

Sustainable livelihood strategies and outcomes of ageing farmers in Kenya's Central Highlands



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Abstract

The global population is rapidly ageing. By 2050, old people will outnumber the young for the first time in history with 80% of the ageing population located in developing countries. Sub-Saharan Africa is experiencing rapid growth in its ageing populations. The main causes are due to decreasing fertility and mortality rates resulting in increased life expectancy and urban youth migration. Age is one of multiple driving factors that influence livelihood strategies, yet there is a knowledge gap on the connection between ageing rural populations and the sustainability of their livelihood strategies and outcomes. The aim of this study is to assess how ageing farmers' livelihood capitals, mediated by the influence of institutions and organisations, affect adoption of livelihood strategies and the achievement of sustainable livelihood outcomes in the Central Highlands of Kenya. Data was obtained while conducting questionnaires, semi-structured interviews, and focus group discussions. The results were categorised in the context of the sustainable livelihoods framework and compared with literature for analysis and validity. Old farmers were found to have reduced physical capabilities and labour access due to limited financial resources and youth migration resulting in decreasing levels of productivity and financial stability. Old farmers' capabilities to overcome the obstacles posed by age are limited by institutional and organisational mismanagement. The issues of adequate capital access faced by ageing farmers increases their vulnerability to various economic and natural shocks. It is concluded that age poses a significant barrier to the realisation of sustainable livelihood outcomes.

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Work distribution

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Abbreviations and Definitions

AO	Agricultural officer (may be followed by 1 or 2)
FGD	Focus group discussion
fFGD	Female focus group discussion
mFGD	Male focus group discussion
GDP	Gross domestic product
GoK	Government of Kenya
KU	University of Copenhagen
LMIC	Low- and middle-income country
NGO	Non-governmental organisation
SLF	Sustainable livelihoods framework
SSA	Sub-Saharan Africa
UN	United Nations
SACCO	SACCOs are a type of cooperative that farmers can join that provide loans with lower interest rates and smaller loans than banks with less requirements.

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1. INTRODUCTION

The global population age 60 and above has more than doubled since 1980, and in almost all countries, the proportion of old people is increasing (UN DESA, 2017). Table 1 depicts the expected changes in the population distribution of old people in different regions of the world. By 2050, old people will outnumber young people (under age 15) for the first time in history, numbering roughly 2 billion with 80% residing in developing countries (WHO, 2014; UN DESA, 2017). The countries of SSA will see between two to fivefold increases in their elderly population between 2017 and 2050 (UN DESA, 2017). Major causes of the global ageing trend are due to decreasing fertility and mortality rates (Biritwum et al., 2013). Life expectancy at age 60 in Africa is now almost on the level with the global average, and further increasing (Aboderin, 2012). Demographic changes in households are a driver for changes in agricultural practices and livelihood strategies. As cities attract young generations and income sources shift to other sectors, agricultural labour capital is diminished leading to threatened food security and livelihoods among rural communities. Hence, rural communities across developing countries face a comprehensive problem characterised by an ageing population within farming (FAO, 2017). Even though the Kenyan government and NGOs have tried to engage youth in agriculture through funding training and other initiatives (Mwaura, 2017), there remains a clear shift in employment among Kenyans towards off-farm sectors (Yeboah & Jayne, 2016). Currently, agriculture directly provides livelihoods for 75% of the population; however, only 11% of the Kenyans age 18-35 are interested in farming as an occupation (Awiti et al., 2015; Mwaura, 2017). This lack of a rural workforce and disengagement could significantly disrupt Kenya's smallholder driven agricultural economy as agriculture contributes 36% to the country's GDP (World Bank, 2016; Mwaura, 2017).

Table 1: Global trends in ageing showing the percentage change in the total population being ≥ 60 years, based on regional UN estimates from 1950 - 2050 and adapted from world population prospects (UN DESA, 2011).

Region	Percentage of population aged ≥ 60 years				
	1950	1975	2000	2015	2050
Asia	6.7	6.6	8.6	14.8	24.4
Europe	12.1	16.5	20.3	27.3	33.6
Latin American/carribean	5.6	6.5	8.4	14.9	25
North America	12.4	14.6	16.3	24.7	27
Oceania	11.2	11	13.4	19.1	23.5
Sub-Saharan Africa	5.2	4.8	4.8	5.5	8.3

There are multiple driving factors that influence livelihood strategies including economic stability, population density, access to market, the presence of development projects, and climatic conditions, especially in the agricultural sector (Pender et al., 2006). Indeed, high population density can result in deterioration and intensification of farmlands and can support the creation of nonfarm industries (Liu and Yamauchi, 2013). Climate change over the coming decades is predicted to negatively impact yield of major staple crops such as maize (Schlenker and Lobell, 2010). On the positive side, improving market access can stimulate the production of cash crops, thereby creating more stable incomes via shifts in agricultural practices and crop varieties (Pender et al., 2006).

In the agricultural sector, an ageing workforce has major implications on sustainable land use and development (FAO, 2017). Older farmers have reduced health and physical capabilities which affects the application of livelihood strategies and the resulting livelihood outcomes (Scoones, 1998). A decline in physical strength requires additional labour to achieve the same outcomes. Since crops and cultivation practices vary in labour intensity, a shift in livelihood strategies and income sources might be observed in ageing rural households. Widowhood is an additional factor that hinders productivity for old farmers as husband and wife teams are more efficient together (Cattell, 2003). Furthermore, access to useful agricultural information is moderated by financial resources and other factors, i.e. illiteracy, that provide further obstacles for ageing households. While 78% of Kenya's adult population can read and write, only 51% over age 65 is literate (Knoema, 2015; CIA, 2017).

The role and dynamics of institutions, organisations, policies, and legislation heavily mediate access to various livelihood capitals which, in turn, influences the livelihood strategies adopted by farmers (DFID, 1999). These aspects play a key role in shaping the development of sustainable livelihood outcomes, i.e. well-being, financial stability, natural resource resilience, and sustainability.

Demographic changes are a driver for governments of developing countries to implement new policies that counter the negative socioeconomic impacts associated with an ageing population (UN DESA, 2017). If policies are enacted proactively to circumvent the consequences anticipated with ageing demographics, adaptive measures are far more likely to be successfully implemented (UN DESA, 2017). Gender, ethnicity, and rural-urban residence are well-documented factors explaining inequalities and poverty in SSA, but even though evidence points to age as a key factor, it is poorly documented in SSA (Aboderin, 2012). Additionally, there is an apparent lack of literature concerning sustainability of livelihoods in ageing rural populations; this information is essential for the development of solutions that promote societal adaptation under the socioeconomic threats proposed by ageing demographics. This problem is particularly relevant in developing countries, and existing literature is extremely limited in focus on SSA. The research questions of this project were formulated to address this knowledge gap through the lens of the Sustainable Livelihoods Framework (SLF) proposed by Scoones (1998).

Main research question:

How does ageing of rural communities affect livelihoods in Kenya's Central Highlands?

Sub-research questions:

- 1. How have livelihood strategies of ageing farmers changed over time?*
- 2. How does access to the different forms of capital and institutional influence affect livelihood strategies of ageing farmers?*
- 3. What are the livelihood outcomes and consequences of these pathways?*

Data about livelihood capitals older farmers have access to, and the influence of institutions and organisations mediating these capitals will be collected in order to understand how these factors affect the adoption of strategies to achieve sustainable livelihood outcomes within ageing rural communities.

One challenge of this study might be the difficulty to isolate age as the governing factor in changes of livelihood strategies due to the fact that changes occur during the passing of time, which is not related to ageing necessarily. In a wider context, this could be political, economic, social, cultural, climatic or market-related changes affecting livelihood strategies. Another limitation is that researching about changes in people's life over time requires to activate old people's memory, and some information might have been forgotten over the years due to their old age.

2. BACKGROUND

Nationally, 7% of the population is 55 or older. The median age in Kenya is 19.7 with 40% of the population school-going age (0-14) and 19% prime-working age (15-24) (CIA, 2017). The current demographic structure was caused by high fertility in the late 1970's, even though this rate has significantly decreased over the years (CIA, 2018). A low median age indicates an already existing demographic concern partially due to the cost of providing free education for 40% of the population and the consequent impending need to create jobs without the reliability of significant future economic growth.

Kenya's Central Highlands is one of the most productive agricultural regions in Africa (CIA, 2018). Fertile soils and good market access stimulate growth and commercial agricultural enterprises, but many farmers struggle with small land sizes between 1.2 and 5 acres on average per household (Pender et al., 2006). The research site, Gatuya-ini, is located near the town of Othaya in Nyeri County in the Central Highlands of Kenya. The population of Nyeri County is approximately 690,000 with 76% of inhabitants living in rural areas (Wiesmann et al., 2016). The Kikuyu people are the predominant ethnic group living in the region; the dominant local language is Kikuyu, but proficiency in Swahili and English is also common, especially among the younger generations.



Overlooking a typical agricultural scenery in the Othaya region with the Abadare mountain range in the background.

Population density is relatively high in Kenya's Central Highlands (PRB, 2011), but this does not necessarily translate into a strong agricultural labour force. Since a high proportion of the population is below age 15 and basic education is now compulsory for children (The Constitution of Kenya, 2010), there is limited human labour capital from this age group which was a historically relied upon source in farming communities (Pender et al., 2006).

3. THEORY

The Sustainable Livelihoods Framework (SLF)

The research aims to understand the stated objectives through adoption of the SLF as defined by Scoones (1998). This framework offers a consistent structure to analyse the achievement of sustainable livelihoods by small-holder farmers of rural communities in developing countries. We will base our definitions of “livelihood” and “sustainable livelihood” on the following:

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base (Scoones, 1998).

The SLF is an interdisciplinary approach that relies on five main components: contexts, livelihood resources, institutional processes and organisational structures, livelihood strategies, and sustainable livelihood outcomes (Scoones, 1998). Scoones (1998) explains that, in a particular historical, socioeconomic, and demographic context, certain combinations of livelihood resources, or capitals, lead to certain combinations of livelihood strategies that, in turn, lead to certain outcomes. Moreover, institutions and organisations greatly influence the establishment of certain strategies (figure 3.1).

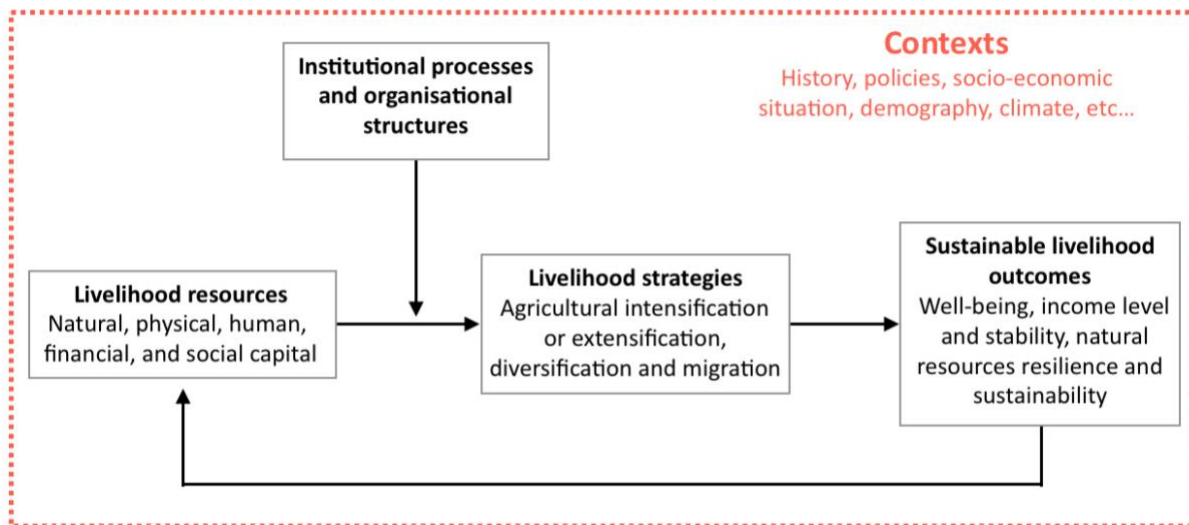


Figure 3.1: Simplified schematic of the different components of the Sustainable Livelihoods Framework (SLF). The arrows represent a relationship between two components. Adapted from DFID, 1999.

A livelihood strategy is defined as an activity adopted in order to achieve desired livelihood outcomes; examples of such activities include agricultural intensification or extensification, diversification within or outside agriculture, and even migration (Scoones, 1998). Livelihood resources that influence strategies are divided into five different forms of capital: natural, physical, human, financial, and social (DFID, 1999). First, the dependency of rural communities on natural capitals such as land and water strongly influences their agricultural crop selection and climatic vulnerability; second, physical capital includes infrastructure such as irrigation, storage facilities, and transport; third, “skills, knowledge, ability to labour and good health” are defined as human capital; fourth, financial capital includes available stocks such as income, cash, savings, livestock, and flows of money such as pensions and remittances; and fifth, social capital includes relationships with neighbours and the community, family relationships with children, grandchildren, husbands and wives, and societal traditions regarding land ownership and inheritance (DFID, 1999). Institutions and organisations are the “social structures and processes through which sustainable livelihoods are achieved” (Scoones, 1998), and they are constantly evolving in time. In simple terms, institutions (e.g. agricultural officers and other governmental agencies) are society’s rulemakers while organisations (e.g. SACCOs and agricultural cooperatives) are the players; both structures mediate the access to resources through restrictions or opportunities. Finally, sustainable livelihood outcomes are characterised by poverty reduction,

improvement of well-being and capabilities, as well as livelihood adaptation and vulnerability, and natural resource resilience (Scoones, 1998).

