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Sugarcane - food security paradox: Evidence from Uganda's cane growing sub-regions

Executive Statement

The core aim of this briefing note is to answer the question, "Is sugarcane growing associated with household food insecurity - and perhaps even causes it?" The study relied mainly on primary data collected from the sugarcane-growing sub-regions of Buganda, Busoga and Bunyoro. Food security is measured using three indicators: Household Food Insecurity Access Scale (HFIAS), Months of Adequate Household Food Provisioning (MAHFP), and Household Dietary Diversity Score (HDDS). Regardless of the food security measure used, on average, findings show that cane-growing households were more likely to be food secure than their non-cane-growing counterparts. However, within the cane-growing households, the households in the Busoga sub-region were more likely to be food insecure than their counterparts in the other sub-regions. Furthermore, being registered with a miller was associated with better food security. Within the non-cane growing households, residents in the Bunyoro sub-regions were more food insecure than their counterparts in the other regions. Land size was found to be a critical input to the food security question. Those in cane production with land size less than eight acres and those of non-cane output with land less than two acres were severely food insecure. Consequently, the food insecurity-sugarcane question in Uganda is beyond sugarcane and as such, innovative solutions that comprehensively address food security in these regions are required.



What is the issue?

Sugarcane and food security have been key issues of debate in development in Uganda. A consensus on whether sugarcane growing is suitable for food security has not been reached. The mixed insights from anecdotal evidence depend on who provides their view on this: the miller, outgrowers, or government. First, millers often ascertain that sugarcane, as an industrial crop, has yielded better food security outcomes for outgrowers given the better income they obtain. This later enables outgrowers/sugarcane-growing households to smoothen their food consumption needs upon pay.¹ Second, the Government, especially the Ministry of Trade, Industry and Cooperatives, which has been the principal player in creating the enabling environment for the key players,^{2,3} is neutral with a bias on licensing more mills to increase the sugarcane production capacity to meet both the domestic and export demand. Third, outgrowers have had mixed reactions, arguing that sugarcane growing had fostered food security. In contrast, others attribute their food insecurity to being directly or indirectly involved in growing

sugarcane.⁴

Ideally, the mixed views stem from the increasing conversion of land originally under food crop and forest cover in favour of expanding cane production by households, millers (old and new) and the government. The initiative is mainly due to the need to increase cane production to meet both the growing demand from the mills as an input and create a niche to meet both domestic and export markets for sugar and other sugarcane-related by-products such as biofuels, electricity, alcohol, fertiliser, sweets.⁵ Land area under cane increased from approximately 20,000 hectares in 2005 to over 81,000 hectares in 2020, leading to a total sugar production increase from one million metric tons in 2000 to over six million metric tons in 2020.⁶ Households' rush to convert land for cane was driven by lucrative prices, and new households observed the old outgrowers growing rich from the engagement.⁷ These households thought sugarcane could improve growers' food security and well-being as a relatively high-return crop through increased farm income and generate additional farm and non-farm employment.⁸

While household income poverty had reduced, food poverty increased in Uganda's leading sugarcane-growing sub-region of Busoga (from 52% in 2016/17 to 56% in 2019/10). In comparison, in Bunyoro, it remained unchanged (at 33%) and improved in Buganda (from 35% to 32%) over the same period.⁹ The food poverty situation was linked to sugarcane growing. Still, without concrete evidence to this assertion, an increase in food insecurity in sugarcane growing sub-regions does not imply causality as income poverty had improved, especially in Busoga and Bunyoro in 2020 (from 36% to 29.4% and 19.3% to 9.8% respectively) and increased for Buganda North from 10% to 13.8%.¹⁰ Therefore, This policy note aims to provide preliminary insights into this paradox by providing evidence on whether sugarcane growing improves food security in the sub-regions of Buganda, Busoga and Bunyoro. This is an extract from a working manuscript titled *"Sugarcane Production and Food Security in Uganda"*.

How did we approach the issue?

The primary data collected from Uganda's sugarcane-growing sub-regions-Busoga, Buganda and Bunyoro was used to provide insights into the sugarcane-food security question. The data was collected from 1,771 (983 cane.¹¹ and 787 non-cane¹² grower) households in December 2021 by the Economic Policy Research Centre (EPRC) with support from the Innovations Lab for Food Security Policy, Research, Capacity, and Influence (PRCI) project. Detailed information was collected on household demographics, food security, land management, and community characteristics of cane and non-cane outgrowers. In addition to data collected from households, key informant interviews (KIIs), community barazas and Focus Group Discussions (FGDs) were held in each sub-region to provide more insights into what the numbers depict. From the data, three household food security measures were constructed as presented in Box 1.

