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THE ECONOMICS OF TOBACCO FARMING IN KENYA: A LONGITUDINAL SURVEY





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About Tobacconomics

Tobacconomics is a collaboration of leading researchers who have been studying the economics of tobacco control policy for nearly 30 years. The team is dedicated to helping researchers, advocates, and policy makers access the latest and best research about what's working—or not working—to curb tobacco consumption and its economic impacts. As a program of the University of Illinois at Chicago, Tobacconomics is not affiliated with any tobacco manufacturer. Visit www.tobacconomics.org or follow us on Twitter www.twitter.com/tobacconomics.

ABBREVIATIONS/ACRONYMS

CAPI	Computer Aided Personal Interviews
FCTC	Framework Convention on Tobacco Control
HDI	Human Development Index
WHO	World Health Organization



DEFINITION OF TERMS

Tobacco Farmer

A farmer who engages in growing tobacco as part of his/her livelihood.

Contract Farming

Tobacco leaf production where the farmer has a working and committed relationship with the tobacco leaf buying company. The farmer receives production inputs on credit and extension services and in turn agrees to commit land resources and time in order to provide agreed quantities.

Independent Farming

Tobacco leaf production where the farmer has no committed relationship with the tobacco leaf buying company. The farmer buys inputs for tobacco production from their own resources and sells the leaf to any leaf buying company, middle men, or fellow farmers.

Wave 1

Survey carried out in 2014/2015 tobacco growing season

Wave 2

Survey carried out in 2017/2018 tobacco growing season

Wave 3

Survey carried out in 2018/2019 growing season

Current Tobacco Farmer

A farmer who grew tobacco in wave 3 of the survey

Former Tobacco Farmer

A farmer who was once a tobacco farmer but did not grow tobacco in Wave 3

Current-Current Tobacco Farmer

A farmer who grew tobacco in both wave 2 and wave 3 surveys

Current-Former Tobacco Farmer

A farmer who grew tobacco in wave 2 but did not grow tobacco in wave 3.

Former-Current Tobacco Farmer

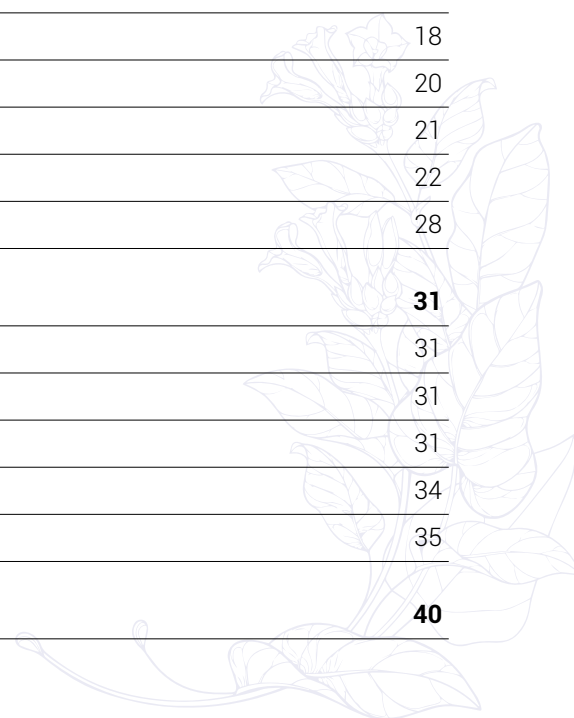
A farmer who was a former tobacco farmer in wave 2 but resumed growing tobacco in wave 3.

Former-Former Tobacco Farmer

A farmer who did not grow tobacco in any of the surveys

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EXECUTIVE SUMMARY

The tobacco industry's narrative suggests that growing tobacco leaf provides a good living for thousands of Kenyan farmers. We conducted two waves of a household survey of nationally-representative samples of small-scale tobacco farmers and former tobacco farmers. We complemented these surveys with follow-up focus groups. The results of our research unequivocally demonstrate the opposite of the narrative of prosperity perpetuated by the tobacco industry:

Most smallholder tobacco farmers consistently lose money. Moreover, the median former tobacco-farming household is much better off economically than the median household currently engaged in tobacco farming.

The Facts:

- ❖ The median former tobacco-farming household has nearly twice as many household resources compared to the median tobacco-farming household.
- ❖ Many tobacco farmers report a small profit when they consider only their tobacco revenue minus their direct costs (e.g., seeds, fertilizer, etc.); however, this does not account for the value of their labour.
- ❖ Tobacco is arguably the most labour-intensive crop in Kenya – for most farmers, it takes more than 1000 hours of unpaid household labour to produce one acre of tobacco, even when accounting for hired labour for the most intensive tasks such as harvesting.
- ❖ When household labour is included in the profit calculation, even at a minimal value, almost all farmers are operating at a substantial economic loss.
- ❖ The opportunity cost of farming tobacco is high. Tobacco farming households spend more than 1.5 times the working hours farming on average compared to non-tobacco farming households. This is precious time that farmers cannot spend on other economic activities, education, or leisure.
- ❖ Most contract farmers report being stuck in a debt cycle—growing tobacco only to pay back the previous year's debt to the leaf-buying companies.

Social and environmental issues

- ❖ In 2018, approximately two-thirds of tobacco farming households reported using child labour to grow tobacco. Some parents kept their children from school to work in the tobacco fields.
- ❖ Many of the children working in the tobacco fields handled inorganic fertilizer and dangerous agricultural chemicals.

- ❖ In focus groups, farmers reported that they used their children out of desperation—tobacco’s low prices prevented them from hiring legal, adult labourers.
- ❖ Issues with food security among smallholder farmers varied across regions. In Meru, 10% of farmers reported food insecurity, while in Migori it was approximately 15%.
- ❖ Cultivating tobacco leaf displaces land that could be used to grow food crops that would alleviate persistent food security problems in some Kenyan regions.
- ❖ Most farmers grow Virginia tobacco leaf, which must be flue-cured with woodsmoke before they sell it.
 - ◆ The curing process exposes farmers to dozens of harmful toxicants.
 - ◆ The demand for wood causes widespread deforestation, leading to erosion and other land and environmental degradation.
- ❖ Overall, tobacco cultivation is one of the most demanding crops in terms of using agricultural chemicals and inorganic fertilizers, placing enormous stress on ecosystems including groundwater quality, soil nutrients, and watersheds.

If tobacco-based livelihoods are so challenging, why do farmers grow tobacco leaf? The vast majority of farmers operate under contract with leaf buying companies who supply them with inputs like fertilizers and offer extension services. The companies deduct the costs of inputs from the sale price when the contract is complete. A small minority of farmers are independent. They procure their own inputs and are not guaranteed a buyer.

Despite the challenges in farming tobacco, the following are among the reasons farmers grow tobacco:

- ❖ The perception of a ready market for the leaf (i.e., farmers know they have a buyer even if the price might be low).
- ❖ Access to credit through contracting.
 - ◆ Contract farmers do not pay in advance for their inputs.
 - ◆ At the same time, many independent farmers report difficulties borrowing money from other sources.
- ❖ Perception of its viability as a crop.
 - ◆ Most farmers do not receive or have ready access to training to grow other crops, particularly food crops.
- ❖ Access to cash.
 - ◆ Subsistence farming generates little cash, and farmers need cash for certain expenses (e.g. healthcare and education); despite typically yielding net economic losses overall, tobacco farming is more likely to generate small windfalls of cash than many other crops.



Alternatives to tobacco growing

Many farmers report that they have considered abandoning tobacco farming, but they face challenges identifying viable alternatives, particularly those that provide them with cash.

There are viable economic alternatives...

- ❖ Many tobacco farmers are already growing what non-tobacco farmers grow (e.g. maize, beans, sweet potatoes etc.), but they are less productive because they spend so much of their time on tobacco.
- ❖ Former tobacco farmers are growing a wide variety of crops suitable to each region.
 - ◆ In Meru, many farmers grow beans, mango, groundnuts, cowpeas, bananas and sorghum.
 - ◆ In Migori, there is widespread cultivation of sweet potato, millet, groundnuts beans, and maize.
 - ◆ In Bungoma/Busia counties, farmers are growing more maize and cassava and raising livestock.
- ❖ In addition to growing a wide variety of crops, former farmers are engaging in other alternative livelihoods
 - ◆ In Meru, farmers engage in other livelihoods such as local transport logistics, wholesale and retail trade, computer services, local professional opportunities from county governments (e.g. teaching and revenue attendants), and construction.
 - ◆ In Migori, alternative livelihoods include local professional opportunities such as teaching, county government initiatives like the sweet potato processing plant, construction, and transport logistics.
 - ◆ In Bungoma and Busia, former farmers are engaged in local transport and logistics and county government employment opportunities.

What can be done to help tobacco farmers?

Employ a multi-sectoral approach to address the key issues related to shifting tobacco farmers to new, more viable economic livelihoods.

- ◆ Activate/re-energize the government's Tobacco Control Working Group on Article 17 that is mandated to coordinate relevant government ministries and departments to support tobacco farmers' transition towards alternative livelihoods.

- ◆ Help develop markets for other products and livelihoods with the help of key ministries including Agriculture, Finance, Trade, Labour, and the East African Community.
- ◆ Help farmers to access credit (with support from the National Treasury) and market information.
- ◆ Increase efforts of agricultural extension services to maximize other crops with support from Ministries of Agriculture and Environment.
- ◆ Challenge the inaccurate narrative that small-holder tobacco farming is lucrative. Instead, rely on independent, evidence-based research.
- ◆ Research shows that former tobacco farmers pursue other more fruitful economic activities when freed from the high labor demands of cultivating tobacco.
- ◆ There is strong evidence from an array of studies showing tobacco farmers are poorer than non-tobacco farmers in the same areas.





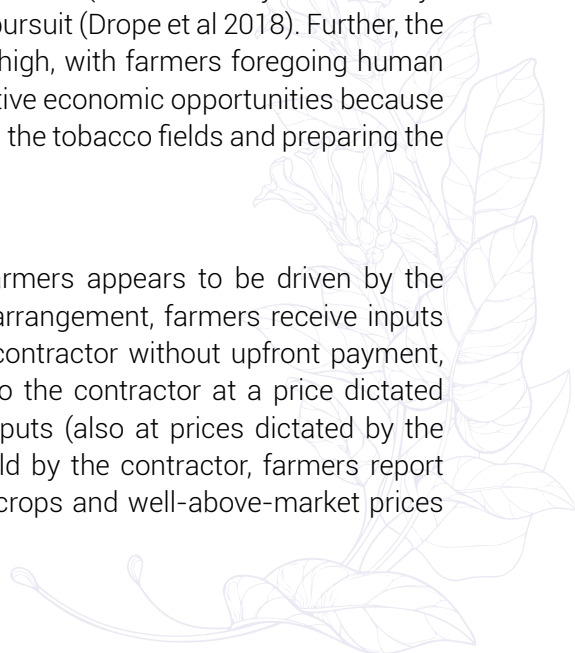
INTRODUCTION

1

Tobacco control initiatives in very high Human Development Index (HDI) countries have resulted in reductions in consumption and have likely raised the costs of doing business for tobacco companies. To mitigate further financial losses, these companies have been expanding efforts to increase both consumption and production in lower HDI countries, with economic prosperity brought by the tobacco industry being the principal narrative for the expansion (Drope et al 2018). It therefore follows that governments in lower HDI countries, which are often more economically and politically vulnerable, have encouraged expansion of the tobacco sector based on a narrative of increased foreign direct investment and/or the protection of the economic livelihoods of farmers who are dependent on tobacco growing.

In recent years, there has been an increase in empirical research to counter the tobacco industry's economic prosperity narrative. The results are being used by policy makers, investors in the agricultural sector, tobacco control advocates, and health workers to safeguard interests of those who are dependent on tobacco growing for livelihoods (Makoka et al 2016, Magati et al 2018). Empirical evidence from this research has demonstrated that tobacco farming is not a prosperous pursuit for most farmers. Specifically, research consistently finds that most smallholder farmers over-pay for tobacco inputs (e.g. fertilizers, pesticides, etc.), receive very low prices for their tobacco leaf, and dedicate hundreds of hours (more than any other widely-grown crop) to a mostly unprofitable economic pursuit (Drope et al 2018). Further, the opportunity costs of farming tobacco are very high, with farmers foregoing human capital development and other often more lucrative economic opportunities because they expend so much household labour toiling in the tobacco fields and preparing the leaf for sale.

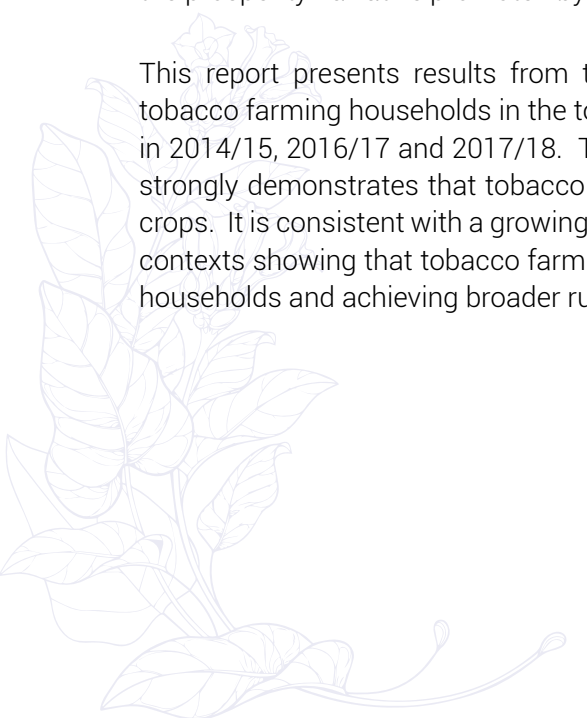
Much of the economic struggle of tobacco farmers appears to be driven by the phenomenon of contract farming. In such an arrangement, farmers receive inputs at the start of the season from a leaf-buying contractor without upfront payment, but they are then obligated to sell their crop to the contractor at a price dictated by the buyer and pay back the costs of the inputs (also at prices dictated by the provider). Not surprisingly, with all leverage held by the contractor, farmers report unfair treatment, including low prices for their crops and well-above-market prices for the inputs.



Given the typically unprofitable nature of tobacco farming, it is important to provide empirical and detailed reasons why smallholder tobacco farmers are attracted to tobacco farming, why they continue to cultivate it, and what can be done to transition them to other livelihoods. Previous research in Kenya has suggested that more than 55,000 households engage in tobacco farming as the primary source of livelihood (Kibwage, Netondo & Magati 2015). Research suggests that farmers grow tobacco for three main reasons: 1) There is a perception of an assured market despite prices being consistently low; 2) There is difficulty in obtaining credit for other economic activities; 3) It is a way of generating cash in low-cash economies for necessities like education and healthcare (Drope et al 2018, Magati et al 2018, Makoka et al 2016).

