

**SOCIAL AND PHYSICAL CONSIDERATIONS ON SMALLHOLDER
FARMERS' LIVES AND LIVELIHOODS IN RURAL KENYA: ILIMA CASE
STUDY**

A Project Paper

Presented to the Faculty of the Graduate School
of Cornell University

in Partial Fulfillment of the Requirements for the Degree of
Master of Professional Studies in International Development

By Melissa Goldman

August 2021

© 2021 Melissa Goldman

ABSTRACT

This paper looks at the complex impact of urban migration on smallholder agriculture in Ilima, Kenya. Specifically, it examines topics around food security, soil erosion, the use of remittances, agroecological practices, and the values that underpin these. Ilima, a small, rural village in Makueni County, Kenya that is experiencing large amounts of urban migration was used as a case study. A total of 33 households were interviewed, 29 in Ilima and four in urban centers. It was found that many residents, including youth, want to invest in agriculture in Ilima, but multiple barriers exist, causing migration and the land to become fragmented and degraded. The main barrier was found to be small land size. Remittances showed a positive association with food security, but the pathways remain unclear.

BIOGRAPHICAL SKETCH

Melissa Goldman is a global public health professional, driving impact through various methodologies in the fields of food security, agriculture and water, sanitation, and hygiene (WASH). She applies public health principles to her work, taking a systems approach and thinking holistically to solve complex problems. Melissa has expertise in participatory research methodologies and developing strategy that connects to achievable and measurable outcomes. Melissa served as a Peace Corps volunteer in Nepal in the food security sector, and has conducted various research in Belize, Malawi and Kenya. Melissa currently holds a position in philanthropy, investing funding into sustainable WASH models in Uganda, Ghana and Ethiopia. Melissa resides in Los Angeles, CA and in her free time she loves to hike and is always fermenting something in her kitchen.

I dedicate this paper, in part, to the late Professor Julie Lauren, who acted as my advisor prior to the onset of her illness. Professor Lauren continued to gently push me to work on my thesis and carry on, even though I was going through a difficult time personally. Her kindness, coupled with toughness, always impressed me and I know she would be proud that I am finally finished. She was the only female in her PhD program, one of the many reasons why she continues to be an exemplary role model.

I also dedicate this paper to Anthony Kilonzo Kasimu and Sarah Mbithi, the “Dream Team.” I could not have completed this research without your friendship, guidance, and crammed (but fun) boda boda rides through the hills. A special thank you to you both.

ACKNOWLEDGMENTS

I would like to acknowledge the support of the International Center for Tropical Agriculture (CIAT) for supporting this research. Specifically, I would like to thank Ravic Nijbroek of CIAT who provided invaluable input into this work. I would also like to acknowledge Cornell University faculty, who inspired me throughout my coursework, leading me to take on this ambitious project. A special thank you to Professors Terry Tucker and Maricelis Acevedo, who were enthusiastic to support this thesis and provided their guidance.

TABLE OF CONTENTS

Contents

Introduction.....	1
Intent.....	3
COVID-19 Considerations.....	4
Kenya Situational Analysis and Literature Review	5
Ilima Case Study.....	11
Background to Ilima Case Study.....	11
Methodology	13
Community Support	13
Questionnaire Development	13
Interview Process and Approach.....	14
Considerations	15
Ilima Background.....	15
Focus Groups.....	16
Interview Results	20
Participant Demographics	20
Agriculture	21
Land Size, Layout and Tenure.....	22
Productivity and Agroecological Practices.....	25
Crop Sales.....	26
Agriculture Values.....	27
Soil Erosion and Soil Fertility	28
Urban Migration and Remittances	29
Selling.....	30
Agriculture.....	31
Migration Values	32
Food Security	35
Food Security and Agriculture/Soil Erosion	37
Food Security and Selling.....	38
Food Security and Remittances	38
Nutrition Values	39
Other Findings	39

School fees.....	39
Discussion and Recommendations	40
Soil Erosion and Infertility	41
Land Size.....	43
Inputs and Infrastructure	44
Urban Migration and Remittances	44
SWOT Analysis.....	46
References.....	47
Appendix.....	49
Interview Guide.....	49

Introduction

As our world continues to globalize, the problems that we face are ever more visible and identifiable. It is well known that our world faces food insecurity, poverty, climate change and a multitude of global health threats, as well as other priority challenges. A blueprint for addressing these challenges to ensure peace and prosperity for all people and the planet was laid out in 2015 by the United Nations and its member states, titled the 2030 Agenda for Sustainable Development Goals. This outlines 17 sustainable development goals (SDGs) that are addressed on a global scale. The SDGs aim to tackle the world's toughest problems through more focused and strategic efforts to improve access to quality education, reduce inequalities, and ensure access to clean and safe water, to name a few (United Nations, 2021). These are ambitious goals that will require large investments, coordination, and collaboration to be achieved.

Although the goals are outlined in 17 separate categories, multiple social and physical considerations need to be considered, as many of the goals rely on the success and sustainability of the others. This can be seen in SDG 2 “Zero Hunger” and SDG 11 “Sustainable Cities and Communities”. As the world continues to urbanize and food insecurity continues to be a challenge, it will require in depth analyses to better understand how subsistence agriculture will be impacted by changing demographics, and how urban areas will become sustainably food secure. Many agriculturalists from rural areas are migrating to cities, leaving an underdeveloped agriculture sector that is already strained.

Since many farmers around the world continue to practice subsistence agriculture, it is prudent to understand how urbanization and other social changes have impacted their lives and

livelihoods and what the future might hold for them as the agriculture sector changes and stretches to keep up with development in a changing world. For example, remittances are commonly sent from urban to rural areas, shifting the economics in rural areas. It is important to understand exactly how these remittances have impacted rural areas, as this likely causes both constraints and benefits for smallholder farmers.

Further compounding the situation with these two SDGs is SDG 13, “Climate Action”. Zero hunger cannot be achieved if climate change adversely affects the agriculture sector. More extreme weather patterns have led to severe flooding, drought, and soil erosion, all which significantly impact production. Another SDG to consider in this conversation is SDG 1, which deals with poverty alleviation. Agriculture presents great opportunity to increase income for millions of rural farmers, contributing to this important SDG (CIAT, 2021).

Understanding the considerations for smallholder farmers is not sufficient for achieving the SDGs. Strategic planning will be required to ensure that those in both urban and rural areas are food secure. This will take precise and targeted development in the agriculture sector, with investments in infrastructure including farm to market roads, innovations in agroecological methodologies that increase yield and efficiency, and investments in the institutional and physical factors that enable more sustainable land and water management. At the same time, climate change will need to be mitigated.

This paper examines the complex social and physical constraints to smallholder agriculture in Kenya, which is experiencing rapid urbanization, high levels of food insecurity and rapid climate change and therefore exemplifies many low to middle income countries in similar situations. Ilima in Makueni County, a small rural village, is used as a case study to better understand and more clearly illustrate factors that have an impact on the lives and livelihoods for

its residents, presenting granularity that is often overlooked in discussions regarding SDGs. Examination begins at the macrolevel with a review of literature pertaining to smallholder agriculture in Kenya. The Ilima case study will offer in-depth insights into the ways that selected constraints influence lives and livelihoods in one locale. Food security, agriculture (encompassing agricultural practices and soil erosion and fertility), climate change, land tenure, migration and remittances will be explored and discussed.

For the purpose of this paper, the phrase “lives and livelihoods of smallholder farmers” will be used to encompass all of these topics as well as the values underpinning all. This allows for a holistic view into the lives of those practicing smallholder agriculture. No standardized definition of smallholder agriculture currently exists, and therefore the term smallholder agriculture will be used to describe any farmer cultivating land that is used for either only subsistence or a combination of subsistence and selling. Some literature states that cultivating under two hectares would typically mean smallholder agriculture, but that in Sub-Saharan Africa, two hectares does not produce as much as in other regions and can therefore not be considered smallholder agriculture (Rapsomanikis, 2015). Due to this, hectarage will not be considered in the definition.

Intent

The primary intent of this paper is to provide the residents and local governmental officials of Ilima Ward in Makueni County with the results of the research conducted between July 1st and October 15th of 2018 for their own analysis and use, to provide brief recommendations, and background information on the considerations for smallholder agriculture in Ilima, which should be taken into consideration upon planning any initiatives that impact their lives. The paper will be provided to the district government, the local ward government, and key

informants via email. If requested, a presentation to share the results will be delivered through Zoom. The secondary purpose is to inform a potential partnership with CIAT, in which this research will provide valuable considerations and background information on the topics that will impact future agricultural development initiatives in the community.

COVID-19 Considerations

This research was undertaken prior to the declaration of COVID-19 as a pandemic by the World Health Organization on March 11th, 2020. However, it is worth mentioning how COVID-19 might impact urbanization and small-holder agriculture moving forward as there are likely to be ripple effects for years to come. A recent study by UNDP and the Pardee Center for International Futures at the University of Denver outlined potential COVID-19 scenarios for recovery over the next decade. The study found that “COVID could drive the number of people living in extreme poverty to over 1 billion by 2030, with a quarter of a billion pushed into extreme poverty as a direct result of the pandemic” (UNDP, 2021). This, in itself, would have a huge impact on both food security and urbanization, as purchasing power declines and populations seek employment in urban areas to supplement income, despite the fact the urban areas often experience the most devastating outcomes due to COVID-19.

The world does not have to wait until 2030 to see auxiliary impacts of COVID-19 on the world. The impact on food security can already be seen, as global food prices have risen by 40% since January 2020. Since then, maize prices are 66% higher, wheat prices are 23% higher and cereal prices are 45% higher. These increases suggest that COVID-19 has strained or interrupted supply chains and that the macroeconomic conditions have caused a stronger demand, despite the fact that the world’s major grain supply is currently at a sufficient level (World Bank, 2021). Essentially, the current issue is higher food prices and reduced income, which means increased

risk for food insecurity, especially in lower to middle-income countries. Although the issue is not supply related at the time, the World Bank is predicting that key agricultural inputs (i.e., seeds, fertilizer) may also be affected by supply disruption and inflation, potentially contributing to decreased agricultural outputs.

Additionally, farmers that are experiencing acute food insecurity due to COVID-19 may be forced into decisions that decrease food security further into the future, such as using their next year's seed stock for consumption, putting future production at risk (World Bank, 2021). Other drivers remain consistent, including climate change, conflict, and even the ongoing locust crisis that is impacting 23 countries. This, coupled with the economic impact and other factors yet to be hypothesized, will impact smallholder farmers lives and livelihoods for years to come.

Kenya Situational Analysis and Literature Review

Before diving into the case study of Ilima and exploring the complex social and physical considerations to small-holder agriculturists' lives and livelihoods in Ilima, it is important to understand the context and undertake a situational analysis on the focal topics surrounding considerations for small-holder agriculture. This background will be important in understanding how the greater Kenyan situation is impacting smallholder agriculture in Ilima. Since little existing data is available on the case study ward, we will first examine trends in the entire country. The topics to be covered are food security, agriculture, climate change, land tenure and size, and migration. These topics were selected based on the results of the Ilima case study. They reflect the topics that the community identified as areas that need to be considered.

Kenya, a lower middle-income country, is located in Sub-Saharan Africa, sharing borders with Tanzania, Uganda, South Sudan, Ethiopia and Somalia. It has a population of 53.8 million inhabitants and ranks among the 10 most populated nations in Africa. Kenyans make up over 40

different ethnic groups, and it houses 1.1 million international migrants, half of which are refugees. The median age is 20.1 years and 46% of the population living on less than 1 USD per day. These demographic statistics were pulled from Statista (Faria, 2021).

According to the Global Hunger Index (GHI), Kenya currently ranks 84th out of 107 countries, with a level of hunger that is considered serious, according to GHI's index¹ (Concern Worldwide & Welthungerhilfe, 2021). Although the level of hunger has been on the decline in recent years, it is still a level of concern. According to the same study, key indicators for the ranking including the proportion of undernourished in the population at 23%, the prevalence of wasting in children under five years at 4.9%, the prevalence of stunting in children under five years at 31.1%, and the under-five mortality rate at 4.1% (2021).

The Kenya Agricultural Research Institute (KARI), in a recent study, divided food security causes into two categories of demand and supply, and stated that, "Demand side factors include: rapid population growth, rapid urbanization, low income, poverty and increasing demand for food products for biofuel production in developed nations. Supply side factors include declining agricultural productivity, high input prices, decline in world food stocks, underinvestment in rural infrastructure, climate change and climate variability, underinvestment in agriculture, poor markets and market access by small holder farmers" (Emongor, N.D.). This is especially important to smallholder farmers, as they rely at least partially on subsistence agriculture for their food security.

In Kenya, agriculture is the backbone of the economy, adding 33% to Kenya's gross domestic product. It employs more than 40% of the total population, including 70% of those living in rural areas (USAID, 2021). According to the World Bank, it contributes to 31.4% of

¹ The Global Health Index quantifies data to rank countries based on their level of hunger, with five categories 1) low 2) moderate 3) serious 4) alarming and 5) extremely alarming.

poverty reduction, and makes up 65% of the country's exports (2019). Despite this reliance on agriculture and the Kenyan Government's goal of full Kenyan food security by 2022, the sector faces many barriers. One study recognized the following six areas as key barriers to agriculture productivity in Kenya: 1) land and population pressures 2) low agriculture research, development, and extension 3) lack of access to markets 4) climate change 5) soil infertility and land degradation and 5) lack of public expenditure to develop the agriculture sector (Birch, 2018).