Because this framework can be applied at different scales and for different groups of people, the definitions of the elements constituting the framework are free to be defined alongside research-specific objectives, hence the listed elements are not exhaustive. The first step is to define the most relevant indicators of a sustainable livelihood according to the subject research group. It is through the informants' personal definitions of the framework's elements that the factors can be determined and categorised. Socioeconomic factors such as gender, income level, or former political position may influence access to different forms of capital and selection of livelihood strategies (Scoones, 1998); this must be discussed when analyzing results determined through the lens of SLF.

4. METHODS

4.1. Rationale for choice of methods

Due to time limitation for data collection, we elected to focus only on ageing farmers' experiences. Therefore, we eliminated the need to interview young people and compare their viewpoints. From this perspective, our interest in trans-demographic issues such as land inheritance practices and youth migration is limited to the aspects that affect old farmers.

We chose to work with different social science methods such as questionnaires, semi-structured interviews, and focus group discussions as they would help us gain a deeper insight in old farmers' everyday life (appendix 2). If we had had more time, methods such as farm typology and soil sampling would have been relevant to examine the sustainability of old farmers' livelihood strategies on a more quantitative scale. Additionally, better documentation of participant observation would have provided deeper understanding of the livelihood strategies and resource access of our subject group.

4.2. Ethics

To maintain proper research ethics, we guaranteed our respondents' anonymity, and asked consent to take pictures of them and to record during interviews. We also made sure to show our gratitude for their participation and answered any questions they had concerning our research. We experienced surprise and curiosity from some respondents, for they had not seen white people since the British colonisers, however we explained our aims and the questionnaire or interview would proceed nicely in all cases.

Initially we assumed corruption would be a sensitive topic, but most farmers spoke freely about it although they would generally mention it as mismanagement.



Picture of a 97 year-old farmer on her farm.

4.3. Questionnaires

As a first approach to get an overview of the study site, questionnaires are a good method to collect large amounts of descriptive features. Closed questions are recommended since they are easier to interpret, while open questions require more coding afterwards (Smith et al., 2015). Our questionnaire was mostly consisting of closed questions for the sake of analysis, with few open questions.

A pre-selection of farmers over 60 was made thanks to our local guide, and 45 respondents were located around Gatuya-ini by mapping their farm on Google Earth (figure 4.3.1). Out of the 45 pre-selected respondents, some were not home resulting in a total of 33 completed

questionnaires. Additionally, 5 other respondents filled out the questionnaire before the focus group discussions started.

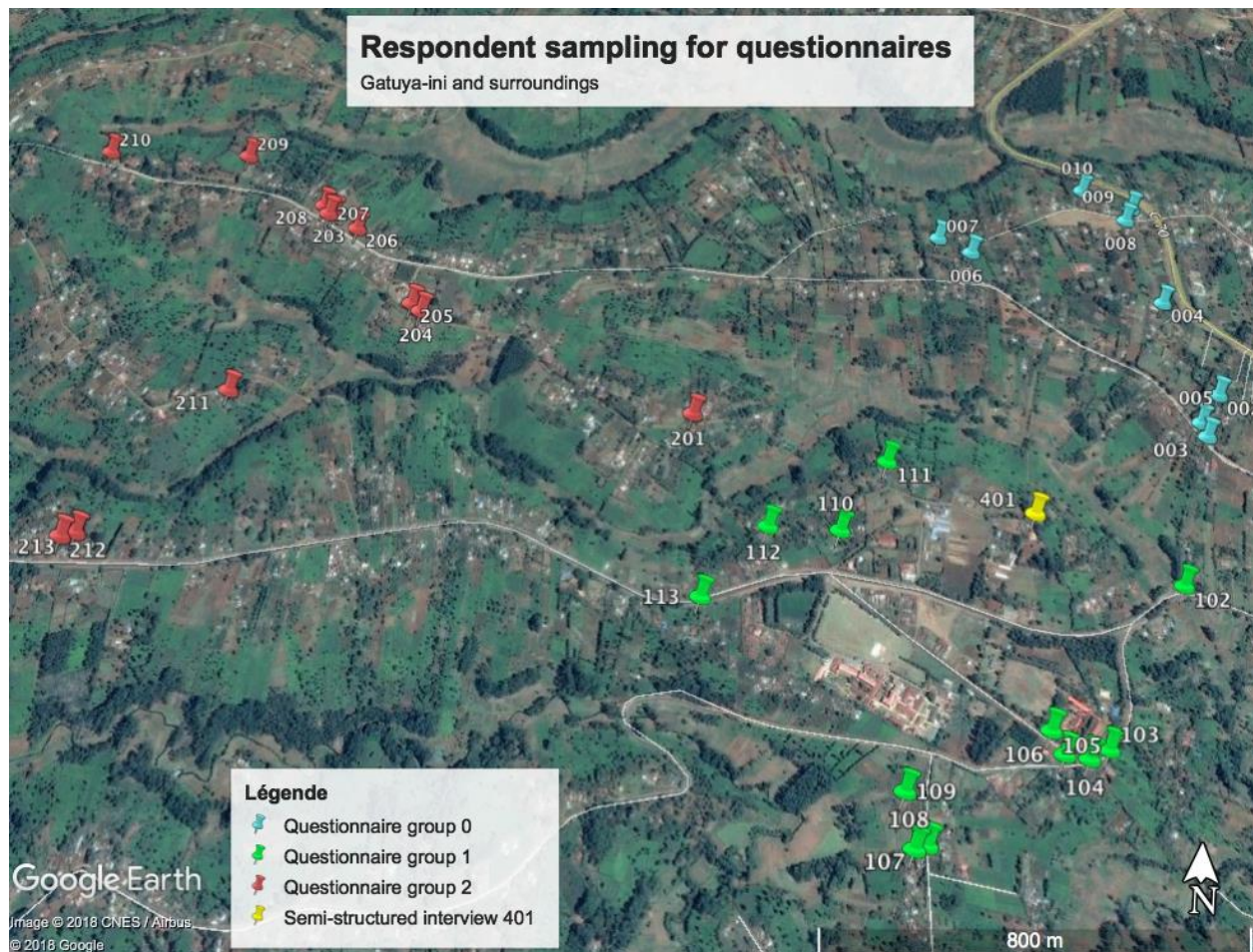


Figure 4.3.1: Map of the sampling for questionnaires. Blue, red and green pins represent the questionnaires that were conducted by the three different groups; the yellow pin represents a respondent for a semi-structured interview with who no questionnaire held. The numbers represent the questionnaire numbers by which informants are nominated.

To conduct all the questionnaires in one day, we spread into three mixed groups of three. One person questioned the respondent with the help of a translator, as only one of our informants performed the questionnaire in English, while a third person took notes and observed (appendix 3).

Each questionnaire has been numbered with the group number being either 0, 1 or 2, followed by the chronological number of questionnaire; e.g. group 1 conducted its 6th questionnaire of the

day refers to questionnaire no. 106 (appendix 4.1). In the following, we will reference interviews with these numbers.

4.4. Semi-structured interviews

The loosely defined guideline of semi-structured interviews enabled us to gain insight into the informant's perspective on changes experienced over time, and issues or opportunities that we might not have thought about. Open questions were mostly asked, including life story inspired questions (appendix 4.2). While interviewing, timelines of the farmers' lives were drawn in order to get a more visual overview of the changes occurring in the past.

Among the questionnaire respondents, nine were selected for semi-structured interviews; some profiles were representative of the average farmer in the area and some deviated on different aspects, only one female was represented. Only one of our informants was able to speak English fluently. Moreover, one interview with a farmer and retired agricultural officer was conducted in a mix of English and Swahili. Additionally, three key informants were interviewed, being the head of the agricultural office in Nyeri South, one agricultural officers from the same office, and the chief of the Othaya Township sub-location. These three interviews were conducted in English. To conduct the semi-structured interviews, we spread into two mixed groups of four consisting of one interpreter, one Kenyan student and two KU students each, excluding our guide.

4.5. Focus group discussions

Two FGDs with integrated participatory ranking of problems and solutions concerning old farmers were conducted, one with only women and the other only men (appendix 5.1), enabling

respondents to express themselves more freely, since gender might present a discriminatory factor in rural Kenyan communities. This was well orchestrated as our research group consisted of four women and four men, with two KU students, one Kenyan student, and one interpreter of each gender. The discussions were held in a school, considered a neutral place for our respondents to convene. Two rooms on opposite sides of a courtyard were used in order to create a privacy barrier between the two discussions.

The respondents were invited by our local guide, they were not chosen from the farmers we already met. These new respondents were asked to answer the same questionnaire, yet, not all of them did due to a lack of time. While the discussions started, tea, mandazis and chapatis were served to the respondents. Both FGDs lasted about 1.5 hours.

4.5.1. Female FGD

Five old women were present and the discussion started off pretty easily. In the beginning, one of the women would speak more than the others, but as they were getting more into the discussion, the speaking time became more equally distributed. At first, we were sitting observing outside of the circle consisting of the informants and the interpreter, but we felt that a more participatory dynamic from us was more efficient. We changed positions and faced all the informants while staying a bit outside of the circle as we were drawing, listing their arguments and guiding our interpreter throughout the discussion. The informants would keep speaking together, not to us, but the dynamic of the discussion was felt to be more lively with this setting.

To perform the problems ranking (appendix 5.2), our informants first listed all the problems they face due to age, then ranked them. However, it is not certain our respondents did the ranking in a very accurate way, they rather voted for which problem is a *big* problem, and we based the ranking on the degree of dissatisfaction a problem would raise among the respondents. Afterwards, solutions for ageing farmers were addressed, but they were addressed as solutions to the aforementioned problems, hence they were not ranked.

4.5.2. Male FGD

A lively discussion took place with a small group of three old men. Initially, the dynamic of the group was dominated by two of the members sitting on one side of the table, but when initiating the ranking exercise, the setting adopted by the respondents and the translator changed, yielding a more cohesive discussion. We sat behind them taking notes, observing and guiding the translator to address certain aspects. It seemed to support the group discussion that we were placed outside of the circle.

The participatory ranking of problems and solutions (appendix 5.2) were performed by getting the group to draw a mind map of problems related to ageing and related solutions. After that, we suggested some points that they did not touch upon but that we felt were central aspects. Eventually, ranking both problems and solutions spurred a lively discussion.

4.6. Translation

During the fieldwork we had the opportunity to work with two interpreters originating from the village where we stayed. This enabled us to connect more with people and the local culture, however we believe it potentially affected our data collection for several reasons. First, we assume that a lot of information was lost throughout the translation. For example, after a several-minutes-discussion with a respondent, the interpreter would translate only a brief summary, most likely forgetting some information. Second, the interpreter might have interpreted or selected the information given by the informant while translating it, causing the information not to be raw. This potential misinterpretation can be due to the interpreter's own understanding of our research and his own beliefs and culture. Some things may have seemed obvious to them while they were actually not obvious to us. Due to their cultural background they have a different understanding and viewpoint that shapes the way they live and express themselves and interact with each other, which was new to us (Paarup-Larsen, 1989). Clear explanations of our research goals and good

communication helped overcoming these challenges and improved our understanding of each other's culture.

4.7. Bias and Validity

We worry that the role of our local guide as an elder of the village might have biased some data because of his influence amongst the locals. He may have persuaded some respondents to participate even though they were initially reluctant. Therefore, we asked our guide not to be present during the interviews and focus group discussion conducted afterwards.

Due to their great knowledge about the area and the local people, the guide and interpreters may have influenced the data, as they would sometimes add information or correct the respondent's answer.

Data obtained appear to be consistent both within and between the methods although there are discrepancies between individual statements. There are some contradictions between farmers and key informants, indicating that divergence may come from informants' position. Yet, the internal validity of the data is ensured through triangulation of our results from each method.

The relatively small sample size of this study and the lack of literature concerning ageing populations and sustainable land use in developing regions compromise the possibility to generalise the findings to a broader context or another location under similar settings.

5. RESULTS

The average old farmer in the area is a male, age 76, married, and lives either alone or with 1 to 4 other family members while being the household head. He most likely has not had primary education when he was a child, has been a farmer all his life, and now owns 2.3 acres of land. He mainly grows coffee and tea alongside subsistence crops for his family's personal consumption. He still has a sense of pride regarding farming even though his physical capabilities have reduced with age and his financial stability and productivity has decreased compared to when he was younger.