There has been progress in educating smallholder farmers about the economic impacts of tobacco growing and working with relevant government departments to help improve their prospects. First, some Kenyan government agencies, including the Ministry of Health and the Tobacco Control Board, have been supportive of efforts by tobacco control advocates in building the capacity of county government officials and alerting farmers to the dangers of tobacco use. Indeed, the Kenyan government has been at the forefront in legislating tobacco control by signing the World Health Organization's Framework Convention on Tobacco Control (FCTC) and tobacco control regulations. Article 17 of the FCTC specifically addresses the promotion of economically-viable alternatives to tobacco farming. Second, tobacco control advocates and researchers have consistently provided empirical evidence to counter the prosperity narrative promoted by the tobacco industry.

This report presents results from three waves of surveys of tobacco and non-tobacco farming households in the tobacco growing regions of Kenya implementing in 2014/15, 2016/17 and 2017/18. The evidence emerging from this ongoing study strongly demonstrates that tobacco farmers would be far better off pursuing other crops. It is consistent with a growing body of research in other countries and in other contexts showing that tobacco farming is a barrier to improving the lives of farming households and achieving broader rural development goals.



2.1 Sampling and Survey Instruments

We conducted three waves of household economic surveys, with Wave 1 carried out in 2014/15, Wave 2 in 2016/17, and Wave 3 in 2017/18. For Wave 1, we implemented a survey of 585 tobacco farmers designed to solicit an understanding of the different social and economic factors in the three areas where tobacco is most widely grown in Kenya (the counties of Migori, Meru and Bungoma/Busia).

To determine the sample size for Wave 1, we first defined the population size N of tobacco farmers in Kenya to be approximately 55,000. For the simple random sampling process, we adopted the conservative standard deviation p to be 0.5, confidence level as 95% ($Z=1.96$), and we allowed the margin of error e to be 4.5%.

$$n_1 = \frac{z^2 \hat{p}(1-\hat{p})}{e^2} \quad (1)$$

Based on equation (1), we obtained the unadjusted sample size needed to be 494. To adjust for population size, equation (2) was then considered.

$$n_2 = n_1 \frac{N}{N+n_1} \quad (2)$$

As the population size is large, the adjusted sample size remains at 494. Based on previous agricultural surveys in the country, we expected the response rate to be between 85% and 90% and sought to reach out to 600 tobacco farmers. We aimed for equal geographic distribution by recruiting 200 smallholder farming households in each of the three geographical areas. One administrative location with the highest concentration of tobacco farmers was chosen in each county with Kuria East and West sub-counties in Migori; Imenti central sub-county in Meru; and Malakisi, a town center at the border of Bungoma and Busia counties. The village center in these locations was identified with enumerators moving along a predetermined selected transect route that converged back to the village center. Data for the survey were collected from every third household that fell in the transect route, though in sparsely-populated areas, we shifted to every other household. Alternatively, where identification of tobacco farmers was difficult, snowballing technique was used with tobacco farmers helping to identify each other. In Malakisi, the Mastermind tobacco leaf center is located on the Bungoma side and generally its farmers have been



reducing in numbers because of non-payment or delayed payment, while BAT's leaf center is located on the Busia side and has more farmers. It follows that farmers on the Bungoma side are predominantly contracted to Mastermind while on the Busia side, the farmers are predominantly contracted to BAT. Because of this, most of the respondents in this study site were from the Busia site as shown in Table 1. The county border in this area is particularly difficult to identify, and using the strict transect walk to collect the data randomly led to this dynamic. We ended with a sample size of 585 (a response rate of ~97.5%). While we had no a priori reason to suspect that there were large regional differences, we nonetheless chose to implement the survey evenly across each of the three study sites.

To improve reliability in our data collection, Waves 2 and 3 used computer assisted personal interviewing (CAPI) which identified the GPS coordinates of the households. This was important as it provided confidence that the households surveyed in Wave 3 were the same households from Wave 2. In Wave 1, we utilized paper questionnaires, and the main process of identification was through telephone contacts. Because of the uncertainties of the Wave 1 identification methods, when we returned in Wave 2, we had some challenges matching accurately to the original households. Therefore, for the sake of accuracy, the results in this report are from Waves 2 and 3 only, where we are confident that we captured the same households and can accurately compare them over the two time periods. There was an attrition rate of 15%, and the final number of households visited was 455. Please refer to an earlier report for the Wave 1 results (see Magati et al. 2016).

Qualitatively, in both 2017 and 2018, we implemented key informant interviews with Ministry of Agriculture extension officers and relevant county government officials in all three regions. In 2017, we held one focus group discussion in Imenti central sub-county in Meru where 20 participants were randomly drawn from the villages where data were collected. In 2018, we held focus group discussions in all three counties where 10 participants were invited drawing a mix of experience in tobacco farming and gender. Questions in the focus groups included the historical timeline of farming in the area, seasonal and daily schedules of household members, livelihood mapping, historical resource analysis, resource flow matrix analysis, and stakeholder analysis.

2.2 Data Analysis

For this report, we employ both descriptive and multivariate analyses. The descriptive analyses aim to elucidate the breadth and depth of farmers' general characteristics. The multivariate analyses are intended to explore causality of selected key relationships.

TOBACCO FARMING CHARACTERISTICS

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3.1 Socio-Demographic Characteristics of Respondents

Table 1 shows the socio-demographic characteristics of the survey respondents in the two waves. Wave 2 had a total of 474 respondents interviewed while wave 3 had 444 respondents. Overall, the vast majority of tobacco farmers are middle-aged males, usually older than the general population and with primary-level education. With the addition of questions in Wave 3, we observe that most respondents are married (>84%).

There was a small amount of attrition from one wave to the next, mainly the result of migration of households from Migori to other locales, likely in search of better economic opportunities. This observation was a result of calling households that could not be traced in Wave 3 or when inquiries were made by enumerators to neighbours as to why some respondents in Wave 2 were no longer residing in their homesteads.

Table 1: Socio-Demographic Characteristics

	Wave 2						Wave 3					
	Contract Farmer (n=258)		Independent Farmer (n=57)		Former Farmer (n=159)		Contract Farmer (n=201)		Independent Farmer (n=25)		Former Farmer (n=218)	
Region												
Bungoma	37	14.34%	5	8.77%	3	1.89%	36	17.91%	1	4.00%	9	4.13%
Busia	100	38.76%	8	14.04%	16	10.06%	76	37.81%	7	28.00%	40	18.35%
Meru	62	24.03%	9	15.79%	28	17.61%	38	18.91%	5	20.00%	66	30.28%
Migori	52	20.16%	34	59.65%	108	67.92%	51	25.37%	12	48.00%	103	47.25%
Gender												
Male	239	92.64%	48	84.21%	135	84.91%	186	92.54%	21	84.00%	197	90.37%
Female	19	7.36%	9	15.79%	24	15.09%	15	7.46%	4	16.00%	21	9.63%
Age (years)												
<21	4	1.55%	0	0.00%	2	1.26%	2	1.00%	0	0.00%	2	0.92%
21-35	86	33.33%	19	33.33%	41	25.79%	57	28.36%	4	16.00%	61	27.98%
36-60	168	65.12%	38	66.67%	116	72.96%	142	70.65%	21	84.00%	155	71.10%
61+	10	3.88%	6	10.53%	4	2.52%	2	1.00%	2	8.00%	7	3.21%



Table 1: Socio-Demographic Characteristics (Continued)

	Wave 2						Wave 3					
	Contract Farmer (n=258)		Independent Farmer (n=57)		Former Farmer (n=159)		Contract Farmer (n=201)		Independent Farmer (n=25)		Former Farmer (n=218)	
Education												
Not yet or no schooling	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1	0.46%
Elementary school	22	8.53%	3	5.26%	16	10.06%	19	9.45%	3	12.00%	35	16.06%
Junior Primary	133	51.55%	18	31.58%	72	45.28%	107	53.23%	13	52.00%	99	45.41%
Senior Primary (std5 - 8)	55	21.32%	21	36.84%	38	23.90%	43	21.39%	5	20.00%	41	18.81%
Junior Secondary	28	10.85%	5	8.77%	17	10.69%	0	0.00%	0	0.00%	0	0.00%
Vocational	1	0.39%	1	1.75%	1	0.63%	0	0.00%	0	0.00%	5	2.29%
College or University	9	3.49%	3	5.26%	11	6.92%	11	5.47%	1	4.00%	9	4.13%
Completed Secondary	0	0.00%	0	0.00%	0	0.00%	19	9.45%	1	4.00%	21	9.63%
Marital Status												
Divorced	.		.		.		3	1.49%	2	8.00%	5	2.29%
Married	.		.		.		180	89.55%	21	84.00%	188	86.24%
Single	.		.		.		9	4.48%	0	0.00%	13	5.96%

We tracked not only the farmers but also all members of the household that are economically active. Economic activities are typically a collective enterprise with household members contributing in different ways, including farming activities (tobacco and non-tobacco), other enterprise (e.g. fish-farming or selling other goods), and off-farm employment (informal and formal). As observed in Table 2 below, for all sets of households (i.e. whether current or former tobacco farmers), there is no significant difference in the percentage of households that engage in different off-farm activities.

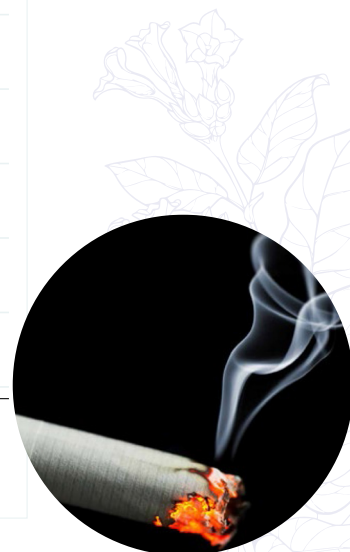
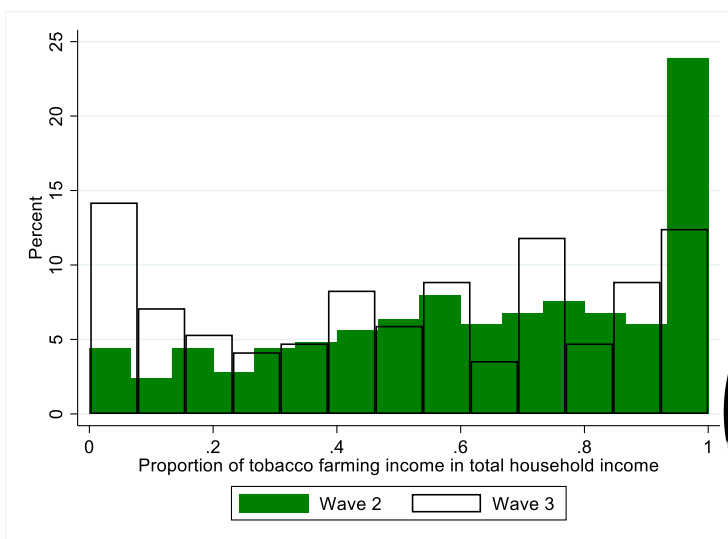
However, we note that the percentage of those who actively grew tobacco in Waves 2 and 3 utilize household human resources in business engagements at a greater rate than those who did not grow tobacco in both waves. It is not entirely clear why, but this may be because they have larger families to support— the Wave 3 survey demonstrates that tobacco farming households are on average larger—and/or the unfavourable economics of tobacco farming compel these households into other economic activities to make up for their poor returns.

Table 2: Main Source of Livelihood by Self-Report – Total Household Members

Activity	Time Frame	Households Actively Farming Tobacco in Waves 2 and 3		Households who grew Tobacco in Wave 2 only		Households who grew Tobacco in Wave 3 only		Households Who did not grow tobacco in Wave 2 and 3	
		n	%	n	%	n	%	n	%
Work for a wage, salary, commission or any payment in kind, from work in agriculture or non-agriculture	7 days	1230	4.15%	539	5.57%	201	2.99%	716	3.91%
	12 months	1230	4.96%	539	5.94%	201	2.99%	716	4.61%
Run a business of any size	7 days	1230	3.41%	539	3.53%	201	5.47%	716	4.19%
	12 months	1230	5.04%	539	4.45%	201	5.97%	716	4.61%
Help without being paid in any kind of business run by this household	7 days	1230	6.67%	539	4.64%	201	4.48%	716	4.33%
	12 months	1230	10.24%	539	5.75%	201	5.97%	716	5.45%

Further analysis suggests that tobacco farming income generally decreased as a proportion of household income between Waves 2 and 3. Figure 1 below demonstrates that farmers are increasingly diversifying their income into other livelihood sources. Thus, only a minority of tobacco-farming households relied on tobacco farming as their major income-earning activity, even though survey respondents often reported it as their primary job.

Figure 1: Proportion of Tobacco Income in Total Household Income



At least 36.1% of Kenyan households live under the poverty line (Republic of Kenya, 2018). Specifically, for tobacco growing regions, Busia County has the highest poverty rate at 68%, while it is lower in Migori (42%), Bungoma (35%) and Meru (19%) (Republic of Kenya, 2018). The survey results suggest that among respondents, poverty declined between the two waves, and there was less poverty among former tobacco farmers compared to current tobacco farmers in all the regions.

Table 3: Households Below Poverty Line

Regions	Current Farmers		Former Farmers	
	Wave 2	Wave 3	Wave 2	Wave 3
Bungoma	24	22	4	8
	83.33%	59.09%	75.00%	62.50%
Busia	77	55	14	32
	87.01%	74.55%	71.43%	71.88%
Meru	56	19	26	57
	50.00%	21.05%	26.92%	17.54%
Migori	41	35	70	87
	85.37%	57.14%	57.14%	33.33%
Total	201	134	114	186
	74.63%	58.21%	52.63%	36.02%

Generally, in both waves, as observed in Table 4 below, it is evident that income from non-agricultural sources plays an important role in households for both current and former tobacco farmers. Agricultural activities are still the main sources of income with both current and former tobacco farmers ranking production of crops other than tobacco as second and first respectively. This is an important observation because it dispels the notion that households engage in tobacco production for a total lack of alternative livelihood sources. In Wave 2, former tobacco farmers' involvement in other livelihood sources (e.g., other crop production, livestock farming and formal employment) was higher than for current tobacco farmers, though this dynamic shifted slightly in Wave 3. While engagement of former tobacco farmers is still relatively high in those trades in Wave 3, the difference is no longer statistically significant between former and current tobacco farmers possibly indicating that incomes from tobacco farming are becoming less sustainable to these households and they are further diversifying their income sources. We also observe that former tobacco farmers engage significantly more in casual labour than do current tobacco farmers, which may be the result of former tobacco farmers simply having more time to allocate to these other activities. The former tobacco farmers also receive higher remittances and gifts from relatives to supplement their incomes. The dynamic is not completely clear but it is possible that members of the non-tobacco farming households may be more likely to leave the area and remit money back to their families.