Another study by the World Bank explains that there needs to be an increase in agricultural financing, as despite the high level of the population employed in agriculture, only 4% of bank loans are allocated towards this. There also needs to be an increase in fertilizer use and access, as current research finds that its use remains inadequate. The Government of Kenya also needs to establish structured commodities trading, as currently the government plays a large role in marketing agricultural outputs, thereby withholding opportunity for the private sector. There also needs to be an investment in irrigation, as 83% of land in Kenya is arid and semi-arid. Currently, only 2% of Kenya's arable land is irrigated, stifling productivity. Finally, Kenya needs to support stronger farmers' organizations, as many smallholder farmers are not integrated into value chains, and therefore are not included economically (World Bank, 2019).

Climate change is a topic that underpins both food security and agriculture and is immensely important to smallholder farmers, as it is rapidly impacting their lives and livelihoods, and will continue to for the foreseeable future. It will exacerbate the high levels of food insecurity and the low levels of agriculture productivity. Due to Kenya's heavy dependence on rain-fed agriculture, draughts have serious consequences for rural household income and national food security. Increasingly erratic and unpredictable rainfall present serious challenges

to farmers. Greater frequency of “big rainfall events” increases soil erosion and exacerbates soil infertility.

One study predicts that, by 2050 in Sub-Saharan Africa, crop yields will decline by 14% for rice, 22% for wheat, and 5% for maize, which will severely strain an already strained food system, decreasing calorie intake by 500 per day per person (IPCC, 2007). It is hypothesized that adapting to climate change for Kenya will be a challenge, as existing stressors such as insufficient spending on rural infrastructure, HIV/AIDS prevalence, rain-fed agriculture, poor data and knowledge gaps, and widespread poverty will contribute to the ability to adapt (Kabubo-Mariara & Mulwa, 2019). Kenya will likely see an increase in temperature of 1.2-2.2 degrees Celsius, and increased duration of heat waves, and an increase in rainfall from 3 to 20%, and general unpredictability by 2050 (USAID, 2018).

Kenya also has a complex land tenure system that impacts not only the country’s GDP and development as a whole, but also each individual farmer’s livelihoods. The National Land Commission of Kenya (NLC) describes land tenure as the most important factor for production, a means of wealth and power, and the sole livelihood for many. It states that land was the major factor for the country’s fight for independence from Britain but remains a source of frequent conflicts within the country, between tribal groups and between communities (National Land Commission, 2021). In 2009, Kenya adopted the National Land Policy (NLP) which prevents illegal allocation of public land in Kenya and in 2013, the government also adopted the National Land Commission, that acts as the lead agency in land matters. The Commission has passed a broad range of reform to secure the land rights of rural people. The policies and reforms the Government of Kenya has made are available to the public, but there is a lack of evidence-based documentation on how these policies and reforms have been implemented, and their impact.

Also lacking is literature on the customary and cultural practices of land tenure, and community perspectives.

There is conflicting evidence regarding the association between size of land holding and productivity. Ibendahl and Haney, state that, “when it comes to farm profitability, and land base, bigger isn’t better, better is better” (2021). This is based off of 10 years of data, albeit on generally large farms of various sizes. Another study that conducted a meta-regression of 1000 cases from 1997-2018 concluded that there is not substantial difference in profitability based on land size, but that larger land may grant cost savings for inputs (Garzon Delvaux et al., 2020).

Migration and remittances also need to be considered in the conversation around smallholder agriculture, for multiple reasons. First, there is increasing need for development in the agriculture sector to supply food to a growing and urbanizing population. As rural people migrate to urban areas, there is less labor available for farming. Additionally, family members that remain in rural areas often become the beneficiaries of remittance flows. This could potentially lead to an increased investment in capital for smallholder farming. Understanding how these remittances are invested is vital to understanding the future of smallholder agriculture. This is increasingly pressing, as urbanization has been on a steady rise in Kenya, from 23.5% in 2010 to 28% in 2020, which represents an annual 2.3% growth rate (Faria, 2021). Additionally, the country’s population has increased significantly from 11 million in 1970 to 39.6 million in 2011. It is expected to double, and reach 81 million by 2039 (FAO, 2021).

Numerous studies describe how remittances help alleviate the poverty burden. Recipients invest in their children’s health, development and education (a form of insurance to help families manage shocks), in entrepreneurial activities, and in land and houses. Remittances are also associated with a reduction in infant morbidity and mortality and improvement in the literacy

rates of children (Dendir, 2017). This same study found that of those who receive remittances in Kenya, 65% save at least some. Also, recent research suggests that about 1/3 of all Kenyan households have at least half of their household members in a rural center, and that poor urban workers remit a substantial portion of their wages, while more educated families are likely to move together to urban areas (Greiner & Sakdapolrak, 2012).

It has also been found that in Kenya poor soil quality and reduced yields acts as a driver for migration, and that the remittances act as a significant source of resiliency and livelihood strategy when productivity fails. The remittances are sometimes reinvested in agriculture, typically to intensify production, however many families were not able to invest their remittances in agriculture because it had to go to daily activities and expenses. One of the theories states that those that make the most money in urban areas get the most out of the land in the rural areas, and that differing success in labor migration needs further research as to its impact on farming success (Greiner & Sakdapolrak, 2012). Another important consideration on the rural smallholder farmer is that the burden of caring for the land and producing is left to those that stay behind. However, this is often counteracted by the increased ability to purchase labor and compensate or its loss (Greiner & Sakdapolrak, 2012).

Although smallholder farmers are able to use remittances towards agriculture intensification and to protect amongst shocks, and have better outcomes for children when receiving remittance, remittances as whole, have a complex impact on the lives and livelihoods of their recipients. The current literature reflects this complexity. One study by Nyangena found that households that receive remittances are actually less likely to adopt soil conservation methods, as the focus turns to non-agriculture related activities lessens the concern about land quality (2008). This could lessen overall economic opportunity and food security. This is an

issue, as Kenya's population and economy are heavily reliant on agriculture, as stated above. To summarize, the literature points to agricultural recovery and increased yields through remittance investments and new ideas, while also pointing to a decline in productivity due to decline in labor (Greiner & Sakdapolrak, 2012). Additional research is needed to identify the differentiating outcomes between these two groups who have migrants in their household.

Ilima Case Study

Background to Ilima Case Study

This study was conducted under the guidance and support of the International Center for Tropical Agriculture (CIAT). Established in 1967, CIAT is an international organization improving agricultural outcomes to make farming profitable, competitive, and resilient through research-based initiatives. The ultimate vision for CIAT is a sustainable and robust food future. It helps decision makers, farmers and scientists respond and contribute to multiple SDGs, including topics surrounding agriculture, sustainability, big data, and climate change. CIAT is currently supporting 170 projects in 60 countries across Asia, Africa, and Latin America (CIAT, 2021). CIAT is a branch of a larger umbrella organization, titled the Consultative Group on International Agricultural (CGIAR).

CIAT has hubs in Columbia, Kenya, Italy and Vietnam, with 21 offices and field operation sites, and has over 1,000 staff. The office in Nairobi is the hub for Sub-Saharan Africa where CIAT supports multiple programs. Its Africa programming focuses on four themes. These themes are 1) leveraging markets through improved productivity and competitiveness, 2) agriculture for improved nutrition and health, 3) transforming farms and landscapes for sustainability and 4) investment planning for resilient agriculture. CIAT states that "Sub-Saharan

Africa is undergoing rapid transformation due to increasing urbanization, income and lifestyle changes, intensification and homogenization of farming systems, and climate change” and that “these present both challenges and opportunities for millions of smallholder farmers” (CIAT, 2021). It has created roadmaps based off of the four themes that will address the challenges and leverage agriculture to be the engine of growth in the region.

As primary investigator, I joined CIAT as a student researcher between July and October of 2018 while pursuing a Master of Professional Studies degree in International Development at Cornell University. The research I conducted was overseen by Dr. Ravic Nijbroek, an interdisciplinary scientist with a PhD in Human Geography, MSc in Agricultural Engineering and BS in Environmental Engineering. Dr. Nijbroek sat on the Agroecosystems and Sustainable Landscapes (ASL) team at CIAT, primarily focusing on land restoration in East Africa.

Dr. Nijbroek had prior engagement with government officials in Makueni County, who had expressed concern for the high levels of soil erosion in a hilly area of the county (Ilima). Although CIAT had no presence at that moment in Makueni County, Dr. Nijbroek and the county officials decided that there was opportunity for partnership and potential collaboration on the topic of soil erosion. My main objective was to conduct a situational analysis to better understand the context for a potential soil erosion project and to add perspectives and voices of community members prior to the onset of the potential project, taking a participatory research approach. I was also the first CIAT representative on the ground, so I was tasked with making community connections and laying the groundwork for fruitful conversation and collaboration inclusive of a multitude of local and regional stakeholders.

Methodology

The research to inform this case study took place over a course of four months in Kenya, both in Nairobi at CIAT offices and in Ilima. I conducted the research as primary investigator supported by the CIAT Nairobi branch. This support included guidance and expertise, logistics (such as transportation to and from study site, loaned GPS/GIS equipment) and existing local government connections that helped guide field activities.

Community Support

Multiple meetings were conducted with Makueni County government officials prior to the onset of the research. The objective was to build off of prior conversations surrounding a potential CIAT and Makueni County soil erosion initiative, to gain more information and context, and to get permission to conduct research in Ilima. The meetings included CIAT staff, Makueni County officials, and me. After permission was gained and a site visit to meet Ilima government officials took place, I began the study by conducting two focus groups in Ilima in order to get an overview of community perspectives and current challenges and desired outcomes. This process helped inform the interview guide that would later be used to conduct the semi-structured interviews.

Questionnaire Development

The questionnaire was designed using other key informants to understand if the questions were culturally relevant and appropriate. A consent script was developed and read to each participant, so they understood their rights and that they could leave the interview at any time or refuse to answer any question, and that there would be no monetary gain. This was read to each

participant prior to participation and verbal consent was given. I also obtained approval from the Institutional Review Board (IRB) at Cornell University and shared the interview questionnaire for approval. To protect identity, participants were given a code that corresponded to their recording number on recording device, to conceal their name.

Interview Process and Approach

A total of 33 semi-structured interviews were conducted. Twenty-nine were conducted in Ilima and four were conducted in urban centers, to obtain both urban and rural perspectives. The rural interviewees were selected based on location, gender, age and socio-economic status, as guided by the enumerators. The urban interviewees were all relatives of the rural interview participants, who gave their contacts. This methodology ensured that the urban migrant was actually from Ilima to reinforce an actual linkage back to the community. The interviews were conducted with support from two Ilima residents, who acted as local experts, logistic coordinators and enumerators. The interviews took an average of one hour each. The participants were offered a gift of soap, sugar and oil for their time. Some of the interviews were conducted in English, but the majority were in the local language, translated in real time by the enumerators. The study also includes a literature review, looking at global trends as well as trends within Africa and Kenya. Atlas-TI was used to analyze the data.

During the course of the study, I resided in the community with a local government employee. This was intentional in order to build trust and establish the relationship for future collaboration. This also helped me in understanding the context, as I lived and worked alongside the community. I was able to observe daily life and get to know the residents and their perspectives outside of the formal interview process. My observations helped me to pivot

questioning and approach as I moved forward with the research, helping me to deepen conversations, resulting in candid interviews.

Considerations

The questions and prompts were qualitative in nature and sample size in interviews was limited compared to the total population, and therefore the findings from this study cannot be considered statistically significant. Instead, the findings from this study are meant to suggest certain themes and areas for further investigation, while giving the community a voice prior to a government-led project implementation. The study asks questions that not only provide insights regarding smallholder agriculture in Ilima, but also local values, which are often overlooked when planning new initiatives despite their importance to the success and direction of a community-based initiative.

Household income could not be assessed with sufficient precision to be of value to the study. When asked about household income, most respondents stated that they did not know, that it was not enough, or that they had nothing. After multiple attempts to gather information on income, I pivoted and asked instead if people were satisfied with their income. Most respondents simply said that they were not, rendering this data point irrelevant.

Ilima Background

Ilima is a ward located within Makueni County, Kenya. Makueni contains a population of 884,527 people, 49% of who are male and 51% of who are female. It is primarily flat semi-arid land, with annual rainfall between 250mm to 400mm per annum on the lower regions of the county and from 800mm to 900mm at the higher regions and average temperature between 15C and 26C. It is located in the southern part of the Eastern province, with the center of the county

being 182 kilometers Southeast of the capital city of Nairobi (Center for Health Solutions Kenya, 2018). Ilima has a population of 32,7171 according to Wikipedia (2021). Unfortunately, specific demographic data is unavailable for Ilima Ward. It is very hilly, anecdotally referred to as the hilliest ward in all of the county.

As I observed, Ilima is a small, rural, sparsely populated, hilly community that is primarily dependent on smallholder agriculture, with many households having migrants in the family who are sending remittances to support those that are living in the ward. Most are lower income and seeking financial opportunity. Most are involved in agriculture, evenly distributed across demographics such as age groups, gender, occupation and socio-economic status. The agriculture sector has been complicated by rampant soil erosion and infertility. Multiple site visits revealed very large gullies encroaching on farmland and rendering roads impassable. The community is comprised largely of small, unproductive agriculture plots, and humble homes, mostly without access to water or electricity. The average walk to a water point was 30 minutes, though some enterprising residents earned income by delivering water to households via donkey. The community had a small-town center with few shops and a small morning market for farmers to sell their goods locally. The roads were all small, narrow and unpaved, largely on cliff areas leading out of Ilima, making transportation very difficult. To the main market center, it would take about two hours by vehicle. There was little to no public transportation available between Ilima and the market center.

