# Social Networks and Economic Behavior: Impacts of gifting in Tanzania

by

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# Abstract

Informal institutions such as social networks are often drawn upon in order to protect households from market failures. Social networks often involve gift giving both within and outside the family network to cope with production uncertainties and food insecurity. But some community members avoid giving out gifts to either family members or outsiders. Following literature reviewed, there are three key reasons or motivations for gifting – altruism, reciprocity, and social norms. Although all three motivations may be for any gifting between households, each motivation is more associated with different types of households than others. In this thesis, I assume gifting between households of the same family network is more likely motivated by altruism, or social norms that create obligations, whereas gifting between households of different families is more likely motivated by reciprocity. However, these gifting behaviors may involve behavior such as free-riding or investment in social capital. As such, gift transfers within or outside family networks can affect the productivity activities of those who give and receive gifts.

Therefore, this paper seeks to examine how gifting behavior of farmers, among friends and family networks in the Kongwa and Mvomero districts in Tanzania, affects their productive activities. To do so, using primary data obtained from 552 households from 4 villages in each of two districts in Tanzania, a probit model is run to examine the determinants of a household decision to give gifts or not. Also, I estimate a tobit model with household weeding effort and an OLS model with agricultural crop yields as a function of different family types while holding constant other factors that affect agricultural productivity.

My results support the idea that the formal economy (i.e. access to formal institutions, or services such as savings and credit institutions) is a substitute to social networks in these rural areas. I also provide estimates that suggest that productive efforts of farmer households differ depending on whether they are engaged in gifting with members of another household unit but within the same family network, or outside their family network. To be specific, the empirical evidence suggests that, relative to households not engaged in gifting, nonfamily gifting households have higher yields whereas family gifting households invest lover productivity efforts by weeding less.

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# Chapter One: Background

## 1.1. Economic Issue

In developing economies, rural villages are frequently agrarian with subsistence farmers who rely on informal institutions. One key institution is the reliance on social networks – specifically gift giving networks. This institution can involve transfers characterized by gifting both within and outside family networks to cope with production uncertainties and food insecurity.

Theories on coerced altruism, kinship, and giving, maintain that transfers from a wealthier or more productive family member to other family members is often mandated by social norms (e.g. Alger & Weibull, 2007, 2010; Robinson & Williams, 2001). Thus, it is frequently expected that wealthier households will transfer some of their wealth to other households of family members. Such transfers may take the form of gifts, with little or no expectations of favor in return (see e.g. Annamma, 2001 on gift reciprocity within a family context). The transfers are typically modeled as being dependent on factors such as the riskiness of the production environment, the giver's level of altruism and her investment incentives. The few studies that have examined theoretical predictions of economic behavior have been based on casual observation (see Alger & Weibull, 2007, 2010)[1]. In this study, I explore empirical predictions of economic theory regarding gifting behavior of rural households and their productivity activities using a unique set of primary data collected in districts of Tanzania in 2011.

The Tanzanian economy is one of the poorest economies in the world (Ellis & Mdoe, 2003). The economy's agricultural sector contributes over a quarter of the GDP and employs about 80% of the workforce (Central Intelligence Agency, 2013). Though the country has a high potential for agricultural development, productivity remains low (Kiratu, Märker, &

[1] These, and other, theoretical papers are discussed in the next chapter

Mwakolobo, 2011). The agricultural sector is predominantly characterized by rural households as smallholders practicing subsistence and traditional farming methods with low levels of technology and low utilization of modern inputs (Mashindano and Kaino, 2009).

In my study villages, family bonds are frequently strong and are characterized by members having obligations to one another. Gifts are often transferred from wealthier family members to other family members of different households and may be undertaken because of social norms that create obligations (Alger & Weibull, 2007, 2010). In order to reduce the costs of these obligations, these practices may involve behavior such as free-riding and shirking. Therefore, gift transfers within family networks can affect economic decisions such as, the production behavior of those who give gifts, and also of those who receive gifts. Without the need for reciprocity within family transfers, households assured of being on the receiving end may decide to enjoy more leisure. In such cases, these households can free-ride on the giving households' hard work. Such behavior may cause giving households to choose lower productivity efforts because they anticipate gifting obligations that could take away some of the proceeds of their hard work. Therefore, I assume that intra-family transfers create the potential for free-riding, and as such, may act as a disincentive to household production behavior.

In light of the above, it is plausible that transfers within family networks involve free-riding behavior, and these, in turn, may act as disincentives for households' agricultural productivity. More generally, while recognizing the potential benefits that gifting can provide, I wonder whether existing family networks may help reinforce poverty traps for these households. As such, the main research question of this thesis is as follows; how does gift giving behavior of farmers, friends and family networks affect their economic behavior?

## 1.2. Study Objectives

To address the main research question of this study, I examine how the gifting behavior of farmers, among friends and family networks in the Kongwa and Mvomero districts in Tanzania, affects their productivity activities. More specifically, my objectives are as follow:

- To explore and analyze socio-economic factors that affect household's decision to be engaged in gifting.
- To examine whether and how these gifting behaviors of households affect their agricultural productivity through measures of crop yields and weeding effort.

To explore these objectives I estimate a Probit model to assess socio-economic characteristics that affect household decision to be engaged in gifting or not. Also, I estimate an Ordinary Least Squares (OLS) model and a Tobit model to analyze how these gifting behaviors of households affect their crop yields and weeding efforts respectively. These models are discussed into details later in the chapters 4 and 5 of this thesis. As such, I collect data as part of a larger project named CGP Tanzania (See section 1.3 below for brief information about the CGP Tanzania) that enable me to categorize farmer households as "autarky" or "non-autarky". In my classification, an autarky household neither give gifts to nor receive gifts from members of other blood-related families, or members of their network of friends, while a non-autarky household gives or receives from either or both of these two groups. I hypothesize that gifting outside family network (within network of friends) may be characterized as investing in social capital while gifting within members of blood-related households occurs as a result of altruism, which may be coerced through obligation.

## 1.3. Crop-Goat Tanzania Project

This study is part of a larger project titled Integrating Dairy Goat and Root Crop Production for Increasing Food, Nutrition and Income Security of Smallholder Farmers in Tanzania (CGP Tanzania). The project is funded by International Development Research Consortium (IDRC) and Canadian International Development Agency (CIDA) based in Canada. The main objective of the project is to improve food security and human nutrition through an integrated program of dairy goat cross-breeding and goat milk production that is coupled with cassava and sweet potato production for food and feed in districts of Tanzania. Key institutions involved in this Project are University of Alberta, Canada, Sokoine University of Agriculture, Tanzania, and the International Livestock Research Institute (ILRI), Kenya as a third party institution. A baseline survey for CGP Tanzania was conducted in 2011 (See Appendix D for the CGP survey instrument). Data used in this thesis was obtained from the Mvomero and Kongwa districts during the CCP Tanzania baseline survey.

## 1.4. Thesis Organization

This thesis is organized into six chapters. The next chapter (i.e. second chapter) reviews literature on social networks, gifting and economic behavior. The third chapter gives background on the study site and presents the data collection process. In chapter four, I describe the empirical method employed and discuss findings from modeling household's decision to be engaged in gifting (i.e. give or receive cassava) or not. In chapter five, I present an empirical model, results and discussion to compare the productivity efforts of each household type described above. Finally, chapter six presents summary, conclusions and policy implications of the study. This chapter ends with identified policy recommendations and areas for further research.