Table 4: Income Sources of Respondents

Income Source	Wave 2			Wave 3		
	Former	Current	p-value	Former	Current	p-value
Crop production (Tobacco)	4.26%	93.24%	0.00	0.00%	86.47%	0.00
Crop production (other crops)	77.30%	65.12%	0.01	80.77%	74.88%	0.15
Livestock production	33.33%	22.78%	0.02	42.79%	36.71%	0.21
Natural resources sales (charcoal, firewood, timber etc)	12.77%	6.76%	0.04	13.46%	8.70%	0.12
Formal employment	8.51%	3.91%	0.05	10.58%	8.70%	0.52
Casual labour	15.60%	9.96%	0.09	16.83%	8.21%	0.01
Beer brewing	1.42%	0.71%	0.48	0.96%	0.48%	0.57
Petty trading/business (shops/poshomills, etc)	15.60%	11.74%	0.27	18.75%	18.84%	0.98
Land rentals	1.42%	2.85%	0.36	4.81%	0.97%	0.02
Gifts/Remittances	4.26%	0.00%	0.00	25.00%	13.53%	0.00
Pension	0.00%	0.36%	0.48	1.44%	0.00%	0.08
Artisanal skills (weaving, brewing, carpentry etc)	3.55%	2.85%	0.70	7.21%	3.86%	0.14
Other (specify)				6.73%	2.90%	0.07

3.2 Land Use

The survey results suggest differences in how farmers typically allocate their land. We observe in Table 5 that farmers who grow tobacco tend to assign much of their cultivated land towards tobacco production. This might be due to these farmers attempting to extract more efficiency gains for an overall endeavor that is particularly labour-intensive. With the exception of Busia, we observe that former farmers typically have more cultivated land. Though Migori farmers still assigned nearly 60% of their land on average to tobacco, this was the least among all regions. This may be a result of Alliance One's decision to cease contracting with tobacco farmers in 2016 in the county, after which households have been engaged in other livelihoods resulting in reallocation of land to other crops. However, recent expansion by BAT in the county, which is reflected in the survey, may be leading to an increase in the land allocated to tobacco.

Table 5: Land Use for Wave 2

Region	Current Farmer			Former Farmer
	Assigned for tobacco	Land Cultivated	%	Land Cultivated
Bungoma	2.07	2.80	74.12%	14.00
Busia	2.08	3.27	63.66%	1.06
Meru	2.10	3.07	68.41%	
Migori	2.21	3.79	58.36%	5.40
Total	2.09	3.23	64.76%	3.37

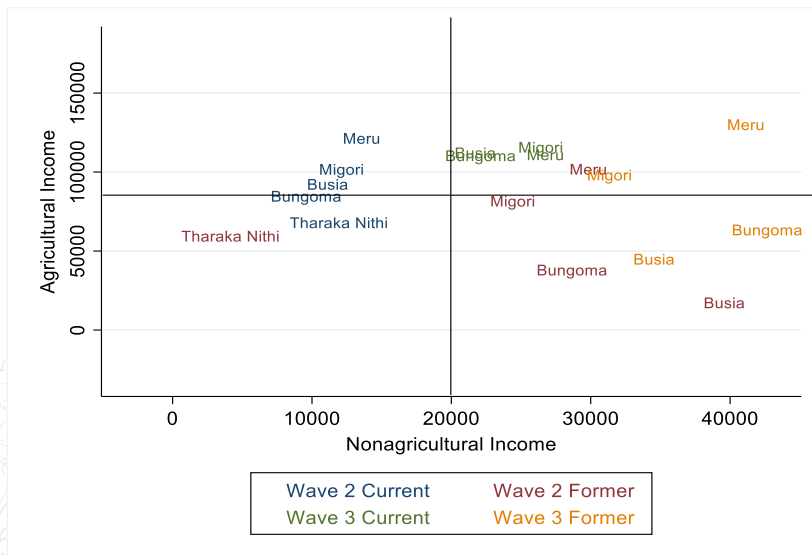
4

THE ECONOMICS OF TOBACCO GROWING

4.1 Sources of Income

Figure 2 shows that farmers receive income from both agricultural and non-agricultural sources. The figure suggests that since Wave 2, current farmers have diversified income sources and we observe that there is generally more income received from non-agricultural sources in all counties. For former farmers, the share of agricultural income has declined, while income from non-agricultural sources has increased.

Figure 2: Agricultural vs Non-Agricultural Income



4.2 Characteristics of Tobacco Farming

4.2.1 Market Share

As shown in Table 6 below, there have been reductions in the market share of the leaf-buying firms between Waves 2 and 3, except for the East Tobacco Co. Ltd., which entered the market in 2017. Results, however, indicate that British American Tobacco is still the most dominant firm.

Table 6: Number of Contract Farming Households and Market Share of Contract Farming, by Firm

Tobacco Firm	Wave 2		Wave 3	
BAT	203	75.46%	180	71.71%
Alliance One	8	2.97%	1	0.40%
Mastermind	58	21.56%	49	19.52%
East Tobacco			21	8.37%

Further analysis shown in Table 7 of the regional distribution of the leaf companies shows that BAT is the dominant firm in Bungoma, Busia and Meru Counties accounting for more than 80% of the market share. Mastermind on the other hand was dominant in Migori county, accounting for 89% of the share in Wave 2, but then reduced dramatically to 28% in Wave 3. This coincided with BAT entering the market after the exit of Alliance One and possibly taking over the mantle as the most dominant firm at 43% in Migori country also.

Table 7: Regional Distribution, by Firm

County	Wave 2			Wave 3			
	BAT	Mastermind	Total	BAT	Mastermind	East Tobacco	Total
Bungoma	32 (82.05%)	7 (17.95%)	39 (100%)	45 (88.24%)	6 (11.76%)	0	51(100%)
Busia	105 (97.22%)	3 (2.78%)	108 (100%)	67 (82.72%)	14 (17.28%)	0	81 (100%)
Meru	58 (92.06%)	5(7.94%)	63 (100%)	36 (81.82%)	8 (18.18%)	0	44(100%)
Migori	5 (11.11%)	40 (88.89%)	45 (100%)	32 (43.24%)	21 (28.38%)	21 (28.38%)	74
Total	200	55	255	180	49	21	250

4.2.2 Land, Production, and Prices

Each season, farmers make important decisions about the amount of land they will cultivate, which will include land that they own (if they own land) and tracts of additional land that they lease. In Figure 3, we observe relative consistency in farmers' cultivated land. There are a couple of exceptions, including independent farmers in Busia county who decreased their average land cultivated by nearly 40 percent.

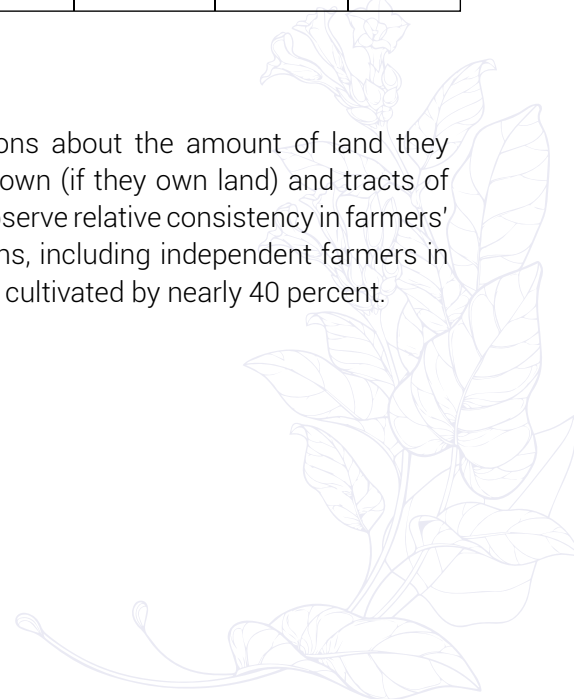
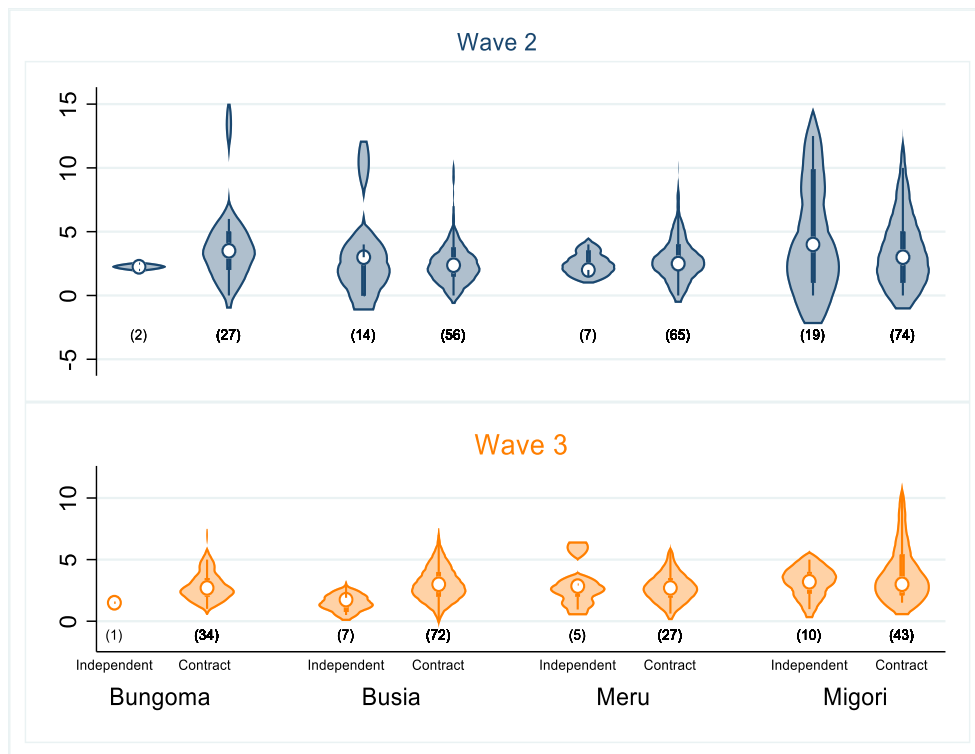
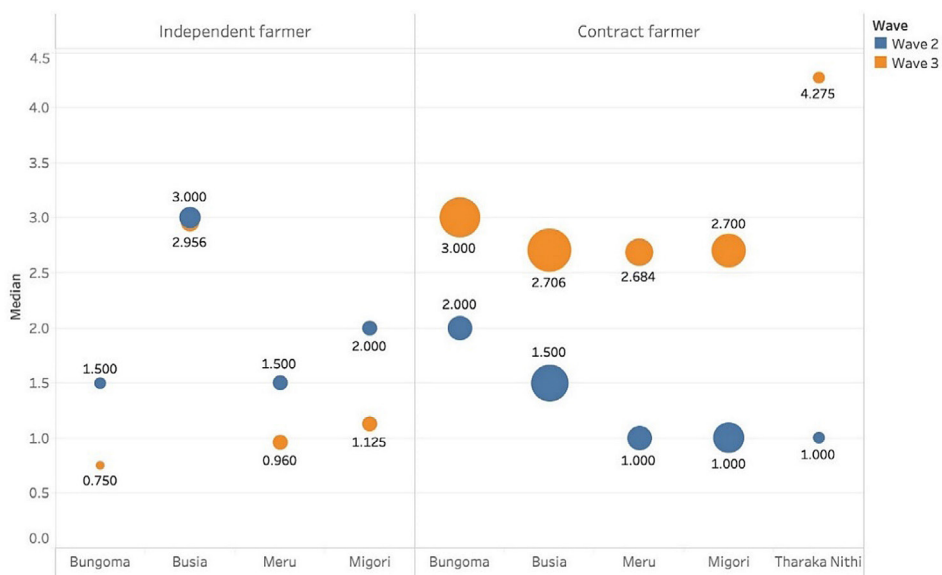


Figure 3: Violin Plot of Total Land (Acre) Cultivated by Continuing Tobacco Farmers in both Waves, by County (numbers in parenthesis indicate the number of farmers)



Once farmers decide how much land in total to cultivate, they then must decide how much to allocate to tobacco leaf. We observe in Figure 4 that contract farmers across all counties allocated significantly more land on average to growing tobacco leaf in the second time period. Greater allocation of land to tobacco was mainly by contract farmers working under the guidance of the extension staff of the tobacco companies. According to our informants in the government and among farmers (both survey and focus group discussions), the companies predetermine the quantity of tobacco they believe they will require in a farming year, and this is likely to be a major factor influencing the farmers' eventual contractual obligations. There was, however, an observed reduction in land allocation among independent farmers in Bungoma, Meru and Migori. In Bungoma and Meru, this is possibly attributable to reductions by farmers who had relations with Mastermind Tobacco, which had problems with a lack of payment to farmers in the first time period in the previous season.

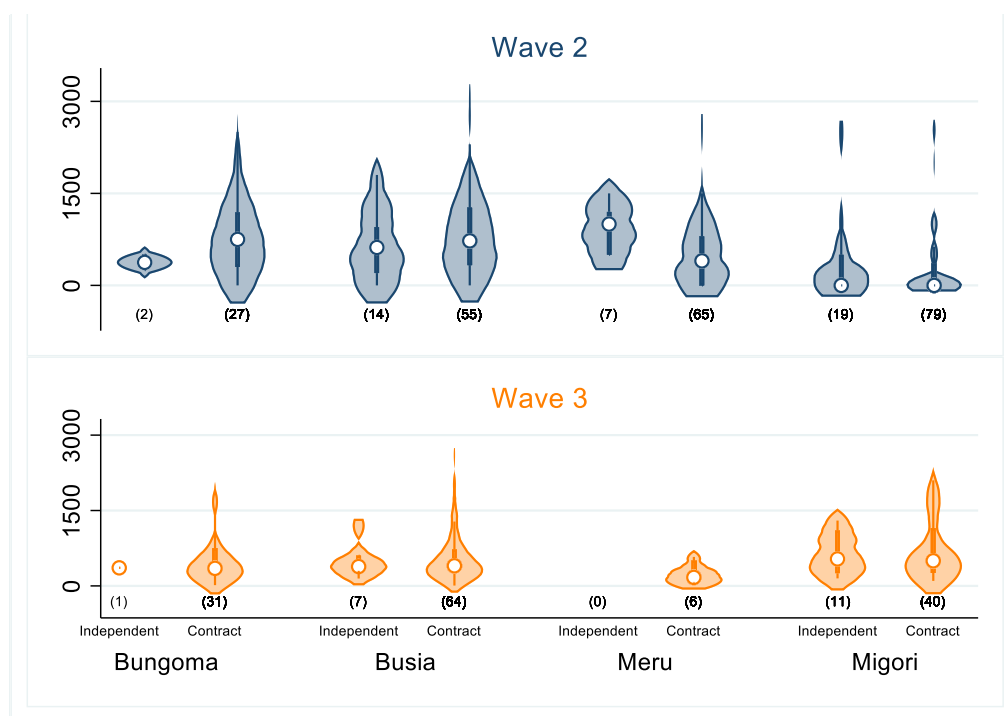
Figure 4: Land Allocated to Tobacco Farming by Farming Households Continuing to Grow Tobacco, by County



Tobacco yields can be variable across seasons, so even if a farmer dedicates the same amount of land to tobacco farming, the actual number of kilograms produced can vary markedly from season to season. In Figure 5, we observe a decrease in production between the two time periods, especially for contract farmers. Recalling the results from above about increased land allocated to tobacco farming in the second time period (Wave 3), this is perhaps a surprising finding, and it suggests very low tobacco yields in the second time period. While low yields could be attributed to poor weather in the farming season during Wave 3, increased land allocation was largely a result of contractual obligations.