Focus Groups

Two focus groups were held in Ilima to begin the discussion on the intersections between urban migration and small-holder agriculture, and to understand general community context and assessment, as well as to gain community buy-in and engagement. The focal groups were held in

two different areas within the ward to allow for diverse attendance. Participants were selected by local government. Local government officials, local farmers, and youth leaders were invited to attend. The group discussed topics surrounding community groups, water, youth migration, soil erosion and landscapes. Participants were also given the opportunity for unstructured discussion about agriculture and other challenges that the community faces.

The topic of community groups was discussed to better understand how the community already organizes around agriculture, and what the current strengths of this system are. The focus group reported that most people farm for themselves, and do not participate in groups. They stated that farmer's groups are difficult to organize because people have different schedules and are in differing situations. However, even though not used by many, there are agriculture banks in the form of microcredit associations and agriculture groups that are active. There is also an active group for storing grain after harvesting, to eventually sell when the markets are favorable, led and driven by the community to maximize profits. The focus group also stated that the youth are not involved in any of these groups, so the community feels that when the elderly pass away the groups will end. The largest agricultural-related group has 63 members who grow French beans and market their crop cooperatively for mutual benefit. Although the group expressed the difficulty with forming and sustaining groups, there was an agreement that they are important. One farmer said, "united we stand but divided we fall".

Water was identified as a major constraint to productivity in the ward. Everyone present at the focus group was in agreement about the need for irrigation and the lack of steady and predictable rains. They identified the underlying issue as a lack of capital, since that prevents households from purchasing lining for water pans, or other water systems. They also mentioned that water is not evenly distributed, and that people in the lower lands receive more opportunity

for water harvesting. Exacerbating the issue, the group mentioned that government-funded projects have not taken off because of land tenure arrangements; people refuse to allow water projects to intersect with their property. In order to create larger water schemes, infrastructure that benefits all will have to run through private land, which landowners are hesitant to permit. Water groups are reported as non-existent, as people want to be self-sufficient. Microloans were mentioned as a possible solution, as well as timetables for water usage. There was one small river accessible only to the people that lived in the lowlands, who were able to use this for irrigation. Others relied on boreholes. There was one small reservoir that five households shared and jointly managed, that was accessible for multiple uses. One farmer reported creating a gravity irrigation system from the reservoir.

The topic of youth and migration was also discussed. The participants stated that youth are not interested in agriculture because they do not want to do hard work and because they value an urban lifestyle. They stated that the current educational system prepares youth for white collar jobs, and that agricultural education should be integrated into the curriculum in the public school system in order to prepare youth who seek careers in agriculture. In general, the group explained that there is a lack of awareness and technical skills surrounding topics pertaining to agriculture among both youth and the general population. The group also stated that parents tend to encourage their children to migrate, and therefore the parents' perspectives need to change if agriculture is to be considered as part of their economic future. It should be noted that there were no youth attendees at these meetings. This led me to hold a subsequent youth-only focus group to gain this important perspective.

In Ilima, it is very clear that soil erosion is a main concern. The degraded landscape, and many farms transected by large gullies are clearly visible. A few households are precariously

near the edge of such gullies. This topic was a major focus of conversation. The entire group was in agreement that this was a priority issue that needs to be addressed, and that sustainable land management in hilly areas has been neglected. Moreover, if it is not addressed, there will be no progress in agriculture due to soil infertility and land degradation. Roads were often badly damaged to the point of not being passable. Landscapes were discussed and farmers recognized that limited access to capital, small farm-size, and poor infrastructure are major constraints to production.

The possibility of starting a community-based farming system to address some of these constraints was discussed, per scoping request and recommendation of CIAT. The community members stated that this system showed potential to benefit the population in Ilima, but that it might be met with hesitation because of a complicated land tenure system and the traditional way of farming for oneself, with an emphasis on self-reliance. The benefits associated with an alternative, more community-based option was outlined in which local households would combine resources to invest in necessary inputs such as irrigation in order to intensify production.

In general, the possibility of CIAT partnering with local government and community members in Ilima was met with enthusiasm. The details of this partnership were not formalized at the time of research, as CIAT was scoping the region for their needs, but the community was excited about the potential of applied research that focuses on agriculture in their community. It was a very active focus group, with many of the participants passionately expressing their concerns and sharing their knowledge and experiences. To summarize, major constraints to productivity that were reported included water, eroded soil, lack of community/government support, lack of capital, lack of land and lack of youth interested in investing in Ilima's future.

The findings during the youth-only focus group contradicted the elder's opinions on the hopes and future planning of youth in Ilima. There were around twenty youth of mixed gender in this youth focus group, and it was conducted in a local church. Many of the youth explained that they feel that they have no choice but to leave Ilima, even though they would like to stay near their families and live in Ilima. They stated that there simply were not economic opportunities in Ilima, and that this is partially due to the lack of infrastructure such as roads and markets to sell to. They also explained lack of any other industry beyond agriculture.

The stigma behind being a farmer was also discussed, and the youth primarily felt that Kenya was experiencing a boom and agribusiness, which was exciting for them. However, they also explained that even though agribusiness is something they would be interested in, it would be difficult in Ilima because of the soil erosion, small lands, and lack of irrigation. Regarding life in urban places outside of Ilima, the youth said that they realize life is actually hard in urban centers, and that the excitement fades when faced with the reality of poverty in urban areas.

Interview Results

The research details quantitative and descriptive findings such as demographics and common agricultural practices and will then explore correlations, with an emphasis on the rural data as this is the primary dataset. Urban participants were not included in any analysis, and instead were only used qualitatively for their insight. As specified in the methodology section, this research is not intended to claim any causation or statistical significance as this was not the intent. The dataset is not sufficiently robust to make any such conclusions. The data analysis will include qualitative data presented from community members in the form of quotes and opinions.

Participant Demographics

The total number of rural households interviewed was 29. There were 16 males and 15 females (the number here is higher than the total to account for a few interviews of couples, making the total number of rural participants 31). Those reporting together will be considered one participant, or household, for the analysis. Four participants were living in urban areas, two male and two female. Out of those that reported occupation, 23 were farmers, eight worked as casual laborers, three reported participating in business, three were in government, and two were in trade (note that N is greater than 29 because some participants reported more than one occupation). Out of the participant group, 52% of respondents had children in their household. The average household size was 6.3. The mode in the data set is 6. The smallest household had one person (N=2) and the largest household had 11 people (N=1).

Agriculture

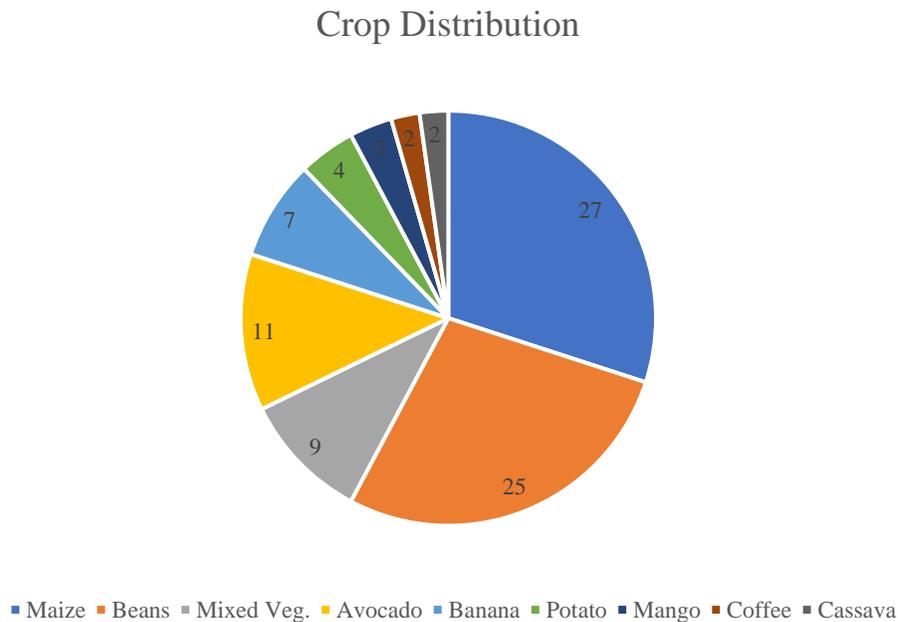


Figure 1. Crops and the number of participants that reported growing these crops

The main crops cultivated were maize (N=27) and beans (N= 25). Lesser grown crops were mango, coffee, and cassava, with only two farmers reporting cultivating each of these crops. Eighteen participants reported having livestock.

Land Size, Layout and Tenure

Average land size was 2.2 hectares. The average land layout is 2.5 plots per person, with the mode being one plot and the highest being six separate plots for one person. Four people reported their land in one plot, three people reported having their land in three plots, two people reported having their land in four plots, two people reported having their land in six plots, and one person reported having their land in two plots.

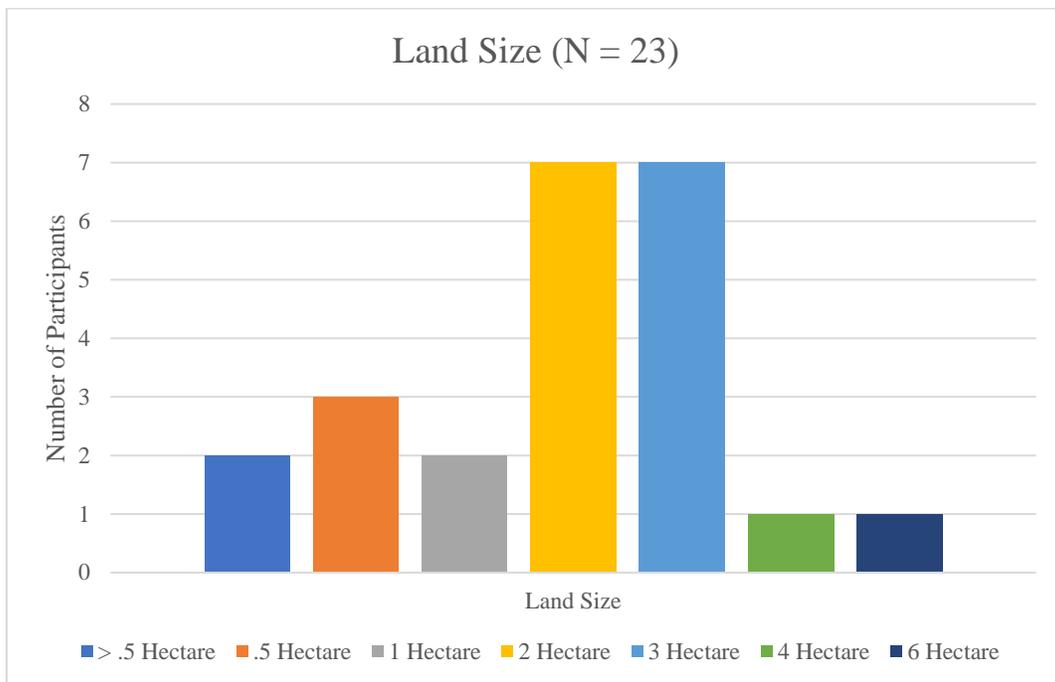


Figure 2. Land size and the number of participants reporting in each category

Land selling was not very common but did occur. One woman was asked if she could purchase land in Ilima if she wanted to, and she explained that she would prefer to buy in other

areas but not in Ilima because of the cutoffs² due to soil erosion. One person that sold in 2008 said that they sold the land because of school fees, but that they were glad they did this because their daughter finished college. Another land buyer had recently purchased land and similarly explained that they sold the land for school fees. When asked if land was available in Ilima for purchase, most said that it is available but not very easy to come by and can be competitive to purchase, but that lack capital is the larger issue in land purchasing.

Many participants reported land size as an issue to productivity and to urban migration. In Ilima, the males of the family inherit the land and then split it among themselves. Throughout the generations, this has divided the land further and further into small portions. One participant said that because the land size is so small, his family cannot divide and can only live-in urban areas and come visit Ilima. Another woman spoke of her plan to buy land but that “in Ilima, the lands are just so small, they are all over, so it might be hard, but we do like that place.” Another farmer stated, “This place is congested, so I want to have a farm somewhere else, like on the highway, I would like to purchase there because the means are cheap, there is not enough room here.”

“It’s our family land, but I’m the one left here to receive everything. If [my brothers] wanted to we would divide equally, each one of us has a right. If we divide the land, each would not have enough food for their family, we are six of us, so we would have to look for new land.”

Many residents also cited land size as a reason why youth are leaving and migrating, saying this is a large barrier. When one participant was asked why youth leave, he stated that they leave “because there is nothing here and the parents do not set anything for them here and then they grow up and land size is very small. But the problem, even if they go out there, they are not planning to purchase anywhere and they will plan to come back here when they retire, I

² Cutoffs are used in Ilima to direct water away from arable land. They are hand dug trenches that divert rainfall.

was hoping people would purchase land elsewhere, so their family can resettle, but they don't and they just come back here, and they are not adding any value." Another farmer stated that his daughter would have stayed and cultivated the land in Ilima if they had more land.