# Chapter Two: Literature Review

## 2.1. Introduction

In this chapter, I review literature on social networks, gifting, and household economic decisions. Theoretical works or considerations on social networks, gifting and economic outcomes are presented, followed by related empirical works. I start by discussing some sociological roots of social networks followed by characterizations of social networks. Next, literature on social networks and gift gifting are presented, followed by characterizations of gift giving and those presented in this study. Subsequently, I review literature on empirical works on gift giving and economic outcomes. This leads to a review of empirical works on social networks and economic questions. Next, I review literature on rural households' livelihood and economic decisions, which is the context within which my empirical work on gifting is undertaken. The chapter ends with identification of gaps in literature that this study seeks to fill.

## 2.2. Theory and Concepts in Social Networks and Gifting

### 2.2.1. Sociological roots of social networks

The study of social networks has grown to be a central field of sociological study over the past fifty years (Jackson, 2005). The founding fathers of sociology, such as Max Weber, have put forward theories of individualism and economic rationalism (see e.g. Boettke & Storr, 2002; Delatour, 1948; Herrmann-Pillath, 1994; Roth & Weber, 1976). These theories can be taken as justification for the model on rational economic humans commonly known as the homo economicus model (see e.g. Boettke & Storr, 2002). This model suggests that human beings are rational, such that they try to obtain the best possible wellbeing at the least cost, given certain

constraints and a set of information about the set of alternatives. However, theorists such as Marcel Mauss have since criticized the individualism concept of the homo economicus model drawing evidence from traditional societies. Mauss demonstrated that choices made by people regarding production and exchange of goods follow patterns of gift exchanges or reciprocity (see e.g. Goldschmidt, 1955; Mauss, 1969). Also, Mauss was fascinated by works on socialism and social networks formation through reciprocal exchange of gifts (see e.g. Goldschmidt, 1955; Mauss, 1969). This concept of reciprocity establishes a relationship over time between two agents.

### 2.2.2. Characterizations of social networks

The term "social network" has been used in many different contexts. For example, Maertens & Barrett (2013) define social networks, within the context of technological adoption, by links among individual members (nodes) through which information, money, goods or services flow. According to Buchenrieder (2006), social networks are one of the ways that people use to cope with uncertainty, extend personal benefits and achieve outcomes that could not be achieved individually.

Some authors (e.g. Hu & Jones 2004) equate 'durable social networks' with concept of social capital, though others have also pointed out that social capital is a much broader term. For example, according to the World Bank (2011), social capital refers to the institutions, relationships, and norms that shape the quality and quantity of a society's social interactions. A more narrow view of social capital looks it as "a set of horizontal associations between people, consisting of social networks and associated norms that have an effect on community productivity and well-being" as the World Bank (2011) puts it. In this thesis I will assume,

following Mitchell & Trickett (1980), that social networks refer to linkages among members of a defined population. More specifically, in the economics literature, social networks are a depiction of specific connections between people and the characteristics of these connections. Focusing on these connections is economically important because these network connections can increase productivity by reducing the costs of doing business (see. e.g. World Bank, 2011). Similarly, in Ghana, networks between small-scale manufacturing enterprises enhance economic performance by facilitating the flow and diffusion of transaction-cost-reducing technical information (e.g. Barr, 2000). I discuss further below other economic literature on social networks.

To analyze social networks, there is a need to measure them. A question that scholars frequently ask is how can a social network be measured? Some scholars attribute the measurement difficulty to the fact that there exist diverse definitions for the term "social networks" (e.g. see Buchenrieder, 2006; Woolcock & Narayan, 2000). There are many ways scholars have tried to measure social networks in the past. For example Behrman et al. (2002) used the number of socially interactive partners to operationalize social networks. Specifically, they labelled the term "chat" to represent whether or not respondents had ever talked to someone about family planning. Also, Aker (2007), in his study on social networks and household welfare in Tanzania, used household membership in community-based organizations and participation in village life to measure social networks.

Though social networks themselves have been the focus of much scholarly attention, there have also been studies of specific aspects of networks, such as gifting, which I turn to below.

### 2.2.3. Social networks and gifting

One potentially important aspect of social networks is gifting. Studies have shown that social networks are strengthened by exchanges of gifts (see e.g. Komter & Vollebergh, 1997; Robinson & Williams, 2001; Sherry Jr, 1983).

Gift giving has been of interest to many social scientists in the past. Following on literature discussed above, an early contribution is that of Mauss (1969) who argues that gifts are never free. There is always a social meaning to gift giving. He explains that people do not give gifts simply because they are purely altruistic; they give in order to establish position or rank. Thus the giver dominates the receiver by giving and, as such creates a gift-debt that has to be repaid on the part of the recipient. By itself, the impression of an expected return of the gift establishes a social network between the agents through time. Therefore, Mauss (1969) asserts that a social bond is created through giving, and this bond creates an obligation to reciprocate.

Komter & Vollebergh (1997), who studied gift giving and the emotional significance of family and friends, emphasized that gift giving is the cement of social relationships. In their work they constructed an emotional hierarchy of different social relationships on the basis of an analysis of feelings accompanying gift giving. The results they found suggested that friendships are emotionally more important than ties to extended kin. This finding brings to light the differential effect of social distances among agents. Also, the above context suggests that gift-giving necessitates a network of agents with at least some prior knowledge of each other. Therefore observing gifting behavior among agents may imply an already existing relationship which is being maintained.

### 2.2.4. Characterizations of gift giving

The literature generally discusses three reasons for gifting: 1) reciprocity (Mauss, 1954) 2) altruism (Derrida, 1992; Kerr et al., 2004), and 3) social norms (Alger & Weibull, 2007, 2010; Kolm & Ythier, 2006).

Some people give gifts because they expect favors or wish to create an obligation in return. The reward for giving can be either immediate or realized in the near future (Bauman, 1993). According to Bauman (1993), although it is kindness that is more likely to prompt gifting, there is still an expectation of returned favor or reward because the eagerness to give gift is "not likely to survive indefinitely" if previous gifts are not returned. As such there are other forms of gift relations where expectations of returned favor or rewards are met. This kind of gift relationship is often reciprocal in nature. A transaction within a business setting where exchanges are both immediate and specific is an example of such kind of exchange relationships (Bauman, 1993). Similarly, Sahlins & Banton (1965) also discussed a similar type of gift relationship characterized by "direct exchanges" that loosely applies to returned gifts or exchanges of equivalent value undertaken within an appropriate period. A reciprocal gift relationship is often less personal as the participants approach each other as "distant economic and social interests" (Sahlins & Banton, 1965).

Another reason why people give gifts is because they get pleasure from it. They give because of their preference for the good of other peoples' welfare (Kolm & Ythier, 2006) or simply because they want to show love (Cheal, 1987). While altruism is "a behavior that benefits others" (Kerr et al., 2004), it often comes at a cost to the giver (see Packer, 1977). Rewards for giving out of altruism are neither discussed at the time the offering is made (see Bauman, 1993) or returned in any aspect (see Silk, 2004). As such, an altruist gift is the type that is given out of

love for others and often discussed in literature as absence of any degree of exchange or potential of the gift being returned. For example, according to Derrida (1992), a true gift is a product of generosity given out of pure altruism. Derrida (1992) is one of many scholars who believe that for there to be a gift, it is very important that the receiver not only give back either immediately or anytime in the future but also must not even recognize it as a gift. As such there must be no return or exchange so as not to "annul" the gift (Derrida, 1992). Silk (2004) discussed altruism in her work on gift theory, aid chains and social movements as an abstract free gift which is not be returned in any aspect. However, Silk (2004) added that pure altruism may be the only practical approach in cases such as humanitarian emergencies, as those at risk are in no position to help themselves.