Box 1: Definitions and measurement of food security indicators used

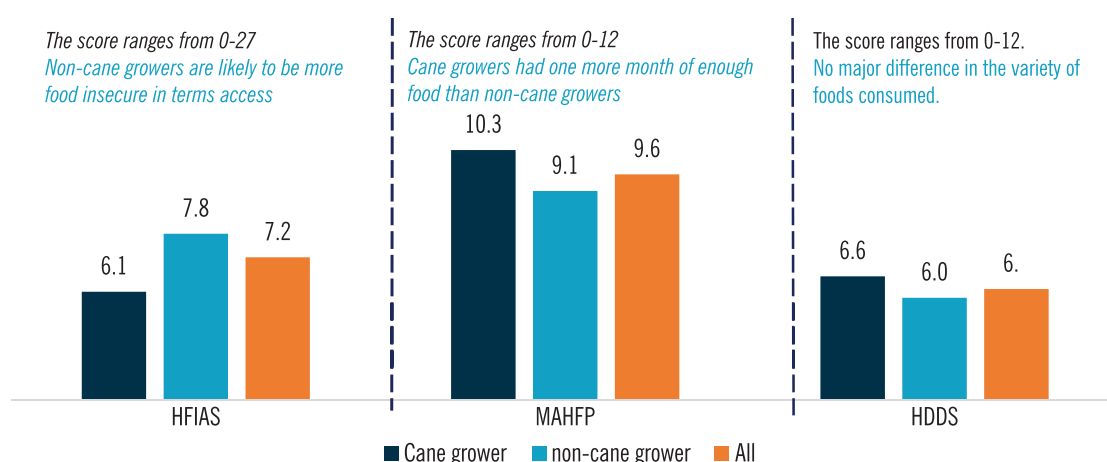
Food security exists when all people have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences.¹³ Food security is known to be comprised of four major dimensions: availability, access, utilisation, and stability.¹⁴ The three measures used are:

- The Household Food Insecurity Access Score (HFIAS):** The HFIAS measures the household's degree of food access in the past 30 days. The score ranges from 0 to 27 using nine food insecurity experiences. The lower the score, the more food secure (closer to 0) and vice versa. HFIAS covers the access domain with specific components on quantity, perceived quality, and preference touched.¹⁵
- Months of Adequate Household Food Provisioning (MAHFP):** The MAHFP measures the domain of access and availability above the minimal level of the year. The indicator is the sum of the months of adequate food provision (0-12). Respondents' recall period is 12 months.¹⁶
- Household Dietary Diversity Score (HDDS):** HDDS covers the access domain with quantity and quality components touched if measured individually for the latter. It involves counting the number of food groups (of 12 groups) consumed by a household over a 7-day recall period in this study. The score ranges from 0-12, in which a low HDDS value signifies higher food insecurity status and vice versa. The 12 food groups include cereals, roots and tuber, vegetables with tubers, leafy vegetables; fruits; meat, poultry; eggs; fish; legumes/nuts/seed; milk and milk products; oil/fats; sweets (sugar/honey) and, spices, condiments, beverages.¹⁷

What did we find?

On average, cane grower households are more likely to be food secure than non-cane growers' counterparts. All three measures of food security employed show that growing cane in 2021 was

Figure 1 Food security status by cane growing status and measure, December 2020-2021



Note: The mean differences are statistically significant.
 Source: EPRC-PRCI Sugarcane survey dataset, 2021.

associated with higher food security (i.e., lower food insecurity) relative to non-cane growers- despite the mixed views from anecdotal and other empirical literature on cash crop production and food security (Guloba *et al.* 2023). For instance, in Figure 1, the mean HFIAS score for cane grower households is lower (6.14) than that for non-cane growers (7.84) households. Likewise, the MAHFP indicator reveals that cane grower households had, on average, 10.3 months of adequate food (thus more food secure) while non-cane growers had 9.1 months (less food secure). In contrast, the mean values for HDDS were higher (6.6) in cane grower households than for non-cane growers (5.97) on a scale of 0 to 12 food groups.

Engagements with the community revealed that new entrants in cane growing were dedicating all their land to cane growing without leaving some for other food production. A participant said:

“We farmers who started growing cane earlier have more knowledge than others, and we don’t have any food insecurity issues. Here, for example, you cut your cassava and plant 100 stems. Once harvested, you will eat them for four months. How does a person complain of food insecurity when he is a cane grower? I call that poor planning” (Survey participant 2021).

Others said food insecurity was a much wider problem than people were willing to admit, and it goes beyond cane growing communities. That is:

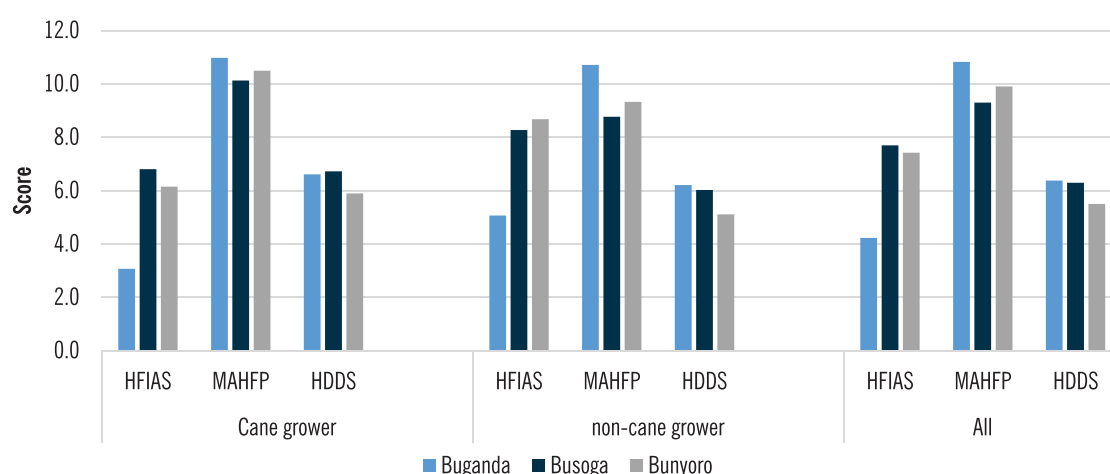
“There is no food completely when you go deep down in the villages and that is poor planning. Even outside cane growing area like in Kampala, we have people who feed on beans and posho from Monday to Monday. Food security here is hard, I used to feed my family on fish twice in a week and I cannot access fish because the government interfered and can now only afford small fish”. (Survey participants 2021).