"You know, in fact, there is this, um, I don't know, there is this slogan of looking for greener pastures, so once they complete school or studies and acquire certificates they need to get jobs, the white collar jobs, so they normally migrate to towns to look for jobs, because the aged people like me now, because I am over 50 now, have got to stay here at home, take care of the compound and whatever is there, and now the children are the ones who go to work in town, because the land we have cannot sustain all of us."

There also seems to be a trend of investing in agriculture outside of Ilima and leasing land elsewhere, since the land is demarcated between family members and becomes too small over the generations. When one participant was asked why their children decided to cultivate land outside of Ilima, they stated that "[it is because] of the availability of water, here [Ilima] there is only rainfall, where they rented there is irrigation," pointing to the irrigation issue in the area. However, there is interest in keeping land in Ilima and not having the entire family relocate to a new plot or urban center. "Having the land ties the family together" stated one participant. There were some cases where one brother stayed behind to take care of the land while other brothers left and invested in new land elsewhere since there was not enough to support multiple families.

Productivity and Agroecological Practices

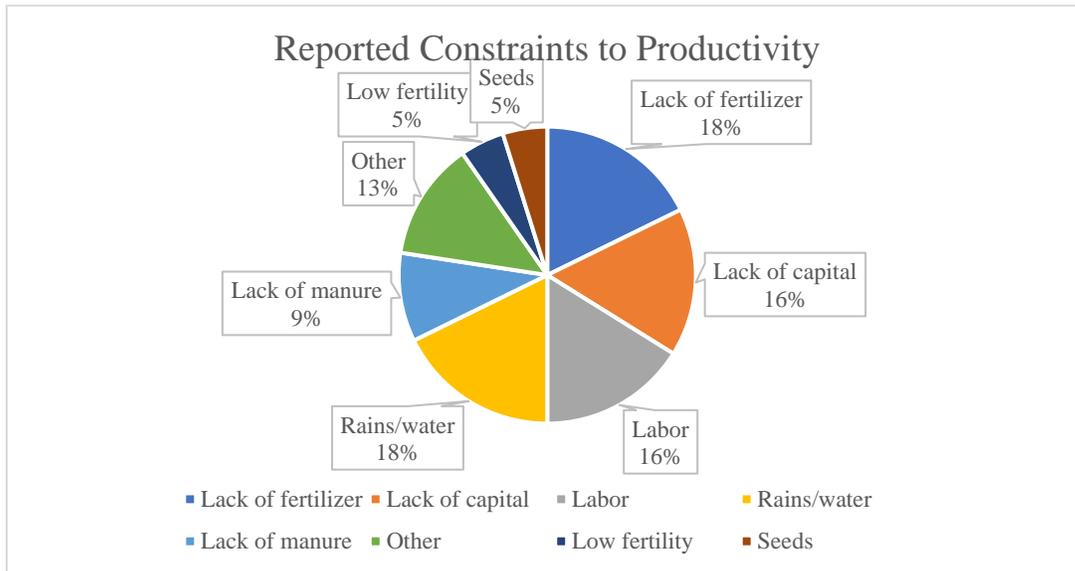


Figure 3. Productivity constraints, with the percentage of participants reporting each

In the discussion on constraints, the participants (N=20) were also asked what they viewed as strengths in their cropping system. The strengths identified were profitability (5), use of fertilizer (5), obtaining food (3), having manure (3), productivity (2), fertile soil (1) and having seeds (1). One participant reported high levels of productivity, three reported average levels of productivity, and twelve reported that their productivity was low. Concerning threats to the farming system, one farmer stated that, “threats are there, like rainfall unpredictability, space, pests like maize caterpillar, also capital, plus market is also a problem. And we also have soil sampling; we don't know our soils, just knowledge we have from school; we just don't know what methods to use, and the seed types to grow. We just go to an agrovet and we do not know the ecological requirements.”

Another participant discussed the need for agriculture training, saying that, “because the rains have come, everyone should be in their farm, but farming needs skills and knowledge, and the majority of community here do not know, they just take it as lifestyle and order. If they can be sensitized on what is farming, I think people would produce (...) they can produce what they are

producing without knowledge, but if they know, they can produce a lot and maybe even get a surplus for sale.” Four participants paid for labor consistently, while three paid when they could.

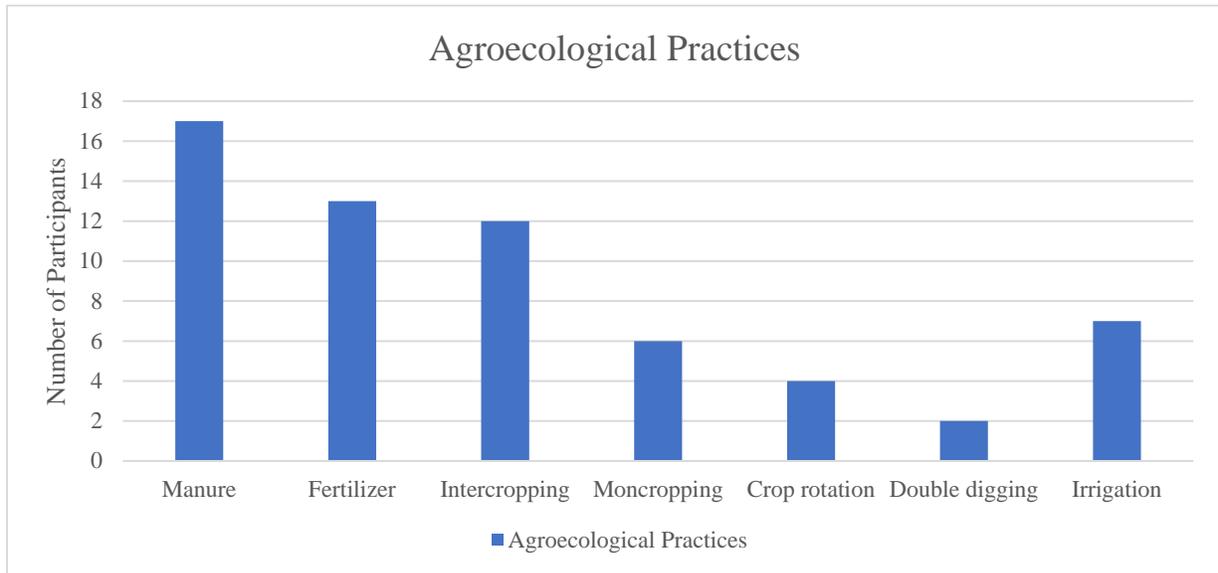


Figure 4. Number and of agroecological practices per participant

Crop Sales

Out of the 29 rural participants, 13 reported that they were not selling crops, and 11 reported that they were. The remaining five participants sold occasionally. Out of 12 participants that were asked, half said that they had enough to eat after selling, and half said that they did not. Nine were selling avocado, five were selling maize, three were selling banana, three were selling vegetables, two were selling beans, two were selling coffee, one was selling mango and one was selling livestock. Four participants had said that access to markets was a constraint to their success as a farmer. Out of the participants asked, 16 said that they believe that agriculture can be profitable, and three believed it could not be profitable. Some conditions given for profitability include irrigation (this was the most common reason given), land size, capital to invest and fertile soil. One farmer who said it cannot be profitable stated that, “I think land size -

it is enough to eat but not to sell. So you take some of the profit, go sell so you can get something else like cooking oil, you use it to get another product you do not have, so land size and productivity is not enough, maybe the rain was not sufficient.”

Agriculture Values

Each participant was asked that if they won the lottery, would they still farm. Eighteen participants stated that they would still farm even if they no longer needed to due to the lottery, two said that they would stop farming. One stated they would not stop farming because “God blessed the soil and not man, so I won't stop.” One stated that she would continue to farm and work even harder if she won the lottery. Many said that they would reinvest their earnings into the land. When asked if agriculture can be profitable, fourteen of the participants stated that they thought that agriculture could be profitable, while three said they do not think that it can be profitable. Fourteen reported liking to farm. Four said that they want their children to farm, and three said that they would not want their children to farm. When the farmers were asked what they like and do not like about farming, many stated that they like that they get their own income and food from their land. A few mentioned religion, explaining that agriculture brings them close to God and that it has been honored by God and is a duty to fulfill. One person exclaimed, “free style!” Some just mentioned that it was the only option for them. What was not liked was the lack of rains and capital.

Some believe that agriculture is stagnant and will not continue to be invested in by future generations as they look for white collar jobs. However, some believe that agriculture is having a renaissance. One farmer explained that “Now days, they are not migrating as much as before, because of the technology, of farming

“Being a farmer, at least you know even the bible, even the bible says that kings harvested from the shamba. At the same time, when God created man, he took them to the shamba and he told them to cultivate and he shall produce food and he should feed on it, so actually I am following the bible.”

and at the same time the education that they are getting from the agriculture extension officers. They are going around and training people on farming, and they are becoming enlightened, and they realize that farming is really a job, it is no longer just farming. It can now provide employment and at the same time occupation.” Another said that his hope is to be an agriculturalist and teach others, grow the agriculture sector, and not move to an urban area.

Soil Erosion and Soil Fertility

When asked if soil erosion was an issue in the ward, 82% (N=24) of the participants stated yes. Nine of the participants brought up soil erosion without the prompt of being asked, removing the power of suggestion. Only one person stated that soil erosion was not a problem in their community. One of the reasons given for why soil erosion is an issue is infertility (N=11). Participants identified that it is caused from rains (N = 3) and the terrain being hilly (N = 4).

Soil erosion came up in conversations surrounding agriculture, migration, and productivity. The community appears to have a high general awareness of the problem of soil erosion in Ilima, and they understand what issues it is causing in their farming system, including infertility of soil, with eleven people out of the participants stating this. One farmer had said that his son had to move out of Ilima due to soil infertility. Another farmer stated that because his land is so small, he had to dig cutoffs to prevent soil erosion. Another recognized that, “the rains come, the soil is ripped away and becomes bare, so the thing that helps is making terraces and making sure the soil is not cleared.”

Some participants spoke of soil erosion and soil infertility at a larger scale, addressing issues with neighbors or in their greater community. One farmer with a large gully that is shared by neighbors stated that when his neighbor does not take care of their land and it starts to get eroded, it will impact them because the water may flow from the neighbors to theirs, and the soil is

growing even more infertile. Another farmer had stated that, “[the community] is planting trees, but not enough, and digging cutoffs, but none are doing terraces. The biggest challenge for them to plant trees are sizes of plots, too small, so if they plant trees, only one is planted because the size of the land is too small and they won’t be able to plant maize and beans, plus the seedlings are sold [...]”

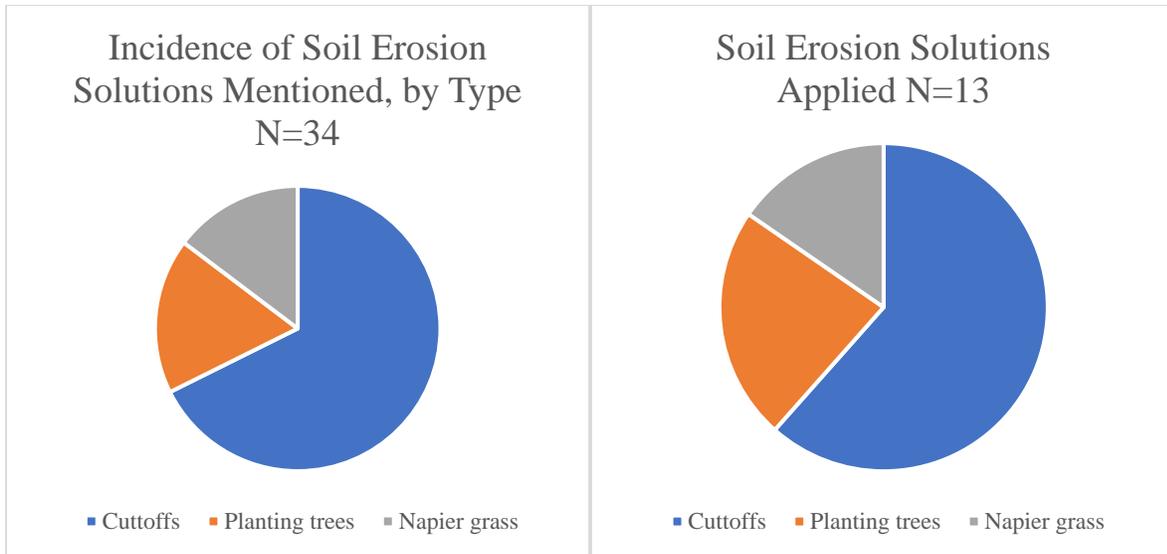


Figure 5. Number of soil erosion solutions identified and applied

Three soil erosion solutions were mentioned 34 times by the participants (some participants identified more than one solution), but only 13 were actually applied. This could suggest that there is a high level of understanding of what to do about soil erosion, but that there are barriers to applying the identified solutions.

Urban Migration and Remittances

Out of the participants (N=21) that reported on migration, 88% stated that someone from their household had migrated, be it a child or spouse. None reported migrants outside of Kenya. Occupations of migrants included business, trade and casual labor. 73% (17) of 23 respondents reported receiving remittances, with one participant stating that they receive remittances

occasionally. Seven reported receiving no remittances. Of the seven households not receiving remittances, two families still had a household member who had migrated, while 100% of the households receiving remittances had a family member that had migrated.