Finally, some people give gifts because others want them to. The literature generally discusses this as the role of social norms. In recent studies, gift giving has been discussed to be highly dependent on the norms, obligations, and authority that exist in a particular community in which the agents belong to, and where the transfer is taking place (e.g. Alger & Weibull, 2007, 2010; Chen, 2010; Robinson & Williams, 2001). As Kolm & Ythier (2006) put it, gifts are "insistently demanded by strong social norms". Therefore individuals may be coerced by social norms to appear as altruistic towards other agents through gifting. This kind of seemingly altruistic behavior is often referred to as coerced altruism (Alger & Weibull, 2007) This is because societal expectation in a way coerces an individual to appear as altruistic towards receiver.

Although people are thought to be engaged in gifting because of one of the three reasons discussed, linkages and connections exist. As such, the different types of reasons for gifting can be found in different circumstances. The altruistic and social norms reasons are more likely to be

prevalent in situations where there are closer social connections. For example, Alger & Weibull (2007) points out in their work that gift transfers to members of immediate family networks or more specifically immediate kin are often altruistic or mandated by social norms. Conversely, reciprocity as a reason for gifting is more likely to be prevalent in situations where there are less close social connections. For example, Sahlins & Banton (1965) described a type of gifting relationship in their work as reciprocal and characterized as less personal. According to Sahlins & Banton (1965), this type of gift relationships often exist between closer but non-kin.

Accordingly, another way that I see these different kinds of gifting relationship is within family networks and outside family networks. As such, next, I discuss below theoretical works, which represent recent theories on gift transfers, social norms, and family networks in the context of production efforts. These studies are discussed in two parts; first, to throw more light on gifting within family networks, and then next, to give an insight on gifting outside family networks.

#### *2.2.4.1. Within family networks - a case of gift transfer and production efforts among kinship households*

Alger & Weibull (2007) analyzed the theoretical effects of family ties and gift transfers on the incentives for production. They analyzed how the strength of family ties affects the choice of a risk-reducing effort, and whether the informal insurance provided within the family may be a good substitute for market insurance. In their work, they used gift transfers between family members to represent informal insurance within family networks. Also they allowed for siblings to be altruistic towards each other but assumed that transfers between them were dictated by social norms (i.e. coerced altruism). This allowed them to compare how production efforts by

agents coerced through social norms to make transfers is different from that by atomistic individuals[2]. They modeled families as pairs of siblings (identical individuals) where family ties are defined as a mixture of true and coerced altruism between siblings. According to Alger & Weibull (2007), under uncertainty each sibling exerts some level of effort to produce output. However social norms dictate that a sibling with higher output must share a specified amount of this output with his sibling. Their model suggests that coerced family altruism decreases production efforts by individuals in equilibrium compared to agents living in autarky. This is because coerced altruism potentially involves a free-riding effect, which in turn decreases the level of production effort. But they also hypothesize that altruism mitigates this free-rider effect by way of an empathy effect. This is because an altruistic individual has an incentive to increase his or her risk-reducing effort for two reasons. First, to increase the probability of being able to help a poorer sibling, and second, to decrease the probability of being unlucky and imposing on the sibling to help him or her out.

#### *2.2.4.2. Beyond family networks – a case of gift transfers among "friendship households"*

According to Wellman (1992), although people are usually in frequent contact with their immediate kin, most people have more friendship ties than kinship ties. Hence, they come into contact and possibly seek more support from friends than close kin. These ties with friends help provide social support that "transcends narrow reciprocity" (Wellman & Wortley, 1990). It is also one of the ways of creating social capital that people use to take advantage of opportunities and cope with uncertainties (Kadushin, 1981). As such "it is not enough to look solely at how people use kin in times of crisis" (Wetherell, 1998). There is the need to look into how people

[2] Atomistic individuals represent individuals living in autarky or individuals with no family ties

use their kin and friends for different purposes. This is because different types of ties provide different kinds of support, and some types of ties may be unsupportive (Wellman & Wortley, 1990).

Therefore, there are significant theoretical works that have been done on gifting within family network, not much done outside family networks (i.e. friendship networks). Now I turn to related empirical studies starting with characterization of gifting used in this thesis.

## 2.3. Characterization of Gifting used in this Thesis

In this thesis, I characterize households to either belong to one of three household types or groups:

- Autarky households
- Family gifting households
- Nonfamily gifting households

Where autarky households are those not engage in gifting, family gifting households are those engaged in gifting with members of their family network, and nonfamily gifting households are those engage in gifting with people outside their family network. I characterize household into these categories because whenever I find out whether a household is one of these types of households, it could shed some light on the three reasons for gifting I discussed above. Though I cannot discern given my data which of these three motivations or reasons for gifting are behind the gifting behavior of households, I however assume that the following might be their relationship (see table 2.1 below).

Table 2.1: Motivations for gifting

| Reasons for gifting / Type of households | *Social Norms* *(e.g. coerced altruism)* | *Altruism* | *Reciprocity* |
|---|---|---|---|
| **Family gifting households** | high | high | low |
| **Non-family gifting households** | low | low | high |
| **Autarky households** | - | - | - |

In table 2.1, I indicate that the closer one is within a family, the higher I think social norms or altruism will dictate gift transfers within that network. This behavior will result in reduced production effort of the gifting agent because of the potential existence of free riding behavior. Similarly, the more one is integrated with members outside a family, the higher I think reciprocity will dictate gift transfer within that network. As such, it is highly possible that this type of gifting behavior can result in increased productivity because of increased social capital. Also, in table 2.1, I show that gifting because of social norms or altruism may potentially have identical effects.

Therefore, using the CGP Tanzania data, I investigate how gift transfers among different households within the same family network[3] affect economic decisions such as their productivity activities. I compare the productivity efforts of family gifting households (e.g. gifting between kinship households) and non-family gifting households (e.g. gifting between friendship households) with that of autarky households.

## 2.4. Empirical Literature in Social Networks and Gifting

### 2.4.1. Empirical studies in social networks and economic questions

[3] Same family network is defined broadly in this thesis by blood relations and marriage.

There are many aspects of social networks that are of interest to economists. Studies on social networks by economists have been mostly focused on addressing key economic questions such as; what are the effects of social networks on technological adoption, information dissemination, and production and consumption decisions? A review of some of these studies is presented below in the next two sub-sections.

#### *2.4.1.1. Social networks, technology adoption, and information dissemination*

Some early scholarly contributions to the literature on social networks have also included these network effects on information dissemination and technology adoption in healthcare. For example, using data in the U.S.A., Anderson & Jay (1985) demonstrated how social network analysis can be used to provide information or policy decisions pertaining to physicians' adoption and utilization of new medical technology. In their study they found empirical evidence to suggest that a physician's relative position in a network is an important determinant of his/her participation in the diffusion process. Similarly, Salloway & Dillon (1973), in a study comparing healthcare utilization between family networks and friend networks in the USA, stated that these networks "differ in their patterns of mutual help or role support in times of need, and that these differences will have an influence on the use of health services". Their results suggest that friendship networks expedite timely utilization of health services compared to family networks.