At the sub-regional level, cane growers were more likely to be food secure across all three measures than non-cane growers. Figure 2 highlights the high potential of being food secure for cane growers in each sub-region. However, comparisons at the sub-regional level also reveal that the Buganda subregion’s cane grower households were likely to be more food secure compared to the cane growers in the Busoga and Bunyoro subregions for each measurement of food security. Similarly, non-cane growers in Buganda were more likely to be food secure compared to their counterparts in other regions of study. Discussions in a Community Baraza held in the Masindi district located in the Bunyoro sub-region revealed that most people were facing food uncertainties in Masindi sugarcane growing communities. This is because many people have taken on cane growing as a buffer for earning money. This means they left little or no land at all for food crops.

“We have an issue of food security since most of the land is being utilised for cane growing. I started with one hectare and educated my children but as per now, Kinyara has taken long to harvest my cane and some is drying in the field.” (Survey participant 2021).

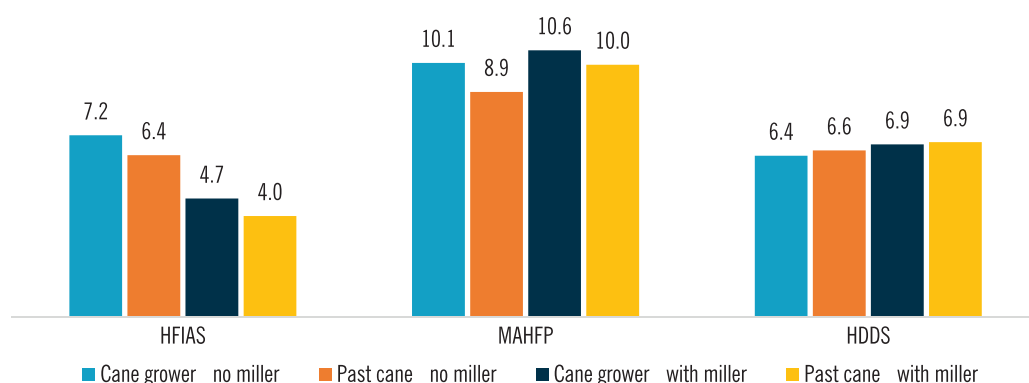
Cane growers with clear market arrangements with a miller were likely to be food secure. Cane grower households that have never been registered (no miller-farmer institutional arrangements) were found to be more food insecure in terms of access (have higher average HFIAS), about 3 months of household food inadequacy (low MAHFP and low HDDS than their registered counterparts (Figure 3). The miller-farmer institutional arrangements (which determine the ability of households to sell cane and earn income) are a critical source of food security. Evidence revealed that cane-grower households with no mill prior arrangements were likely to be food insecure (HFIAS score 7.2), followed by those who are past cane growers with no miller (6.4). The households that stopped growing cane also had fewer months of adequate food— meaning 8.9 months of adequate food provision and a relatively less diverse diet (low

Figure 2 Food security measure by sub-region and cane growing status



Note: The mean differences are statistically significant.
Source: EPRC-PRCI Sugarcane survey dataset, 2021.

Figure 3 Food security measures by cane grower status and miller relationship, %



Source: EPRC-PRCI Sugarcane survey dataset, 2021.

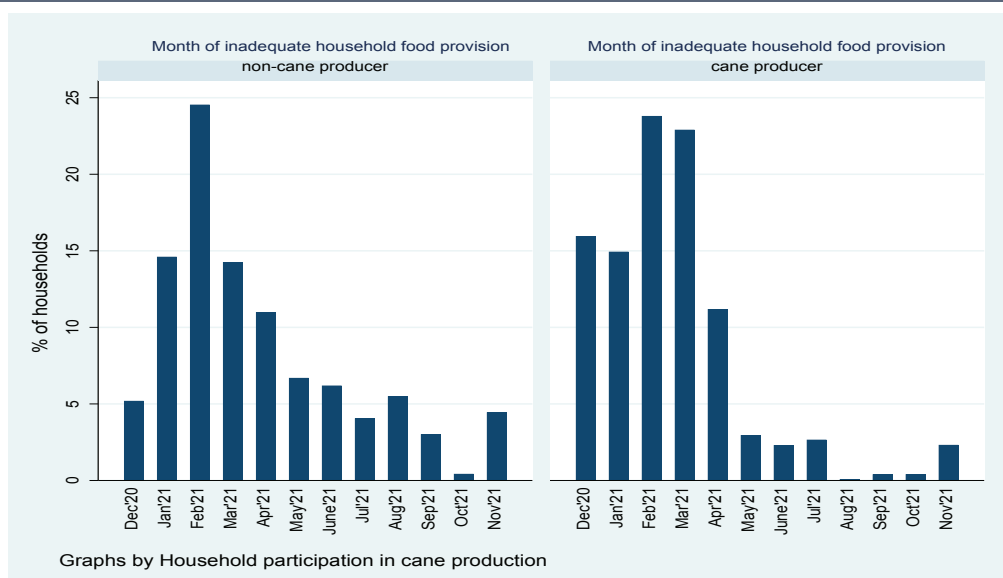
HDDS on average). Cane grower households with clear miller attachments were found to be food secure for all outcomes for all three food security measures. Effective coordination is imperative for sugarcane to improve the food security of growers and, indirectly, that of non-growers (Mbowa et al, 2022).