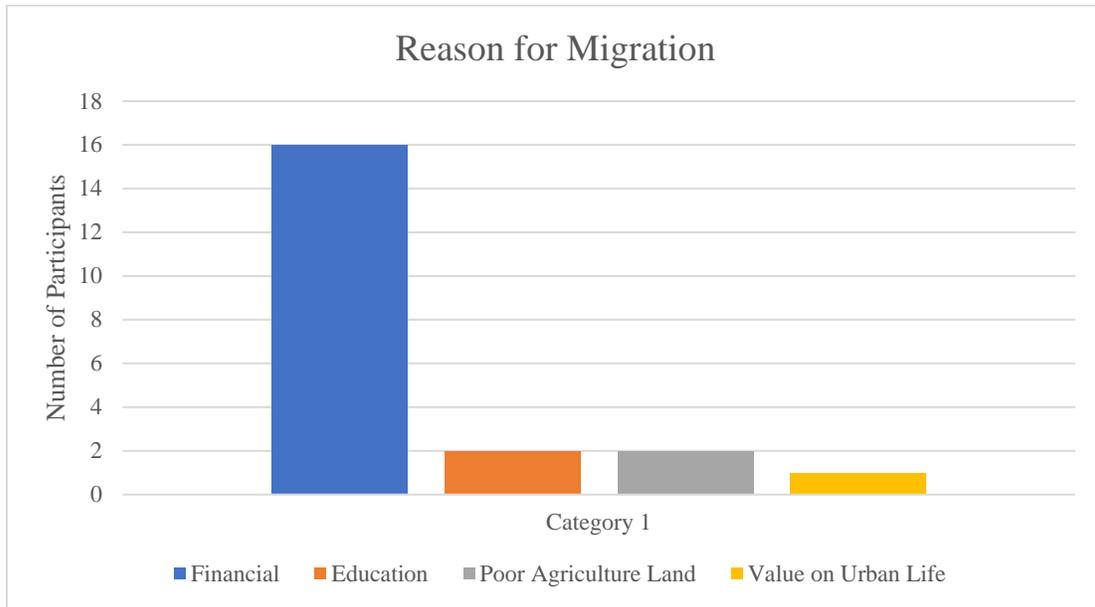


Figure 6. Reasons for migration as reported by participants

Selling

Of those that were receiving remittances, 40% (N= 6) were not selling and 60% (N=9) were selling their crops or only selling crops sometimes. Of those that were not receiving remittances, 70% (N=5) were not selling and 30% (N=2) were selling. To summarize, more households that were receiving remittances were selling versus the households that were not receiving remittances. This could indicate an increase in ability to invest in agriculture (land and other inputs) that has caused an increase in productivity, allowing for sales, or an ability to purchase more food and therefore not needing to hold on to harvest to prepare for shocks such as school fees, allowing for increased ability to sell.

Remittance Investments

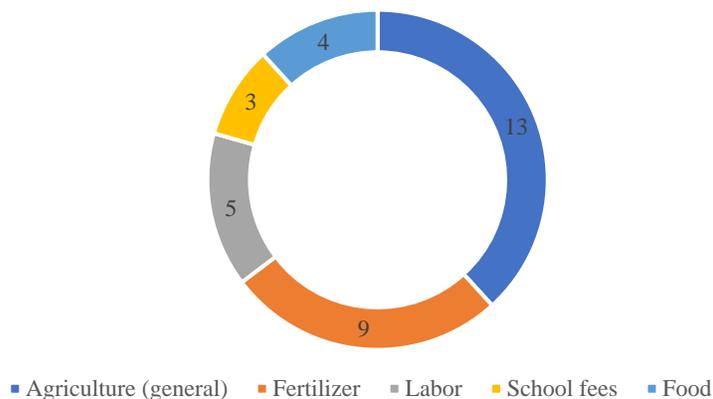


Figure 7. Remittance investment types and the number of participants reporting each

Agriculture

Of the participants that do not receive remittances, 30% reported using fertilizer, while 64% of those receiving remittances used fertilizer. Fifty-seven percent (57%) of non-remittance receivers used manure, while 70% of remittance receivers used manure. In the group not receiving remittances, the average amount of agroecological practices applied was .7 practices and the average for the remittance receivers was 2.4, suggesting an increase in agroecological practices when receiving remittances, perhaps out of an ability to purchase inputs. Out of the non-remittance group, zero said that they paid for labor and out of the remittance receiving group, five reported paying for labor, indicating that receiving remittances might increase labor purchasing power. In the non-remittance group, the average land size was .75 hectares and in the remittance group it was 2.7 hectares. This could suggest higher purchasing power for land with remittances (nine participants in the remittance group mentioned land purchasing or selling, compared to zero in the non-remittance group) or could suggest that those with greater land mass have more income from agriculture and can therefore send their children to school or urban centers, which in turn continues to grow generation wealth.

Land size could potentially be a factor influencing households' likelihood of investing in agriculture. Of those that reported investing in agriculture and also on land size, all but one person had land sizes over 2 hectares with three cultivating above five hectares. In the group that did not specify that they were investing in agriculture, 9 had land sizes at or below two hectares, and four were cultivating 3 hectares, but none had above three hectares. This suggests a potential correlation between land size and investing remittances in agriculture. Since few reported using remittances to purchase land, it cannot be surmised that the land sizes are bigger for those who have more remittances due to land purchasing practices, pointing to the potential that having a larger land size might encourage those to invest in their agricultural system. It can also not be surmised that those who are not receiving remittances are forced to sell their land to explain for their smaller land size, as there were few who reported selling land.

What could be inferred is that remittances have a protective and boosting effect on agriculture productivity through multiple pathways (land purchasing, access to other input such as agriculture) but what also should be considered is generational wealth that allows households to send their family members to urban areas in a supportive way that sets the migrant up for success, as mentioned prior. What illustrates this is that the seven participants in the non-remittance receiving group mentioned constraints to migration, while only one out of the 17 in the remittance receiving group mentioned a constraint to migration. Irrigation occurred in one family that was not receiving remittances and in four families that were receiving remittances.

Migration Values

For the participants who reported having a migrant in the family and were asked about outcomes (N=19), seventeen (98%) stated that if the family member had stayed home, they would have experienced a negative outcome on the family. Only one person stated that if their family member did not migrate, that it would be positive. Reasons that were given for the negative outcomes were that the land would be divided smaller and would be impossible and/or that they rely on the money from remittances to survive. When asked whose choice it was for the migrant to leave Ilima, many stated that it was the migrant's own choice. However, due to the negative outcomes that many of the participants mentioned that would have occurred if the migrant stayed home, the choice of staying in Ilima appears to be less of a viable option.

The older adults interviewed tended to believe that the youth wanted to migrate, and that they were only interested in white collar jobs, and that they thought that farming was unattractive or even "dirty."

One explained that "most youth don't see the benefits of [farming], they see just going to Nairobi, wearing good clothes, that is what they wish; they don't want to be tired out and they say farming is tiring." One adult said that there is not a problem with Ilima, and that it is just the youth's choice.

However, when the youth themselves were interviewed (in the standard interview process and also in the youth focus group N=11, varied ages but younger than 25) many youths revealed

"For balance of ecosystem, there must be some leaving and some staying, so now you find that there is balance, some leave, many successfully, but when they come back, they have no economic impact, the little they saved they just buy food and take care of themselves, they do not invest here, it is an imbalance. The ones that stay cannot change their community. It may take some time, it takes a generation to realize that there is a gap and vacuum living here, from our motherland, and taking it somewhere else. In years they realize that, and the main thing they realize, is that when the infrastructure is improved, and the agriculture sector is taken seriously, there can be some investment in agriculture, then there will be ways of taking produce to market, then they will realize they can come back, but until then, the majority will have to go."

the opposite, that they felt like they had no choice but to migrate, explaining that they have a lot of pride in their hometown, and that they want to invest in Ilima but that the infrastructure and pathways were not there. They identified barriers for success in Ilima including irrigation, small land size, lack of infrastructure such as roads to connect to markets, and lack of new technologies in agriculture. The youths were also excited about agriculture technology and had pointed to peers that have been successful.

One youth stated that, “It is a self-esteem thing, to move or not to move, according to me, the money you get in town, is the same money you get in rural area, but life is cheap in rural. With good control of yourself and sources of income around you, you will stand a better chance than urban area because there is so much spending.” Most also explained that the typical pattern is that a youth or the spouse leaves Ilima, sends back remittances, and then eventually returns to live in Ilima. One female youth said, “It is the cycle. You go out, for the people that do not have the money, so if you can have small cash, if someone starts with that and then grows from there, if people are really poor, children are asked [to leave], and they get money, and it goes back to Ilima.”

“As far as migration is concerned,[...] there will be no production, no food, even in urban centers there will be no food - so some kind of sensitization [needs to happen], so the youths that have finished school will not have to search, they can produce on their farm, and then take it to the town [...] meanwhile there is a lot of rain water that flows, and now when you practice ag, depending on rain, it becomes a challenge again, so we need to practice irrigation, so they can still produce to sell, and also markets. If these things can be collectively put into place, the movement of youths would work - but if dependent on the rain for agriculture, it just won't work”

One thing that was consistent between the age groups is the recognition of the struggle that one faces when they move to an urban center. One farmer stated that “Those who decide to stay are better placed than those who decide to go to town, because at the end of the day they just come back here, and they start at 0. Those who are just here, those who migrate when they come

back, after going to town and come back, those who are here are more ahead. In fact, we are more developed than those who are in town. The owners, they come here and we are doing better than those who are working in town.” Others explained that the people they know who have left have a low standard of living in the urban centers and struggle. One person explained that they pretend that they are not struggling, but that he knows that they are. Some of the interviewees were migrants that have left Ilima and returned and were able to contribute a unique perspective. One returned migrant shared that, “Before I left, I used to do agriculture, feed children, and pay school fees, but I had an expectation that once I left, I would get more, but expectations were not met.”

Food Security

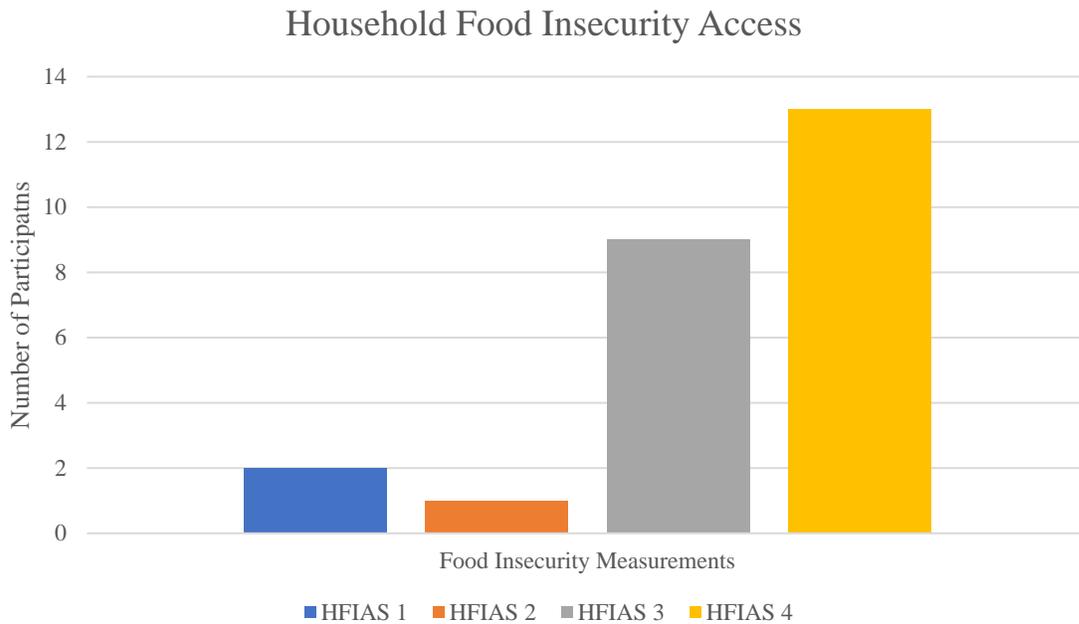


Figure 8. HFIAS and the number of participants falling into each category

Key: Household Food Insecurity Access (HFIAS)³ category for each household. 1 = Food Secure, 2=Mildly Food Insecure Access, 3=Moderately Food Insecure Access, 4=Severely Food Insecure Access.

Many of the participants fell into HFIAS categories three and four (86%). Only three participants fell into the first and second categories. Due to the very small N in category one and two, it was very difficult to identify any trends or correlations in the differences between the more food secure groups (1&2) and the less food secure groups (3&4), and therefore categories 3 & 4 will be used for this analysis only, except where 1 & 2 are relevant.

Correlations that corroborate current literature on the subject include land size (HFIAS 3 was an average land size of 3.8 hectares and HFIAS 4 had an average land size of 1.6 hectares) meaning that the less land, the more food insecure. Household size also followed suite with current literature on food security (HFIAS 3 was an average of 3.8 persons and HFIAS 4 was an average of 5 persons per household), inferring that the larger the household size, the less food secure. Other potential correlations that are worth further investigation include remittances (HFIAS 3 had all participants reporting receiving remittances where 83% in HFIAS 4 received remittances), potentially suggesting that remittances have a protective factor on food security. Pathways to this increase in food security could be from direct investment in agriculture that could increase yield, investment in land, or increased purchasing power to buy food (see figure that details allocation of remittances reported by participants). To summarize, large land size, smaller household size, and receiving remittances all appear to have a protective effect towards food security.