In recent literature however, there are so many ways social networks have been explored empirically. A recent study on the effect of social network on information dissemination and adoption in developing economies is that by Vasilaky (2013). Using data on cotton farmers in rural Uganda, Vasilaky (2013) measures social networks through a social networks-based program (SNP). This SNP involves training each female cotton producer participating in one agronomic activity during the cultivation and harvesting of cotton and it also involves increasing

the size of social network of female cotton producers by pairing them, randomly, in mentoring relationships. Her results suggest that the social networks-based program (SNP) had a significant impact on yields for the poorest subsistence farmers. Also, in Maertens & Barrett (2013)'s work on the effect of social networks on technological adoption in three villages in India, they measured social networks using the closeness of farmers' living places, the closeness of their crop fields, and also the whether a farmer passes by another famer's field on regular basis. Their results suggest that social networks play an important role in mediating the diffusion of agricultural innovations.

#### *2.4.1.2. Social networks, production and consumption decisions*

Warde & Tampubolon (2002), Narayan & Pritchett (1999) and Fafchamps & Minten (2002) assess, respectively, the effect of social networks on households' consumption and firm's production decisions. Warde & Tampubolon (2002), using data obtain from the British Household Panel Survey (BHPS), showed that there are differential effects on consumption decisions by networks from close friends (i.e. which presents a stronger form of network) and that associational memberships. To capture consumption, Warde & Tampubolon (2002) only considered people's engagement in practices and not processes of acquisition of goods and services. This is because, according to them consumption involves "situated activities entailed in social practices wherein items are appropriated and utilized in order to sustain those practices". Narayan & Pritchett (1999), in the study on households income in Tanzania, indicated that households in villages with stronger networks are more likely to enjoy better public services, use advanced agricultural practices, use credit for agricultural improvements, and join in communal activities.

Similarly, Fafchamps & Minten (2002), in their study on returns to social network capital among traders in Madagascar used the number of relatives in agricultural trade, the number of traders known, and the number of potential informal lenders to capture the effect of social network capital. Using data on agricultural traders in Madagascar, Fafchamps & Minten (2002) found these social networks have a large effect on a firm's productivity – i.e. better connected traders have larger sales and added value than less connected traders.

In this study, I investigate the context of rural livelihoods in developing countries. I now turn to reviewing relevant literature within this context. But to my knowledge there have been no empirical studies conducted in this context. Nonetheless studies on rural livelihoods and household economic decisions without social networks provide relevant insight to my studies and will be reviewed below.

### 2.4.2. Empirical studies in gift-giving and economic outcomes

There are few empirical studies that have looked at aspects of behavior closely related gift-giving behavior and specific economic outcomes. For those that do, some fail to take into account that there are different motivations for giving and these motivations may have differential effects (i.e. potentially due to the type of relationship) on economic decisions. Also, others tend to concentrate on only one type of networks (i.e. mostly networks outside the family bond). For example, Garner & Wagner (1991)[4] explored the economic dimensions of extra-household gift expenditures. In their work, Garner & Wagner (1991) characterized extra-household gift expenditures as "total annual expenditures for gifts of goods, services, or money

[4] Garner & Wagner (1991) used data from the Quarterly Interview component of the 1984 – 1985 United States Continuing Consumer Expenditure Survey. They estimated a probit model and an OLS model with 1) the probability that a consumer unit will allocate part of its budget to extra-household gift expenditures and (2) the corresponding level of gift expenditures as dependent variables respectively.

given to individuals, households, and organizations outside the consumer unit". As established above, because of the different motivations for giving, there may be differential effects (e.g. because of social distances) on household's economic decisions such as gift expenditures. However these differences were not taken into consideration in the work of Garner & Wagner (1991). But, Leider et al. (2010) and Di Falco & Bulte (2011) consider these differences. Leider et al. (2010) explore resource allocation decisions and expectations based on social distances (SD) and structured incentives. To be specific, Leider et al. (2010) analyzed the extent to which Harvard undergraduates, under various social distances, are aware of other people's baseline altruism using an experimental design. They use coordination task as an incentive mechanism[5] to identify these social distances (i.e. SD[6]==1,2,3, ≥4 or 5) between any two respondents, classifying them as either socially close direct friends, less close friends-of-friends or socially distant strangers. Also, Di Falco & Bulte (2011), using data on households from KwaZulu-Natal, South Africa, explored how sharing behavior within kinship networks affect household savings and consumption decisions. Using the number of family dependents or the size of kinship network as a proxy for social capital, Di Falco & Bulte (2011) found that households alter their expenditures depending on the size of their kinship network, consuming more durables goods that are deemed non-sharable and reduce savings in liquid assets when they are associated with others linked by either marriage, blood lines, or adoption. However, their results also suggest that this kinship sharing behavior usually necessitated by customs and social norms may hinder income growth.

[5] Giving is termed efficient using an exchange rate of 1:3 which means each token is worth 10 cents to the allocator but 30 cents to the recipient. Giving is termed neutral using 1:1 exchange rate where a token is worth the same for both agents. And finally giving is termed inefficient at an exchange rate of 3:1where e token is worth 30 cents to the allocator but 10 cents to the recipient.

[6] SD represents the social distance between any two agents. An SD; =1 represents a direct friend; =2 represents a friend of a friend; =3 represents a friend of a friend of a friend; ≥4 represents a student in the same staircase/floor who is at least 4 distance from allocator; =5 represents a student from the same dorm outside above categories

## 2.5. Other Related Literature

### 2.5.1. Rural livelihoods & household economic decisions

The livelihoods of rural people in developing economies are often characterized by high levels of deprivation (Olawuyi & Oladele, 2012). According to Devereux (2001), risk and vulnerability are also key features of rural livelihoods and poverty. Also, rural agriculture in developing economies is frequently characterized by smallholders practicing subsistence and using rudimentary traditional farming methods with low levels of technology and low utilization of modern inputs (see e.g. Mashindano and Kaino, 2009). Therefore livelihood insecurity is a re-emerging issue in rural development (Devereux, 2001). Rural households use numerous livelihood strategies to cope with uncertainties, vulnerabilities, risks, and more generally insecurities. In what follows, I concentrate briefly on rural household agricultural productivity. This is because this is the type of economic decision that I will be investigating with my empirical models.

### 2.5.2. Agricultural productivity

Rural livelihoods in developing economies frequently rely on agricultural productivity. A number of scholars have tried to assess the role that agriculture plays in the livelihood of rural folks in developing economies. For example Christiaensen, Demery, & Kühl (2006) looked at the role of agriculture in reducing poverty. They find that enhancing agricultural productivity, especially in Sub-Saharan Africa, is a critical starting point in designing effective poverty

reduction strategies. A number of studies have also investigated determinants of productivity. For example, among smallholder cassava farmers, factors that have been modeled include land, labor, and other inputs such at the fertilizer and agrochemicals. In addition to these, some studies control for; location[7], farm management, soil quality and household characteristics (e.g. Verschelde, Vandamme, D'Haese, & Rayp, 2011); household size, level of education in years, age, gender, farmers' organization and extension contact (e.g. Anyaegbunam et al., 2010; Madu, Anyaegbunam, & Okoye, 2008). In this study, I too control for these types of factors.

