



Brief report

The Economic Geography of Kenyan Tobacco Farmers' Livelihood Decisions

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Abstract

Introduction: The narrative of prosperous economic livelihood of tobacco farmers in Kenya as alleged by the tobacco industry deserves challenge as evidence increasingly suggests that smallholder tobacco farmers are making little or no profits. Article 17 of the World Health Organization Framework Convention on Tobacco Control encourages viable alternative livelihoods for tobacco farmers. There is little evidence, however, on how tobacco farmers make livelihood choice decisions.

Methods: A total of 527 purposefully selected smallholder tobacco farmers in Kenya from three main tobacco-growing regions participated in a 2017 economic livelihood survey. Geo-economic data were matched to surveyed farmers' Global Positioning System coordinates to estimate each farmer's access to nearby economic centers. Ownership of cell phones or radios was also used to estimate farmers' virtual access to nearby economic activities to understand better the role of information. Multivariate logistic regressions were used to control socioeconomic status and self-reported activity in nearby economic centers.

Results: Tobacco farmers rarely live within 10 km of an economic center. Results suggest that the further away farmers live from economic centers, the less likely they are to grow tobacco, but more likely to grow tobacco under contract. Also, farmers owning a cell phone or radio are not only less likely to grow tobacco, but also to not engage in farming under contract if they do grow tobacco.

Conclusions: Physical and virtual access to nearby economic activities is significantly associated with tobacco farmers' livelihood choice decision and should be taken into consideration by decision makers while developing interventions for FCTC Article 17.

Implications: Smallholder tobacco farmers in lower-income countries are making little or no profits, but few studies have been conducted to illuminate what perpetuates tobacco production, with such studies urgently needed to support governments to develop viable alternative livelihoods for tobacco farmers. This study suggests that geographic and technological factors that shape farmers' economic decisions can help policy makers tailor alternative livelihood policies to different regional contexts and should be a focus of future research in this area.

Introduction

Rigorous recent research demonstrates that around the world most smallholder tobacco farmers are making little or no profits.¹⁻⁴ In addition, harms such as deforestation and green tobacco sickness exacerbate an already bleak situation.⁵⁻⁸ Tobacco farming is now predominately conducted by smallholder farmers located in lower-income countries, including Kenya.⁹⁻¹² In recognition of the global health and economic challenges tobacco poses, Kenya became a signatory to the World Health Organization Framework Convention on Tobacco Control (WHO FCTC), with Article 17 of the treaty encouraging the provision of support for economically viable alternative activities to tobacco farmers. Indeed, a WHO FCTC working group recommended in 2014 that economic diversification, engagement of farmers and workers, and seeking solutions that fit within broader sustainable development goals are several of the key principles to guide this effort. Although there have been small-scale, external donor-led efforts to encourage livelihood transitions in Kenya, the government has not taken an active role.³ To support governments' development of alternative livelihoods, there is an urgent need to understand the factors that contribute to tobacco production. Research, another bedrock of the working group's recommendations, is only beginning to illuminate the economic, social, political, and geographic factors that perpetuate tobacco production in low- and middle-income countries.¹³⁻¹⁶ This research builds on earlier work in Kenya focused on more traditional economic dynamics of tobacco farming by offering a novel analysis of the geographical and technological factors that shape farmers' economic decisions in Kenya. Specifically, we examine tobacco farmers' livelihood choice decisions under different physical location and information accessibility to nearby economic activities.

Methods

Tobacco Farming Survey and Sampling

Smallholder tobacco farmers ($N = 527$) were purposively selected in Kenya from the three principal tobacco-growing regions in our 2017 quantitative household-level economic livelihood survey that generated a nationally representative sample of the country's approximately 55 000 tobacco-farming households.^{3,8} We also consulted follow-up transcripts of focus group discussions we completed with a subsample of farmers after the survey's initial wave. The survey questionnaire was developed by a multidisciplinary and international research team and implemented in January 2017 and highly comparable with the World Bank's Living Standards Measurement Study in structure. The survey questionnaire collected Global Positioning System data on households and was divided into nine sections: household characteristics; livelihood, income, and assets; land ownership and crop production; tobacco production generally; tobacco production under contract; tobacco marketing; farmer debt and credit; household food security; and the future of tobacco production. Of the participants, 345 were current tobacco growers, of which 287 had a partnership contract with principally two leaf-buying companies, British American Tobacco and Mastermind. Details of survey and data collection processes can be found in Magati *et al.*^{2,3} In this research, both key dependent variables are dichotomous: current versus former tobacco farmer, and contract versus independent tobacco farmer.

The analytic sample was restricted by all controlled covariates to perform complete case analysis, which reduced the sample size to 436 for current versus former farmer models for estimating both physical and virtual access. The distance to the nearest economic center was

calculated by finding households' nearest neighboring towns from World Gazetteer Town data using geodetic distances and was divided into three categories: 10–14.99 km, 15–19.99 km, and more than 20 km. We only observed three households living within 10 km of an economic center and did not include them in the analytic sample, which further reduced the sample size for physical access models by 3; for contract versus independent farming models we restricted the sample size to the subsample of current tobacco farmers to 311 for physical access models and to 314 for the virtual access models.