5.1. Livelihood Strategies

The turbulent decades building up to the end of British colonisation and the transitory phase into independence thereafter significantly impacted the trajectory of agricultural production in Kenya's Central Highlands. Through constructing timelines of the farmers' lives, it became clear that most adopted tea and coffee following the freedom of independence in 1963 (004, 113, 211, AO1). Due to the improvements to financial stability, the popularity of the crops spread (figure 5.1.1). Before independence, people predominantly grew traditional subsistence crops such as millet, sorghum, yams, cassava, arrowroots, and maize (004, AO1), and with the exception of maize and arrowroot these crops are nearly nonexistent in the region today (007, AO1). This shift in the region's agricultural production diverted long-established, local economic networks away from decentralised, community-scale barter and trade systems towards the centralised, market-based systems (004, 007, 113).

“During the colonial period, traditional food crops were not sold but exchanged; there was no money. But after 1963, farmers in the area started producing tea and coffee introducing the concept of cash crops. Kenyans could not cultivate cash crops before independence because the British controlled the market. To grow cash crops, they had to clear a lot of forest which caused excessive deforestation in the country” (004).

Figure 5.1.1 depicts the current income sources for the sampled group of ageing farmers in ranked order from producing the highest (rank 1) to least (rank 4) income proportion. Insight into the income reliance of old farmers illustrates the force of international markets that encourage the production of tea and coffee, while dairy also provides farmers a significant share of income through strong regional markets. Macadamia, avocados, bananas, cabbage, and timber are also reported to produce incomes albeit subsidiary compared to the three aforementioned sources. The “other” category, which includes traditional crops like arrowroot and sugarcane, represents a low proportion of income for ageing farmers as these crops are mostly grown for subsistence, but surpluses can still be sold to local markets.

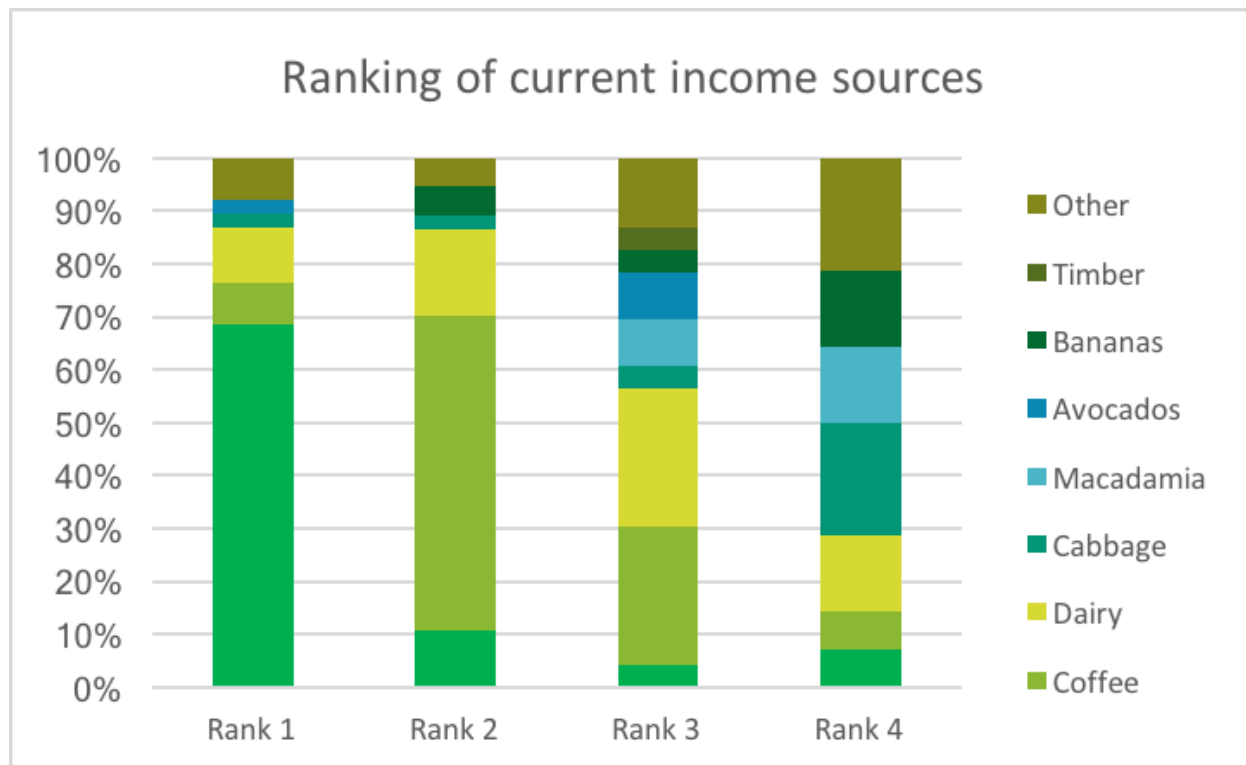


Figure 5.1.1: Ranking of the 4 major income sources from highest to lowest. Tea and coffee are predominant among the first and second main income sources respectively. Dairy seems to be important on all 4 positions. “Other” refers to sugarcane, kale, spinach, arrowroot, sweet potato, guava, potatoes and beans, which mainly are food crops for personal consumption. From questionnaires.

While tea was noted to provide a more steady income than coffee in recent years (106, 110, 211, 401, AO2, mFGD), many farmers reported a trend of increasingly low earnings and overall

financial instability caused by price volatility (particularly regarding coffee) in the market; as such, many have started diversifying their income streams away from tea and coffee alone (006, 110, 211, 401, Chief). However, diversification does not seem to be a significant trend in the region as 82% of questionnaire respondents report no change in their crop selection over time, and 13% report a decrease.

Over the past few decades, a market for perennial tree crops, most notably macadamia and avocado, has emerged encouraging farmers to diversify their production in order to increase income stability (010, 106, 110, 113, 209, 401, AO1, AO2, Chief). Farmers in the region have shown a willingness to try such new initiatives with the potential to increase earnings from their land (AO1). The comparatively low input intensity of perennial tree crops is promising; less labour and fertilizer is needed to produce profitable yields compared to tea and coffee (110, 113, AO1). This can be correlated with the decreased inputs observed for ageing farmers that support the idea of less input intensive crops due to the general decreasing trend in inputs (figure 5.1.2). The current success of these crops has led farmers to plan for increasing their tree crop production (110, 209). Shortcomings in relying heavily on perennial tree crops might include a lack of market access that is still in a developmental stage (106, 113), the inconsistent incomes due to annual or biannual harvest cycles (211, mFGD), and the multiyear delay between planting saplings and their first harvest which can be hard for ageing farmers to justify (fFGD, mFGD).

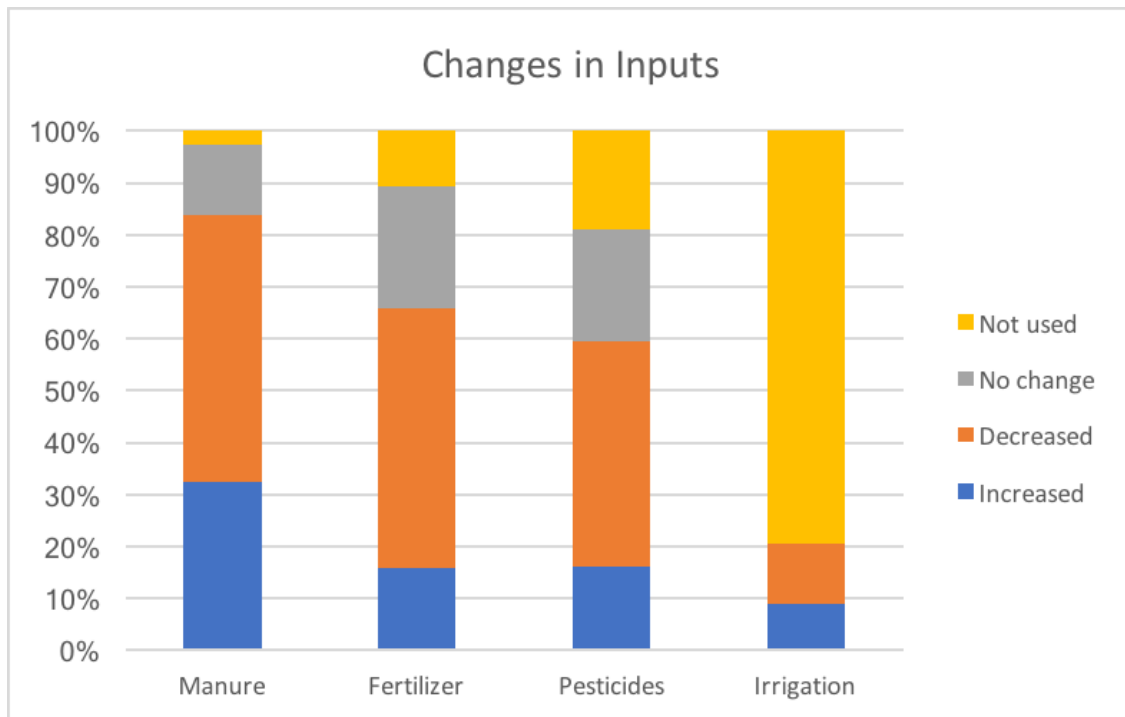


Figure 5.1.2: Changes in inputs applied over the years such as manure, fertilizers, pesticides, and irrigation. From questionnaires.

Farming remained an integral part of older farmers' lives even if they had an off-farm job when they were younger (003, 010, 106, 110, 113, 211, 401). Figure 5.1.3 shows that a slight majority of the sampled population were career farmers without other jobs, but a comparatively large portion also had jobs before entering old age. Only one of the 38 sampled farmers transitioned into farming from another career (figure 5.1.3).

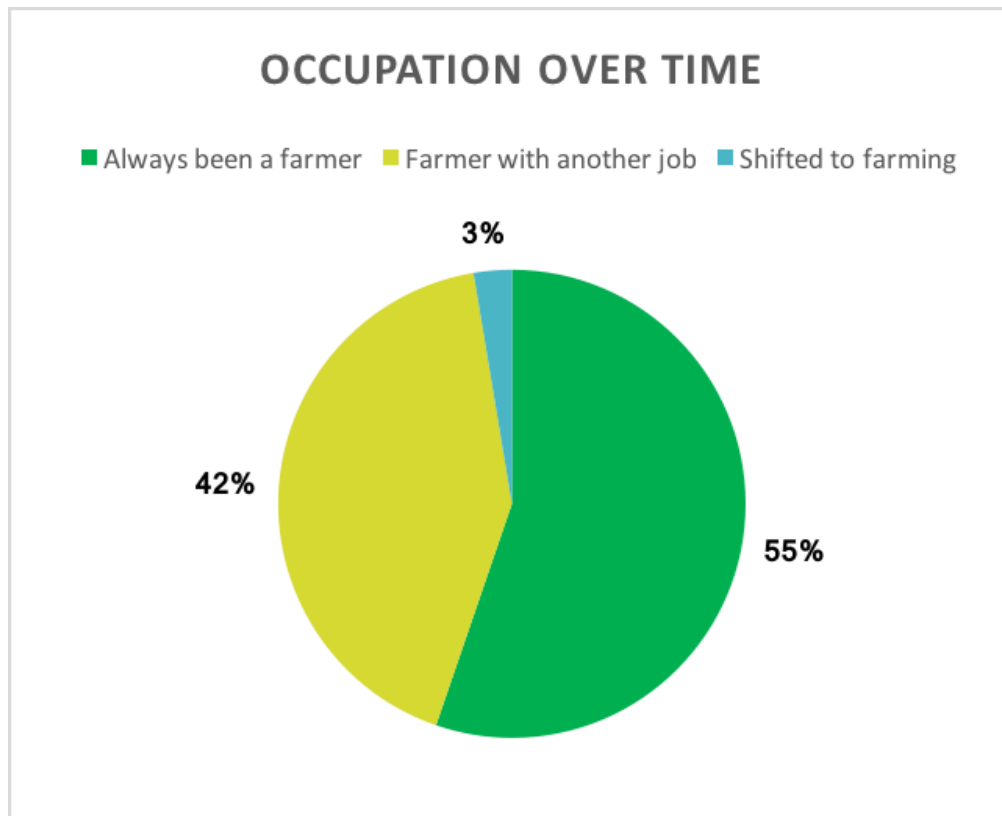


Figure 5.1.3: Distribution of farmers that have always only been farming (a majority of 55%), farmers that have had other occupations over the years (42%), and farmers that switched to farming over the years (3%). From questionnaires.

While figure 5.1.4 shows a slight majority of ageing farmers report no change in their proportion of land under cultivation, a fairly large portion of the sample population admits to a decrease in their proportion of agriculturally productive land. There may be confounding considerations of whether land no longer under production by ageing farmers is now under cultivation by the children who will inherit the land through the common practice of subdivision, despite the land still legally belonging to the elderly. Some old farmers report already subdividing land among their children (004, 113, 211), yet it is unclear how land is then considered part of the total when declaring decreasing land area production versus no change.