³ The HFIAS is a USAID developed standardized tool to estimate the prevalence of food insecurity (USAID, 2007)

Food Security and Agriculture/Soil Erosion

Another correlation of interest would be in the reporting on soil erosion as a constraint and problem. All participants in HFIAS 4 stated that they believe that soil erosion is an issue. Comparatively, only 44% of participants in HFIAS 3 stated that they believed that soil erosion is a problem. This could mean that soil erosion is impacting food security levels or that the perception of soil erosion creating a problem is different between the two groups. More research needs to be done in this area.

“At some point I feel that there is some product that got very wasted, and it was out of the people that we employed there they were not really supervised, I think they put water on the tomato leaves, then my dad got depressed because of the school fees, and he started drinking so he kind of left everything, there were cabbages, people came and stole, so I thought if I worked there, it would be better” – a female youth who migrated to Nairobi speaking of the impact school fees have had on her life.

Additionally, 100% of participants in HFIAS 4 identified cutoffs as a solution to soil erosion, while 55% reported this in HFIAS 3 group. Other preventions that were identified were more consistent throughout the two groups (i.e., napier grass, tree planting, etc.). Another correlation under this category is HFIAS and the specific issue that soil erosion causes. In HFIAS 4, 66% said that it reduces soil fertility compared to 11% in HFIAS 3.

Food security is also impacted by climate and landscape. Many participants explained that when the weather is not favorable, they do not have enough to eat, or that they only have enough to eat when production is high or mentioned that they cannot produce enough to eat due to soil infertility and soil erosion. One farmer explained that they used to sell their produce but now they cannot because of soil infertility which occurred as a result of soil erosion. Another said that because of the nature of the soil and climate, the maize can only be immediately consumed, and they cannot harvest enough to store. One woman explained that when the rains are not favorable, she does not have enough to eat, and she is forced to sell a goat or a hen to

then purchase food. Agroecological practices between the two groups were also compared. HFIAS 3 averaged 1.5 agroecological practices per household, while HFIAS 4 averaged 2 agroecological practices per household, showing similarities between the two groups in the amount as well as the type of agroecological practices.

Food Security and Selling

Selling was fairly consistent among all participant in the HFIAS groups. Only six participants were not selling, and these households were equally distributed among the HFIAS groups and therefore cannot be said to impact food security. However, this should be further explored. When asked if there was enough to eat after selling, these numbers were also equally distributed among the HFIAS categories. Additionally, 100% of participants in HFIAS 4 identified cutoffs as a solution to soil erosion, while 55% reported this is HFIAS 3 group.

Food Security and Remittances

Of those receiving remittances, 40% (N= 6) were not selling and 60% (N=9) were selling their crops or only selling crops sometimes. Of those that were not receiving remittances, 70% (N=5) were not selling and 30% (N=2) were selling. This could infer that those not receiving remittances had to sell due to no other forms

of income, and could in turn impact food security, especially given that HFIAS 3 had 100% or participants reporting receiving

remittances where only 83% in HFIAS 4 received remittances. One participant explained that if she didn't have the remittances for her farm, she would have to reduce the size of land that she cultivates and she would have to sell maize and beans so she could get labor, fertilizer, and

“Normally, in the [rural area], normally the food is produced directly form the shamba, in town they normally use processed food, so it has chemicals and what have you, but here (Ilima) is better. I feel stronger than I was when I was in town”

seeds. This could potentially impact her food security if she is forced to sell in order to keep her farm operational. Other participants specifically mention purchasing food with remittances. This was equally distributed among HFIAS groups.

Nutrition Values

When asked if the rural diet or the urban diet was healthier (N=24), 87% stated that they believed that the rural diet was healthier, and the remainder believed that the urban diet was healthier (13%). One farmer said that “In Ilima, it is better because here when I find onions, I can plant vegetables and eat and if you eat in Nairobi there is no place to plant a garden.” Another stated that, “The diet is better in rural because life is cheap in rural areas, and you do not need to buy food.” This cost of food came up multiple times, with participants saying that food is expensive in the cities, and more affordable in the rural area because you grow it, and therefore you can eat.

Of the 13% that believed the urban diet was healthier, some reasons given were that you had choices and food available consistently. One urban interviewee stated that, “In Nairobi, you have choices, unlike when you are hungry, so if you have income in Nairobi, it is easier to get a better diet, but in rural it is the same today, tomorrow, so to change is a rare case, so what they want is just something to put in their stomach to keep them moving, you go with what you have.”

Other Findings

School fees

One subject that came up often but was not probed or anticipated by the researcher, was the matter of school fees. School fees were mentioned 17 times in the interviews, with no prompts by the enumerator. This unprompted mention of school fees in the context of

smallholder agriculture, alone, indicates that this is an important consideration in the lives of the farming community in Ilima. It is a commitment taken seriously by residents and has shown to be a shock and barrier to investing in agriculture and an occasional threat to food security. Some respondents reported forced sales of land and subsequent reduction in land for food production.. This needs to be considered by CIAT and the local government as a potential barrier to soil erosion amelioration and agriculture productivity, as it presents as not only a shock, but a potential priority over agricultural investments.

School fees may be more of a shock for those that are experiencing higher levels of food insecurity, as they were mentioned by 9 participants in HFIAS group 4, by 3 participants in HFIAS group 3, and by 0 participants in both HFIAS groups one and two and should therefore be especially considered in the food insecure, or people with no remittances and small land size. Three participants mentioned the need to sell land for school fees alone. Others mentioned that they use revenue from the sale of produce to pay for school fees. One farmer stated that he likes being a farmer specifically because it allows him to pay for school fees. Another stated that if she won the lottery, she would buy more land so she could produce a lot to pay for school fees. When asked how remittance income was used, 9% of respondents mentioned school fees..

Discussion and Recommendations

The interviews revealed important interactions between family priorities (especially children's education and year-round food security) and the practices and decisions associated with smallholder farming livelihoods. Local criteria for farming success in Ilima was articulated throughout the interviews, and will guide this discussion. Ilima residents aspire to a robust and sustainable agriculture system that allows for community members to profit and grow, while

supporting their families and paying school fees, where migration is a choice and not a mandate⁴.

In this vision, robust and sustainable agriculture means no soil erosion or infertility, greater access to irrigation to minimize the negative impacts of climate change, larger farm size, improved connection to markets, and access to necessary inputs.

Achieving this vision will require reducing a multitude of barriers and bolstering the progress that has already been made. The four main categories that need to be addressed by the government, partners, and community members to achieve the vision include mitigation of widespread soil erosion and soil infertility, addressing marginal land size and fragmentation across generations, improving access to the inputs and infrastructure required for agricultural development, and designing development strategies that more fully account for the ways in which urban migration and remittances impact the community. The following section will discuss these barriers.

Soil Erosion and Infertility

Concerning soil erosion and soil infertility, the community is in multiple stages of the behavior change theory model⁵. Generally speaking, the community has moved past the pre-contemplation stage, as most recognize the problem as well as the potential solutions, and are already onto the other stages of adjusting and adapting their agricultural system to be successful in the eroding landscape of Ilima. This means that any soil erosion projects that may occur within the community will not need to invest much time in the awareness stage in order for the community to buy-in to any project or to understand the issue. There is already a deep

⁴ Please note that this is not a specific quote from the community, rather it is a vision that the author has created based on the results of the interviews and observations

⁵ Behavior change model identifies six stages of behavior change that is commonly used in planning initiatives that require behavior change to be successful. The stages are precontemplation, contemplation, preparation, action, maintenance and relapse.

understanding of soil erosion and soil infertility. Additionally, much of the community is past the contemplation stage. All want to be able to make changes throughout Ilima and in their own agriculture system. Residents of Ilima are in varying later stages of the model, primarily in the determination, action, and maintenance stages, having had about half of the participants already applying soil erosion prevention and amelioration in their farming system.

There are a few underlying reasons why some of the residents may not have applied the necessary approaches to reduce soil erosion, despite understanding the issue and understanding the preventive measures. One of the more obvious reasons would be lack of capital to invest in solutions, or lack of ability to purchase labor to help implement them. Another reason would be the general lack of investing in agriculture due to land size, allowing the land to be less productive over time and supplementing the lack of food supply and income with remittances instead of attempting to increase yield, despite most of the participants believing that agriculture can be profitable and clearly articulating deep cultural ties to the land and agricultural lifestyle.

This points to the potential of remittances being both helpful to stop soil erosion (increasing purchasing power to invest in prevention) and harmful (reducing the risk of having an unproductive agriculture system as residents experience increased food purchasing power and supplemental income from remittances). Each individual household will have to believe that investing in their land will be worth their time and investment and will benefit them and their families despite the “safety net” represented by remittances. Those not receiving remittances will also need to believe that investing in their land will be worth the effort. However, they might need a government subsidy or other assistance to do so.

Since it has been shown that residents are more likely to invest in agriculture and the land if they have larger land size, this needs to be taken into account while planning and

implementing a sustainable soil erosion initiative as a top priority. It is clear that land size is a key player in agriculture development in the community, and that the residents might be less likely to truly buy into and contribute to any program if they feel that their land is too small to benefit them, even with an increase in agricultural inputs. This represents a “catch-22” scenario, where the residents do not want to invest in the land because of lack of productivity and size, but they are experiencing a lack of productivity due to the lack of investments in the land, despite land size.

Land Size

In the prior discussion on soil erosion and soil infertility, land size was presented as a potential roadblock into getting community members committed to a soil erosion amelioration project, as they perceive this as a major issue. Land size acts as a catalyst for other barriers to achieving the ultimate community vision as well. One specific way that land size is a barrier to achieving the vision is through its impact on food insecurity. The research found a correlation between land size and food insecurity in Ilima. Food security acts as a driver for forced urban migration, an issue clearly stated as a problem by the youth of Ilima, who explained they had no other choice but would prefer to remain in the community. This presents itself as an underlying driver for forced migration.

Despite some evidence that the elders believe the youth do not want to farm, and despite some youth being attracted to experiencing urban lifestyle, it was clear that farmers wanted to make money from agriculture, but that the various barriers such as land size prevented this from happening. This was another clear driver in forced migration, as youth must leave their communities to make enough money to support themselves and their families while still maintaining what they can on their small plots in Ilima.

An underlying challenge in the size of land is the demarcation of land to the younger male generations as a long-upheld tradition, cutting the land size into smaller and smaller portions, contributing to forced migration and lack of investment. This not only causes smaller land sizes for future generations, but it has also meant that some family members are simply being pushed out as there just is not enough land to support multiple generations. Some of these migrants have decided to invest in other regions, further risking the future of agriculture in Ilima. Other areas, particularly those that afford access to irrigation and/or are less impacted by soil erosion can be viewed as a more attractive option than remaining in Ilima. A creative solution will have to be developed by the community to address the disincentives for youth weighing the benefits of remaining in Ilima, versus farming elsewhere or migrating to urban areas to pursue non-farm livelihoods..

Inputs and Infrastructure

Deciding the worth of investing in soil erosion prevention and amelioration by the Ilima population potentially means that other agriculture inputs that allow one to be productive and profitable may also need to be considered, as soil erosion and land size are not the only issues that the community is facing. Irrigation, climate change, lack of purchasing power for other inputs like manure and fertilizer, lack of market access and lack of labor all need to be considered. If these necessary inputs are inaccessible than the community might still feel as though they cannot develop their land any further and will need to migrate. In essence, a holistic approach needs to be taken that looks at the entire smallholder farming system, not just one barrier. If the other barriers still exist, success may be elusive.

Urban Migration and Remittances

The data from the interviews suggests that remittances have a positive impact on the lives and livelihoods of smallholder farming households in Ilima. For one, it shows that there is a positive association between food security and remittances, land size and remittances and agroecological practices and remittances. Land size was found to have a similar association. Since those that were receiving remittances also had the most land, it is difficult to discern the pathways. It is also a challenge to identify the direction of causation. For example, are those that are receiving remittances more food secure because of purchasing power of food or because their plots of more productive due to increased inputs? Or is it simply the land size that is the driver and not remittances? Or perhaps having larger land has allowed households to send their family members to urban centers or to become high educated due to increased income from their larger land? These are all questions that are not answered, and that demonstrate the complexity.

To ground and illustrate this complexity, the population of Ilima can be broken down into two differing groups. The first group, Group A, has a migrant in the family that is sending remittances, and have not had many barriers in sending a family member to migrate. They have larger land and experience mild to moderate food insecurity. They either do not experience soil erosion or do not believe soil erosion is a large issue. They are investing their remittances in agriculture, among other things, and are selling their produce. The second group, Group B, does not have a migrant in the household, and is most likely not receiving remittances, and have reported barriers to sending a family member to migrate. They typically have small land and are experiencing moderate to severe food insecurity. They either are experiencing soil erosion themselves or at least believe that soil is erosion is a large issue. They practice fewer agroecological methods and are selling less of their produce. Consistently, all participants

primarily fit into one of these two categories. All participants lived and cultivated similar lands that were all susceptible to soil erosion.