Almost four out of ten cane and non-cane grower households reported February 2021 as the month with utmost inadequate food availability. However, the non-cane growers reported a relatively widened spell of months of limited food provisions than cane growers (Figure 4). This could be attributed to the lack of adequate incomes and seasonality in cropping cycles of annual subsistence food crops (beans, maize, etc.) to smoothen food inadequacies throughout the year. The seemingly pronounced 5 months (from December 2020 to April 2021) of inadequate food provisioning among cane-grower households could be occasioned by the long time for harvesting, sales, and payment of sugarcane by mills.

At the time of the survey, at least a good portion of households had sold cane around August to October 2021, and income from cane had started to dwindle. Hence, an increase in inadequate food provisions was observed in November 2021 as cane markets were sticky. Besides, had cane supply and demand been adequately coordinated between growers and millers, this result strongly suggests that cane growers who did not sell their mature crop on time would likely have had better food security had they been able to sell at least some of their cane at the right time.

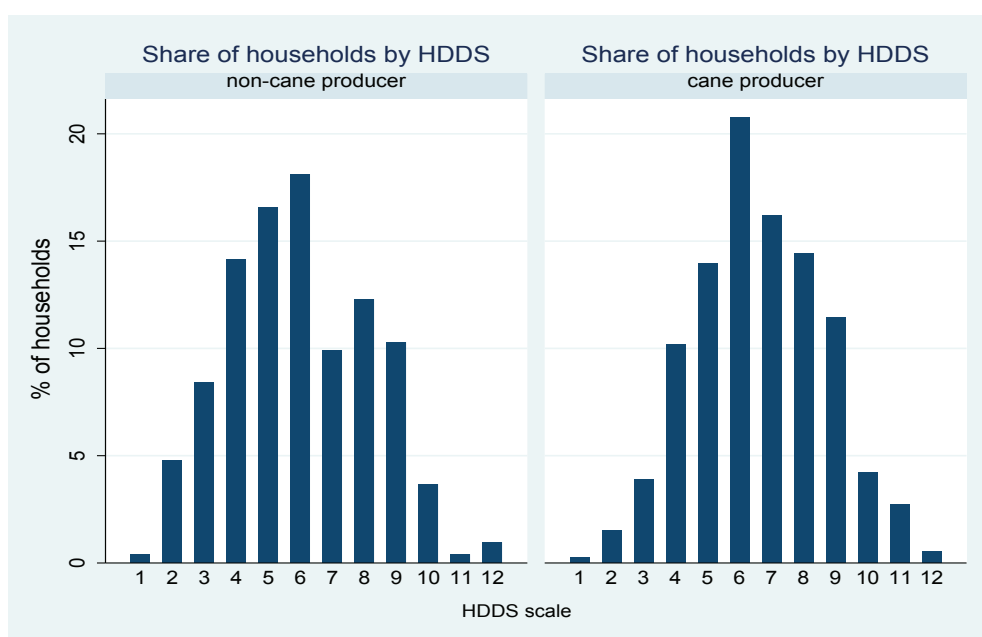
There is a relatively balanced normal distribution of HDDS across cane and non-cane-growing households. On average, a household diet has six food types. About 21 % of cane growers ate 6/12 food groups while 18 % of non-cane growers ate 6 /12 food groups (Figure 5).

Figure 4 Months of inadequate household food provisions by cane grower status (%)



Source: EPRC-PRCI Sugarcane survey dataset, 2021.