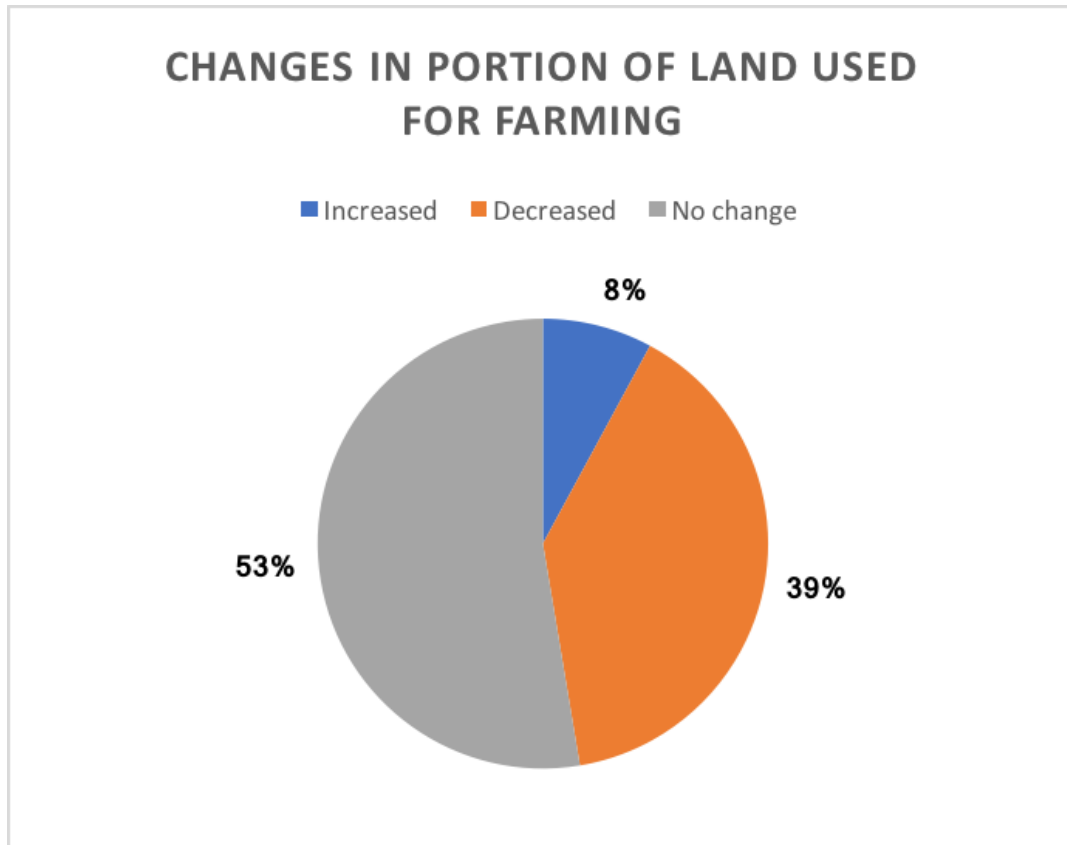


Figure 5.1.4: Changes in portion of land used for farming, 39% of informants decreased the area used for farming on their land, while 53% have experienced no change through time. From questionnaires.

5.2.Livelihood Capitals

5.2.1. Natural capital

A vast majority of informants state that weather events negatively impacted farming over the years (004, 006, 010, 106, 110, 113, 209, 211, 401, Chief, fFGD, mFGD). Both FGDs ranked weather and droughts as their fifth major challenge. Indeed, the decrease of rain and increasing regularity of severe droughts has damaged agricultural production and threatened the viability of rearing livestock. “The main event that has affected me most as a farmer is drought, [...] maybe every 2 to 3 years” (010). Such statements about droughts are common, while only one farmer states that he was never affected (209).

Since tea and coffee were introduced en masse by the British settlers and then perpetuated by Kenyan farmers, wide areas of forests have been cleared to make room for these cash crops (004, 006, 106, 211). At a smaller scale, some farmers cut down trees on their own land to make room for the cash crops in addition to their subsistence food crops (004, 006).

Agriculture seems to have intensified over the years in the sense that the soil is continuously being farmed rendering it infertile (mFGD). Due to the decrease in soil fertility over time, the need for fertilizers has increased in order to compensate (113). However, the use of fertilizers has increased over time for only 16% of the old farmers we held questionnaires with which shows that the vast majority of the respondents (84%) had either not changed, decreased, or are not using fertilizers at all (figure 5.1.2). Manure from livestock also constitutes a significant input (106).

5.2.2. Physical capital

As soil erosion is a problem on bare soil (mFGD), most of the informants experienced issues with erosion which leads them to take measures against it; some plant napier grass (004, 010, 209), trees (110, 209), or tea (113) to prevent soil erosion. Terracing is also used (006, 010, 209) as well as digging trenches (006, 110, 113, 209). One farmer even has large bags filled with soil laying in the paths of his tea fields to prevent soil erosion, but states that he is now too old to do something better (211). Some of them have been taught during educational events many years ago how to prevent soil erosion (010, 110). Informant 006 explains that he dug trenches and built terraces in 1984 and that they did not need any maintenance since then. This shows that farmers took measures against erosion when they were younger, but are not willing to put energy into maintaining these measures, as their physical capabilities have reduced.

Informants pointed at the lack of irrigation system due to its cost, which hinders the adoption of horticultural crops such as cabbage (fFGD, mFGD). For that matter, a vast majority of 82% of questionnaire respondents have never used irrigation at all, which makes the link to the fact that old farmers are less inclined than young farmers to adopt and invest in technologies.

5.2.3. Human capital

From the questionnaires, half of the 19 out of 38 respondents had not finished primary education or had no education at all, while 12 completed primary school, 2 completed secondary (until high school), and 5 completed higher education. “We used to help our families farm until eventually taking over the land, but today it is different; maybe it is the education that has changed this” (106). While this trend today is far less ubiquitous than in the past, many old farmers began farming immediately after finishing school (106, 110, 211). Informal education through participation in educational events or farmer field schools improved farming practices (110, 113). Indeed, farmers lack knowledge to grow e.g. fruit trees (mFGD). Moreover, knowledge about best management practices has resulted in increasing yields (106).

However, old age results in reduced health, physical capabilities and energy to work the land due to body pains and memory loss, causing productivity to decrease (003, 006, 010, 110, 113, 211, 401, Chief, AO2, fFGD, mFGD). The female FGD rank ageing, in reference to reduced health and physical capabilities, in second position while males rank it in fourth position. “Ageing has an effect on their health as their bones become weaker and they cannot be as effective as they once were” (fFGD).

Indeed, applying inputs has become one of the most difficult part of farming due to age (110). Knowledge acquired throughout years of experience as a farmer is not enough to compensate for reduced health and strength (010, 211, Chief). Additionally, respondents declare that widowhood is often a problem as the workload on the farm is higher when working alone in addition to maintaining the house (fFGD, mFGD). Hence, some of the informants feel the need to hire labour for these reasons (004, 006, 106, 113, 401). On the other hand, some of them claim that farming is healthy and maintains their physique (106, mFGD).

All of the respondents are household head, most of them live alone (24%), while 66% of them live in an household consisting of 1-4 additional persons, and a minority of 11% consisting of 6-

8 additional persons. According to one of our key informants, the number of children per family has decreased in the area (AO2), and farmers evoke the fact that their children have migrated to larger cities and out of farming (003, 106, 209, 211, 401), resulting in less family labour available (003, 106, 110, 209, 113, 401, AO2, mFGD) and sometimes working alone on the farm (fFGD). “Due to the increased labour, some farmers experience physical difficulties” (fFGD). Therefore, labour ranks in third and fourth position for respectively male and female FGDs, even though they refer to labour by blaming both the decreased availability of family and hired labour, and a decrease in activity, which is inherent to physical capabilities. Hence, labour input has mostly decreased over time (figure 5.2.3.1a) even though a majority of 62% of respondents to the questionnaire are hiring additional labour (figure 5.2.3.1b). The questionnaire data also reveals that the farmers decreasing the amount of labour were primarily the ones dependent on family labour, with 40% decreasing family and hired labour, and 50% decreasing family labour.

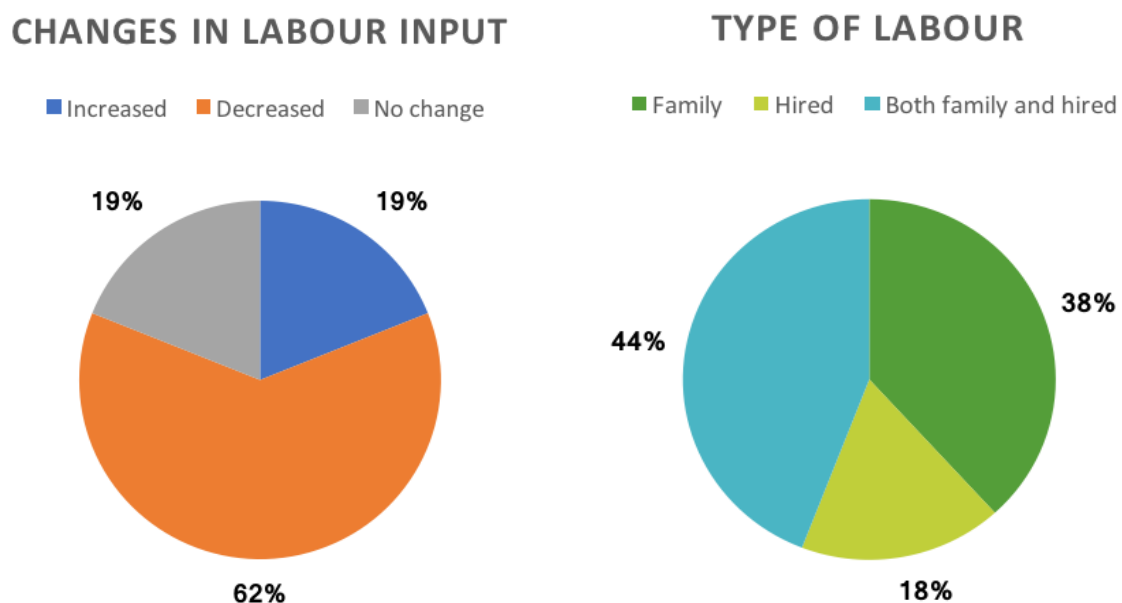


Figure 5.2.3.1a: Changes in labour input over the years. A majority of 61% of the respondents have decreased their labour input on their farm. Figure 5.2.3.1b: Type of labour working on the farm. A majority of 62% respondents hire additional labour while 38% rely only on family labour. Labour is sometimes hired seasonally for harvests only. From questionnaires.

5.2.4. Financial capital

Several respondents own livestock as a source of financial resources, including cows (004, 010, 110, 209, 211, 401), chickens and geese (006, 113). However, droughts have caused the amount of livestock to decrease for several farmers (003, 006, 106, 110, 209, 211) which resulted in a decrease in financial stability (110, 113). The amount of livestock farmers can support is reported to decrease with age (004, 006, 113, AO2).

Less diversification of income sources is believed to decrease old farmers' financial stability (004). Several informants point out poor marketing and their reduced productivity as drivers for their reduced income (106, 110, 209, 211, Chief, AO2). The cost of production is higher now than before, thus old farmers' income is lower even though crops prices have increased (AO1). This lack of financial resources, ranked as the main challenge for both FGDs, hinders the farmers' possibilities to invest in new agricultural ventures and technology (003, 209, fFGD, mFGD), to buy inputs (106, 110, 211) and to hire labour (004, 010, 106, 211, fFGD, mFGD). Indeed, the cost of hired labour has increased over the years and is now too expensive for some farmers (003, 006, 113, AO1, AO2, fFGD).

Some farmers rely on loans to enhance farming (fFGD). Moreover, some farmers that used to have another employment beside farming receive pensions, however it does not correlate with an increase in financial stability for these farmers (003, 106, 401). Many informants declare their expenses have decreased due to the fact that their children moved out several years ago (004, 006, 113, 209, 211, Chief, AO2, mFGD). It is normal for children to send remittances to their parents (003, 006, 010, 113, 209, 401), but it only constitutes a minor contribution. Furthermore, women during the FGD stated that they do not receive remittances, but on the contrary, they send money to their children (fFGD).

Prices fluctuations for tea and coffee and mismanagement do not guarantee good access to market and stable incomes for farmers (401, Chief, AO1, AO2, fFGD). Prices for tea are still rather low (113, 401, fFGD) even though it has improved over the years (401) and the bonus earned at the end of the year is good (211, fFGD). Several informants declared that coffee prices

have gone down over the years (006, 113, 209, 401, fFGD), however, one informant states that prices have doubled in 2015 (110). Concerning coffee, farmers are paid only once a year and delay in payments sometimes happen, which negatively affects them (mFGD). Additionally, when the weather is favourable, many farmers increase their productivity which results in less demand and thus more competition and lower incomes (fFGD). It is believed that farming was more profitable in the 1970s and 1980s when cooperatives were introduced and before cartels infiltrated them (106). Yet, a good market for macadamia and avocados is opening up (110, AO1, AO2).

5.2.5. Social capital

Several informants agree that the community helps them through sharing farming techniques and organizing group trips to educational events (004, 106, 110, 113, AO2). Some have the feeling that they learn a lot from interacting with their neighbours (004, 006, 106, 110, 113), whereas others state there was no interaction among the community members regarding farming practices (010, 211). “They learn from one another but they do not join hands in farming. You can see your neighbour is growing something good, you go there, you talk to him, he teaches you” (004). Two informants argued that today, contrary to before, farmers tend to follow their own ideas without coordinating with their neighbours (004, 401). Moreover respondents explained that competition between farmers brings them motivation and pride as they want to be “good farmers” (mFGD).