Figure 5: Median Tobacco Production in Kilograms for Farming Households Continuing to Grow Tobacco, by County



Tobacco leaf prices, like many agricultural commodities, are vulnerable to fluctuations between seasons, within seasons (leaf is not necessarily sold all at once by farmers because it is not typically harvested all at once), and across regions. In Table 8, we observe significant variation across seasons, farmer classification, and counties. It is not clear what explains the differences among the counties in the same time periods, though tobacco leaf buyers would suggest that quality is the main driver of price. Among time periods, there is the added complexity of local and global demand for tobacco leaf, which is likely to be a major variable affecting price. In focus groups, farmers consistently reported a lack of transparency in the process of determining leaf prices on the auction floor. Because the pricing process does not include outsiders, and tobacco farmers themselves are often excluded from the rationale for price outcomes, it is not unreasonable to infer that price is based largely on a target that is preset by the buyers before the auctioning occurs. This dynamic is supported by the dissatisfaction with the pricing/grading dynamics (discussed below) wherein farmers are given lower grades at auction than they believe is accurate and fair, depressing the prices they are paid.

Table 8: Tobacco Leaf – Average Price per Kilogram (KSh/Kg) by County Status Quo Farmers

		Wave 2		Wave 3	
		Contract	Independent	Contract	Independent
Bungoma	n	21	2	33	1
	price	191.38	127.33	149.86	150
Busia	n	39	9	69	6
	price	171.91	145.97	133.82	130.88
Meru	n	21	4	24	0
	price	139.69	174.15	159.29	.
Migori	n	27	6	33	6
	price	178.62	141.07	170.00	142.06

4.3 Costs of Tobacco Farming

Tobacco farming has been well established empirically to be extremely input-intensive, both in terms of direct inputs such as fertilizers and chemicals, but also farm labour, both hired and household. In this section, we compare these costs across the households that grew tobacco in both years.

Figure 6 presents the median direct input cost per household across counties. These direct inputs include seeds/seedlings, fertilizer (inorganic and organic), agricultural chemicals (e.g., insecticide, herbicide, etc.), and equipment (depreciated), among other smaller inputs. We observe variation across the counties, which is partly driven by variation in farm size. One pattern that is especially clear is that direct input costs increased significantly for contract farmers across all counties. Focus group discussions with farmers suggest that this increase is due to a number of factors including leaf-buying companies giving contract farmers far more inputs than they required (but still obligating them to pay for them), contract farmers purchasing inputs from leaf buying companies at inflated costs, and contract farmers farming tobacco on larger parcels and therefore requiring more inputs.

Generally, there was a reduction in the parcels of land dedicated to tobacco farming in Wave 3, except in Migori County. The likely explanation in the county is renewed motivation for both independent and contract farmers to grow tobacco with the enthusiastic entry of BAT and East Tobacco to the region after the exit of Alliance One in Wave 2.

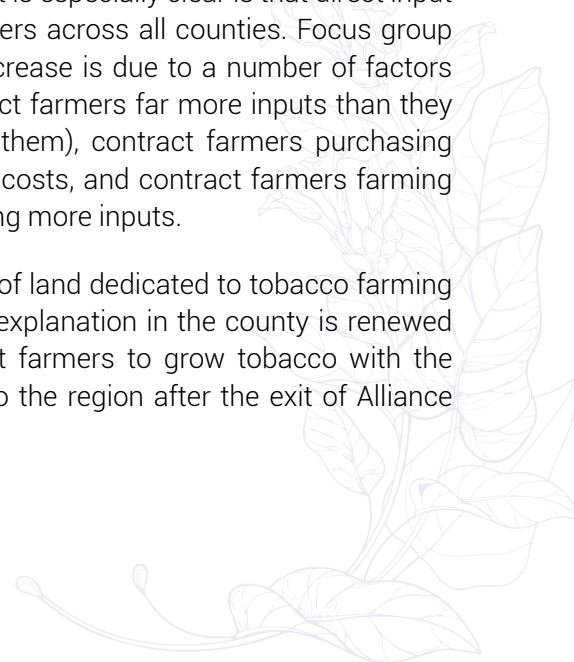
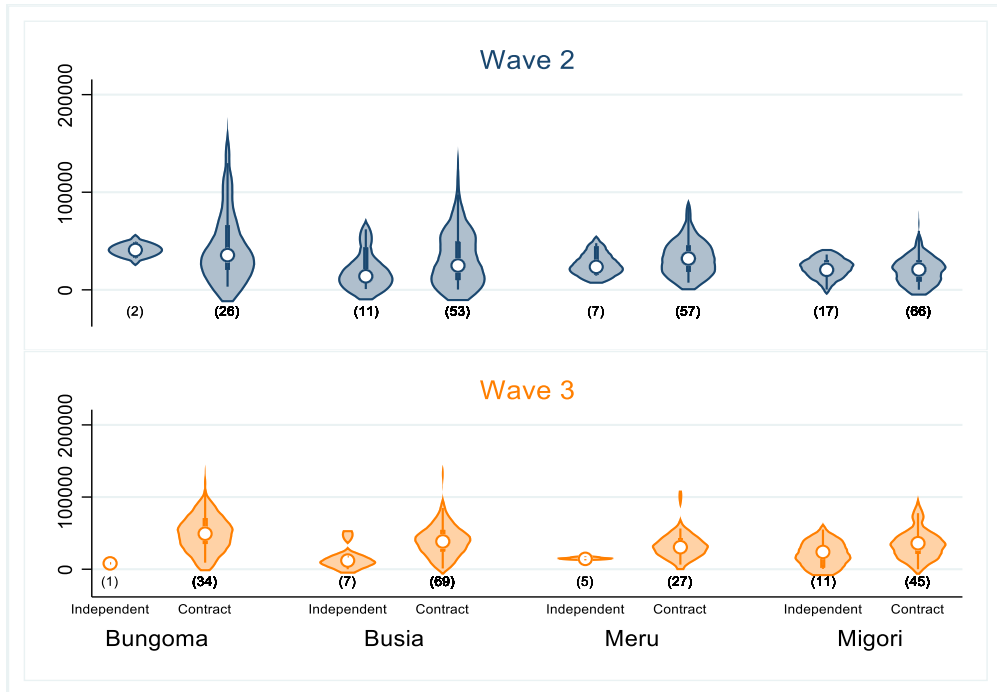


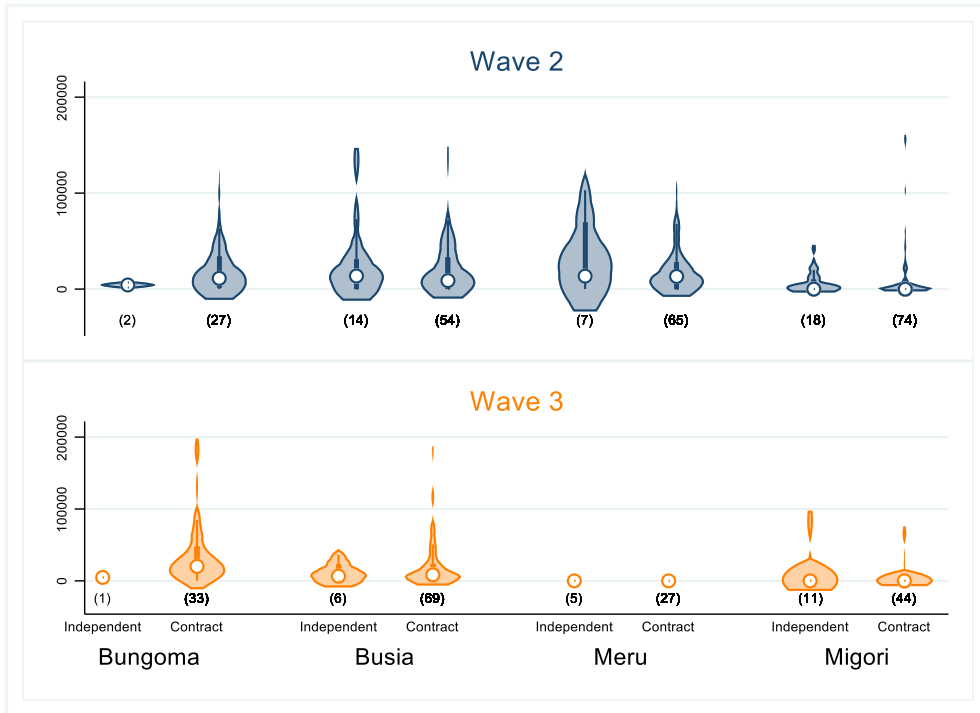
Figure 6: Median Direct Inputs (Ksh) Per Household for Continuing Tobacco Farmers, by County



Some farmers, particularly those with more cultivated area, employ hired labourers to help in production. In Figure 7, we present the average hired labour costs per household for farmers who grew tobacco. Again, we observe considerable variation across counties in both time periods. An interesting observation in Wave 3 is that farmers in Migori and Meru reduced their hired labour costs. While this lowered their costs of production, as we observe later, it did not necessarily positively affect their earnings from tobacco farming as might be reasonably expected. This shows the unpredictability associated with tobacco farming and suggests that farmers' abilities to improve their incomes appear limited



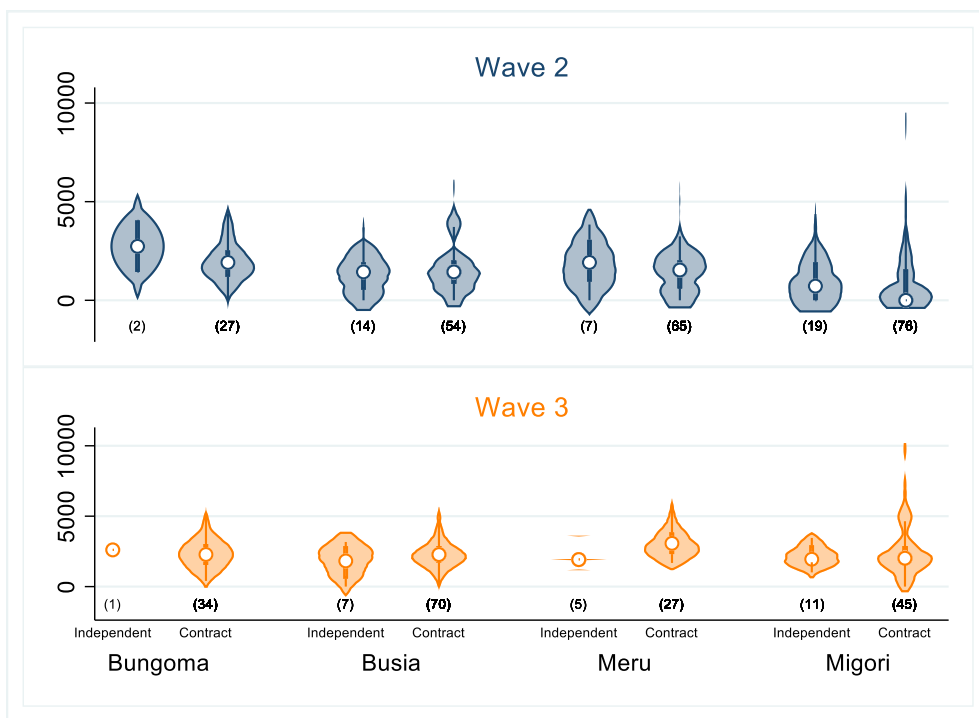
Figure 7: Median Hired Labour Costs for Continuing Tobacco Farmers, by County



An emerging empirical literature suggests that the vast preponderance of labour dedicated to tobacco farming is unpaid and undertaken by the tobacco farmer and her/his family members. Figure 8 presents the average household labour (per household – i.e. not controlling for land size) dedicated to farming. There is some variation across counties, but even more over time; there was a clear increase in household labour in the second time period for most farmers. There are two possible reasons for this increase. First, the increase in family labour coincides with the reduction in hired labour illustrated above suggesting contract farming households were trying to cut down tobacco farming direct costs by increasing hours household members put into farming in order to maximize earnings. Secondly, we observe that tobacco households allocated more land in Wave 3 towards tobacco growing than in Wave 2 suggesting households were possibly thinking that they might increase income through greater production. Typically, an increase in land allocation towards tobacco means more labour – in this case because they were trying to get more earnings, they coupled this with using more household labour than hired labour.



Figure 8: Median (per Household) Household (Unpaid) Labour Hours Dedicated to Tobacco Farming by Continuing Tobacco Farmers, by County



4.4 Profits

More important than just production or gross income is to calculate tobacco farmers' profits because it permits a better evaluation of the households' economic livelihoods. In Figure 9, we present perceived profits of tobacco farmers. This is also sometimes termed "gross margins": gross revenues from selling tobacco leaf minus the direct costs such as fertilizer, seeds, chemicals and hired labour. We observe wide variation between the two years and across the counties. Independent farmers in Bungoma and contract farmers in Migori saw the highest average gross margins (around 40,000 KSh), while contract farmers in Bungoma had the worst gross margins (-37,000).

