. Oxford University Press.

Jelsma I., Bolding A. and Slingerlands M. (2010). Smallholder Sugarcane Production in Xinvane, Mozambique – Report from the Field. Wageninen: Wageninen University

Khan, F., Wegener, M., & Khan, M. Z. (2019). Engagement with extension services by small-acreage sugarcane farmers in selected districts of Pakistan. *Rural Extension and Innovation Systems Journal*, 14(2), 34-42.

Madhanapall, A. (2012). Small-scale grower projects: A catalyst for rural development. South. *Africa Sugarcane Journal*. March 2012: 18-23.

Mblinyi, M. and Semakafu A.M. (1995). Gender and Employment in Sugarcane Plantations in Tanzania. *Sectoral and Working Discussion Papers*, SAP, 2.44/WP.85. Geneva: International Labour Organisation.

Millennium Ecosystem Assessment. (2005). Ecosystems and Human Well-Being: Synthesis; Island Press: Washington, DC, USA.

Ministry of Finance, Planning and Economic Development. (2013). *Report*. Kampala, Uganda

Ministry of Finance, Planning and Economic Development. (2015). Sustainable Development Report: Uganda's Aspiration for Middle Income Status. Strategies for Sustainable Land use and Management. Economic Development Policy and Research Department. Kampala, Uganda.

Mtshali, S. M. (2002). Household livelihood security in rural KwaZulu-Natal, South Africa. Ph.D. Thesis. Wageningen: Wageningen University

Mwavu, E. N., Kalema, V. K., Bateganya, F., Byakagaba, P., Waiswa, D., Enuru, T., & Mbogga, M. S. (2018). Expansion of commercial sugarcane cultivation among smallholder farmers in Uganda: Implications for household food security. *Land*, 7(2), 73.

Mwavu, E., Kalema, N., Bateganya, M., Waiswa, R., Enuru, D., & Mbugga, N. (2016). Agrobiodiversity of home gardens in a commercial sugarcane cultivation land matrix in Uganda. *Int. Journal Biodiversity Science*. Ecosystem Service Management.

National Environment Management Authority. (1997). State of the Environment Report- Uganda,1996. NEMA Secretariat. Kampala, Uganda.

Oyugi, B. (2016). Social-economic impacts of sugarcane farming on livelihoods and the biophysical environment in Transmara sub-county Kenya.

Rocca, V. (2016). Gender and livelihoods in commercial sugarcane production: A case study of contract farming in Magobbo, Zambia. *Zambia* (June 1, 2016).

Sanghera, G. S., & Sharma, M. (2015). Women in Sugarcane Farming: Challenges and Opportunities. *Journal of Krishi Vigyan*, 3(2s), 119-124.

Sengendo, H. (2016). Macmillan Uganda Secondary School Atlas. ISBN 978-0333-68797-O

Shumba, E., Roberntz, P. and Kuona, M. (2011). Assessment of Sugarcane Out grower Schemes for Biofuel Production in Zambia and Zimbabwe. Harare: WWF.

Uganda Bureau of Statistics report (UBS). (2016). The National Population and Housing Census 2014- Sub County Report. Kampala, Uganda.

Uganda Sugarcane Technologists Association report (USTA). (2017). Kampala, Uganda.

Vermeulen S. (2011). The Economics of Climate Change: Potential impacts on the agricultural industry in Sub Saharan Africa. Consultancy Africa Intelligence.

Waibi, M. (2019). Sugarcane growing and Household Food Security: A case study of Mafubira Sub- County Jinja District. A dissertation submitted to Kyambogo University Graduate School was Not Published.

Waswa F., Gweyi - Onyango J. & Mcharo M. (2012). Contract sugarcane Farming and Farmer's incomes in the Lake Victoria Basin, Kenya. *Journal of Applied Biosciences* 52: 3685– 3695, ISSN 1997–5902. Elewa

Wegulo, F. and Obilinji, H. (1999). The Interface between Farm and Non-farm Activities among the Mumias Sugarcane Growers. *Working Paper* 524. Brighton: IDS.

Wiggins, S., Henley, G., & Keats, S. (2015). Competitive or complementary? Industrial crops and food security in sub-Saharan Africa. Overseas Development Institute Report; *Overseas Development Institute: London*, UK, 41.

Zaidi, N. H., & Munir, A. (2014). Participation of Women in Sugarcane Farming System-A Case Study of Bijnor District (Western Uttar Pradesh). Economic Affairs, 59(3), 449-457.