The youth is not willing to work in agriculture anymore (106, 401). Young people “refuse to do the work and just want to work in the town. [...] They just want money but do not understand no one else will grow the food if they do not” (106). Some farmers hope their children will return to the land and become farmers (003, 004, 110, 113, 211), informant 211 “would love that, so that they can support their families in an easy way”. On the other hand, some farmers are afraid their children would sell their piece of land once they inherit, and therefore not pass it on (004, AO2). Selling inherited land is despised in Kikuyu culture because they fought for their lands in the years leading up to independence (004, Chief, AO2).

Due to general population growth and land subdivision after inheritance, lands have become smaller and smaller, corresponding to a lack of financial resources (113, 211, 401, Chief, AO2, mFGD), which hinders agricultural development in the region (401, Chief). Old farmers also have a strong feeling of ownership over their lands, and are sometimes not willing to pass it on to their children, hindering the transition of land to young more productive farmers (401, Chief, AO1, AO2). However, one of our key informant stated that old farmers would not mind renting out their land, as long as it is not sold, and that employing a manager would improve productivity (AO2). Indeed, some farmers may rent out their land if it was larger (fFGD). On the other hand, according to the chief: “The main driver for young, mature farmers to migrate to urban areas is to go to Nairobi and work and live there, because the land at the family farm is too small and therefore not sufficient income would be generated”.

5.3. Institutional and Organisational Influence

The institutional structures are the national and county governments and the policies and legislation they put in place, while the organisations in this context include agricultural cooperatives and SACCOs that purchase farmers’ produce and provide inputs and credits to farmers.

One central way the government influences the rural population of farmers is through subsidised inputs that help farmers (010, 110, Chief, AO2) such as fertilizer (Chief, AO2) and seeds (004, 113, 401, Chief), and by providing loans through commercial banks (004, 006, 010, Chief, AO2). However, the government does not fund old farmers, but only the youth and women (AO2, mFGD). Moreover, many farmers have experienced a decrease in subsidies (006) and in the amount of information and education provided (003, 211, 401, AO2, mFGD). Most likely because the amount of agricultural officers associated with the office in Othaya has been reduced from 56 to 8 officers over the last years (AO2). Many farmers report that they have stopped coming to educate them (003, 006, 106, 113, 211, 401, Chief, AO2, fFGD, mFGD). “Before,

they used to have a specialist that would come to the farm and educate them about farming, but today they rarely come, so production was higher when they used to come and teach them” (006). Moreover, the government funds the youth and women, but there is no program for old farmers (AO2, mFGD).

There is a lot of mismanagement especially within the cooperatives (209, Chief, AO2, fFGD), and all the cooperatives have collapsed due to bad governance except the Othaya coffee cooperative (AO2). Mismanagement has been ranked as second and fourth main challenge respectively during the male and female FGDs. Mismanagement is due to cartels (106, Chief) and it is clear in the way that farmers are sold fake pesticides and fertilizers. “They are not effective and yields keep on decreasing, and there is the sale of fake or expired fertilizers” (fFGD). Moreover some farmers believe that there are too many directors (110), and that these directors always get re-elected for the cooperatives and have too high salaries (fFGD). There is very limited transparency in the cooperatives since farmers that get supplied with inputs or deliver coffee or tea do not know the price of the inputs they get nor the income they have earned before they are paid (fFGD). At the same time the interest rates in banks are also high, deterring farmers from taking up loans (Chief, AO2, mFGD), creating distrust to banks (003, 209, AO2), and the same is the case for the SACCOs (fFGD) even though some find them useful for loans (113, 211, AO2).

Farmers state that there is good security in the area (fFGD, mFGD), even though the fear of theft is still hindering adoption of macadamia for some farmers (003, 006), and it has been one of the challenges evoked by the male FGD. Furthermore, there is no law in place restricting subdivision of land and stopping the decrease in land sizes, but it is not allowed to own below 0.25 acre (Chief). These are all aspects of the governance structure that affect the livelihood strategies and outcomes of ageing farmers (DFID, 1999). The government is actively trying to improve livelihood strategies and outcomes by encouraging farmers to diversify their production with avocado and macadamia through giving out 1 million trees (AO2) and regulating the sale of macadamia to national markets ensuring a higher price for farmers (AO2).

5.4. Livelihood Outcomes

Farming gives a sense of pride that provides a happy life for many old farmers in the region (004, 106, 110). The lifestyle is a way of keeping active and avoiding the idleness that often accompanies old age (106, mFGD). The ability to provide subsistence needs and alleviate the worries of hunger is empowering to their work (010, mFGD). Working hard and receiving an income from farming is some of the most rewarding aspects of the job for many people (003, 110, 211, 401, fFGD, mFGD). Others report self-dependence and the ease of life as their most favorable aspects of farming (006, 106).

In order to understand how farmers are affected by ageing, changes in financial stability are important to consider. The vast majority of the sample population discloses a decrease in their financial stability corresponding to old age (figure 5.4.1). Widowhood was brought up as a reason for decreased financial stability (113).

As depicted in figure 5.4.2, a major caveat appears to be the lower productivity that accompanies ageing for many farmers (003, 006, 110, 211, AO2). Direct causes of this correlation are reduced work stamina from lower energy levels and overall diminishing physical capabilities (fFGD). Some even mentioned increasing difficulties in consistently providing enough to eat for themselves either through means of self-subsistence production or access to sufficient financial resources (110, 211).

INFLUENCE OF AGE ON FINANCIAL STABILITY

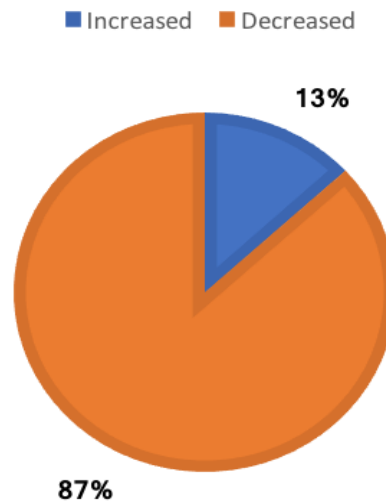


Figure 5.4.1: Changes in financial stability due to age. A majority of 87% of respondents declared their financial stability has decreased due to age. However, the five respondents who stated their financial stability increased with age are between 60 and 74, which is under the average age of 76.2 years old. From questionnaires.

CHANGES IN PRODUCTIVITY

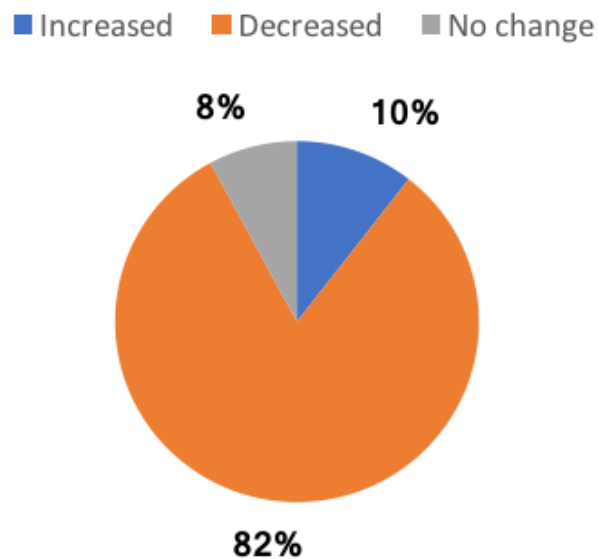


Figure 5.4.2: Changes in productivity over time. A majority of 82% respondents indicate that the quantity of their agricultural production has decreased over time. From questionnaires.

It is believed that old farmers farm 70-80% of the land in the study area (AO1, AO2). The potential productivity and profits from the region's farmland is inhibited by the unwillingness of old farmers to relinquish their land to younger farmers (113, 401, Chief, AO1, AO2). When transition of land does occur, subdivision usually accompanies the process further decreasing potential productivity through the diminished efficiencies of scale of famers on increasingly small inherited plots (113, mFGD). In fact, some farmers wish their children to find off-farm jobs and not return since the lack of land access presents a barrier to successful farming in the region (113, fFGD). Diminishing fertility of cultivated lands is a further limiting factor of productivity for all farmers (113), especially the old who report applying less inputs with age (figure 5.1.2) implying a decrease in their capacity to amend depleted soils.

6. DISCUSSION

Understanding of the impacts associated with the expected ageing demographics is required to discuss the future of sustainable livelihoods in the region. The SLF is applied throughout this research to identify factors governing changes in livelihood strategies and outcomes observed among old farmers in Kenya's Central Highlands. Understanding how ageing farmers apply livelihood strategies based on access to different capitals through mediation of institutional influences provides insight into the prospects of sustainable livelihood outcomes for rural communities in similar contexts facing ageing demographics.

Pender et al. (2006) conclude that there are multiple driving forces influencing livelihood strategies such as economic stability, population density, market access, government initiatives, and climatic conditions, especially in the agricultural sector. This list of factors closely resembles the major influences on sustainable livelihood strategies established by this research on ageing farmers: reduced physical capabilities, limited financial access, increasing severe droughts, insufficient land resources, and institutional mismanagement.

The reduced physical capabilities of ageing farmers leads to a decline in both portion of land used for farming and productivity. While Yang et al. (2011) and Guo et al. (2015) find that the acquisition of knowledge and skills old farmers gain with age leads to higher productivity, this is not the case in the area of study where respondents indicate that greater knowledge and skills cannot compensate for their reduced physical labour capacity. Examples of the underlying factors behind the contrasting findings between these two regions might include differences in availability of financial resources and family labour leading to varying degrees of input accessibility.

The economic development experienced in the East African Highlands leads the labour force to diversify away from agriculture into the nonfarm sector (Tanui et al., 2013), which can improve access to financial capital for increasing farm productivity (Reardon et al., 1994). Studies from Kenya also show that nonfarm income sources increase investment in soil prevention practices by 37% (Tanui et al., 2013). However, nonfarm occupation does not constitute an income source

for the old farmers studied in the Othaya region. This reveals a different trend between the greater farming community and that of old farmers which further aggravates the problems of elderly who lack the financial resources to invest in farming.

Increasing extreme weather events in the region present serious dilemmas for ageing farmers who lack the capacity to implement adaptive livelihood strategies, making this group more vulnerable compared to young farmers (GoK, 2010). Rainwater storage and irrigation are measures that can alleviate vulnerability to droughts in the region, but old farmers lack financial resources to invest in these technologies and blame a lack of government support initiatives.

The decreasing trend in portion of land under cultivation among the elderly may be a coping strategy for the lack of human and financial capitals. A lack of land access is one aspect encouraging the migration of young people to urban areas like Nairobi for study and work opportunities which, in turn, decreases the rural workforce. There are increasing constraints on access to land in Kenya and other countries in the region primarily driven by population pressure, fragmented land holdings, and declining soil fertility (Tanui et al., 2013). The interwoven issues concerning land transition, youth migration, and ageing rural populations leads to decreases in access to human and social capital negatively affecting old farmers' livelihood strategies and outcomes. Consequences include both reduced productivity and financial stability on the individual and regional scale. Unless the traditional inheritance systems are reformed to fit within a free market situation, population growth and ageing rural communities will decrease productivity and food security (Tanui et al., 2013). Reforming these systems could facilitate both more sustainable transition of lands and increased productivity.

The limitations ageing farmers face regarding access to livelihood capitals are exacerbated by the fact that government programs exclusively focus on the youth and women and by mismanagement within formal institutions and the agricultural cooperatives. There appears to be significant problems with organisational corruption especially within the tea and coffee cooperatives, negatively impacting the growers of these crops whom are primarily old farmers. Limited extension services in the region leaves farmers without the education necessary to amend agricultural practices and improve productivity. While the issue of mismanagement

concerns farmers in general, it is a recurring challenge old farmers pointed out, and their age may lead to greater difficulties with adapting and coping with these issues. The disengagement theory in gerontology states that old people tend to disengage from society while simultaneously being rejected (Tornstam, 1989); this concept supports reasoning that old farmers' are inherently predispositioned to have disadvantaged access to public benefits and suffer more from the obstacles posed by institutionalised mismanagement.

Pender et al. (2006) found macadamia and avocado to be the most common tree crops in the region providing good incomes. The Kenyan government attempts to promote income diversification with avocados and macadamia, but most old farmers lack the knowledge to adopt perennial trees crops and the risk of theft poses a serious threat. Inadequate dissemination of agricultural knowledge due to poor education services maintains old farmers' inertia to leave their livelihood strategies regarding crop selection unchanged. This underlines the institutional underestimation and disregard for the consequences of an ageing population. The government overlooks the chance to proactively implement policies and legislation to improve structural management and effectively mitigate the socioeconomic consequences of ageing.