Figure 5 Share of households by the dietary diversity score



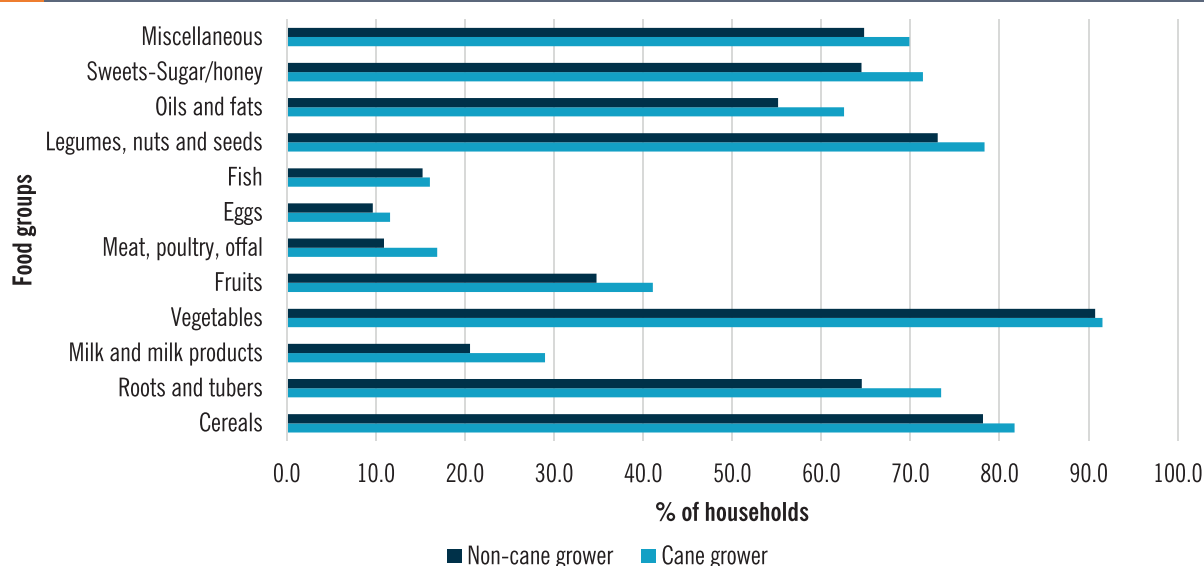
Source: EPRC-PRCI Sugarcane survey dataset, 2021

For all the food groups, cane grower households consumed more, especially foods with high protein content, than non-cane growers. Specific to the food types that comprise the diets, among non-cane-growing households, meat, poultry, offal, and fruits and vegetables were the most consumed food groups, while the cane growers tended to consume a relatively balanced diet with more protein (Figure 6).

Depth of food security situation- using HFIAS measurement!

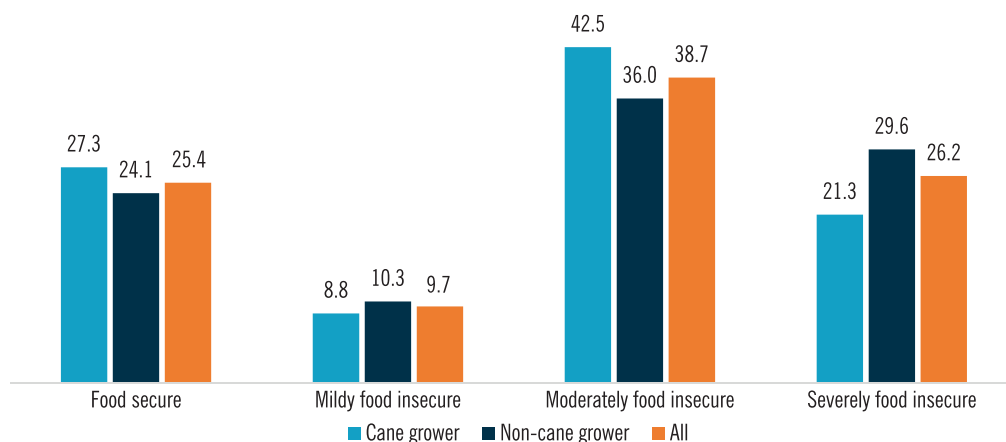
One in every four households in the sugarcane growing subregions are food secure. Only 27 out of 100 cane-growing households and 24 out of 100 non-cane households were food secure (Figure 7). That is to say that food security is a major concern in the sub-region with 75 out of 100 households being food insecure but at varying levels. Non-cane growers were significantly

Figure 6 Share of households consuming different food types by cane growing status, 2021



Source: EPRC-PRCI Sugarcane survey dataset, 2021.

Figure 7 Percentage of households reporting Food (in)security by scale



Source: EPRC-PRCI Sugarcane survey dataset, 2021

more severely food insecure than cane grower households, while cane growers were the majority in terms of being moderately food insecure. Although cane growers have better food security outcomes on average, compared with non-growers, this does not negate the fact that all is not well in the sugar cane growing subregions as various levels of food insecurity loom.

Differences in food security situations differed across subregions and by cane growing status. Generally, in the Buganda subregion, more than half of the cane-growing households were food secure, while combined, 43.8 % of households in the subregion were moderately and severely food insecure in 2021 (Table 1). In Busoga subregion had about 69% of cane growing households moderately and severely food insecure, with the severity of food insecurity higher among the non-cane growers. Lastly, the Bunyoro subregion had the least number of cane and non-cane grower households that were food secure. About 73.5 % of households are moderately or severely food insecure [77.8 % of non-cane growers are here compared to 69 % of cane growers]. Food insecurity is a serious problem more so in Bunyoro for non-cane growers followed by Busoga subregions.