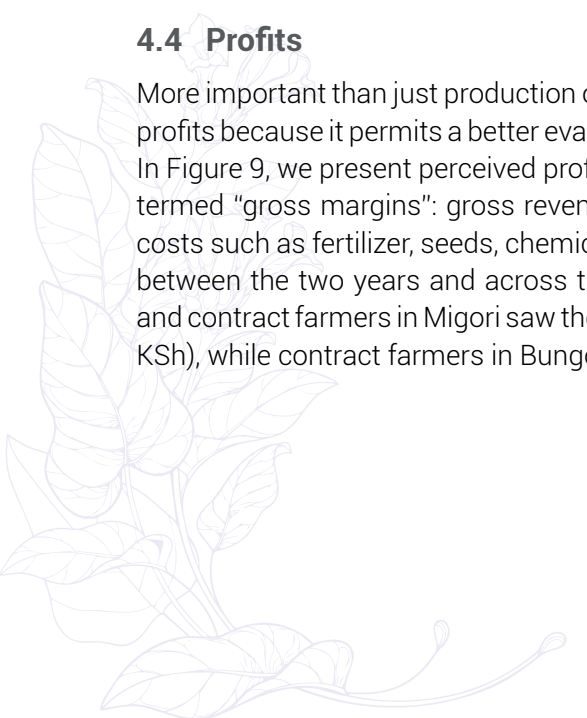
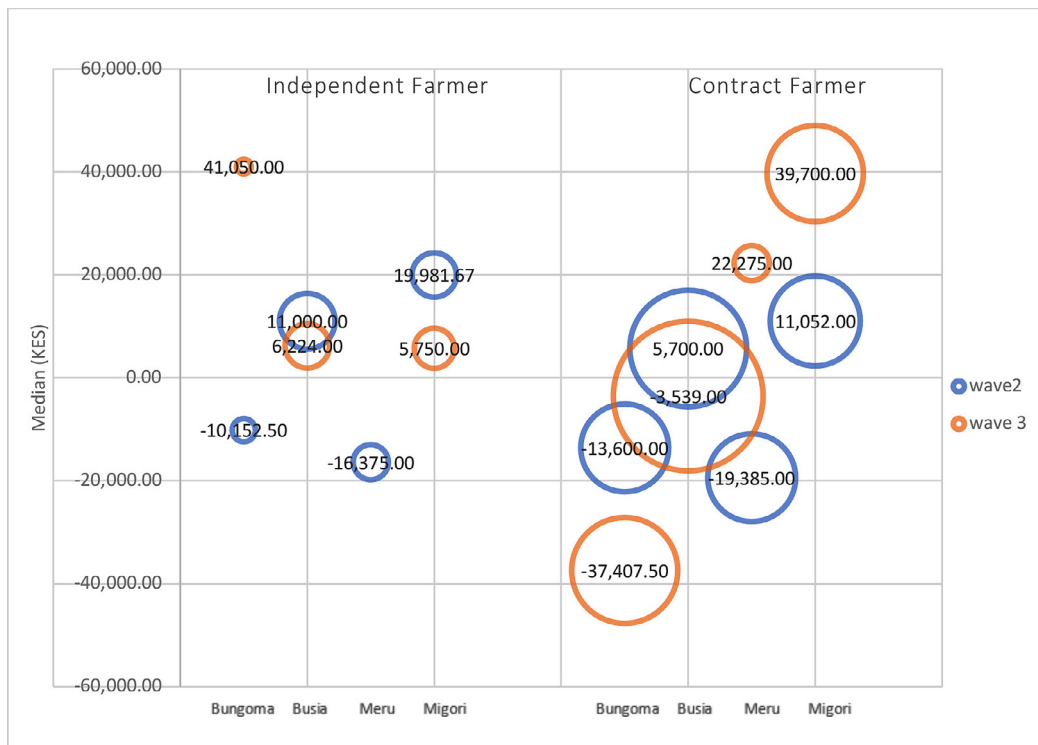


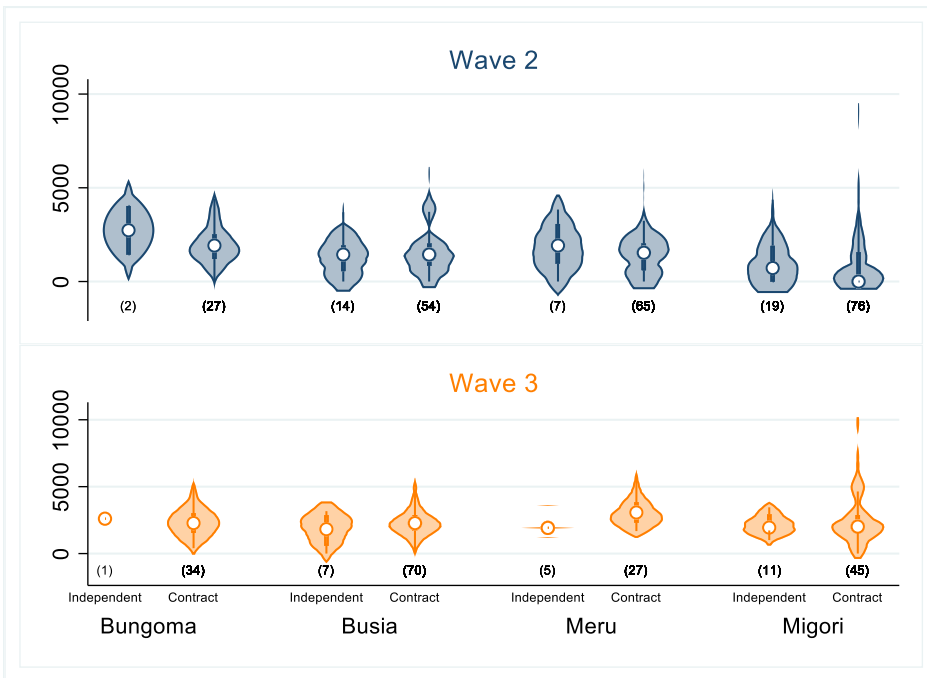
Figure 9: Perceived Profits (KSh) per Household of Tobacco Households who Continued to Grow Tobacco, by County



In Figure 10, we present tobacco farmers' reported profits per household, but in these calculations, we include a value for the household labour. We are working under a well-established assumption that farmers' time has inherent economic value. In this case, their time can be allocated to do any number of productive activities, including growing tobacco, cultivating other crops, or participating in other types of economic activities. In this calculation we assign the equivalent of the average wage paid to casual day labourers under the assumption that any of these family members could have worked at neighbouring farms at this prevailing wage. The results are dramatic. The average smallholder farmer was a net loser economically in every county at both points in time. In other words, they would have been significantly better off economically had they only worked for day wages in the agricultural sector. There was variation in terms of the magnitude of loss with contract farmers from Bungoma in Wave 3 losing the most.



Figure 10: Tobacco Farmers' Reported Profits per Household – Including Household Labour



4.5 Household Resources

One of the most striking findings in this survey is the relationship between median household resources and the decision to continue growing tobacco in both periods. Household resources refer to total earnings by households, including subsistence production by households. Economists increasingly recognize that for many households, including most smallholder farmers, it is critical to conceptualize economic wellbeing beyond simple income, particularly because they consume much of what they produce (World Bank 2016). This dynamic affects how they allocate their labour, land and capital for production. In Table 9 below, we observe that farmers who grew tobacco in both waves reported the lowest earnings of KSh 86,850. However, households that shifted away from tobacco experienced an increase in household resources to KSh 120,965.

This strongly indicates that shifting away from tobacco has a positive impact on household resources. We also observe that households that did not grow tobacco in either time period had the most resources among all categories, with a median of KSh 196,600. Households that previously grew tobacco but decided to shift back to growing tobacco experienced smaller median resources to KSh 133,880 suggesting that returning to tobacco farming makes a household worse off economically.

Table 9: Household Resources by Farmer Type

Farmer Type	N	Median
Current (both waves)	243	86,850
Former tobacco farmers (both waves)	205	196,600
Farmers shifting back to tobacco	44	133,880
Farmers shifting away from tobacco	170	120,965

4.6 Decision to Enter into Contract Farming

The decision to farm tobacco by contract is one of the most important economic decisions that a tobacco farmer makes. Accordingly, we use logistic regression to examine the variables that shape this decision. The results shown in Table 10 suggest that, compared to those who have not completed primary education, farmers who have completed their senior primary schooling are at least 3 times more likely to grow tobacco as contract farmers (compared to their peers who had not finished their primary schooling). Notably, the coefficient for those with more than a primary education was not statistically significant. Further, higher sales and input costs are significantly likely to influence a farmer to grow by contract, which mostly suggests that farmers growing more tobacco are more likely to operate under contract.

Table 10: Logistic Regression Analysis of the Decision to Contract

Variables	Odds Ratio	Standard Error
Years of experience farming tobacco	1.012	0.021
Tobacco sales	0.841**	0.077
Tobacco household labour hours	1.137	0.164
Tobacco hired labour	0.985	0.050
Tobacco input cost	1.289*	0.184
Non-tobacco sales	0.958	0.047
Non-tobacco input cost	1.062	0.052
Non-tobacco hired labor cost	1.044	0.050
Non-tobacco household labour hours	0.710	0.172
Other income	1.000	0.057
Primary school completed (less than primary is the baseline)	3.064*	1.899
More than primary schooling completed	1.933	1.173
Male household head	1.709	1.130
Constant	2.626	5.854
Statistical significance *** p<0.01, ** p<0.05, * <0.1		

4.7 Other Crops Grown/Alternatives

One of the most consequential dynamics to understanding the potential of alternative livelihoods between Wave 2 and 3 is the shifting in and out of tobacco growing. There were farmers who were tobacco farmers in Wave 2 transitioning exclusively to other crops, but there were also farmers that grew exclusively non-tobacco crops in Wave 2 who shifted back to tobacco in Wave 3. In order to understand the shifting patterns, we present the prices of various crops and average production by households with Figures 11 and 12 giving the prices and production for various commodities by the switching behavior in Meru County and Figures 13 and 14 the prices and average production for various commodities in Migori County.

In Meru County, as observed in Figures 11, farmers who switch out of tobacco to other crops generally receive higher prices for other crops when compared to status quo farmers or those who switch back to tobacco. Although we cannot know for certain, we hypothesize that these farmers are investing in these crops with labour and capital and as a result are reaping higher rewards (i.e., price). We also observe in Figure 12 that farmers who continue to grow tobacco or switch back to tobacco not only have limited variety of crops, but also produce lower quantities than those who switch out of tobacco or former tobacco farmers. Or, put the opposite way, former tobacco farmers are generally producing more of non-tobacco crops; coupled with the higher prices that they are typically receiving, it is becoming clear why household resources of the non-tobacco households are generally better than tobacco households.

Figure 11: Prices of Commodities, by Switching Behaviour of Farmers in Meru County

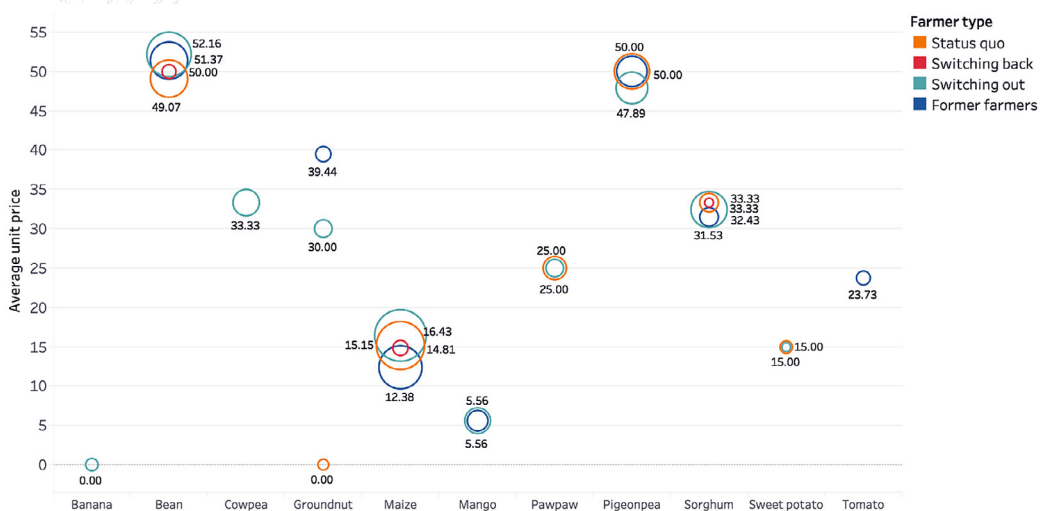
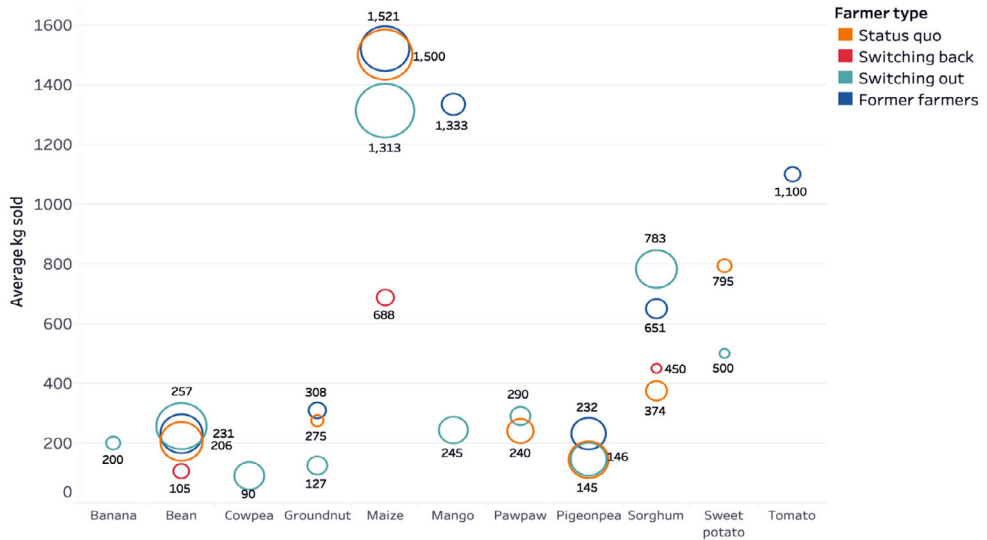


Figure 12: Average Production of Commodities, by Switching Behaviour in Meru County



Migori County offers mixed results in the shifting behaviour of farmers. We observe in Figure 13 that former tobacco farmers receive higher prices for crops they grow except for beans. In terms of production, we see substantial participation in farming other crops by status quo farmers and relatively higher outputs. This finding is not surprising. In Migori county, tobacco farmers as mentioned earlier experienced the exit of Alliance One from the region, and therefore more uncertainty in their economic livelihoods. In addition to this, the other dominant firm in the area, Mastermind Tobacco Ltd., has consistently had difficulties paying farmers in a timely fashion amid other issues that affect the farmers negatively.