Assessment of Connectivity

The Global Positioning System coordinates of each participant were matched to World Gazetteer Towns data to generate household distance to the nearest town with more than a 20 000 population, which is the independent variable we adopted to approximate the physical access of farmers to the nearby economic center. Whether the participant owns a cell phone or radio are the dichotomous independent variables we adopted to approximate the virtual access to nearby economic activities.

Other covariates controlled for are size of household, gender, age, education level of household head, acres of total cultivated land and land assigned to tobacco farming, and if the household needed credit in the last 12 months.

Analysis

Stata, version 13.1 was used to conduct the analyses and multivariate logistic regression was used for all models.¹⁷ For physical access, we examined the association between household distance to the nearest economic center and farmers' choice to grow tobacco and to grow tobacco under contract. For virtual access, we examined the association between ownership of a cell phone or radio and farmers' choice to grow tobacco and to grow tobacco under contract. To exclude the alternative explanation of results being biased from using geodetic distance to approximate physical access and regional differences, robustness tests were conducted by controlling for additional self-reported accessibility questions "are there (other) nearby villages, towns or cities where the family members who work on your farm could seek employment" and "have you or any household members sought work or considered seeking work in one of these places recently," and/or with regional fixed effects. Results for these additional analyses are in the [Supplementary Table 1](#).

Results

Descriptive Statistics

The descriptive characteristics of the models are presented in [Table 1](#). For the current versus former farmer models, there are 433 and 436 observations for the analytic sample for the physical and virtual access models, respectively. For the analytic sample of physical access models, a contractor on average farmed tobacco for 11.23 years, spent Ksh 23 786.03 on physical input and earned Ksh 76 414.93 from tobacco sales; whereas independent tobacco farmers on average farmed tobacco for 14.59 years, spent Ksh 11 704.12 on physical input and earned Ksh 74 105.26 from tobacco sales. For the analytic sample of virtual access models, a contractor on average farmed tobacco for 10.86 years, spent Ksh 23 959.50 on physical inputs and earned Ksh 73 442.65 from tobacco sales; whereas independent tobacco farmers on average farmed tobacco for 13.19 years, spent Ksh 9 464.65 on physical input and earned Ksh 68 595.24 from tobacco sales.

Table 1. Descriptive Characteristics of Analytic Samples

	Physical access models				Virtual access models			
	Current	Contractor	Independent	Former	Current	Contractor	Independent	Former
	<i>n</i> = 312	<i>n</i> = 159	<i>n</i> = 22	<i>n</i> = 121	<i>n</i> = 314	<i>n</i> = 264	<i>n</i> = 50	<i>n</i> = 122
Household distance to nearest major town of >20 000 pop								
10–14.99 km	19.88%	17.61%	36.36%	7.44%	19.75%	17.05%	32.00%	7.38%
15–19.99 km	34.94%	33.96%	36.36%	50.41%	34.71%	33.33%	40.00%	50.00%
≥20 km	45.19%	48.43%	27.27%	42.15%	44.90%	48.48%	28.00%	41.80%
# Of household members (SE)	5.73 (2.91)	5.66 (2.38)	5.91 (2.47)	5.55 (2.19)	5.73 (2.90)	5.73 (2.81)	5.38 (2.21)	5.55 (2.18)
Primary or elementary	22.75%	22.64%	22.73%	34.71%	22.93%	21.59%	28.00%	35.25%
Secondary level education	62.82%	62.89%	59.09%	55.37%	62.74%	63.26%	60.00%	54.92%
Vocational, college, or university	14.42%	14.47%	18.18%	9.92%	14.33%	15.15%	12.00%	9.84%
Male household head	90.71%	91.19%	90.91%	82.64%	90.45%	90.53%	92.00%	82.79%
Age of household head (SE)	42.94 (12.83)	43.70 (12.31)	42.77 (12.22)	42.96 (13.90)	43.04 (12.86)	43.67 (12.68)	40.48 (13.03)	42.86 (13.88)
Need credit	22.44%	20.75%	27.27%	27.27%	22.29%	22.73%	20.00%	27.05%
Acres of land growing tobacco (SE)		2.13(2.39)	2.19(1.30)					
Acres of land owned (SE)	3.48 (3.01)	3.63 (3.12)	3.30 (2.84)	4.15 (8.65)	3.46 (3.01)	3.54 (3.00)	3.07 (2.99)	4.16 (8.62)