Table 1 Household food insecurity access scale by sub-region and cane growing status

Sub-region/HFIAS scale	Cane grower	Non-cane grower	All
<i>Buganda</i>			
Food secure	50.3	34.2	41.0
Mildly food insecure	15.3	15.1	15.2
Moderately food insecure	24.4	31.7	28.6
Severely food insecure	10.0	19.0	15.2
<i>Busoga</i>			
Food secure	24.2	23.5	23.8
Mildly food insecure	6.5	9.6	8.4
Moderately food insecure	43.8	35.1	38.5

Sub-region/HFIAS scale	Cane grower	Non-cane grower	All
Severely food insecure	25.5	31.9	29.4
<i>Bunyoro</i>			
Food secure	17.2	12.8	15.0
Mildly food insecure	13.7	9.4	11.5
Moderately food insecure	56.9	50.7	53.8
Severely food insecure	12.2	27.1	19.7
<i>All</i>			
Food secure	24.1	27.3	25.4
Mildly food insecure	10.3	8.8	9.7
Moderately food insecure	36.0	42.5	38.7
Severely food insecure	29.6	21.3	26.2

Source: EPRC-PRCI Sugarcane survey dataset, 2021.

Households with less land (in acres) were likely to be severely food insecure, irrespective of whether they were growing cane or not. However, land utilisation also matters for food security. Cane-growing households with less than 8 acres of land were severely food insecure (Table 2). As long as the status quo remains, even with land size above 15 acres, food insecurity will remain in cane grower households. Non-cane growers are generally land-constrained. Non-cane growers with smaller acreage were food secure due to proposer utilisation. Nonetheless, the non-cane grower category, which was severely food insecure, had land size of less than 2 acres. Even with households not growing cane, food insecurity will loom unless the intensification of food production is emphasised. Anecdotal evidence showed that most farmers allocate more land to sugarcane growing than food crops, which has undermined household food availability and stability. Even for households that have never grown cane, while they already have small plots of land for food crop growing, they are likely to use poor farming methods which lead to low crop yields, causing food shortages (Jelsma *et al.* (2010). Some sugarcane farmers attributed delayed payments by millers to an increase in food insecurity as they could not purchase food from the market.

Table 2 Food security status by household average land holdings (acres) and cane growing status

HFIAS scale	Cane grower	Non-cane grower	All
Food secure	25.63	2.77	12.75
Mildly food insecure	15.44	3.42	7.86
Moderately food insecure	11.25	3.45	6.94
Severely food insecure	7.95	1.72	3.79
All	14.83	2.77	7.68

Source: EPRC-PRCI Sugarcane survey dataset, 2021.

The role of land in determining the food security status of cane farmers was emphasised by participants in community Barazas, as reported below.

“... Sugarcane growing itself has no problem for farmers who have enough land. They have managed to grow sugarcane and utilize some land for growing food crops. The family doesn’t lack food since you plant 3-4acres of food crops out of the 10 acres and the other 6 for sugarcane growing (by Male FGD participant Manyiro Mayuge).”

A female cane grower re-echoed this

“... People who have small pieces of land are growing sugarcane and they surely don’t have food. Most people with limited land like two acres have used all the land for sugarcane growing; they even hired out most of their land to other people still to grow sugarcane and they abandoned

food production. Me as a person, I left some land for different types of food like beans, cassava, potatoes so me am very safe concerning food, but most people in my village don’t have food (by Female FGD participant, Manyiro Mayuge)

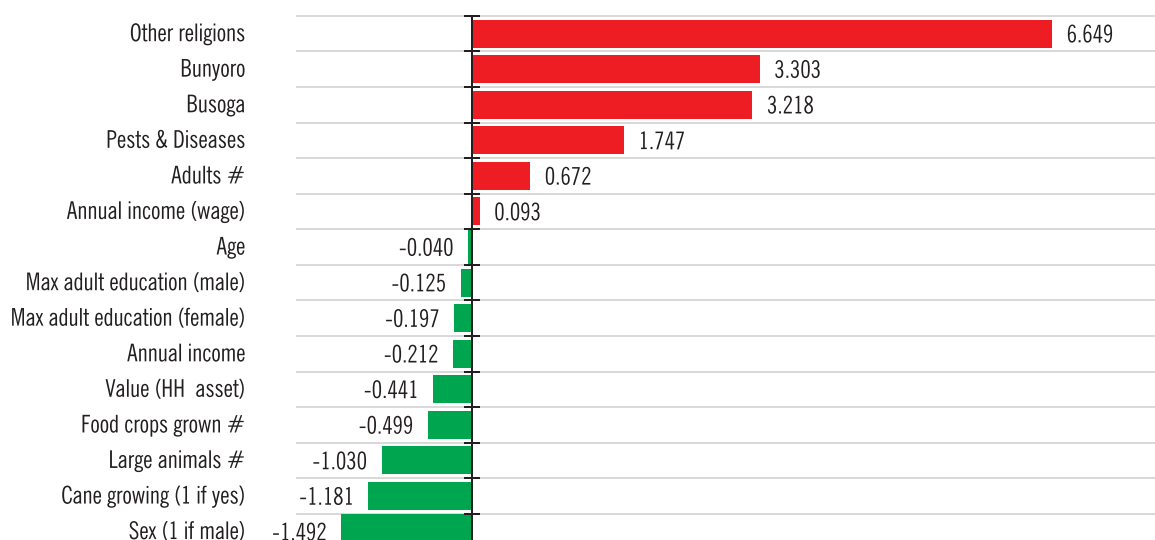
Another participant emphasised that:

“People do not follow advice. You are supposed to leave some land for food but they don’t. The population has increased and the land acreage for sugarcane growing has increased and as it increases, the land acreage of food crops is reducing. Some 80% of the land being used for cane growing is managed by external people and a few people who come from within and the few rich people who own these farms. Some tenants who came from West Nile went back to West Nile, hence migrating to their homes.” (Survey participants 2021).