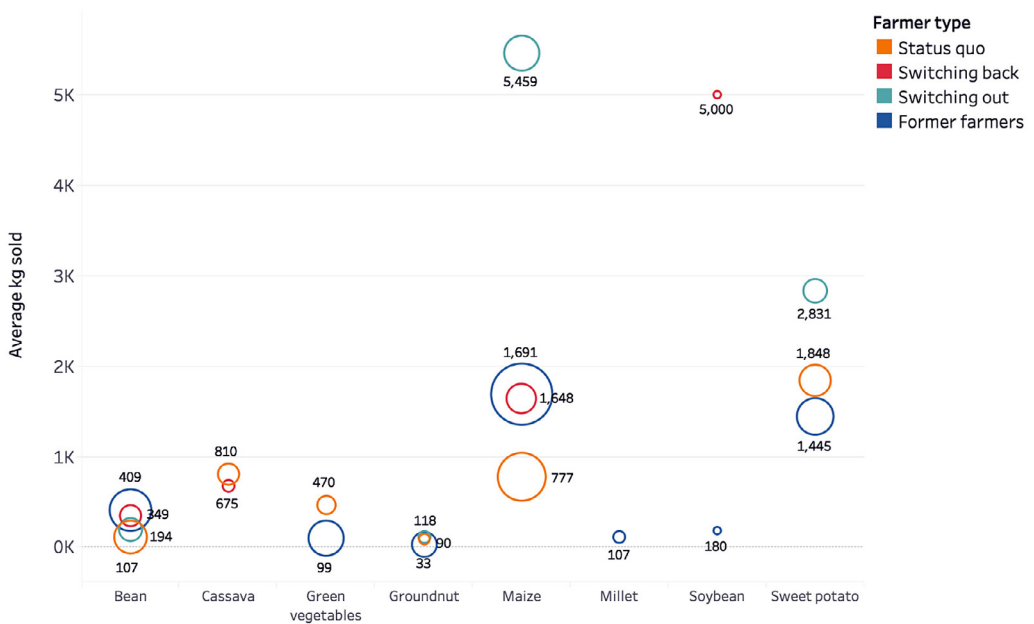
It therefore follows that tobacco farmers are engaging in cultivating other crops to sustain themselves, and it is unsurprising that their performance in farming other crops is similar to that of other farmers. In Figure 14, we observe Migori farmers who shift out of tobacco increasing production of maize and sweet potato. The latter is notable because Migori’s government invested in a new sweet potato processing plant, and it is clear that farmers responded by increasing production of this tuber.



Figure 13: Prices of Commodities, by Switching Behaviour of Farmers in Migori



Figure 14: Average Production of Commodities, by Switching Behaviours in Migori County



In Bugoma County, we observe in Figure 15 that, with the exception of beans, former farmers or farmers switching out from tobacco received higher prices for the alternative crops listed. Further analysis of production of other crops in Figure 16 suggests that status quo farmers generally produce more output. This is an interesting dynamic given the amount of time tobacco farmers have to spend growing tobacco. This could be a suggestion that tobacco farmers have to spend even more time growing other crops to make ends meet, given the unsustainable income they receive from growing tobacco.

Figure 15: Prices of Commodities, by Switching Behaviour of Farmers in Bungoma County

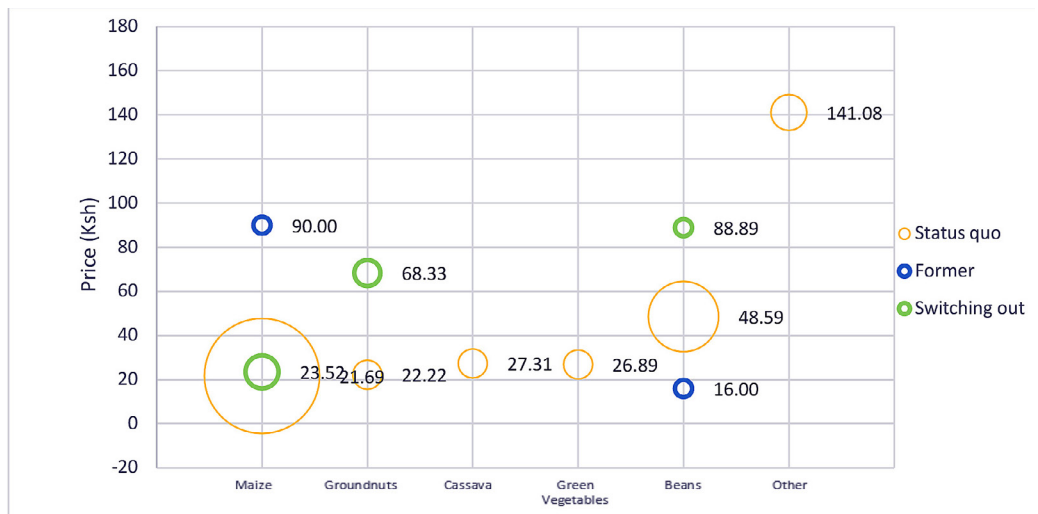
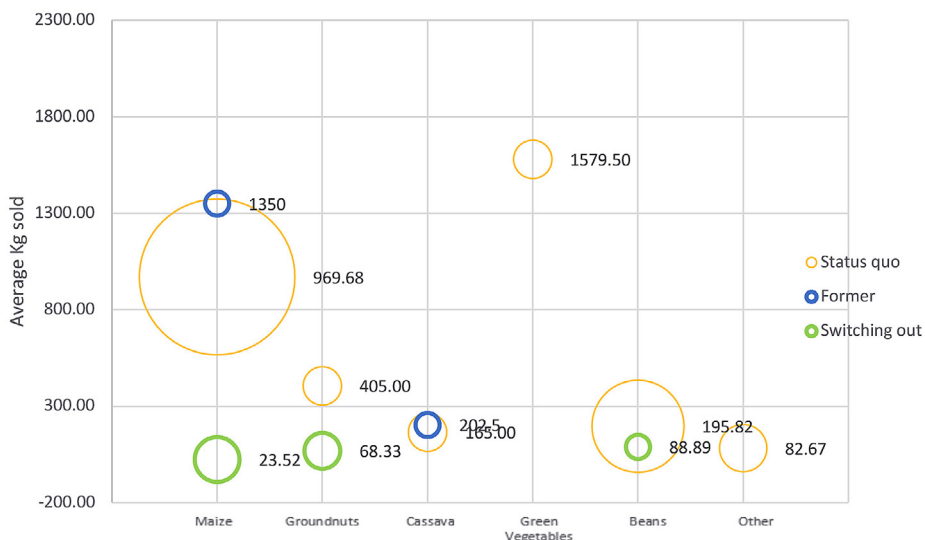


Figure 16: Average Production of Commodities, by Switching Behaviours in Bungoma County



Busia county offers a similar dynamic with regard to the effects of switching behaviour on both price and production. We observe in Figure 17 that those who switch back to tobacco, generally receive the lowest prices. Furthermore, as observed in Figure 18, tobacco farmers generally produce more quantities of produce, possibly because they have to supplement tobacco income, given the low prices they receive.

Figure 17: Prices of Commodities, by Switching Behaviour of Farmers in Busia County

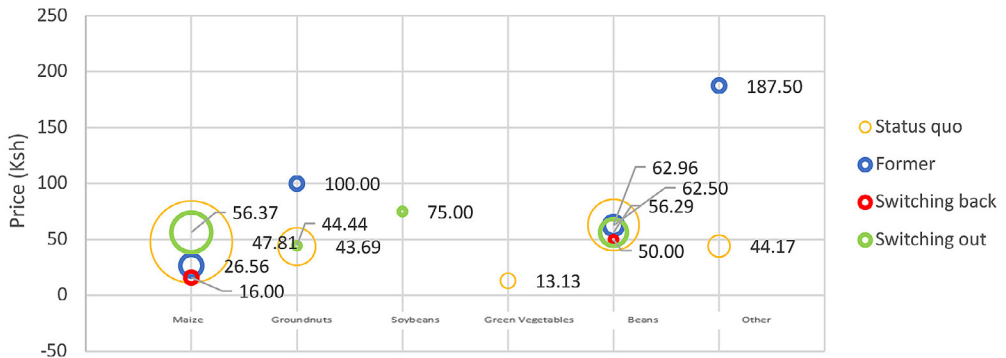
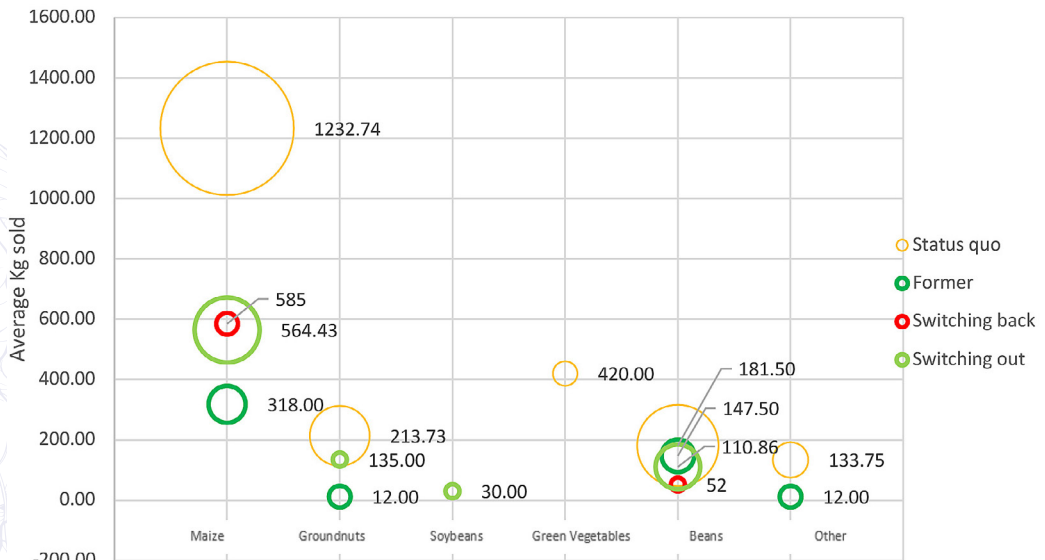


Figure 18: Average Production of Commodities, by Switching Behaviours in Busia County



In order to understand this crop-shifting dynamic in and out of tobacco, we employed a logistic regression to ascertain the factors that determine farmers' decisions to shift away from tobacco. The analysis includes the key economic variables most likely to affect this decision, including tobacco sales, non-tobacco crop sales, years farming tobacco, input costs (for tobacco and non-tobacco crops), hired and household labour, and off-farm economic activity.

Notably, as observe in Table 11 below, only experience and labour hours are statistically significant. Specifically, the longer one has farmed tobacco, the less likely they are to stop, perhaps a sort of inertial effect, and the greater the household labour demands, the more likely farmers will switch away from growing tobacco. This would indicate that younger farmers might be more open to the presentation of alternative opportunities and that farmers in general may be open to information demonstrating how much more labour they put into tobacco relative to other crops. In sum, the results in Table 10 suggest that switching from growing tobacco is almost certainly a very complex dynamic for many households as they consider their cropping decisions.

Table 11: Logistic Regression Analysis of Shifting from Tobacco to Other Crops

Variable	Odds Ratio	Standard Error	P-value
Years of experience farming tobacco	0.921	0.029	0.009
Tobacco sales	1.058	0.070	0.391
Tobacco household labour hours	1.375	0.214	0.040
Tobacco hired labour	0.923	0.069	0.286
Tobacco input cost	0.733	0.243	0.350
Non-tobacco sales	1.083	0.063	0.174
Non-tobacco input cost	0.984	0.067	0.817
Non-tobacco hired labor cost	1.059	0.053	0.251
Non-tobacco household labour hours	1.424	0.461	0.274
Other income	0.983	0.067	0.796
Busia vs Bungoma	11.154	12.902	0.037
Meru vs Bungoma	26.503	30.418	0.004
Migori vs Bongoma	7.460	9.757	0.124
Primary school vs less than primary	0.552	0.408	0.421
Higher than primary vs less than primary	1.336	1.021	0.705
Contract farmer	1.745	1.116	0.384
Male household head	3.583	3.001	0.128
Constant	0.002	0.006	0.110



As discussed above, some farmers that were not cultivating tobacco sometimes shifted subsequently back to tobacco growing. Accordingly, we perform a logistic regression on these farmers' decisions to shift back to tobacco. As observed in Table 12, three variables are statistically significant in influencing this shift: non-tobacco input costs, non-tobacco hired labour costs, and non-tobacco household labour hours. We observe that higher labour and input costs of non-tobacco crops increase the odds of shifting back to tobacco. This would indicate that better supply chains for non-tobacco inputs might help to reduce tobacco farming. That said, the landscape is clearly complex, and much goes into these cropping decisions.

Table 12: Logistic Regression Analysis of Switching from Other Crops to Tobacco

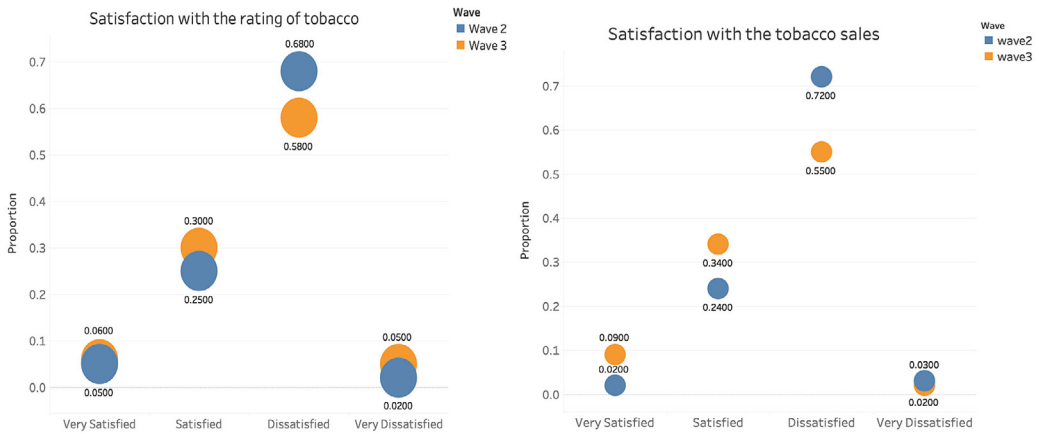
Variable	Odds Ratio	Standard Error	P-value
Non-tobacco sales	1.062	0.049	0.196
Non-tobacco input cost	1.106	0.058	0.056
Non-tobacco hired labor cost	1.137	0.057	0.011
Non-tobacco household labour hours	0.795	0.090	0.044
Other income	1.092	0.096	0.316
Busia vs Bongoma	0.386	0.560	0.512
Meru vs Bongoma	1.038	1.189	0.974
Migori vs Bongoma	7.038	7.625	0.072
Male household head	1.469	1.093	0.605
Primary school vs less than primary	1.172	0.675	0.783
Higher than primary vs less than primary	1.199	0.799	0.785
Constant	0.007	0.013	0.011

4.8 Why Farmers Grow Tobacco

4.8.1 Level of Satisfaction

The survey results suggest that farmers are largely unsatisfied with the way the tobacco companies grade the leaf and the prices they pay for their harvest. Typically, leaf grading occurs at the auction floor with farmers indicating disagreement with the grades awarded to their leaf. Furthermore, farmers express frustration with the tobacco selling process. According to focus group discussions in previous research in Kenya, this results from at least two related dynamics. The first is a perception that prices are too low. The second is that tobacco companies often do not purchase all of the harvested tobacco, even when higher yields result from the inputs provided and the amount of land that is required by the contracts to be cultivated. These dynamics are shown in Figure 19 below for both survey waves.