There are multiple lines that divide the Groups A and B, but the main driver and root cause needs to be identified. Group A might be more able to profitably invest in agriculture, providing greater prospects for a more prosperous Ilima community. Group B might be less able to invest but would benefit more greatly from intensive agriculture interventions including soil erosion amelioration, as they are experiencing the worst outcomes. When planning any initiative, those involved should consider unique approaches to these differing groups, as they have unique needs and concerns.

SWOT Analysis

This SWOT Analysis is a summary of the strengths, opportunities, weaknesses and threats that were discovered throughout this research project. This summary, or snapshot, can be used to help inform conversations that may lead to further research, investigation, or decision making. Many of the strengths can be found in the people, their values, and motivations. Weaknesses and threats tend to lay within the bio-physical environment. Opportunities will depend on reducing the weaknesses and threats, while optimizing strengths.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Strong values in agriculture • Opportunistic youth • Model farmers present • Soil erosion awareness 	<ul style="list-style-type: none"> • Lack of infrastructure • Food insecurity • Small land size • Soil erosion/infertility
Opportunities	Threats
<ul style="list-style-type: none"> • Investing remittances in agribusiness • Community soil erosion program • Farmers groups and youth groups • Commercialization and market connection 	<ul style="list-style-type: none"> • COVID-19 complications • Climate change • Urbanization • End of remittances due to urban poverty • Remittances not invested in agriculture

References

- Birch, I. (2018). Agricultural productivity in Kenya: barriers and opportunities. https://doi.org/https://opendocs.ids.ac.uk/opendocs/bitstream/handle/20.500.12413/14211/483_Agricultural_Productivity_in_Kenya_Barriers_and_Opportunities.pdf?sequence=1&isAllowed=y
- Center for Health Solutions Kenya. (2018). *Makueni County Profile*. <https://www.chskenya.org/wp-content/uploads/2018/02/Makueni-County-Profile-1.pdf>.
- CIAT. (n.d.). *Africa*. CIAT. <https://ciat.cgiar.org/where-we-work/africa/>.
- Concern Worldwide, & Welthungerhilfe. (2021). *Kenya*. Global Hunger Index (GHI) - peer-reviewed annual publication designed to comprehensively measure and track hunger at the global, regional, and country levels. <https://www.globalhungerindex.org/kenya.html>.
- Dendir, S. (2017). Saving out of Remittances: Evidence from Ethiopia and Kenya. *International Migration*, 55(4), 118-140.
- Emongor, R. A. (n.d.). Food Price Crisis and Food Insecurity in Kenya. *KARI*.
- FAO. (2021). *Gender and Land Rights Database*. Land tenure and related Institutions | Gender and Land Rights Database | Food and Agriculture Organization of the United Nations. http://www.fao.org/gender-landrights-database/country-profiles/countries-list/land-tenure-and-related-institutions/en/?country_iso3=KEN.
- Faria, J. (2021, April 8). *Kenya: number of poor people 2005-2020*. Statista. <https://www.statista.com/statistics/1227159/number-of-poor-people-in-kenya/>.
- Garzon Delvaux, P. A., Riesgo, L., & Gomex y Paloma, S. (2020). Are small farms more performant than larger ones in developing countries? *Science Advances*, 6(41).
- Greiner, C., & Sakdapolrak, P. (2012). Rural–urban migration, agrarian change, and the environment in Kenya: a critical review of the literature. *Population and Environment*, 34(4), 524-553.
- Ibendahl, & Haney. (2021). Better is better: larger farm size not linked to improved profitability. *RealAgriculture.com*. <https://www.realagriculture.com/2020/06/better-is-better-larger-farm-size-not-linked-to-improved-profitability/>.
- IPCC. (2007). *Climate change 2007: Impacts, adaptation and Vulnerability: Contribution of the working Group II to the Fourth Assessment Report of the IPCC*. Cambridge University Press.

- Kabubo-Mariara, J., & Mulwa, R. (2019). Adaptation to climate change and climate variability and its implications for household food security in Kenya. *Food Security*, 11(6), 1289-1304.
- National Land Commission. (2017). *FAQs Kenya National Land Commission*.
<https://www.landcommission.go.ke/article/faqs>.
- Nyangena, W. Social determinants of soil and water conservation in rural Kenya. *Environ Dev Sustain* 10, 745–767 (2008). <https://doi.org/10.1007/s10668-007-9083-6>
- Rapsomanikis , G. (2015). *The Economic Lives of Smallholder Farmers*.
<http://www.fao.org/3/i5251e/i5251e.pdf>.
- UNDP. (2021). *Impact of COVID-19 on the Sustainable Development Goals*. SDG Integration.
<https://sdgintegration.undp.org/accelerating-development-progressduring-covid-19>.
- United Nations. (n.d.). *THE 17 GOALS / Sustainable Development*. United Nations.
<https://sdgs.un.org/goals>.
- USAID. (2007). *Household Food Insecurity Access Scale* .
http://www.fao.org/fileadmin/user_upload/eufao-fsi4dm/doc-training/hfias.pdf.
- USAID. (2018). *Kenya Climate Risk Profile*.
https://www.climatelinks.org/sites/default/files/asset/document/2018_USAID-ATLAS-Project_Climate-Risk-Profile-Kenya.pdf.
- USAID. (2021, March 19). *Agriculture and Food Security: Kenya*. U.S. Agency for International Development. <https://www.usaid.gov/kenya/agriculture-and-food-security>.
- Wikipedia. (2021, July 15). *Makueni County*. Wikipedia.
https://en.wikipedia.org/wiki/Makueni_County.
- World Bank. (2019). *Kenya Economic Update: Transforming Agricultural Productivity to Achieve Food Security for All*. World Bank.
<https://www.worldbank.org/en/country/kenya/publication/kenya-economic-update-transforming-agricultural-productivity-to-achieve-food-security-for-all>.
- World Bank. (2021). *Food Security and COVID-19*. World Bank.
<https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19>.

Appendix

Interview Guide

Urban Interview Guide

Demographics:

Family Land size

Household size (rural)

Household size (urban)

Income sources

Income from each source

Remittances (both from rural-urban and urban-rural)

How long ago did you migrate?

Where have you lived since migrating?

Education levels of household members

Female headed or male headed?

Migration Values

⇒What are migration drivers?

- Why did you migrate? Please give all of the reasons you can think of, even if they seem small.
 - Out of these reasons you gave, can you please rank them from most influential to least influential?
- Whose choice was it to migrate?
- Did you always know you wanted to leave? At what age did you start thinking about leaving?
- What did your parents think about this decision?
 - What did you think about their opinion?
- What did your community think about this decision?
 - What did you think about their opinion?
- Were there reasons to stay that you considered? What were they?
- Did you know anyone from the urban area you migrated to?
 - [if yes] did they help you make your decision? How?
 - Did they help you once you arrived? How?
- What help, if any, did you receive when you migrated?
 - [if money]
 - Where was this money from?
 - How much was it?
 - How long did it last?
 - [if a place to stay]
 - Who let you stay?
 - How long did you stay?

⇒What is the final push that happens when people migrate?

- If you could think back to when you migrated, was there a specific event that made your decision final?

⇒Did the migrant try to avoid migration? How?

- How long did it take you to make your decision?
- Was there anything that you did to try and stay in your community
 - [if yes] Why did this not work?

⇒What are the realities after migration?

- Before migrating, what did you think your life would be like in the urban area?
- How does the reality compare?
- What do you wish you could change?
- If you could tell yourself one thing before you migrated, what would it be?
- Do you regret migrating?
 - [if yes] what prevents you from moving back?
- Knowing what you know now, would you have migrated? Why?
- All in all, has your quality of life improved since you migrated? How?
- Do you prefer rural or urban living?

⇒What are the prospects of returning?

- Do you want to go back to your home? Why, why not?
- Is there anything that would make you return home?
- Do you think you will move back home someday?
- If you had to move back home, what would you change?
- Thinking back to the reasons you said you left (refer to these), if they changed would you move back home? Why or why not?
- What are some of the issues you see surrounding urban migration? For the rural and for the urban.
- What impact do you think migration has on:
 - Your family?
 - Your community?

Urban-rural Interaction

⇒What are the basic lines of interaction?

- How often do you talk to your family?
- How often do you go home to visit?
 - When do you usually go home?
 - What are the purposes of these visits?
 - How long do you usually stay?
 - Is anything exchanged?
- How often does your family come and visit you?
 - Who visits?
 - What are the purposes of these visits?
 - How long do they usually stay?
 - Is anything exchanged?
- Are you satisfied with the amount or quality of visits? How would you change them? Why?
- How do you think your family is doing?
- On a scale of 1-5, 5 being the greatest, how connected do you feel with your home community?
- How connected do you feel with your family?

- Do you help anyone in your family access urban markets? Please describe this interaction.

⇒What are the perceptions of home life after migration?

- How do you think your family is doing now?
- Do you worry about them?
- Has this changed since you left? How? Does this have anything to do with you leaving?

Migrants and Agriculture

⇒What are urban dwellers interactions with agriculture and how does this impact soil fertility and food security?

- Do you own your own farm separate from your family's? [if yes, skip questions x-x and proceed to questions x-x, if no, proceed below]
- Please describe your family's farm system
- What practices do they use?
- Even though you have migrated, are you still involved with your family's agriculture, even if it is a small role?

[proceed here if yes, if no - skip questions x-x and ask questions x-x]

- Please describe your exact involvement, what is your role?
 - [if clarity is needed] Is this your family's farm or your farm?
 - [if it is their own farm]
- How often do you interact with your family about agriculture related things?
 - How do you communicate with your family on these matters? (phone calls, facebook, whatsapp etc.)
- Do you make any agriculture-related decisions?
 - [if yes] why do you get to make these decisions?
 - What decisions are they?
 - [if no] would you like to make decisions? How do you think you could be of value? Why aren't you involved?
 - Who would you say makes the most decisions/is the primary farmer?
 - What motivates you to stay involved even though you are not physically there?
- Have you learned anything new about agriculture since migrating?
 - [if yes] What?
 - Where did you learn this?
 - Has this new information transferred to your home? How?
- What would you say is the number one constraint to productivity on your farm?
- Do you purchase anything agriculture related for your family (this includes labor)?
 - [if yes] What? Why can't your family get this without you?
 - Did your family get this before you migrated?
 - [if yes] where did they get it before you moved?
 - What is the benefit for you getting this for them instead?
 - [if sending remittances] does your family use any of the remittances on agricultural related expenses?
 - Did your family have access to these things before you left? If so, how?
- Have you heard of "telephone farming"?
 - [if yes] what do you think of this?
 - What are some positives and negatives to this model?
 - Who benefits the most from this model?

- Do you consider yourself a telephone farmer?
- Do you grow anything in your urban environment?
 - Please describe
 - Is this for sale, consumption, both?

[if no to agriculture involvement]

- Please describe your family's farm system
- Why are you not involved with agriculture at home?
- Would you like to be more involved?
 - [if yes] What do you think you could add?
 - How could your family benefit from your help?
 - Why haven't you done this?

[if owning land separate from family's land]

- How long have you owned this land?
- Who did you buy the land from?
- Where did the money come from to buy this land?
- How large is this land?
- Where is this land?
- Describe the farming system and how you got into this type of farming
- What agro-ecological practices do you use?
 - [Probe] intercropping, manure making, crop rotation, nitrogen fixing
 - How did you hear about these?
 - How do you make sure these practices are happening on your farm?
 - Why are they important?
- Do you use fertilizer?
- Where do you get the seeds?
 - What kind do you use?
- Who works on your farm?
 - Where do these people live?
 - How did you find them?
 - Do they get paid in cash, mpasa, or food?
- Where and how do you sell your produce?
- What was the motivation behind starting this?
- How often do you visit your farm?
 - What happens when you do this?
 - What are you looking for?
- Do you think your children will take over this business?
 - [if no] what will happen to the land after you can't manage any more?
- Do you ever plan on moving to this land?
- What do you think the community thinks about your presence?
- Have there been any consequences to the community that you are aware of?
 - What have you done to mitigate these consequences?
- Has this venture been profitable thus far?
- What inputs have you purchased for this venture?
- What did you consider when choosing this location for land purchasing? Please rank 1 - x, 1 being the most important
 - Land cost

- Soil fertility
- Proximity to markets
- Community acceptance
- Soil erosion level
- Convenient to travel to
- Availability of inputs

[return to questions x-x after self-owned land questions are asked]

[Back to interview]

Migrants and Agricultural Values

⇒What are values behind agriculture for urban dwellers?

- Would you ever aspire to be a farmer? Why or why not?
- Do you think people can profit from agriculture?
 - [if yes] If this is so, why do you not invest? If this changed, would you think of investing? Why or why not?
 - [if no] Why not? If it were profitable, would you think about investing if you had the capital? Why or why not?
- Does your family profit from agriculture?
 - [if yes] what makes them successful?
 - [if no] what do you think they could do to make them profitable?
- Why is agriculture important?
- What prevents soil erosion?
- How can you fix soil fertility?
- How does climate change impact agriculture?
 - Is there anything farmers can do about this? What can they do?
- How does government impact agriculture?
 - Is there anything farmers can do about this? What can they do?
- What are some major issues you see in the agriculture sector?
- Rank the following agriculture considerations on importance with 1 being the most important (for you) and 10 being the least
 - Profit
 - Soil fertility
 - Prevent erosion
 - Cost of seed
 - Cost of inputs
 - Climate change adaptability
 - Labor intensity
 - Consumption purpose
 - Healthy foods
 - Suitability for future generations
- Do you want your children to be farmers? Why or why not?