What are the drivers of food security?

Considering the potential relationship between cane production and household food security outcomes within multivariate regression analysis, Figures 8, 9 and 10 present only the significant factors affecting food security. Findings show that households that grew cane in 2021 had an average HFIAS outcome of -1.18 lower (on average) than those of non-cane growers while controlling separately for other factors that influence household food security outcomes (Figure 8). This means that food insecurity in terms of access declined by 1.18 times in cane grower households compared to those who never grew

Figure 8 Determinants of Household food insecurity (HFIAS)

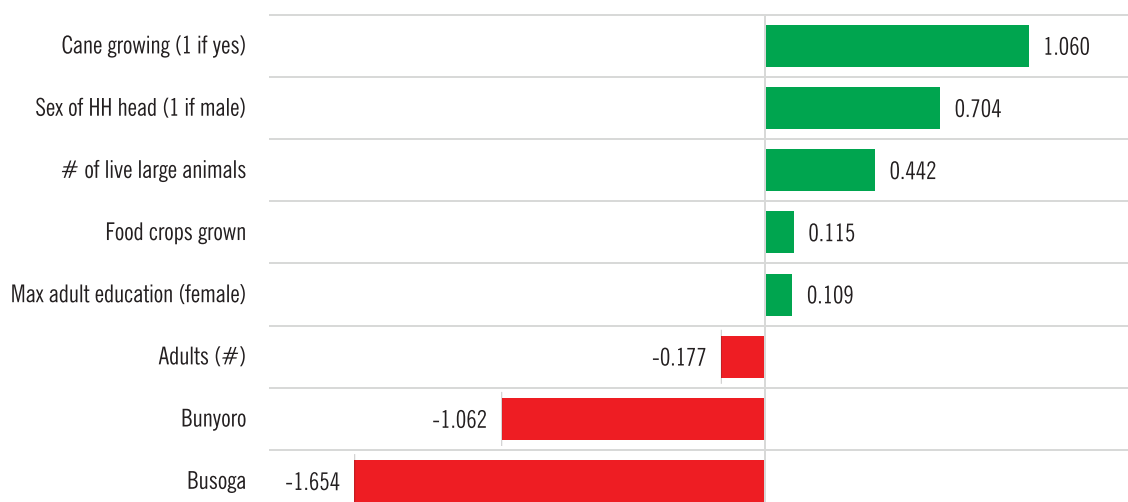


Notes: The other factors identified to lower food insecurity (GREEN) include male-headed households; the age of the household head; the annual income earned from a salary; having a highly educated adult; the number of live large animals; household value of assets; and the number of food crops grown. All these factors significantly reduce household food insecurity access. On the other hand, factors that increase food insecurity (RED) include: - households being resident in Busoga and Bunyoro sub-regions; annual income from wages (known to be less stable); households belonging to an indigenous faith group in comparison to being a Catholic, shocks about crop pests and diseases, and living in a relatively remote area distant from the district headquarters.

Source: Authors computations from regression analysis using EPRC-PRCI Sugarcane survey dataset, 2021

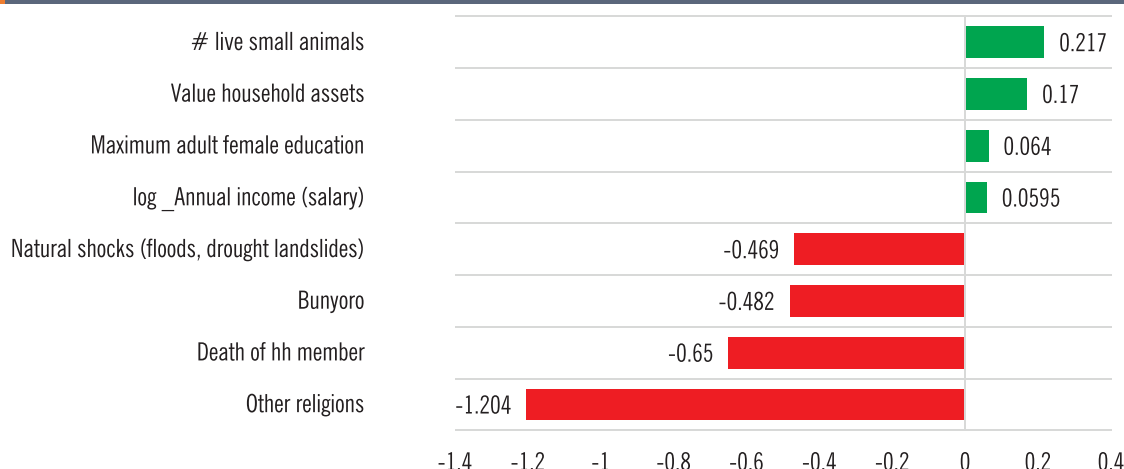
cane. Likewise, we find that cane growing was associated with one additional month of household food provision in 2021, compared with non-cane growers (Figure 9), while growing cane was not associated with food diversity (Figure 10).