Multivariate Results

The multivariate results are found in Table 2. Tobacco farmers rarely live within 10 km of an economic center. Compared with farmers living 10–14.99 km from an economic center, farmers living 15–19.99 km away are 70.4% less likely to grow tobacco, whereas for farmers living more than 20 km away, it is 56.5%. Compared with farmers living 10–14.99 km from an economic center, tobacco farmers living more than 20 km away are 4.2 times more likely to grow tobacco under contract than the tobacco farmers living closest to an economic center. Farmers who own a cell phone are 36.8% less likely to grow tobacco, whereas the corresponding figures for farmers who own a radio are 20.0%. Tobacco farmers who own a cell phone are 58.2% less likely to grow tobacco under a contract, whereas tobacco farmers who own a radio are 38.8% less likely to grow tobacco under a contract. Robustness tests showed similar results and are summarized in Supplementary Table 1. We also found that cell phone ownership was significantly associated with 7 fewer years of tobacco farming for both current and former tobacco farmers (Supplementary Table 3).

Summary and Discussion

Farmers living further away from an economic center are less likely to grow tobacco, but if they grow tobacco, they are much more likely to grow under a contract. This finding suggests that further study is required to examine the relationship between proximity to economic centers and viable economic alternative livelihoods.

Tobacco farmers who live further from economic centers may be inclined to contract farming to ensure transportation of their crop to market, because transportation to market is one major aspect of the services offered through contract. Similarly, they may be attracted to ease of receiving agricultural inputs such as fertilizer and agricultural chemicals that leaf-buying contractors will typically deliver directly to their farm. The narrative of British American Tobacco-Kenya, now the country's largest contractor, specifically emphasizes this ease in its external communications, along with other benefits such as health and crop insurance;¹⁸ notably, research demonstrates consistently that despite these alleged benefits most farmers, economic livelihoods remain bleak compared with many other livelihoods.^{4,8}

Farmers with virtual access to nearby economic activities are less likely to farm tobacco. Although most farmers have cell phones or radios, those who do not, still appear to be contactable by the tobacco industry and seem to be more committed to tobacco farming than those with communication technologies. This contract, according to the farmers, comes in the form of extension services directly from a tobacco company that contracted leaf growing with local farmers, contact that is lacking for many farmers from government agricultural extension services. From an alternative livelihoods perspective, this suggests that communicating directly with farmers might be one avenue to help introduce and potentially shift them to other economic activities. This finding is preliminary, however, and further points to the need to examine the relationship between communication technologies and economic activity. For example,

Table 2. Odds Ratio of Being Current or Contract Farmers Under Different Physical and Virtual Accessibility Levels

Model	Current farmer (vs. former farmer)	Contract farmer (vs. independent)
Household distance to nearest major town of >20 000 pop		
15–19.99 km (vs. <10–14.99 km)	0.296*** (0.114)	2.124 (0.601)
≥20 km (vs. <10–14.99 km)	0.435** (0.168)	4.206** (1.340)
Cell phone	0.673*** (0.118)	0.418*** (0.107)
Radio	0.800* (0.097)	0.612*** (0.108)

Standard error (SE) in parentheses. The first two rows of results came from physical access models, while the third and fourth row of results came from virtual access models.

****p* < .01, ***p* < .05, **p* < .1

are those farmers who can access the internet via cell phones better informed of market factors that then contribute to economic decisions?^{19,20} More generally, programs to increase access to cell phones among tobacco farmers might also help to shift farmers to alternatives as their awareness to these opportunities grow.

Limitations

Geodetic distance itself may not be the best measure of connectivity to a nearby market. Although we included self-reported questions related to physical connectivity for robustness tests, information on access to the nearby roads and markets, if available, would improve findings in future studies. Cell phone use requires not only the network but also a farmer's ability to use text and numbers as well as willingness to connect to a digital economy with a monthly monetary cost. We controlled for education level, but future research with panel data would better control for other intangible characteristics of farmers, such as other types of training.

Conclusion

Access, both physical and virtual, to markets is very likely to be an important factor in efforts to introduce alternative livelihoods to tobacco farmers. These preliminary results suggest that both dynamics matter and strongly suggest that future research should dig deeper into the relationship between access to markets and tobacco production. In this research, we explored the spatial dynamics of tobacco farming using Global Positioning System data, which addresses geographic concerns in the development of alternative livelihoods for tobacco farmers. The economic disparities among different farming communities reveal new directions for future research, particularly on the comparison between more remote communities and those communities closer to commercial centers, which we hypothesize have more diverse economic activities and opportunities including markets for other commercial crops. This research also considered informational access to markets, and future research can examine more deeply the specific facets of farmers' virtual connectivity.

Kenya is among the fastest growing economies in sub-Saharan Africa with rapid development in both physical construction, such as roads and railways, and information connectivity, such as internet coverage. The identification of geographic and information access heterogeneity not only reveals these economic dynamics but also potentially serves as an instrument of quasi-experimental design for future research and can directly help policy makers to tailor alternative livelihood policies to different regional contexts.

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Ethics Approval

IRB of Morehouse School of Medicine.

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Declaration of Interests

None declared.

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