Migrants and Nutrition

⇒What are some of the dietary habits that transfer from rural to urban life?

- [take the HDDS]
- [take the FIS]
- Think back to when you lived at home. What was your diet like?
- How has your diet changed?

- What do you still eat?
 - Where do you get x?
- What do you no longer eat?
 - Why do you no longer eat x?
 - If x was [specified characteristic], would you eat it? Why?
- Do you and your family ever talk about what you are eating?
 - [if yes] how do these conversations go?
 - What do they say?
- Do you and your family ever talk about what they are eating?
 - [if yes] how do these conversations go?
 - What do they say?
- Do you ever worry about what your family is eating?
 - [if yes] what are your concerns?
 - What do you think they or you can do to change this?
- Do you and your family ever exchange food when you see each other?
 - [if yes] What is it and how often?
 - How long does it last you/them?
- Rank, in order, the importance of the following when making food choices (1 being the most important and 8 being the least important)
 - Taste
 - Cost
 - Convenience
 - Health
 - Tradition
 - Locally grown
 - Good for the environment
 - Fun to eat with friends

⇒Open ended questions:

- What are your plans for the future?
- If someone gave you 1,000,000 shilling, what would you do?

Rural Interview Guide (with urban relative)

Demographics:

Land size

Household size (rural)

Household size (urban)

Income sources

Income from each source

Remittances (both from rural-urban and urban-rural)

How long ago did your relative migrate?

Where have they lived?

Education levels of household members

Female headed or male headed?

Farmers and Agriculture

⇒What are the farming practices and how are they correlated to land size, migration ect?

- Please tell me about your farming system

- What do you grow? Please tell me even small-scale vegetable production.
 - [Explain that we will go through each item, and for each item, ask the following:]
 - How much of x do you produce?
 - How was your harvest of X last year? (good or bad is fine)
 - Do you sell any of x?
 - [if sold] What percentage of x do you sell and what percentage of x do you eat?
 - After you sold x, did you have enough for home consumption?
 - Why decides to sell or keep x?
 - Did you ever have to sell x even if you didn't want to? Please tell me that story.
- How satisfied are you with:
 - The amount you produce
 - What you produce
 - How you produce it
- Have you purchased any land recently?
 - [if yes] how long ago?
 - How did you get the money for this land?
 - What is the land used for now?
 - How much land did you buy?
 - How much land did you own before?
- Have you sold any land recently?
 - [if yes] how long ago?
 - What did you do with the money you received? Tell me the story.
 - [if reinvestment] Are you profiting more now or before you sold the land? How?
 - Do you still have some of the profit leftover?
 - [if yes] what will you do if/when this money runs out?
 - [if no] what did you do when the money ran out?
 - Who did you sell the land to?
 - What did they do with the land?
 - In retrospect, was this a good decision, why or why not?
 - Did you feel forced to sell the land? Please tell me that story
 - Whose decision was it?
 - Has your diet changed since selling the land? How?
 - Are there any crops you stopped growing since selling the land?
 - [if yes] do you still eat x? Where do you get x now? Is it more/less/same amount than what you used to eat of x before selling the land?
 - [if purchases x now] where does the money come from to purchase x?
 - What will you do if/when this money runs out?
 - Has selling the land changed what you grow on your remaining land? How?
 - Have you had to supplement your income? How?
- What agroecological practices do you use on you farm?
 - [Probe] intercropping? Nitrogen fixing plants? Crop rotation? Manure making? Green manure?
 - Who decided to do x? (go through each)

- How did you learn how to do x? (go through each)
- What are the benefits of doing x? (go through each)
- [Probe] how much, how often - try and gain quantitative data here
- What would you say is the number one constraint to productivity on your farm?
 - Do you think there is something that can be done about this? Why or why not?
- Do you use fertilizer?
 - [if yes] how much? Where do you get the money?
 - [if no] why not?
 - Who decided to use/not use?

Farmers and Agricultural Values

⇒What are values behind agriculture for farmers?

- Why is agriculture important?
- What prevents soil erosion (do you do this, why, why not)?
- How can you fix soil fertility (do you do this, why, why not)?
- How does climate change impact agriculture?
 - Is there anything farmers can do about this? What can they do?
- How does government impact agriculture?
 - Is there anything farmers can do about this? What can they do?
- What are some major issues you see in the agriculture sector?
- Are you glad you are a farmer? Why or why not?
- Do you think people can profit from agriculture?
 - Why or why not?
- Rank the following agriculture considerations on importance with 1 being the most important (for you) and 10 being the least
 - Profitability
 - Impact on soil fertility
 - Prevent erosion
 - Cost of seed
 - Cost of inputs
 - Climate change adaptability
 - Labor intensity
 - Consumption purpose
 - Healthy foods
 - Suitability for future generations
- If someone gave you 1,000,000,000, would you still farm? Why or why not?
- Do you want your children to be farmers? Why or why not?
- If input cost or labor was not an issue, what changes would you make on your farm?
 - How do you think this would change things?

Urban-rural Interaction

⇒What are the basic lines of interaction?

- How often do you talk to your urban relative?
- How often do you go to visit your urban relative?
 - When do you usually go home?
 - What are the purposes of these visits?
 - How long do you usually stay?
 - Is anything exchanged?

- How often does your urban relative come and visit you?
 - Who visits?
 - What are the purposes of these visits?
 - How long do they usually stay?
 - Is anything exchanged?
- Are you satisfied with the amount or quality of visits? How would you change them? Why?
- How do you think your urban relative is doing?
- On a scale of 1-5, 5 being the greatest, how connected do you feel with your urban relative?
- Do you worry about your urban relative? Why or why not?
- [if receiving remittances] What do you spend the remittances on?
 - Before the remittances, how did you do/buy x?
 - In general, are you financially better off after your relative migrated?
- [if sending remittances] What do you send remittances for?
- Do you sell any of your yield in an urban market? Please describe your connection.
 - Which market?
 - Who helps you?
 - Would you be able to sell in this market if you did not have a connection?

Migration Values

⇒What are some of the thoughts farmers have on migration - does this have an impact on migrant's choices/perceptions?

- Why do you think your relative migrated?
- Whose choice was it for them to migrate?
- What do you think their life is like?
- Do you think that they want to return?
- Do you think that they will return?
- Who will take care of your land after you are not able to?
- What impact do you think migration has on
 - Your family?
 - Your community?

Farmers and Nutrition

⇒What are values and habits farmers have around nutrition, and how does this transfer to their urban relative (looking for correlations)

- [take the HDDS]
- [take the FIS]
- Do you and your urban relative ever talk about what you are eating?
 - [if yes] how do these conversations go?
 - What do they say?
- Do you and your urban relative ever talk about what they are eating?
 - [if yes] how do these conversations go?
 - What do they say?
- Do you ever worry about what your urban relative is eating?
 - [if yes] what are your concerns?
 - What do you think they or you can do to change this?
- Do you and your urban relative ever exchange food when you see each other?

- [if yes] What is it and how often?
 - How long does it last you/them?
- What do you think your urban relative's diet is like?
 - Do you think this is more or less healthy than yours? Why?
 - Do you think this is similar to how they are at home?
- Rank, in order, the importance of the following when making food choices (1 being the most important and 8 being the least important)
 - Taste
 - Cost
 - Convenience
 - Health
 - Tradition
 - Locally grown
 - Good for the environment
 - Fun to eat with friends

Rural Interview Guide (without urban relative)

Demographics:

Land size

Household size (rural)

Income sources

Income from each source

Education levels of household members

Female headed or male headed?

Farmers and Agriculture

⇒What are the farming practices and how are they correlated to land size, migration ect?

- Please tell me about your farming system
- What do you grow? Please tell me even small-scale vegetable production.
 - [Explain that we will go through each item, and for each item, ask the following:]
 - How much of x do you produce?
 - How was your harvest of X last year? (good or bad is fine)
 - Do you sell any of x?
 - [if sold] What percentage of x do you sell and what percentage of x do you eat?
 - After you sold x, did you have enough for home consumption?
 - Why decides to sell or keep x?
 - Did you ever have to sell x even if you didn't want to? Please tell me that story.
- How satisfied are you with:
 - The amount you produce
 - What you produce
 - How you produce it
- What would you say is the number one constraint to productivity on your farm?
 - Do you think there is anything you can do about this? Why or why not?
- Have you purchased any land recently?
 - [if yes] how long ago?
 - How did you get the money for this land?

- What is the land used for now?
- How much land did you buy?
- How much land did you own before?
- Have you sold any land recently?
 - [if yes] how long ago?
 - What did you do with the money you received? Tell me the story.
 - [if reinvestment] Are you profiting more now or before you sold the land? How?
 - Do you still have some of the profit leftover?
 - [if yes] what will you do if/when this money runs out?
 - [if no] what did you do when the money ran out?
 - Who did you sell the land to?
 - What did they do with the land?
 - In retrospect, was this a good decision, why or why not?
 - Did you feel forced to sell the land? Please tell me that story
 - Whose decision was it?
 - Has your diet changed since selling the land? How?
 - Are there any crops you stopped growing since selling the land?
 - [if yes] do you still eat x? Where do you get x now? Is it more/less/same amount than what you used to eat of x before selling the land?
 - [if purchases x now] where does the money come from to purchase x?
 - What will you do if/when this money runs out?
 - Has selling the land changed what you grow on your remaining land? How?
 - Have you had to supplement your income? How?
- What agroecological practices do you use on you farm?
 - [Probe] intercropping? Nitrogen fixing plants? Crop rotation? Manure making? Green manure?
 - Who decided to do x? (go through each)
 - How did you learn how to do x? (go through each)
 - What are the benefits of doing x? (go through each)
 - [Probe] how much, how often - try and gain quantitative data here
- Do you use fertilizer?
 - [if yes] how much? Where do you get the money?
 - [if no] why not?
 - Who decided to use/not use?

Farmers and Agricultural Values

⇒What are values behind agriculture for farmers?

- Why is agriculture important?
- What are some major problems you see on your farm?
 - Is there anything you can do to fix x?
 - Have you done this?
 - Why or why not, what are the barriers?
- What are some major issues you see in the agriculture sector at your community level?
 - Is there anything you or they can do to fix x?
 - Have you or they done this?
 - Why or why not, what are the barriers?

- Do you think soil erosion is a problem
 - For your home?
 - For your community?
- Is there anything that can be done to prevent soil erosion?
 - Do you do this, why, why not?
 - At the community level? Household level?
- Is there anything that can be done to fix?
 - Do you do this, why, why not?
 - At the community level? Household level?
- Do you think soil fertility is a problem?
 - For your home?
 - For your community?
- Is there anything that can be done to prevent soil infertility?
 - Do you do this, why, why not?
 - At the community level? Household level?
- Is there anything that can be done to fix infertile soil?
 - Do you do this, why, why not?
 - At the community level? Household level?
- How does climate change impact agriculture?
 - Has climate change impacted you?
 - Your community?
 - Is there anything farmers can do about this? What can they do?
- How does government impact agriculture?
 - Is there anything farmers can do about this? What can they do?
- Are you glad you are a farmer? Why or why not?
- Do you think they will be farmers? Why or why not?
- Do you want your children to be farmers? Why or why not?
- Do you think people can profit from agriculture?
 - Why or why not?
- Rank the following agriculture considerations on importance with 1 being the most important (for you) and 10 being the least
 - Profit
 - Soil fertility
 - Prevent erosion
 - Cost of seed
 - Cost of inputs
 - Climate change adaptability
 - Labor intensity
 - Consumption purpose
 - Healthy foods
 - Suitability for future generations
- If someone gave you 1,000,000,000, would you still farm? Why or why not?
- If input cost or labor was not an issue, what changes would you make on your farm?
 - How do you think this would change things?

Urban-rural Interaction

⇒What are the basic lines of interaction?

- Do you sell any of your yield in an urban market? Please describe your connection.
 - Which market?
 - Who helps you?
 - Would you be able to sell in this market if you did not have a connection?

Migration Values

⇒What are some of the thoughts farmers have on migration - does this have an impact on migrant's choices/perceptions? Are there qualities to a household that prevents migration?

- Why do you think people migrate?
- What do you think life is like after someone migrates?
- Have you ever thought of migrating?
 - [if yes] what prevented you?
 - Who makes this decision?
 - [if no] why not?
- Has a family member ever thought about migrating?
 - [if yes] what prevented them?
 - Who makes this decision?
 - [if no] why not?
- [if parent of younger children] do you think your child will want to migrate?
 - Will you encourage this? Why/why not?
 - Will you try and prevent this? Why/why not?
- What impact do you think migration has on
 - Your family?
 - Your community?

Farmers and Nutrition

⇒What are values and habits farmers have around nutrition, and how does this transfer to their urban relative (looking for correlations)

- [take the HDDS]
- [take the FIS]
- What do you think the urban diet is like?
 - Do you think this is more or less healthy than yours? Why?
 - Do you think this is similar to how they are at home?
- Rank, in order, the importance of the following when making food choices (1 being the most important and 8 being the least important)
 - Taste
 - Cost
 - Convenience
 - Health
 - Tradition
 - Locally grown
 - Good for the environment
 - Fun to eat with friends