Figure 9 Determinants of Months of Adequate Household Food Provisioning (MAHFP)



Notes: Other factors that increase the MAHFP (GREEN) are a cane-growing household, a male-headed household, a household with a highly educated female adult, the number of live large animals, and the number of food crops grown. Factors that lower MAHFP (RED) are the household size (measured as adult household equivalent) in Busoga and Bunyoro compared to Buganda.
Source: Authors computations from regression analysis using EPRC-PRCI Sugarcane survey dataset, 2021

Figure 10 Determinants of Household Dietary Diversity Score (HDDS)



Notes: Factors that increased HDDS (GREEN) are annual salary income, maximum adult female education, number of live small animals, and total household value of assets significantly. Factors that lower HDDS (RED) are being in Bunyoro in comparison to Buganda, other religions (traditionalists) in contrast to Catholics, households' experiences of natural shocks (drought, floods, mudslides) and death of a household member negatively.
Source: Authors computations from regression analysis using EPRC-PRCI Sugarcane survey dataset, 2021

What do we deduce from the findings?

The key insight for all the food security measures is that other deeply ingrained factors could be driving the food insecurity situation in the sugarcane sub-regions. The government should find lasting solutions for these issues. The general outlook masks differences within sub-regions. While cane growers are generally more food secure, sub-regional comparisons showed that specifically cane

growers in Busoga were more food insecure other than in only one measure (food dietary diversity), while non-cane growers in the Bunyoro sub-region were more food insecure compared to the different sub-regions. The food insecurity, especially among cane growers in Busoga, could be attributed to the coordination failures between 2017 and 2021, when the domestic cane supply (from out growers) became significantly larger than the domestic demand for cane (from millers).

In 2021, on average, households that grew cane had better food security outcomes compared with households that did not grow cane in 2021, on average. This suggests that the increase in income poverty and food insecurity in sugar cane growing sub-regions of Busoga and Bunyoro in 2016 and 2020 was not primarily driven by financial losses experienced by cane producers. In summary, other factors driving food insecurity were depending on annual wage income, belonging to an indigenous faith group, adult equivalent (household size), shocks like crop pests and diseases. Also, being a resident in Busoga and Bunyoro sub-regions contributed to inadequate food access compared to being in Buganda. Maximum adult female education was positively associated with improving food security outcomes.

Nonetheless, although cane growers had better food security outcomes on average compared with non-growers, this does not negate the fact that there were significant adverse developments in the sugarcane industry in recent years as coordination between growers and millers declined significantly in all three subregions. However, in Busoga, it essentially collapsed, disoriented and skewed in favour of the miller in Bunyoro (Mbowa et al., 2022). The overall message seems to be that (a) cane growers in 2021 had better food security measures on average than non-growers, and (b) cane does not appear to have driven the recent decline in food security in the three sub-regions. Nonetheless, while cane does not appear to drive food insecurity in those sub-regions, all is not well in the cane industry as noted by the food security nexus with miller arrangements where current outgrowers who have no miller arrangements were more food insecure compared to those currently growing cane and attached to a miller. Implying miller-outgrower coordination is vital for ensuring food security if payments to outgrowers are made timely.

What needs to be done?

The study was conducted in 2021 (at the climax of a major miller-farmer institutional coordination breakdown), leading to a cane supply-demand imbalance (excess supply of cane), and many farmers could not harvest and sell cane to a mill to earn an income to buy food. A key insight is that food insecurity is a big problem in sugarcane growing subregions, with geographical differences that might impact Uganda's attainment of NDP and SDG targets. Nonetheless, sugarcane growth yields some benefits for food security. However, to harness the full potential of cane growing for food security, we need to:

- Address human capital development, enhance wealth assets in an integrated manner, diversify food crop production, household size and spatial development, control pests and diseases, and strengthen faith and beliefs.
- Pick lessons for the other crops geared towards agro-industrialisation. Ensure that agro-industrialisation does not compromise food security.
- Sugarcane demand-supply is cyclical, and this should be considered in policy design and programming.

- Design spatial programmes for Busoga and Bunyoro to enhance food security that integrates human capital, wealth creation, and crop diversification, among others.
- Guide farming households on enterprise selection that matches with available arable land size. This is assuming the status quo, for cane growers they should have a total land size above 15 acres. In addition, non-cane growers should increase/practice intensification to improve their food security.
- Strengthen government collaboration with faith-based and cultural institutions in mobilising their communities to grow more food for household consumption and income.

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Endnotes

- 1 EPRC, 2021-KIIs
- 2 Sugar Act, 2020
- 3 National Sugar Policy, 2020
- 4 ibid
- 5 EPRC-PIMA, 2022
- 6 (FAO Stat, 2022)
- 7 EPRC-KIIs, 2021
- 8 Hess et al., (2016)
- 9 UBoS (2021)
- 10 ibid
- 11 Cane growers are farming households who were growing cane as of December 2021 either on own or rented land. Only those growing crystal cane
- 12 Non-cane growers are farming households that were not growing cane as of December 2021
- 13 World Food Summit, 1996
- 14 (FAO 2008).
- 15 Coates, Swindale, and Bilinsky; 2007
- 16 Bilinsky and Swindale, 2010
- 17 Swindle and Bilinsky, 2006

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