Age is a factor in the sustainability of land use since old farmers' ability to implement and maintain soil erosion measures, such as terraces, decreases with age. These challenges make it difficult for ageing farmers to maintain the natural resource base through sustainable land use practices. The potential for higher productivity and sustainability from land managed by young farmers is limited by the reluctance of ageing farmers to pass on their land. This claim is well supported by the data on declining use of inputs due to age alongside continuous cropping patterns that do not allow for needed fallow periods to maintain soil fertility; this issue presents one of root causes of declining food production in Africa (Ayuk, 2001). Another significant factor for maintaining soil fertility is the significant decreases in the amount of livestock owned by old farmers not only has implications for income and financial stability, but also for the sustainability of the land use since animal manure is a key resource in nutrient management and supplies much needed organic matter for the soil. As the two strategies stand with either old farmers holding onto their land or subdividing amongst children, the data shows that both courses lead to decreased land productivity.

The aspects of changing dynamics in livelihood strategies for old farmers are dependent on a range of variables. Therefore, it can be difficult to isolate the degree of influence age plays as a factor. However, age was found to be directly correlated with access to several of the capitals and the livelihood strategies, thus implicating many aspects of ageing affects the sustainability of livelihood outcomes for farmers.

7. CONCLUSION

The key impacts of age on livelihood strategies and livelihood outcomes are depicted in figure 7.1. Based on the data, it can be argued that most ageing farming communities in the region lack the resource capacity to diversify their crop selection away from tea and coffee resulting in the static trend. The decreasing trend in productivity and financial stability among ageing farmers is likely influenced by limited capacity to diversify with better suited crops in the context of decreasing access to livelihood capitals, i.e. land size, labour, and livestock, as illustrated in the figure. The declining access to these resources with age and the worsening of outcomes argues for the need of new context-specific livelihood strategies for ageing farmers.

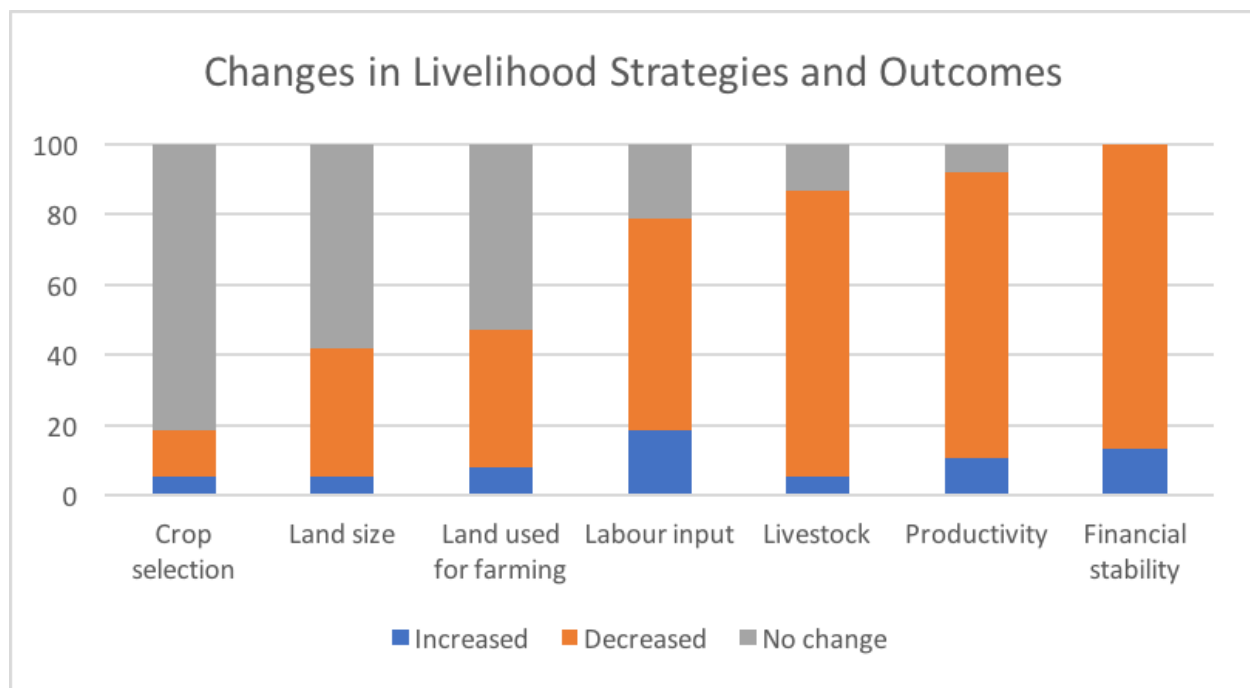


Figure 7.1: On the left, aspects considered as governing factors affecting financial stability and productivity of ageing farmers, on the right, changes on financial stability and productivity. From questionnaires.

The reduced access to livelihood capitals of ageing farming communities leads to decreases in productivity. This results in a lack of necessary financial resources to invest in adequate inputs and hire labour to compensate for the lack of workforce caused by urban youth migration. While youth migration may result in decreased expenses for the ageing farmers, it also creates a lack of incentivisation to improve productivity. Most old farmers in these communities lack the financial

resources and knowledge required to diversify their production away from tea and coffee and transition to less labour-intensive crops. The institutional and organisational support is inadequate for ageing farmers further hindering their capacity to achieve sustainable livelihood strategies and outcomes. However, old farmers seem to be proud of their occupation, either because they are able to maintain their ancestors' legacy, or because they can sustain themselves financially and nutritionally. Incessant fragmentation of land due to the process of subdivision and continuous cropping methods threaten sustainable land use and soil fertility.

The trends in livelihood outcomes analysed through the lens of the SLF clearly indicate that ageing farmers face a decrease in financial stability. While the physical capabilities of farmers significantly decrease with age, their well-being remains satisfactory. The decreasing access to capitals that corresponds to ageing diminishes their adaptive capacity and consequently increases vulnerability to various economic and natural shocks. Overall, the results indicate that ageing reduces farmers' access to the livelihood capitals required for establishing sustainable livelihood strategies and outcomes.

8. PERSPECTIVES AND RECOMMENDATIONS

If birth rates continue to decline, the future demographic structure will result in a reversed population pyramid, since the current massive young population will retire around 2060-70 posing significant social and economic challenges. This calls for immediate policy actions if future socioeconomic consequences are to be averted. Policy and legislation that improves institutional transparency, provides financial aid and investments, and establishes educational programs would enable ageing farmers to better cope with the challenges they face. These measures can enable access and utilisation of adequate inputs and the pursuit of sustainable land use practices to achieve sustainable livelihood outcomes.

Adoption of less input-intense perennial tree crops such as avocado and macadamia trees may constitute an effective alternative for old farmers. Farmers' interest in adopting tree crops is limited by a lack of knowledge and education. However, tree crops take several years to mature which might limit the attractiveness of this livelihood strategy for old farmers. Therefore, a slow transition to these less labour-intensive crops should be facilitated by mediating institutions and organisations. Perennial tree crops can also alleviate the struggle of maintaining soil fertility for future generations.

Formulating formal leasing contracts would enable young farmers to rent pieces of land from older farmers who are unable to efficiently manage the entirety of their land. This approach to facilitating youth engagement in agriculture can provide additional income sources for old farmers from otherwise fallow or unproductive land while increasing overall productivity in the region. A standardised contract would ideally prevent fraud and deter distrust incentivising ageing farmers to lease excess land while intensifying on their remaining plots.

Additional research into the aspects of sustainable land use in ageing farming communities will reveal valuable information on driving factors for maintaining soil fertility and productivity. Comparative studies with young and old farmers in different regions could provide further knowledge for the research of ageing rural population impacts on sustainable land use.

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10. APPENDICES

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1. Synopsis

Ageing rural communities' impact on sustainable land use in Kenya's Central Highland

Synopsis

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1. Introduction

The research site is located near the city of Othaya in Nyeri county in the Central Highlands of Kenya. The area is characterized by a high population density (PRB, 2011), and the average land holding is 0.5-2 hectares per household (Pender et al., 2006). Fertile soils and good market access stimulate growth and commercial agricultural enterprises. However, income sources still vary considerably across the Central Highlands (Pender et al., 2006).

Nyeri county has a total population of approximately 690,000 with 76% of its inhabitants living in rural areas (Wiesmann et al., 2016). About 21% are in-migrants from other counties of Kenya. There is also migration from rural to urban areas within Nyeri (Wiesmann et al., 2016). Nationally, 7% of the population is 55 or older. The median age in Kenya is 19.7 with 40% of the population school-going age (0-14) and 19% prime-working age (15-24) (CIA, 2017). A low median age indicates how demographics in Kenya are an already existing concern. While there is a high population density in the Central Highlands of Kenya, this does not translate into a strong agricultural labour force; since a high proportion of the population is school-going age, there is limited allocation of human capital for farming from this age demographic (Pender et al., 2006). There is also a clear shift in employment trends among Kenyans in all age groups towards off-farm sectors (Yeboah & Jayne, 2016), yet the government and NGOs have tried to engage youth in agriculture through funding training and other initiatives (Mwaura, 2017). This consequent lack of workforce presents issues for the agricultural sector (Mwaura, 2017). Currently, agriculture directly provides the livelihood of 75% of the population; however, only 11% of the Kenyans aged 18-35 are interested in farming as an occupation (Awiti et al., 2015; Mwaura, 2017). This disinterest will significantly influence Kenya's economy as agriculture contributes 36% of the country's GDP (World Bank, 2016).

There are multiple driving factors that influence livelihood strategies including economic stability, population density, access to market, the presence of development projects, and climatic conditions, especially in the agricultural sector (Pender et al., 2006). Indeed, high population density can result in deterioration or intensification of farmlands and can support the creation of non-farm industries. These effects can also be the result of in-migration (Liu & Yamauchi, 2013). Good market access can stimulate the production of cash crops, thereby creating a shift in agricultural practices and crop varieties and providing more stable incomes

(Pender et al., 2006). Moreover, climate change is predicted to negatively impact yield of major staple crops such as maize in the coming decades (Schlenker & Lobell, 2010).

Demographic changes in households are also a driver for changes in agricultural practices and livelihood strategies. Rural communities across developing countries face a comprehensive problem characterized by an ageing population (FAO, 2017). As cities attract young generations and income sources shift to other sectors, agricultural labor capital is diminished leading to threatened food security and livelihoods among rural communities (FAO, 2017). In the agricultural sector, an ageing workforce has major implications on sustainable land use and development (FAO, 2007). Furthermore, older farmers' health and capabilities are reduced which affects the application of livelihood strategies and their outcomes. A decline in physical strength requires additional labour to achieve the same outcomes. Additionally, widowhood hinders productivity as a husband and a wife are more efficient together despite their advanced age (Cattell, 2003). Some crops and cultivation practices are more labour intensive than others. Thus, a shift in livelihood strategies and income sources might be observed in ageing rural households. Access to information due to financial resources and other factors like illiteracy can provide further obstacles for ageing households. Even though 78% of the population over the age of 15 can read and write, only 50.8% of the population over 65 years old is literate (Knoema, 2015; CIA, 2017).

Institutional processes and organisational structures are of great influence regarding access to various livelihood resources and, consequently, mediate their influence on livelihood strategies adopted by rural households (DFID, 1999). Indeed, institutions, organisations, policies, and legislation can either restrict or improve access to certain forms of capital. Hence, such factors indirectly shape sustainable livelihood outcomes, i.e. well-being, income level and stability, natural resource resilience, and sustainability.

There is an apparent lack of information in the literature concerning ageing rural populations and the connection with agricultural based livelihoods and sustainable land use practices. This problem is particularly relevant in developing countries as previously discussed, and research is particularly limited in focus on the countries of Sub-Saharan Africa.

To begin, an overview of the age distribution in Othaya will be determined. Then, the research will be structured according to the Sustainable Livelihoods Framework (SLF) proposed by

Scoones (1998). Data about changes over time in agricultural practices, occupations, and the livelihood resources that older farmers have access to will be collected in order to understand how these changes affect sustainable livelihood outcomes among ageing rural communities. Information about livelihood resources will be categorized in the different capitals listed by the SLF – natural, physical, human, financial, and social capital (DFID, 1999). Further categorization and analysis of the influential role that livelihood resources and strategies play in establishing sustainable livelihood outcomes will occur after collecting data from the questionnaire results completed by ageing farmers in the area.

2. Research questions

Main research question:

How does ageing of rural communities affect livelihoods in Kenya's Central Highlands?