Figure 19: Satisfaction from Tobacco Farming – Leaf Rating and Sales



Evidence from the focus groups discussions corroborates previous research that indicates that contracts overwhelmingly skew in favour of tobacco companies (e.g., Chavez et al. 2016; Goma et al., 2019; Magati et al. 2018; Makoka et al. 2016). The contracts are not only unilaterally created by the companies without any input from farmers, but they serve as the only precondition to a supposedly assured outlet for the tobacco harvest. Conditions in the contracts include compulsory purchase of inputs as determined by the company’s extension staff (price and quantity), company determination of the land size dedicated to tobacco farming, and the possible forfeiture of household assets in the event that inputs are not paid from the harvest, regardless of the reasons for low output.

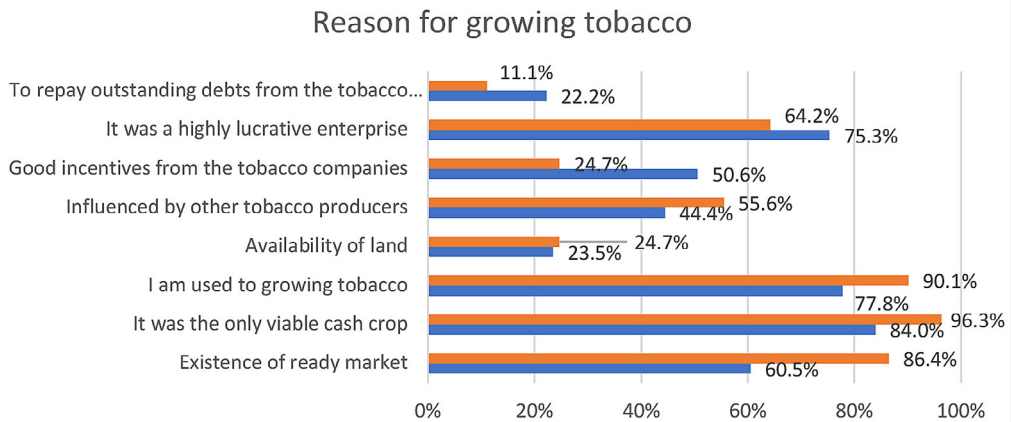
Because of this overarching dissatisfaction, it is critical to explore why farmers make the decision to continue growing tobacco leaf. As seen in Figure 20 below, current tobacco farmers (those who answered this question in both waves) most frequently identified the following reasons for growing tobacco:

- ◆ A perception that tobacco is the only viable crop in their area
- ◆ A perception that it is highly lucrative
- ◆ A familiarity with growing tobacco
- ◆ The existence of a ready market

Notably, those influenced by incentives from tobacco companies decreased between the two waves from 50.6% in 2017 to 24.7% in 2018. This likely reflects market shifts on the part of the tobacco leaf-buying firms as firms dropped coverage of some geographic areas while focusing on others. The farmers reported considerable uncertainty in which firms were contracting in this time period and where.

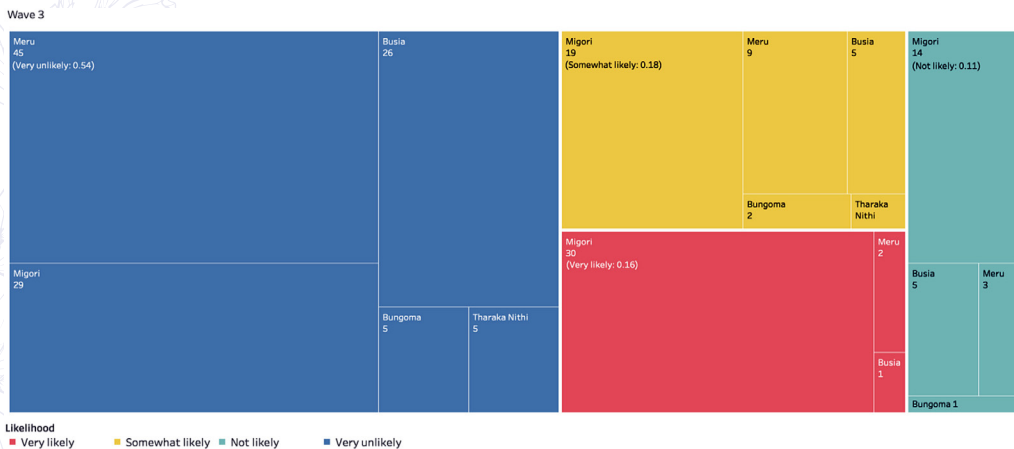


Figure 20: Reasons for Growing Tobacco Among Farmers Who Grew Tobacco in Both Waves



Farmers were also asked about the likelihood of growing tobacco in the future considering typically low and/or inconsistent income from growing tobacco. Results shown in Figure 21 below indicate that farmers are unlikely to grow tobacco in the future, even in regions that have consistently grown tobacco on a large scale, such as Migori. These findings indicate that farmers continue to grow tobacco even though it is not their first preference, and they suggest that interventions to encourage farmers to switch towards other livelihoods would likely be well received.

Figure 21: Likelihood of Growing Tobacco Again in Future



5.1 Household Income

Analysis of the incomes across different sources indicates that in both waves, the difference in earnings between current and former tobacco farmers is not statistically different for most engagements. However, we observe that crop production (other crops) and gift remittances in wave 3 are the only statistically significant differences, with former farmers having high incomes as seen in Table 13 below.

Table 13: Average Income from Different Sources

Income Source	Wave 2					Wave 3				
	Former		Current		p-value	Former		Current		p-value
	n	mean	n	mean		n	mean	n	mean	
Crop production (Tobacco)	7	108,571	254	107,934	0.9925	0		172	141,971	
Crop production (other crops)	100	87,512	181	106,905	0.6982	167	193,809	153	116,859	0.026
Livestock production	43	127,017	63	256,246	0.4906	85	129,662	74	87,288	0.4585
Natural resources sales (charcoal, firewood, timber etc)	16	196,263	18	23,517	0.2626	28	32,786	16	35,225	0.9162
Formal employment	10	315,300	10	212,300	0.382	21	760,740	15	120,400	0.0960
Casual labour	21	169,474	28	85,496	0.1061	34	136,665	16	85,150	0.3187
Beer brewing	2	30,000	1	41,600		2	75,000	1	115,200	
Petty trading/ business (shops/poshomills, etc)	21	121,000	32	157,794	0.4902	38	209,537	36	354,389	0.3359
Land rentals	2	9,750	8	11,500	0.8387	10	19,000	2	7,000	0.2718
Gifts/Remittances						51	58,824	26	173,231	0.0507
Pension	1	87,917	0			3	60,333	0		
Artisanal skills (weaving, brewing, carpentry etc)	4		8	156,000		12	176,317	8	140,225	0.7546
Other (specify)	0	105,000	0	281,250	0.4123	14	244,200	6	115,267	0.5176

5.2 Asset Accumulation

An economic prosperity narrative is consistently pushed by the tobacco industry to suggest that farmers who grow tobacco are better off than farmers who do not grow tobacco in the same region. The survey results indicate, however, that there is no statistically significant difference in assets between current tobacco farmers and former tobacco farmers. Some development experts identify asset accumulation as an important component of economic development (Moser 2007). Under certain conditions, these assets can partially form the basis of a household's economic security and/or

contribute to other economic activities. They may also reflect the permanent income status of households, which can be a better and longer-term indicator of economic wellbeing.

For example, for farmers, having a vehicle to transport goods and/or having a mobile phone to monitor market prices help make these households more prosperous (Li et al. 2019). Accordingly, in Table 14, we examine current and former tobacco farmers' household and agricultural assets. The most commonly-held assets were televisions, radios, livestock, poultry, and furniture. The most valuable assets were cars and large livestock, though in both cases, ownership of such assets was rare.

Table 14: Household and Agricultural Assets: Current vs Former Farmers

HOUSEHOLD	Current Farmers	Former farmers
Radio	84.44%	76.02%
Cell-phone	97.78%	94.57%
TV set	23.11%	24.89%
Chairs	100%	98.64%
Bed	99.56%	98.64%
Mattress	99.11%	98.64%
Table	100%	98.19%
Bicycle	41.33%	26.70%
Refrigerator	0.89%	0.90%
Motor Cycle	24.44%	22.17%
Motor Vehicle	1.33%	1.36%
Posho mill/kiosk/shop	7.11%	10.86%
LIVESTOCK		
Large livestock	81.33%	71.95%
Small livestock	51.56%	54.30%
Poultry	93.78%	90.05%
AGRICULTURAL		
Wagon	2.22%	1.81%
Plough	54.22%	43.89%
Tractor	0%	0%
Jake	0%	0%

5.3 Food Security

Food security, particularly in the agricultural sector, is an ongoing challenge for lower-income households (Kenya 2017). The survey indicates that at least 98% of households in the survey produce their own food. The survey also suggests similarities in how long the food lasts for both current and former tobacco farmers, as shown in Table

15 below. Despite producing their own food, the quantity produced did not last the entire year, with both sets of farmers indicating the need to purchase food for at least four months in a year. This finding suggests that efforts by tobacco companies to expand production by pressuring farmers to dedicate more land towards tobacco production may have negative impacts on food security. Not only does this take away land from food production, but greater tobacco production often encroaches on the season for food crops, exacerbating the risk of tobacco growing households being more food insecure.

Finally, the low tobacco payments discussed above create a situation where families frequently have insufficient funds to purchase food. All this said, former tobacco farmers demonstrated similar struggles, so many of the challenges are related to structural issues in the agricultural sector generally and broader rural underdevelopment in some counties. It is clear, however, that tobacco farmers do not have more food security than their peers who have stopped growing tobacco.

Table 15: Food Security

		CURRENT FARMER		FORMER FARMER	
		wave 2 N=172	wave 3 N=225	wave 2 N=332	wave 3 N=221
Food self-sufficiency					
Whether the household produces their own food		98.26%	98.67%	98.80%	98.19%
Longevity of food supply (months)		7.62	8.45	7.28	8
months that staple food production lasted for household	month				
	<=1 month	0.59	0	0.61	0.92
	2 months	1.18	0.45	1.22	1.84
	3 months	7.1	6.76	5.79	7.37
	4 months	6.51	5.41	5.49	8.76
	5 months	16.57	7.66	8.84	7.83
	6 months	24.26	19.82	29.57	20.74
	7 months	3.55	7.21	4.88	3.69
	8 months	7.1	6.31	20.12	6.91
	9 months	0.59	2.25	2.44	3.23
	10 months	1.18	2.7	2.13	0.92
	11 months	1.78	0.9	1.22	0.46
	12 months	28.99	40.54	17.68	35.48

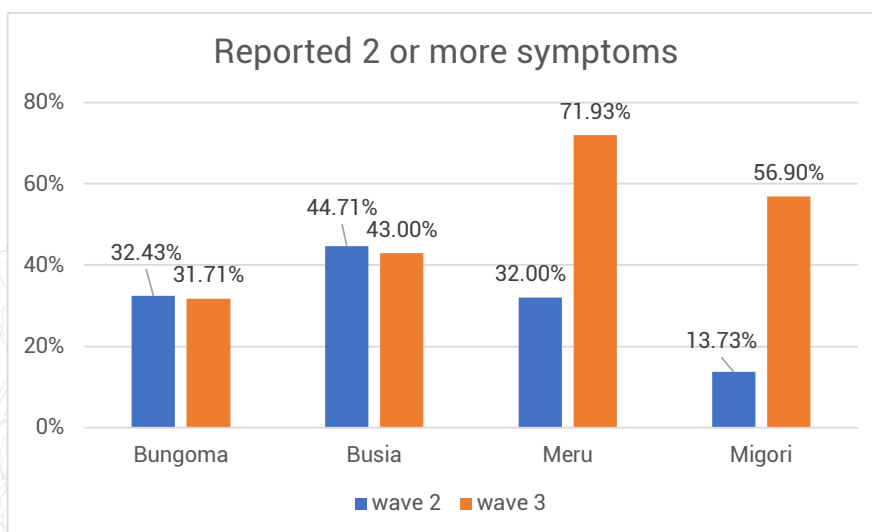


5.4 Health Status

Literature on tobacco growing suggests that farmers are afflicted by green tobacco sickness (GTS) due to exposure to nicotine poison (Arcury and Quandt, 2006). The surveys show that tobacco farmers in Kenya lack protective clothing, including gloves, exposing them to GTS. While direct evidence of the incidence of GTS is dependent on laboratory testing of the urine of household members, the survey sought to explore whether members of the tobacco growing household exhibited symptoms known to be associated with GTS during the growing season. This was done by listing all known GTS symptoms, with respondents asked whether members in the household experienced any of the symptoms in the growing season.

Figure 22 shows the percentage of tobacco growing households where family members experienced at least two of the symptoms. The results of the survey indicate that farmers and their families may indeed be experiencing the effects of GTS.

Figure 22: Green Tobacco Sickness



In order to understand the relationship between tobacco farming practice and self-reported nicotine poisoning, we conducted analysis of the variance of the proportion of farmers that reported any nicotine poisoning symptoms among four groups of farmers: "status quo" farmers who farmed tobacco in both waves, "switch in" farmers who farmed tobacco only in the later wave, "switch out" who farmed tobacco only in the former wave, and former farmers who did not farm tobacco in either wave. From pairwise comparisons of groups' average rates of self-reporting symptoms, we

can see from Table 16 that “switch in” farmers reported significantly fewer nicotine poisoning symptoms in the former wave, but after starting tobacco farming practice in the latter wave, there are significantly more people reporting such symptoms. In other words, when starting to farm tobacco, farmers begin to experience nicotine poisoning symptoms.