## 2.6. Identified Gaps in the Literature

The literature on social networks includes considerations of gifting and the potential economic consequences. But this gifting literature has not considered;

- Developing countries,
- Both family and nonfamily networks,
- And impacts on productivity decisions.

This study thus aims at filling these gaps in knowledge, and examines for the first time predictions of economic theory regarding gifting, productivity activity and more generally, rural household livelihood behavior using a unique set of primary data collected in 2011 from districts of Tanzania.

[7] To control for geographical differences in land quality, most studies employ location dummies. These dummies can be used to control for differences due to climate, multiple cropping indexes, soil quality and differences in irrigation systems (e.g. Chen, 2010).

# Chapter Three: Study Area and Data Collection

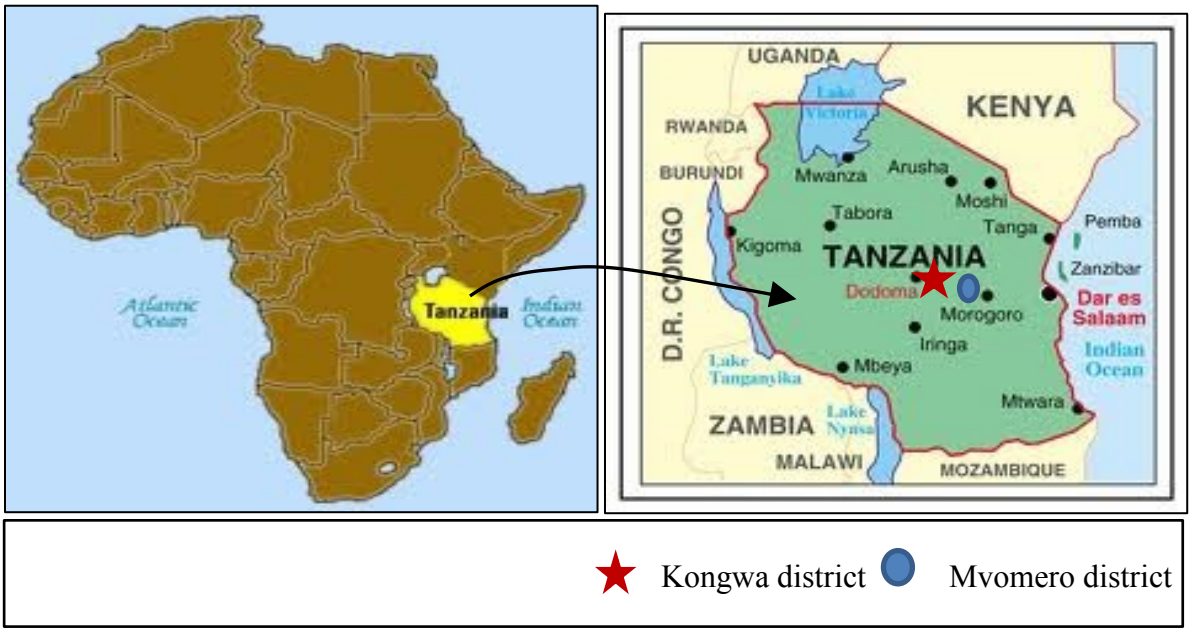
## 3.1. Study Sites

This study focuses on two regions of Tanzania (see Figure 3.1). Tanzania has a tropical climate with its highlands temperatures ranging between 10 and 20 degree Celsius. According to the 2012 census, the Tanzanian population had grown at a fairly stable rate of 2.7 percent over the past ten years to approximately 44.93 million (Tanzania Bureau of Statistics, 2012). Thus, Tanzania's population is doubling every 25 years (World Bank, 2013). In Tanzania, the agriculture sector is the main provider of livelihoods for around 80% of the population. Hence progress in this sector is central to national poverty reduction (Mnenwa & Maliti, 2010). Although Tanzania is considered to be a low income country, the Tanzanian economy has seen a reasonable success and steady growth in the past decade and by 2012, the economy had achieved a GDP growth of about 6.9 percent per annum (World Bank, 2013).

In this thesis, I analyze data obtained within four villages in two districts of Tanzania: Kongwa and Mvomero. These districts were selected based on the objectives of the larger research project to introduce dairy goats and improved root crops. Therefore my criteria for selection included low dairy goat population (food insecurity), and availability of land for the cultivation of root crops. The districts contain mixed ethnic groups including the Maasai, a pastoralist group who are known to keep vast herds of goats under free range management systems. Generally the Maasai are semi-nomadic people located primarily in central and south-western Kenya and northern Tanzania. However they can be found, though in smaller groups, all across the central parts of Tanzania including Kongwa and Mvomero.

Mvomero is located in the south-eastern part of Tanzania while Kongwa is centrally located (Figure 3.1, also see Appendix A1 – map of Kongwa and Mvomero). According to the 2012 national population census and district council, Mvomero has a total area of 7,325 square kilometers with a population of 312,109 and an average household size of 4.4. Kongwa district, which is 4041 square kilometers big, holds a population of about 309,973 with an average household size of 5.0.

Figure 3.1 - Map of Tanzania




The economies in Mvomero and Kongwa districts depend heavily on agriculture, mainly from crop production. According to both district councils' profiles, more than 80 percent of the adult population in Mvomero earns their livelihood from agriculture, whereas in Kongwa about 90 percent of the labor force is engaged in agricultural farming. In Mvomero, their agricultural production relies on specifically rainfall and irrigation whereas in Kongwa, their agricultural production relies mostly on rainfall. However, for some villages in Kongwa, there are several valleys that are suitable for agricultural irrigation. The Mvomero district, which has two main

rainy seasons, experiences annual rainfall amounts ranging between 600-2000mm. The Kongwa district is also categorized into two zones based on rainfall amounts with the first zone's amount ranging between 400 – 600mm and the other zone ranging between 600-800mm. The high rainfall amount in most villages in Mvomero are good for agricultural and livestock rearing, whereas most villages in Kongwa district are considered very dry. Irrespective of dry conditions, Kongwa is also known to have high potential for agriculture. This is because, like Mvomero, the soils in most villages in Kongwa are generally considered to be highly fertile, and rich in organic matter with moderate permeability. According to the district council's profile, Kongwa's total arable land is estimated to be 3,637 square kilometers while Mvomero's total arable land is estimated to be 6,635 square kilometers.

In both districts major food crops cultivated are maize, millet and sorghum, and major cash crops include castor oil seeds. Other food crops cultivated in Mvomero are paddy rice, sweet potatoes, and cassava, whereas in Kongwa, other food crops are millet, sweet potatoes and cassava. Other cash crops cultivated in Mvomero are sugarcane, coffee, and cotton, whereas in Kongwa, other cash crops cultivated include sunflower, groundnuts, and sesame. Beef and dairy cattle, sheep, pigs, and chickens are common livestock kept in both districts.