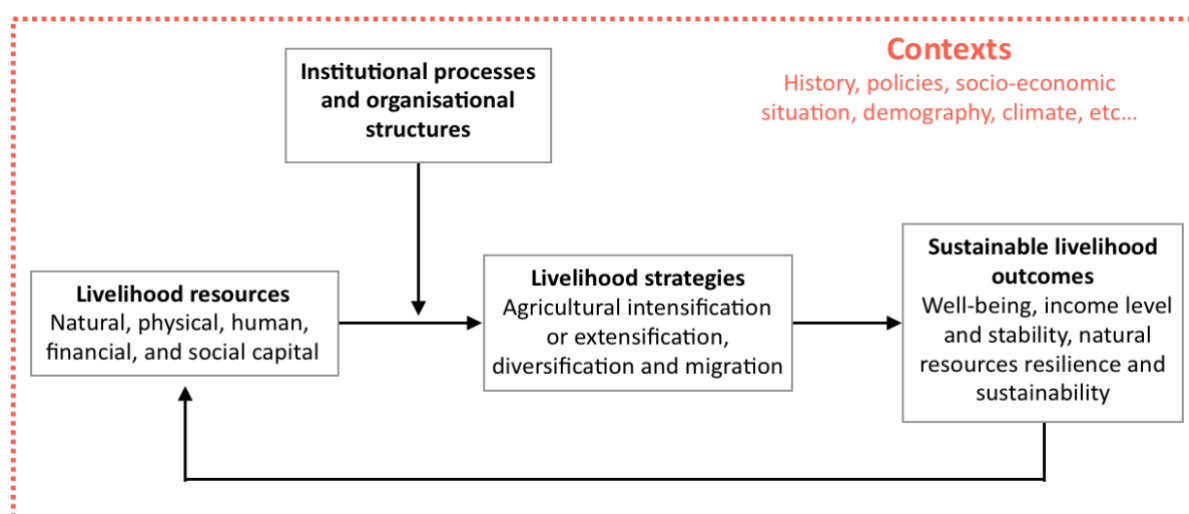
Sub-research questions:

1. How have livelihood strategies of ageing farmers changed over time?
2. How does access to the different forms of capital and institutional influence affect livelihood strategies of ageing farmers?
3. What are the livelihood outcomes and consequences of these pathways?

3. Theoretical Framework

The research aims to understand the stated objectives through adoption of the Sustainable Livelihoods Framework (SLF) as it is defined by Scoones (1998). This framework offers a consistent structure to analyse the achievement of sustainable livelihoods by small-farm holders in developing countries such as Kenya. We will base our definitions of livelihood and sustainable livelihood on the following definitions: *“A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base.”* (Scoones, 1998). The SLF is an interdisciplinary approach that relies on five main

components: contexts, livelihood resources, institutional processes and organisational structures, livelihood strategies, and sustainable livelihood outcomes (Scoones, 1998). Scoones explains that, in a particular historical, socio-economic, and demographic context, certain combinations of livelihood resources, or capital, lead to certain combinations of livelihood strategies that, in turn, lead to certain outcomes. Moreover, institutions and organisations greatly influence the establishment of certain strategies (Cf. figure 1). A livelihood strategy is defined as an activity adopted in order to achieve livelihood outcomes; this activity can be agricultural intensification or extensification, livelihood diversification within or outside agriculture, or migration (Scoones, 1998). Livelihood resources that may influence strategies are divided into five different forms of capital: natural (e.g. land and water), physical (e.g. infrastructure and energy), human (e.g. knowledge and skills), financial (e.g. livestock and insurance), and social (e.g. family and organizations) (DFID, 1999). Livelihood outcomes are characterized by livelihood security, well-being and capabilities, as well as livelihood and natural resource resilience.



*Figure 1: Simplified schematic of the different components of the Sustainable Livelihoods Framework (SLF).
The arrows represent a relationship between two components.*

4. Methodology

The methods described will be used to acquire the data necessary to answer the primary research question (*section 2*) through the lens of the objectives identified under the three sub-research questions (*appendix 5.1*).

4.1. Qualitative methods

4.1.1. Participant observation

Dewalt et al. (1998) describes how taking part in and observing a given culture or group of people's everyday lives, activities, rituals, etc. is important for our understanding of that certain field. When asking our informants about their everyday life and their relation to different agricultural issues, we might not get all the information we need for our analysis. This is because some cultural knowledge is implicit and our ignorance may lead to a lack of awareness. This can be characterized as silent knowledge (Bundgaard, 2010). During the participant observation we hope to collect visual and contextual knowledge about land use, as well as a deeper knowledge on the aspects of our informant's everyday life that are too innate or sensitive to discuss through interview. We also plan on performing a working day exercise where we follow the informants around their farm and help them throughout their day.

4.1.2. Informal interviews

According to Bernard (2011), an informal interview is characterized by a complete lack of control over the interview and the issues touched upon. This type of interview can be a good way to gain rapport or trust with informants due to the informal conditions it is carried out under. Spradley (1979) describes how the first period of the interview is often characterized by a mutual awkwardness. As time passes by and the relationship between interviewer and respondent develops, the mutual trust increases and the interviewer gets access to more and more important information. Therefore, this method can be relevant when information about sensitive topics is needed. Due to the explorative nature of the method, we hope to gain information on relevant aspects of livelihoods that might not be apparent initially or help in identifying other informants who would be appropriate candidates for interviewing. Informal interviews inherently synergize well with participant observation, and the methods will be simultaneously utilized in the field.

4.1.3. Semi-structured interviews

A semi-structured interview follows a loosely defined guideline often based on overall thematic questions relevant for the research. During the process, the interviewer can deviate from the guideline to pursue relevant research subjects arising from the informant. If the conversation dies out during the interview, the guideline can be used to introduce new questions and assure that all relevant subjects are addressed. The semi-structured interview is most useful when time is limited with informants (Bernard, 2011). Through conducting semi-structured interviews, insight will be gained into informants' perspective on changes experienced over time such as agricultural practices, occupational diversification, and impact of migration. Furthermore, knowledge on access to the different capitals and institutional processes will be collected leading to an understanding of the livelihood outcomes of these pathways.

4.1.4. Life-story interviews

As a method for understanding individual lives and connecting with others' experience, life-story interviews are very useful. A life-story interview offers a wide range of human characteristics and qualities, and people telling their own stories reveals a lot about their unique experience. Historical construction of older farmers' lives can be very useful for the research questions proposed in this project (Atkinson, 1998). Through using a narrative approach to our interviews, we hope to get more personal information about the way our informants experience changes over time in livelihood strategies, access to resources, and related outcomes.

4.1.5. Focus group discussions

Focus group discussions (FGD) provide a good environment for understanding collective action and group beliefs which are not captured in personal interviews (Mikkelsen, 2005). The focus group yields different data than interviews: "FGD's show attitudes as socially performed instead of individually performed" (Jakobsen, 2012). Therefore, one should be careful when interpreting consensus opinion arising during FGDs. Group discussions rarely reveal any personal opinions, and the group dynamic might result in a feeling of consensus, thereby leaving out deviations in opinion which might exist outside of the group environment. However, in some cases a 'safe space' is established where people feel more comfortable sharing personal views; this safe space is useful in approaching sensitive issues (Mikkelsen, 2005). The group dynamic will be used as it is expected to provide new information not obtained in the interviews through collectively stimulating the memory of older farmers; thus, gaining additional

information about historical changes in agricultural practices and livelihood strategies not gained during personal interviews may become possible. We might also be able to gain information about the transforming structures and processes (i.e. institutions and organizations) affecting the livelihood strategies of older farmers, and how this has changed over time.

4.2. Quantitative Methods

4.2.1. Area measurement, GPS systems

GPS will be used to map out the area in the first days of the fieldwork and places of specific interest to the research questions. GPS mapping might also be applied in conjunction with creation of the farm typology (mapping land holdings).

4.2.2. Creation of farm typologies

Step by step comparison of farm functioning in a delimited area will be determined by mapping the locations of farmers interviewed. The classification method is based on extensive data about farm functioning such as family, objectives, history, productions, management, techno-economic results, biophysical constraints etc. (Alvarez et al., 2014). According to Giller et al. (2011) and Tiftonell et al. (2010) the collection of data from farms is an essential step in the construction of typologies, and they advise using a survey to capture the whole farming system. Data can be obtained through sampling older farmers and building a basis of understanding regarding farm resources, income/output, and a general resource flow which will highlight the important resources affecting livelihood strategies (Alvarez et al., 2014).

4.2.3. Questionnaire

Questionnaires are useful for collecting large amounts of categorical information. This method is suitable for organizing and analyzing demographic features of a subject group but is somewhat limited in detail. It can be argued that deeper information such as beliefs, feelings, and behaviours can be difficult to quantify through questionnaires (Mikkelsen, 2005). Questionnaires are usefully applied in initial phases of data collection to obtain an overview of the group studied. The information gained through this can be instructive for the application of more in-depth methods. Additionally, the method is useful for establishing a relationship and

knowledge about key informants and can be used to gain knowledge about the general trends in agriculture and the sampled area's demographics.

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Appendix

Data matrix

Research questions	Objectives	Hypothesis	Data required	Methods
1. How have livelihood strategies of ageing farmers changed over time?	1.1 Determine the changes in agricultural practices (i.e. intensification and/or extensification) over time.	Older farmers might cling more to traditional agricultural practices, inhibiting adoption of technology and agricultural inputs; this might improve land use sustainability but decrease agricultural productivity.	Overview of different farming practices, and how they have changed over time	<ul style="list-style-type: none"> • GPS mapping • questionnaires • semi-structured and life-story interviews • focus group discussions
	1.2 Determine livelihood diversification over time, both within and outside agriculture.	<p>Within agriculture: There might be changes in cash crop/staple crop production ratios - which may be caused by a better access to the market, more and more stable incomes.</p> <p>Outside agriculture: There might a change in occupation away from farming to non-agricultural sectors.</p>	Overview of income sources and occupations over time	<ul style="list-style-type: none"> • questionnaires • semi-structured and life-story interviews • focus group discussions
	1.3 Determine the impact of youth migration out of agriculture on livelihood strategies of old farmers.	Youth migration out of agriculture reduces the available labour force.	Effects of reduced labour availability due to migration trend	<ul style="list-style-type: none"> • semi-structured interviews • focus group discussion
2. How does access to the different forms of capital and institutional influence affect	2.1 Natural capital: land quality, size, typology, and water quality and access.	If it is steep maybe old people will struggle to cultivate the land; if there is no irrigation and water access is distant, it	Determine access and typology/quality of land and water for old farmers.	<ul style="list-style-type: none"> • GPS Mapping • farm typology • questionnaires • participant observation

livelihood strategies of ageing farmers?		will cause difficulties for old farmers.		<ul style="list-style-type: none"> semi-structured interviews
	2.2 Physical capital: transport, infrastructures, energy, storage, technologies	<p>Improper storage might lead to loss of post-harvest goods.</p> <p>Good infrastructure facilitate market access.</p> <p>Infrastructures are also e.g. wooden shed where they store their tools or livestock.</p> <p>There might be a technological access gap.</p>	Determine how access and quality of physical capital affect livelihood strategies of older farmers.	
	2.3 Human capital: labour, skills, health, knowledge	<p>Ageing farmers's health and physical condition might hinder productivity.</p> <p>However, ageing farmers might have more knowledge and skills from experience.</p>	<p>Determine whether old farmers' health and physical condition influence their agricultural practices.</p> <p>Determine how experience has shaped knowledge and skills of older farmers.</p>	
	2.4 Financial capital: income, market, credits, insurance	<p>Lack of income will affect the farmers ability to develop agricultural practices and livelihood strategies.</p> <p>Banks may not want to lend money to older farmers.</p> <p>Lack of effective insurance might also be a problem with climate change.</p>	<p>Determine how access and quality of financial capital influence livelihood strategies.</p> <p>Gain knowledge about markets (access, fluctuations), sufficient incomes, poverty/wealth, the benefit of insurance and credits.</p>	

	2.5 Social capital: family and neighbours, relationships, group affiliations.	Older farmers may be less engaged in collective action, decision-making, and information sharing.	Gain knowledge on the access and quality of human capital among older farmers. Determine if the farmers' relationships help them to overcome certain issues.	
	2.6 Determine the effect of transforming structures and processes mediated by institutions and organisations on access to capital for older farmers.	Institutions and organisations play an influential role in determining the access to capitals and impact on livelihood strategies. Corruption might be an inherent aspect of the quality of institutions, organizations, policies, and legislation.	Knowledge on the influence of institutions, organisations, policies, and legislation regarding access to and exchange between capitals as they relate to livelihood strategies. Knowledge on ageing farmers' definition and experience with corruption.	<ul style="list-style-type: none"> • questionnaires • semi-structured interviews • participant observation • interview with agricultural officer • group focus discussion
3. What are the livelihood outcomes and consequences of these pathways?	3.1 Determine the consequences on: income level, income stability, degrees of risk, and well-being.	Diversification of livelihood strategies increase income levels and stability.	Knowledge on farmers' perspective of workload, income improvement, and well-being.	<ul style="list-style-type: none"> • questionnaires • informal and semi-structured interviews • participant observation
	3.2 Determine the environmental consequences of different livelihood strategies: resilience and sustainability.	There is increasingly less agricultural labour available leading to deterioration of rural livelihoods and inadequate adaptation to climate change	Determine if the farmers' livelihood can "cope with and recover from stresses and shocks [...], while not undermining the natural resource base"	<ul style="list-style-type: none"> • questionnaires • informal and semi-structured interviews • participant observation

			(Conway and Chambers, 1992)	
	3.3 Develop understanding of long-term consequences and trends.	There is increasingly less agricultural labour available leading to deterioration of rural livelihoods and inadequate adaptation to climate change.	Farmers' views on the future improvements or changes	<ul style="list-style-type: none"> • data analysis

2. Overview of applied methods

Questionnaires	Semi-structured interviews			Focus group discussions
	Farmers	Farmer and retired agricultural officer	Key informants	
38	9	1	3	2

3. Questionnaire

Introduce ourselves and our objectives before the survey begins.