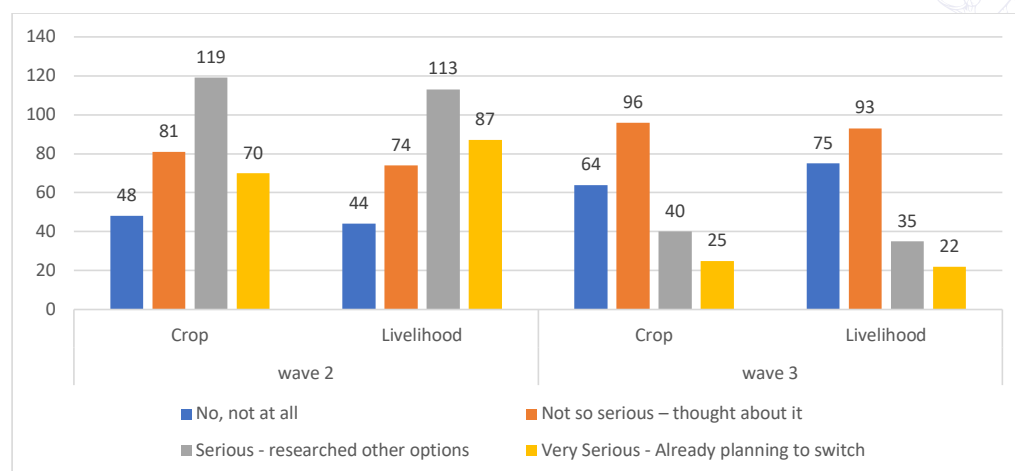
Table 16 – Pairwise Comparisons of Farmer Groups of Two or More Green Tobacco Sickness Symptoms

Group vs Group	Wave 2			Wave 3				
	Group Means		Mean Difference	HSD Test	Group Means		Mean Difference	HSD Test
Status quo vs. switch in	0.6316	0.4000	0.2316	3.2928	0.5395	0.7000	0.1605	2.3064
Status quo vs. switch out	0.6316	0.5571	0.0744	1.0584	0.5395	0.7000	0.1605	2.3064
Status quo vs. former	0.6316	0.6753	0.0437	0.6220	0.5395	0.7013	0.1618	2.3250
Switch in vs. switch out	0.4000	0.5571	0.1571	2.2344	0.7000	0.7000	0.0000	0.0000
Switch in vs. former	0.4000	0.6753	0.2753	3.9148*	0.7000	0.7013	0.0013	0.0187
Switch out vs. former	0.5571	0.6753	0.1182	1.6804	0.7000	0.7013	0.0013	0.0187

5.5 The Future of Tobacco Farming

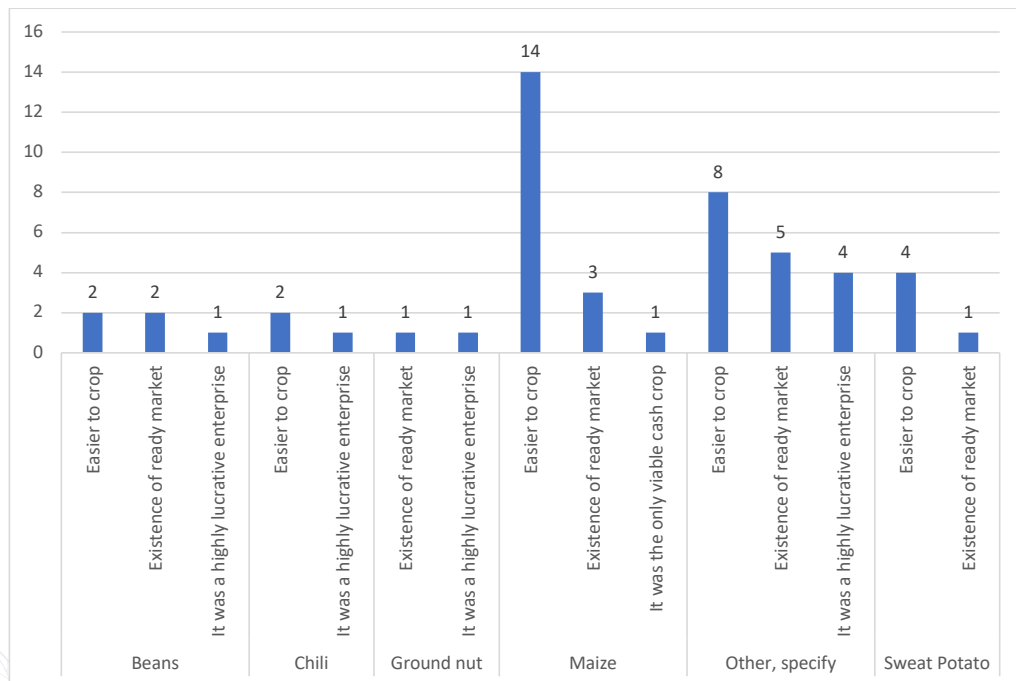
Farmers are increasingly considering alternatives to tobacco farming. From the two waves, we observe in Figure 23 that many tobacco farmers considered switching to other livelihoods or crops. In Wave 2, more farmers actively considered switching to other crops than in Wave 3. It is not surprising that farmers may find the decision to switch from tobacco difficult given the many reasons enumerated in Section 4.8, and the fact that farmers are considering switching from tobacco is good progress for their households' livelihoods (e.g., economic and health).

Figure 23: Crop and Livelihood Switching



Given that some farmers are actively considering alternatives, having either researched different options or made plans to switch, the survey sought to understand these decision making processes. Insight into the alternatives tobacco farmers have in mind can inform policy options that could be explored to make this a reality. Figure 24 below indicates the various crops and livelihood options and the reasons behind the farmers' considerations.

Figure 24: Reasons for Crop and Livelihood Options



Ultimately, farmers' decisions about their livelihoods are complex and driven by many different factors. To understand how leaders can better tailor policies to encourage farmers to pursue more lucrative non-tobacco opportunities, we explore tobacco farmer's willingness to shift to alternative livelihoods using logistic regression analysis (Table 17).

The interpretation of the results is a little cumbersome because the question asks about the things that would make farmers less willing to shift to other crops. For example, there is a statistically significant relationship between tobacco sales and willingness to shift: the greater the level of tobacco sales, the more unwilling a farmer is to shift (i.e., when they do well with tobacco, they prefer to stick with it). Likewise, the lower the level of household labor employed for tobacco, the less likely farmers are to switch away from it (conversely, the greater time devoted to tobacco labour, the more likely they will switch to another crop). Additionally, the greater the use of

household labour on non-tobacco crops, the less willing farmers will be to abandon tobacco. The more educated the farmer, the more willing they are to shift. And finally, contract farming has a strong negative effect on farmers' willingness to shift to other crops or livelihoods.

Taken together, the findings suggest that policy makers seeking to encourage farmers to reduce their reliance on tobacco should focus in two places. First, they should seek to educate farmers on the opportunity costs borne by tobacco farmers because of the labour intensiveness of the crop. As farmers increasingly recognize how much they lose from spending so much of their household labour on tobacco, they will be more likely to consider shifting. Second, policy makers should explore what it is about contract farming that keeps farmers from abandoning tobacco. One optimistic possibility is that farmers can access a form of credit through contracts that they otherwise find difficult to obtain.

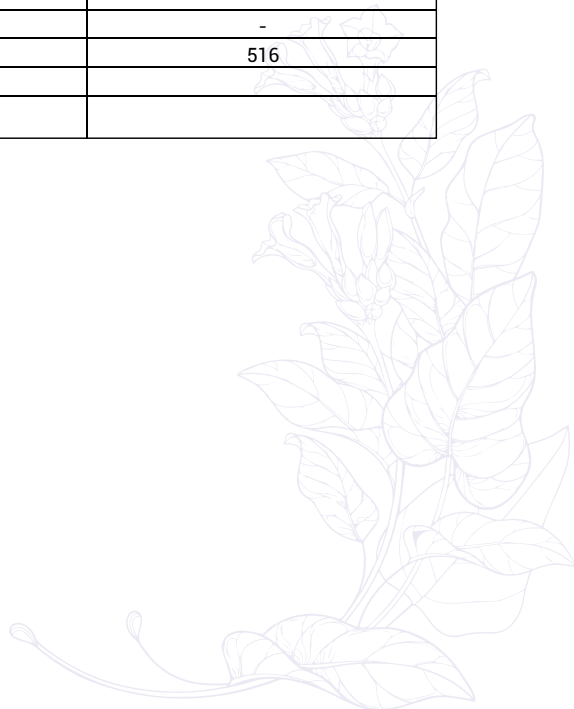
Thus, credit programmes for other crops could address this issue. More pessimistically, farmers in focus groups report a cycle of debt that emerges as farmers are unable to pay off the costs of the inputs from the previous season, forcing them to enter into a new contract. In other words, they do not “choose” to contract, they are literally compelled to continue season after season. Government oversight of unfair contracts could go a long way toward mitigating that issue in the short term. Alternatively, contract farming may indicate a greater need for cash. These farmers might be especially attracted to programs that facilitate the development of alternative cash crops.



Table 17: Willingness to Switch to Alternative Livelihood

	Unwilling to switch to other crops	Unwilling to switch to other livelihood
	(1)	(2)
VARIABLES	odds ratio	odds ratio
	-	
Experience	1.012 (0.00944)	0.994 (0.00948)
	0.994 - 1.031	0.976 - 1.013
Tobacco sales	1.095** (0.0396)	1.135*** (0.0423)
	1.020 - 1.175	1.056 - 1.221
Household labor on tobacco	0.806** (0.0725)	0.845* (0.0798)
	0.676 - 0.962	0.703 - 1.017
Hired labor on tobacco	0.993 (0.0240)	1.017 (0.0247)
	0.948 - 1.042	0.970 - 1.067
Input cost on tobacco	0.955 (0.0505)	0.986 (0.0514)
	0.861 - 1.059	0.891 - 1.092
Nontobacco crop sales	0.976 (0.0207)	0.970 (0.0208)
	0.937 - 1.018	0.930 - 1.012
Nontobacco crop input	1.059*** (0.0219)	1.014 (0.0213)
	1.017 - 1.103	0.973 - 1.057
Nontobacco hired labor cost	0.954** (0.0183)	0.943*** (0.0184)
	0.919 - 0.991	0.908 - 0.980
household labor on nontobacco	1.440*** (0.156)	1.434*** (0.170)
	1.164 - 1.781	1.137 - 1.810
Other income	0.969 (0.0282)	0.940** (0.0282)
	0.916 - 1.026	0.886 - 0.997
Busia vs Bongoma	0.848 (0.198)	1.089 (0.255)
	0.536 - 1.341	0.688 - 1.722
Meru vs Bongoma	0.209*** (0.0716)	0.209*** (0.0730)
	0.107 - 0.409	0.105 - 0.414

	Unwilling to switch to other crops	Unwilling to switch to other livelihood
	(1)	(2)
VARIABLES	odds ratio	odds ratio
Migori vs Bongoma	1.458 (0.461)	1.771* (0.565)
	0.784 - 2.710	0.948 - 3.309
Primary school vs less than primary	0.878 (0.259)	0.532** (0.163)
	0.492 - 1.564	0.292 - 0.970
Higher than primary vs less than primary	0.699 (0.214)	0.718 (0.229)
	0.383 - 1.275	0.384 - 1.342
Contract farmer	2.336*** (0.579)	2.883*** (0.723)
	1.437 - 3.799	1.764 - 4.713
Male household head	1.422 (0.471)	0.836 (0.290)
	0.743 - 2.720	0.424 - 1.651
/cut1	0.692 (0.677)	0.424 (0.455)
	0.101 - 4.713	0.0519 - 3.468
/cut2	3.236 (3.158)	2.249 (2.415)
	0.478 - 21.91	0.274 - 18.45
/cut3	21.70*** (21.39)	13.80** (14.89)
	3.143 - 149.8	1.663 - 114.4
y05		
Observations	516	516
seEform in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		



6

CONCLUSION AND WAY FORWARD

In stark contrast to the narratives of farmer prosperity and economic development proffered by the tobacco industry, the research presented here strongly indicates that tobacco farming in Kenya comes with few gains and significant opportunity costs for individual households. Most clearly, the evidence shows that tobacco-growing households are likely to have fewer overall resources than farming households that do not grow tobacco. Former tobacco growers have more resources than current tobacco farmers, and households that did not grow tobacco in either season evaluated here had the most resources of all. Combined with the intensive labour needs, the health risks, the potential for vicious debt cycles, and the unsatisfying contractual dynamics farmers experience with tobacco buyers, tobacco farming has little potential to improve the lives of farmers compared to other crops. The role tobacco farming might play in aggregate economic development in rural Kenya is likewise unpromising.

Given the dim prospects for tobacco farmers, it is a puzzle why farmers cultivate tobacco at all. The answers to this question that emerge from this research suggest real opportunities for helping farmers shift away from tobacco and towards greater levels of prosperity. In particular, farmers choose tobacco because it means ready access to inputs, clearly identifiable buyers of their product, and in contrast to many other products, it results in access to some cash. Policies and public and private sector initiatives that can facilitate the development of these features in other agricultural products stand to have significant success in improving the living standards of farming households.

Article 17 of the WHO FCTC and Article 13 of the Kenya Tobacco Control Act provide that policy makers encourage alternative livelihoods to those who are dependent on tobacco growing. To facilitate this process, the Tobacco Control Act created a fund equivalent to 2% of the value of tobacco produced and imported for sale in the country to help tobacco growers diversify their crop production and assist in health programmes and costs that result from tobacco use. To help in the diversification efforts, we recommend the following:

- ❖ The tobacco control working group on Article 17 in Kenya which is tasked with leading efforts to encourage alternative livelihoods to tobacco farming should be reconstituted. As a matter of urgency, the group under the leadership of the

Ministry of Agriculture should develop a policy framework and programmes to encourage and develop supply value chains for alternative crops.

- ❖ To improve productivity of alternative farming activities, county governments should increase their employment of extension workers to help farmers become familiar with alternative crops and increase their output.
- ❖ Extension workers should also play an active role in educating tobacco farmers on the high opportunity costs of tobacco. It is not always obvious to self-employed workers how much time they devote to their own business (or farm). Illustrations of these costs may encourage farmers to move to more lucrative opportunities.
- ❖ Government leaders should encourage, facilitate, and support initiatives by county governments to develop supply and value chains and promote alternatives to tobacco growing. For instance, officials in Migori County have worked with development partners to construct a sweet potato processing plant which provides farmers with a ready buyer of this crop and can provide a source of cash that is so attractive about tobacco. They have also promoted aquaculture operations along the shores of Lake Victoria. They have actively helped farmers improve the productivity of their banana crops. And they have been experimenting with programs that have introduced dairy cows and distributed grafted avocado seedlings that may serve as an eventual export crop to satisfy high demand in China.

Taken together, these suggestions can have a significant effect on decreasing the production of tobacco in Kenya. This would have substantial positive effects both on the livelihoods of individual farming households and on development prospects in rural Kenya.



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