### 3.2. Sample Selection and Data Collection

As stated in chapter one, this thesis focuses on analyzing household food gifting issues and household Productivity activities. Therefore the quantitative data for this study was collected through a baseline survey interview, as part of the larger project (CGP Tanzania project). Refer to chapter one of this thesis for brief information on the CGP Tanzania project. This baseline questionnaire was used to obtain a wide range of socioeconomic data as well as formal and

informal market information from the Kongwa district and the Mvomero district (see Appendix D - the baseline questionnaire[8]). Given the sample framework of the CGP Tanzania project, the target number of households to be sampled from the two districts, was 560 households as shown in table 3.1 below. From these two districts, nineteen sub-villages from eight villages were sampled. There are four villages per district, two of which are the program villages and the other two are the control villages. The villages and sub-villages were purposively selected according to characteristics including market access and food security. At the sub-village level, households were randomly selected from a list of households provided by village councils. Table 3.1 shows both target and actual numbers of households interviewed in each village, and as such in each district. However, after the enumeration exercise and data cleaning, the resulting number of households was 552 involving 279 households from Kongwa and 273 households from Mvomero.

Table 3.1: Baseline sampling plan

| District | Program villages (120 per village) | Actual Sample | Non-program villages (20 per village) | Actual Sample | District Total (560) |
|---|---|---|---|---|---|
| **Kongwa** | Ihanda | 120 | Mautya | 20 | **279** |
| | Masinyeti | 117 | Msingisa | 22 | |
| **Mvomero** | Kunke | 119 | Milama | 19 | **273** |
| | Wami Luhindo | 115 | Mlumbilo | 20 | |
| **Total** | | **471** | | **81** | **552** |

Figures in parentheses represent the target number of households per each program village or non-program village

The data was collected by Tanzanian enumerators in 2011. The writer of this thesis was not one of the enumerators for the baseline survey. The survey collected detailed information on demographic characteristics, crop and livestock production as well as their marketing, household

[8] This questionnaire was developed and its administration coordinated by a number of people including Jemimah Njuki and Pamela Pali from the International Livestock Research Institute (ILRI); Deo Gratias Shayo, Faustin Lekule and Sebastian Chenyambuga from the Sokoine University of Agriculture (SUA); Philippe Marcoul, Marty Luckert and Sandeep Mohapatra from University of Alberta (UofA).

assets, income sources, services and information sources, and the gifting of produce and livestock.

# Chapter Four: Determinants of Household Food Gifting Behavior

## 4.1. Introduction

This chapter presents methods employed and analysis to explore my first objective, which aims at analyzing a household's decision to be engaged in gifting. More specifically, I try to find out what types of households are engaged in food gifting. My first objective is pursued by using a model (labelled in this thesis as a gifting model) to examine factors that influence household food gifting decisions regarding whether to engage in food gifting. Tables of socio-economic or demographic patterns including findings from these models will be used in profiling each family type.

This chapter consists of 4 more sections. In the next section, 4.2, I present an empirical framework for the gifting model, followed by a description of the variables employed including their expected signs. In section 4.3, I present results and I discuss my findings. To end this chapter, I present a short summary and conclusions in section 4.4.

## 4.2. An Empirical Framework for Household Food Gifting Decisions

In my empirical approach I examine a household's decision to be engaged in food gifting or not using a Probit model. Before I present the empirical specification of this model, I will discuss my choice of proxy for household gifting behavior.

To measure gifting in this thesis, I characterized food gifting behavior of the households using data on Cassava gifting. To be more precise, I used whether or not households where engaged in cassava gifting in my regressions. Focus group discussions and data gathering in the study areas revealed that cassava, though recently introduced into most of these villages, is a

common item of food gifting among households. As will be shown below, a number of households were engaged in the gifting of cassava even though they did not grow it prior to the survey period. Cassava is a staple, rich in carbohydrates and important for household food security. Cassava is especially valuable as a gift because it can withstand harsh dry conditions, especially the type prevalent in the Kongwa district. As such, cassava is important in maintaining household food security during dry and famine conditions. For the remainder of this thesis, food gifting and cassava gifting will be used interchangeably.

During the survey, households were asked why they gave out or received cassava.

Table 4.1: Reasons for giving/receiving cassava

| **Reasons** | **No. of giving/receiving instances** | **Percent** |
|---|---|---|
| Keep good ongoing relationship | 79 | 52.0 |
| Support for elderly, children or disable in society | 25 | 16.4 |
| Expected future favor | 18 | 11.8 |
| Return favor received in the past | 14 | 9.2 |
| Compensate for harming the other person | 5 | 3.3 |
| Other | 11 | 7.2 |
| **Total** | 141 | 100 |

As shown in Table 4.1, majority of households gifted cassava to keep good ongoing relationships. This motivation encompasses all three reasons for gifting (i.e. altruism, social norms, and reciprocity) discussed in chapter two. Next, most households were engaged in cassava gifting to support the most vulnerable in society. This gifting behavior reflects an act of altruism or is caused by social norms. Finally, some households gifted because they expect a favor in return in the future or because they were returning a favor they received in the past. These gifting behaviors are characteristics of reciprocal gift relationships. Therefore, these

responses bring out all three key reasons/ motivation for gifting discussed in chapter two; reciprocity, altruism, and social norms.

As shown in the literature review, there are a few papers on gifting, but none in the context of developing economies. As such, there is a lack of clear economic reasons for why some households will be engaged in food gifting and others will not. Therefore in this chapter I conduct an exploratory analysis to investigate what type of households' gift. The right hand side of the gifting model is made up 4 categories; socio-economic and demographic characteristics, locations fixed effects, household production of cassava and access to formal institutions/ services/ facilities.

The explicit model specification for the gifting (probit) model that I estimate is as follows:

$$
\begin{aligned}
Gift\ Participate_h &= \gamma_0 + \gamma_1 Household\ Size_h + \gamma_2 Gender\ head_h + \gamma_3 Age\ head_h \\
&+ \gamma_4 Econ.Activity\ head_h + \gamma_5 Education\ head_h + \gamma_6 Total\ Asset\ Index_h \\
&+ \gamma_7 District\ Dummy_h + \gamma_8 Cassava5yrs_h + \gamma_9 Borehole_h + \gamma_{10} Pipe\ Water_h \\
&+ \gamma_{11} Savings\ \&\ Credit\ Inst_h + \gamma_{12} Market\ Information_h \\
&+ e_h \qquad (\mathbf{4.1})
\end{aligned}
$$

Where;

- $Participate_h$ represents household $h$ decision to participate in cassava gifting or not
- $Household\ Size_h$ represents the number of people in household $h$.
- $Gender\ head_h$ represents the gender of the head of household $h$.
- $Age\ head_h$ represents the age of the head of household $h$.
- $Econ.Activity\ head_h$ represents the main economic activity of the head of household $h$.
- $Education\ head_h$ represents the level of education of the head of household $h$

- $Total\ Asset\ Index_h$ represents an indication of the value of household $h$'s total physical assets.
- $District\ Dummy_h$ represents the district of the household $h$.
- $Cassava5yrs_h$ represents household $h$ that have cultivated cassava within the past 5 years.
- $Borehole_h$ represents household $h$ access to borehole.
- $Pipe\ Water_h$ represents household $h$ access to pipe water.
- $Savings\ \&\ Credit\ Inst_h$ represents household $h$ access to saving and credit institution.
- $Market\ Information_h$ represents household $h$ access to market information.
- $\gamma_0$ represents the constant term.
- $\gamma_i, i \geq 1$ represent associated parameter estimates of corresponding variables.

Complete definitions of these variables are presented in table 4.2 below while table 4.3 shows basic statistics on these variables and their expected signs.

Using cassava gifting events among farmer households I construct my dependent variables for the gifting model. I group these households as autarky or non-autarky households, where an autarky household is a household not engaged in gifting and a non-autarky household is engaged in gifting. Table 4.3 shows that 17 percent of the sampled households were engaged in cassava gifting over 3 month period prior to the survey.