“We are university students here to learn about well-being of ageing farmers in this community. We are trying to understand what effects old age has on farming practices and your access to agricultural resources. We would greatly appreciate your help in gaining insight into your life as part of a piece to this puzzle.”

ithui twi arutwo a university na tukite itura riri rianyu guthoma uria andu akuru mararima na kana urimi wao niusenjetie na ukuru na kana nimarakinyerwo ni indio ciiganie na urimi.

Ask if the person wants to stay anonymous.

“Your answers will remain strictly confidential and you are free not to answer certain questions if you wish. All responses remain anonymous and you do not have to provide your name if you do not wish. If you do, it may help us contact you later if we could use further information for our research.”

Nitungienda mumenye ati mashokio maku tukumatumira githomoini gitu tu na hari gutuarithia urimi wanyu na mbele. “Ni wega umenye ati tomuhaka uheyane ritwa riaku na wina wiathi kwaga gucokia kioria ogiothe tugukuria.”

GPS point:	No.:	x:	y:	z:
Location:				

Date:	____/____	Time:	____:____
Informant:			
Telephone number:			
Interviewer:			
Observer:			
Translator:			

Personal information

1. Name: _____
2. Gender: Male _____ Female _____
3. Age: _____
4. Marital status: Single _____ Married _____ Widowed _____ Divorced _____
Wee wi muhiku / niuhikanitie / niukuithitie / (niwahikite/niwahikitwo mugitigana)

Household information

5. Who is the household head?: _____
We niwe mwene guku?

6. People currently living in the same household:
Muri aigana aria muikaraga guku?

Relationship	Age	Gender	Occupation	Name
1)				
2)				
3)				

4)				
5)				
6)				
7)				

Education and network

7. Which level of education have you completed?

Wakinyirie ha githomo giaku?

	Started and unfinished	Completed
Primary		
Secondary		
Tertiary (explain):		
Informal (explain):		

8. Have you participated in any of the following agricultural networks?

Munyitanagira atia na arimi aria ange guikuria?

- Farmers field school: _____
- Cooperative: _____
- Organisation: _____
- SACCO: _____
- Other: _____

Occupation and income

9. What is your current occupation(s):

Wikaga atia kuona uvosho waku?

10. Have you changed your occupation and income sources over time? If yes:

Niuri washegia wira kana mawira maria makuheaga uvosho?

Occupation and income sources	Time

11. Rank your current income sources from highest to lowest?

No nyende uvange mawira maku ukiambia na wira uria ukuheaga uvosho muinge

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

12. Are you planning to continue farming or shift to other income sources?

Wina mufago wa guchejia kana kutigana na urimi na hihi kuingirira mawira mang'e?

13. How did you obtain the land of your farm?

Mugunda uyu urarima wawonire atia?

Inheritance: _____ Purchasing: _____ Renting: _____ Other: _____

Igai ria muciaru / Kugura/ Gukombora/ maigi

14. How has age influenced your financial stability over time?

Ukuru waku ukugiritie atia guthondeka mbeba cia kuigana?

Increased: _____ Decreased: _____ No change: _____

mbecha ciaku nishingihite/ niinyihite / hatire na ugaruruku

Farming

15. What is the size of your land?

Mugunda waku uigana atia?

_____ acres

16. How has the size of your land changed over time?

Muigana wa mugunda waku niucingetie na mahinda?

Increased:_____ Decreased:_____ No change:_____

Niwongerere / niunyahite / hatire na ugaruruku

17. How have you changed the area of land you use for farming?

Muigana wa mugunda waku uria urarima niucengetie?

Increased:_____ Decreased:_____ No change:_____

Niwongerere / niunyahite / hatire na ugaruruku

18. What is the size of your farm compared to the rest of the village.

Muigana wa mugunda waku weigana atia ukigerekania na wa aria ange muringaine?

Small:_____ Medium:_____ Large:_____

Ni munini/ wi gatagatiini/ ni munene

19. Which crops do you grow from most to least in land area?

Urimaga mimera ireku kuuma iria meinge nginya iria minini?

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____
9. _____
10. _____

20. Do you have trees on your land? If yes, for what purpose:

Niuhandite miti mugaundaini waku? Hihi ni ya wira uriku?

- _____
- _____
- _____
- _____
- _____

21. Have you changed your crop selection over the years? If yes, how so:

Kiiria ukuragia nigichengetie na mahinda?

22. Has the quantity of your agricultural production changed over time? If yes, how so:

Muigana wa urimi waku niucengetie na mahinda?

23. Have inputs changed over time:

Njira ciaku cia urimi nicengetie na mahinda?

- Mulching: _____
- Composting: _____
- Manure: _____
- Fertilizer: _____
- Tools: _____
- Pesticides: _____
- Irrigation: _____
- Other: _____

24. Has the number of livestock you own changed over time due to ageing?

Muigana wa mahiu maku nicengetie kwa mahinda niundu wa ukuru?

25. Do you use family labour and/or hired labour on your farm? If yes, how often?

Niwiurutagira wira waku kana ni kuandikana?

	Family labour	Hired labour
How often:		

26. Has the labour input on the farm Increased/decreased with your age?

Mahuthiru maku ma mugunda nimaingehete kana nimanyihite na ukuru waku?

Thank you for participating in our questionnaire. Would you like to be contacted and participate in some of our further work? If yes, write telephone number at the beginning.

Niweka niundu wa unyitaniri wanyu. No wende tuaranirie ringi. Akoro no wende, no utuhe namba yaku ya thimu.

Observations:

- Is the respondent comfortable during the interview?

- Does he/she seem reliable?

- Characteristics of the house and immediate surroundings (new/worn down, tin roof/thatched roof, degree of cleanliness, electricity, tap water, toilet facilities...)

-
-
- Assets (radio, TV, car, motorbikes, bicycle, mobile phone...):
-
-

4. Semi-structured interviews

4.1. List of informants

Farmers

003 - 87 year old male

004 - 93 year old male

006 - 78 year old male

010 - 74 year old male

106 - 67 year old male

110 - 72 year old male

113 - 80 year old female

209 - 74 year old male

211 - 84 year old male

Farmer and retired agricultural officer

401 - 83 year old male

Key informants

Chief

Agricultural officer 1

Agricultural officer 2

4.2. Guidelines

4.2.1. Farmers

Ask if the person wants to stay anonymous.

“Your answers will remain strictly confidential and you are free not to answer certain questions if you wish. All responses remain anonymous and you do not have to provide your name if you do not wish. If you do, it may help us contact you later if we could use further information for our research.”

Nitungienda mumenye ati mashokio maku tukumatumira githomoini gitu tu na hari gutuarithia urimi wanyu na mbele. “Ni wega umenye ati tomuhaka uheyane ritwa riaku na wina wiathi kwaga gucokia kioria ogiothe tugukuria.”

Ask consent for the survey to be recorded.

“Would you agree to answering a brief survey and would you permit audio recording for strict research purposes? Your answers will remain strictly confidential and you are free to not answer certain questions if you wish.”

We start with making a timeline !

There is no order of the questions. Bring mandazis or other snacks.

We are here to learn something about your life as a farmer, so we would like to make a timeline of your career:

Which events have affected you most through your life as a farmer?

Why did you start farming?

What do you like most about being a farmer?

What is the most difficult part about being a farmer?

Have you witnessed any general farming trends over your life in the region?

Questions related to *research* question 1 (strategies):

Have you done anything else than farming over the years?

How has your life as a farmer changed since you took over cultivating this land?

How has your choice of crops changed over the years? Why?

Are you planning to change which crops you are growing now? (relevant for the youngest)

Have you changed the amount of crops you grow for market compared to crops for personal consumption, compared to when you were young?

Have you increased your amount of perennial crops such as fruit trees or trees for timber over the years? Why? (trees are less labour-intensive).

What methods have you adopted or discarded relating farming practices? How have these affected you as a farmer?

Are you doing anything to preserve your soil and crops against extreme weather events?

Have your yields increased since you started farming?

What have been the determining factors for your choice of livestock? Why is livestock important to you?

Do you have less expenses now compared to when you were younger, if yes how has it affected your priorities within farming?

Has the amount of off-farm income changed since you started farming?

Questions related to research question 2 (capital and institutions):

Have you experienced any climatic changes over the years?

How is the market for selling your crops - how has it changed since you were young?.

How has your health/physical condition affected your farming strategies?

How has your labor (family and hired) resources changed over the years? Do you feel like youth migration has impacted this?

How has farming experience and knowledge affected your yield and choice of crops.

Does the community help you to improve your agricultural practices? How?

Have the government and local authorities helped you in any way with farming? How?

How have farmers field school had an impact on your farming strategies?

How being part of SACCOs and/or cooperatives has affected your way of life?

Questions related to research question 3 (outcomes):

Do you feel like your income level and stability are now sufficient to support your needs compared to when you were younger?

What is well-being for you? Do you feel that you have achieved these over the years? (e.g. self-esteem, security, happiness, stress, vulnerability, power, exclusion)

Do you want your own children/grandchildren to become farmers? Why? – maybe rather grandchildren than children because of most children already farm.

4.2.2. Key informants

- Introduce ourselves and define what we consider old (over 60).
- Do you think if ageing has impacted the cost of living for aging farmers, and if it a reason why they may not try to earn more?
- How does it work if the sons do not want to take over the land?

- How many old farmers are located in this area, and has the proportion of old farmers changed over time? If yes, why?
- Get a list of the old farmers in the area or some statistics on how many old compared to young.
- Have you noticed trends in diversification of livelihood strategies among the old farmers?
- Does older farmers tend to diversify or decrease their amount of livestock, focus on growing a specific crop, increase their amount of perennial crops such as trees that are less labour-intensive?
- Are you aware of the challenges that older farmers are facing? Which are they? Do you provide recommendations to deal with these challenges?
- e.g. if he sometimes have to deal with family conflicts over land
- e.g. old farmers complaining about the fact that they don't get a lot of money especially with coffee (might be linked to cooperatives).
- What are the main differences between young and old farmers in terms of financial stability?
- Regarding market accessibility, - do they sell less crops at market
- Is the government or the region helping old farmers with e.g. pensions and other things?
- What are the plans for the future in order to solve these issues concerning older farmers?

5. Focus group discussions

5.1. Guideline

We are going to do the questionnaire with all of the respondents for the FGD before starting the group discussions. However the ones arriving late we should ask them weather they would be willing to do it after wards, so that we don't waist the time of the ones that actually arrived at time, and also because most of them will probably have to leave for lunch.

Francis is getting respondents for the FGD

Making a ranking exercise for the FGD

Initially we will ask them to discuss what are some things that you all like about being a farmer.

Ranking exercise about the problems aging farmers are facing.

Before the ranking exercise we will brief the interpreters about what we are going to discuss and how the focus group will work and what their role as a facilitator are. After we have explained it to them, we will tell them to explain to us how they will introduce the discussion to the group, what we shall discuss and how they should act as facilitators.

We will ask the group to make a brainstorm about problems associated with aging and agricultural production, and the correlation between the 2, and after the mind map is done we will ask the group to rank the biggest problem they are faced with, then the second best and consecutively for the top 5. We are going to add in the below mentioned problems, we see as the most relevant, if they are not mentioned in the mind map, or if the discussion dies out.

Mismanagement (mismanagement in institutions or organizations), Physical capabilities to farm, climatic change/weather change (Drought, irregular rains etc.), land availability, labor availability, financial resources, theft, widowhood.

Solution ranking, ask what the solutions are to the earlier mentioned

We will do this exercise in the same way as the problem ranking, and then we will pose the overall research question again and ask for what they think could be solutions to this.

Planting of perennial fruit crops (macadamia and avocados), reduced labor requirement. irrigation schemes.

Intensification – Intensify production on smaller land area and leasing away the remaining land and earn income from that, and information on benefits of intensification. (Ask whether old farmers would be willing to rent out their land to younger farmers, if they could increase production and give a certain share to the old farmers, instead of maintaining low productivity land).

Take a discussion about the conservatism relating transition of land, and problems of young people not willing to move into agriculture.

Ask whether If your production have decreased with age, and why do you think that is

Put a blank paper on the table so that the participants can make a mind map of the problems, and we can add in if we felt that they are forgetting some relevant problems (which we have identified as relevant)

Guide for interpreters: Make sure that Julius introduce the project, make everyone introduce each other to the group to facilitate a better dynamic, and explain thoroughly how this exercise will work.

5.2. Problem and solution ranking

Problem ranking		Solution ranking	
Male	Female	Male	Female (not ranked)
1) Finance	1) Financial resources	1) Education	Increase finances
2) Mismanagement	2) Ageing	2) Finance	Increase tea prices
3) Labour	3) Labour	3) Labour	Financial aids for elderly
4) Physical capabilities	4) Mismanagement and interest rates	4) Land	Better medical care
5) Weather	5) Droughts	5) Management	More competent surveyors
6) Land		6) Security	Education
7) Loneliness		7) Physical capabilities	Being part of the decision making in cooperatives
8) Theft			Improved seeds

Problem and solution ranking for both female and male FGDs. During the female FGD, solutions were not ranked as they were stated according to the corresponding problems (Cf. section 4.5).