Table 4.2: Description of variables

| Variable name | Definition |
|---|---|
| ***Dependent variable*** | |
| *i.* $\boldsymbol{Gift\ Participate_h}$ | Represents a binary variable taking the value 1 if household *h* was engaged in cassava gifting over 3 month period before the survey and 0 if not. This binary variable is the dependent variable for the probit model. |
| ***Socio-economic and demographic characteristics*** | |
| *i.* $\boldsymbol{Household\ Size_h}$ | Represents the number of people in a household *h*. This includes household members less than a year old. |
| *ii.* $\boldsymbol{Gender\ head_h}$ | Represents a dummy variable taking the value 1 if the head of household *h* is a male and 0 if not. |
| *iii.* $\boldsymbol{Age\ head_h}$ | Represents the age of the head of household *h* measured in years. |
| *iv.* $\boldsymbol{Econ.Activity\ head_h}$ | Represents a dummy variable taking the value 1 if the main economic activity of head of household *h* is agriculture and 0 if not. |
| *v.* $\boldsymbol{Education\ head_h}$ | Represents the level of education of the head of household *h.* This variable is a categorical variable that takes the value 1 if the head of the household has no formal education, 2 if the heads level of education is considered as a primary education, 3 if considered as secondary education, and 4 if considered as post-secondary education. |
| *vi.* $\boldsymbol{Total\ Asset\ Index_h}$ | Represents an index measuring household *h's* wealth. This index represents an indication of the value of household *h* physical assets and it is computed based on asset analyses recommended by Bill and Malinda Gates' funded projects (BMGF, 2010). More details on the BMGF formula for the index computation are in Appendix B. |
| ***Location fixed effects*** | |
| *i.* $\boldsymbol{District\ Dummy_h}$ | Represents a dummy variable taking the value 1 a if household *h* lives in the Mvomero district and 0 if in the Kongwa district. |

| | | |
|---|---|---|
| ***Household production of cassava*** | | |
| *i.* | $\boldsymbol{Cassava5yrs_h}$ | Represents a dummy variable taking the value 1 if household *h* has cultivated cassava within the past 5 years before the survey and 0 if not. |
| ***Access to formal institutions/ services/ facilities*** | | |
| *i.* | $\boldsymbol{Borehole_h}$ | Represents a dummy variable taking the value 1 if a household *h* has access to a borehole and 0 if not. |
| *ii.* | $\boldsymbol{Pipe\ water_h}$ | Represents a dummy variable taking the value 1 if a household *h* has access to pipe water and 0 if not. |
| *iii.* | $\boldsymbol{Savings}$ & $\boldsymbol{Credit\ Inst_h}$ | Represents a dummy variable taking the value 1 if a household *h* has access to a savings & credit institution and 0 if not. |
| *iv.* | $\boldsymbol{Market\ information_h}$ | Represents a dummy variable taking the value 1 if a household *h* has access to crop and livestock market information such as new prices, available markets, and 0 if not. |

Table 4.3: Summary descriptive statistics and expected signs on variables

| Variable name | # of observation 516 | | | | Expected sign |
|---|---|---|---|---|---|
| | Mean | Std. | Min | Max | Probit Model |
| ***Dependent variable*** | | | | | |
| $\boldsymbol{Gift\ Participate_h}$ | 0.17 | 0.38 | 0 | | 1 |
| ***Socio-economic and demographic characteristics*** | | | | | |
| $\boldsymbol{Household\ Size_h}$ | 6 | 2.59 | 1 | 18 | +/- |
| ***1-5*** | ***50.58% of sample*** | | | | |
| ***6-10*** | ***44.77% of sample*** | | | | |
| ***11-15*** | ***4.07% of sample*** | | | | |
| $\boldsymbol{Gender\ head_h}$ | 0.80 | 0.40 | 0 | 1 | +/- |
| $\boldsymbol{Age\ head_h}$ | 44.62 | 15.9 | 20 | 95 | +/- |
| $\boldsymbol{Econ.Activity\ head_h}$ | 0.94 | 0.24 | 0 | 1 | +/- |
| $\boldsymbol{Education\ head_h}$ | 0.64 | 0.58 | 0 | 3 | +/- |
| $\boldsymbol{Total\ Asset\ Index_h}$ | 31.14 | 51.49 | 0 | 658.2 | +/- |
| ***Location fixed effects*** | | | | | |
| $\boldsymbol{District\ Dummy_h}$ | 0.49 | 0.50 | 0 | 1 | +/- |

| | | | | | |
|---|---|---|---|---|---|
| ***Household production of cassava*** | | | | | |
| $\boldsymbol{Cassava5yrs_h}$ | 0.28 | 0.45 | 0 | 1 | + |
| ***Access to formal institutions/ services/ facilities*** | | | | | |
| $\boldsymbol{Borehole_h}$ | 0.61 | 0.49 | 0 | 1 | + |
| $\boldsymbol{Pipe\ water_h}$ | 0.40 | 0.49 | 0 | 1 | + |
| $\boldsymbol{Savings}$ & $\boldsymbol{Credit\ Inst_h}$ | 0.34 | 0.48 | 0 | 1 | + |
| $\boldsymbol{Market\ information_h}$ | 0.42 | 0.49 | 0 | 1 | +/- |

As shown in table 4.3, on average, a typical rural household in my household level data sample is composed of 6 persons living in Mvomero or Kongwa district of Tanzania, mostly headed by a male of age 45 years, with primary or basic education making their living from agriculture. On average, this household is more likely to be a household living in a sub-village with access to a borehole and with access to a savings and credit institution.

As stated earlier, there are no clear economic reasons for why some households will be engaged in gifting and others will not. As such, this chapter represents an exploratory analysis where, to a large extent, I "let the data speak" concerning what kind of households are engaged in food gifting. Therefore I do not have a priori expectations with respect to the social economic and demographic characteristics employed in this model. Similarly, for my location fixed effect variable (i.e. $\boldsymbol{District\ Dummy_h}$), I do not have a priori expectations. However for the most of the remaining variables employed constituting household production of cassava and access to formal institutions/ services/ facilities, I have expected signs and I discuss the basis of these expectations below.

I expect that *Cassava5yrs* will have a positive sign in the gifting model. I hypothesize that if a household grew cassava in the past five years, that household is more likely to participate in cassava gifting compared to people who did not cultivate cassava. The survey data reveals that, though only a small portion of the households (5%) grew cassava during the

surveyed cropping season, many more households (17%) were engaged in the gifting of this commodity. That is, non-producers bought cassava for consumption as well as for gift purposes.

I include variables related to access to formal institutions, facilities, or services. For access to social structures or services such as borehole, pipe water, and savings & credit institutions, I hypothesize that households are more likely to be engaged in gifting if they have access to these social structures or services. For example, access to boreholes, pipe water, and savings and credit institutions at the sub-village or community level may present meeting grounds or points for individuals to socialize. Also, in most rural areas in developing economies, financial institutions mostly will loan money to farmer groups and not individual farmers because of the risk associated in giving a loan to individual farmers. As such, I assume access to these social structures or services may present opportunities to established social networks which are further strengthened through reciprocal gift exchanges. Therefore I expect positive signs on these 3 variables in the gifting model. For access to crop and livestock market information, I do not have any a priori expectation.

Note however that there were some missing fields in the data regarding household access to borehole, pipe water, savings and credit institutions, and market information. To make up for the missing observations, I used the following rules;

*Rule (A):* In cases where everybody else in the same sub-village had access, I assume that the people with no observation did too and vice versa. This particular rule does not apply to access to $\boldsymbol{Market\ information_h}$.

*Rule (B):* In cases where responses were both 'Yes' or 'No' (for say access to borehole) in the same sub-village, I assume that people who did not respond had no access and therefore assigned them 'No'.

Table 4.4: Rules for addressing missing observations

| Variable | No. of missing observations *(Out of 516)* | Obs. assumed to be 'Yes' because all others had access *(Rule A)* | Obs. assumed to be 'No' because of mixed responses* *(Rule B)* |
|---|---|---|---|
| $\boldsymbol{Borehole_h}$ | 83 | 8 | 75 |
| $\boldsymbol{Pipe\ water_h}$ | 94 | 0 | 94 |
| $\boldsymbol{Savings}$ & $\boldsymbol{Credit\ Inst_h}$ | 107 | 0 | 107 |
| $\boldsymbol{Market\ information_h}$ | 81 | 0 | 81 |

As shown in table 4.4, for boreholes, 16 percent of the observations were missing. For 8 of those observations, I assumed to be 'Yes' following *rule (A)* because all other households in the same sub-villages as these households indicated they had access to boreholes. For the remaining 80 observations, I assumed 'No' following *rule (B)* because mixed responses. Similarly, for the reaming variables in table 4.4, I assumed that all missing observations were 'No' following *rule (B)* as some households in the same sub-village indicated they had access whereas the rest indicated they had no access (i.e. mixed responses).

### 4.3. Econometric Results

Table 4.5 reports results for the gifting model (probit) model. The reference households for this model are characterized as;

- autarky
- headed by a female
- making living outside agriculture
- has not cultivated cassava over the past 5 years before the survey period
- living in a sub-village located in the Kongwa district
- with no access to borehole

- with no access to pipe water
- with no access to savings & credit institution,
- with no access to crop and livestock market information

For the remainder of this chapter, this reference household is referred to as an autarky* household. In the discussion below, I concentrate on describing significant determinants of gifting. I discuss these findings under two main subsections. First I discuss findings related to the impact of household socio-economic and demographic characteristics, location controls, and production of cassava on their food gifting behavior. Next I discuss findings related to the impact of household access to formal institutions, facilities or services on their food gifting behavior.

Table 4.5: Results and marginal effects of the gifting model

| **VARIABLES** | **Probit Model (Base : Autarky* households)** | |
|---|---|---|
| Constant | -1.11***[9] | *Marginal Effects* |
| | (0.425) | |
| ***Socio-economic and demographic characteristics*** | | |
| $Household\ Size_h$ | -0.0549* | -0.0124* |
| | (0.0306) | (0.0068) |
| $Gender\ head_h$ | -0.0154 | -0.00348 |
| | (0.185) | (0.0420) |
| $Age\ head_h$ | -0.00302 | -0.0007 |
| | (0.0047) | (0.0106) |
| $Economic\ Activity\ head_h$ | -0.173 | -0.0422 |
| | (0.267) | (0.0699) |
| $Education\ head_h$ | 0.0491 | 0.0111 |
| | (0.130) | (0.0292) |
| $Total\ Asset\ Index_h$ | -7.2e-05 | -0.00002 |
| | (0.0016) | (0.0004) |
| ***Location fixed effects*** | | |

[9]Recall that autarky* household is an autarky household headed by a female, whose main economic activity is non-agriculture, and had not cultivated cassava over the past 5 years before the survey period, and living in a sub-village located in the Kongwa district, with no access to borehole, pipe water, savings & credit institution, and market information. As such the constant term represents the log likelihood of engaging in food gifting by the autarky* household.

| | | |
|---|---|---|
| $District\ Dummy_h$ | 0.412*** | 0.093*** |
| | (0.156) | (0.0353) |
| ***Others*** | | |
| $Cassava5yrs_h$ | 0.513*** | 0.129*** |
| | (0.150) | (0.0412) |
| ***Access to formal institution, facilities or services*** | | |
| $Pipe\ water_h$ | 0.495*** | 0.118*** |
| | (0.145) | (0.0368) |
| $Savings\ \&\ Credit\ Inst_h$ | 0.301* | 0.0711* |
| | (0.166) | (0.0408) |
| $Borehole_h$ | 0.260* | 0.0569* |
| | (0.151) | (0.0320) |
| $Market\ information_h$ | -0.407** | -0.089** |
| | (0.166) | (0.0347) |
| **No. of observations** | **516** | |

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

### 4.3.1. Impact of households socio-economic and demographic characteristics, location controls, and production of cassava on their food gifting behavior

The probit model results shown in table 4.5 suggest that, relative to the autarky* household, the larger the household size the less likely the household is involved in gifting. These results show that an extra household member reduces the likelihood of that household to be engaged in food gifting with other household units by 1.2 percent relative to the autarky* household with smaller household size. Although, I did not have a specific expectation on $Household\ Size_h$, one can conclude based on this result that larger households tend to act as substitutes for inter-household social networks. It can be also inferred from this result that households with more members may be less dependent on others, including the local labor markets and as such behave more likely as autarky households. Therefore a household with more

members may be more self-sufficient and not integrated in other members of different household unit.

I also found that households living in the Mvomero district have higher propensity to be engaged in food gifting than the autarky* household. According to the probit model, households living in Mvomero are 9.3 percent more likely to be engaged in food gifting relative to the autarky* households.

Finally, I also found evidence with the probit model to suggest that household production of cassava does have significant influence on their food (i.e. more specifically cassava) gifting behavior. The result suggests that, relative to the autarky* households, households that had cultivated cassava within the past 5 years prior to the survey season are 13 percent more likely to be engaged in food gifting. This finding confirms my priori expectations mostly because I use cassava gifting as a proxy for household food gifting behavior.

### 4.3.2. Impact of household access to formal institutions, facilities or services on their food gifting behavior

In table 4.5 above, results from the probit model show that access social structures or services such as borehole, pipe water, and savings and credit institutions have significantly positive effects on households' decision to be engaged in food gifting and also conform to my a priori expectations. The results show that household with access to borehole, pipe water, and saving & credit institutions are 11.8 percent, 7.1 percent, and 5.7 percent more likely to be engaged in gifting respectively relative to the autarky* households. This result corroborates views by other scholars that the formal economy is a substitute for social networks or vice versa

(See e.g. Walder, 1988[10]; Xin & Pearce, 1996[11]). Therefore access to savings and credit institutions become substitutes for social network. In rural areas of developing economies, a common practice is that farmers come together into groups to be eligible to secure loans from formal credit institutions for their farm operations. In most rural villages, this is one of the ways the credit or financial institution undertake a risky endeavor of loaning out money to farmers. In such situations, each farmer in the group is responsible for making sure the loan is paid back hence the need to stay in touch with each other. This network established may be followed with reciprocal gift exchanges to maintain the relationship. Since each farmer, optimally, will expect to that the others also do well to be able to pay back the loan, they share information, and even help each other out in their farming operations if need be. Also, it is possible that access to access to social structures such as borehole and pipe water may serve as meeting points where people converge to access them and thus present an opportunity to establish a network maintained through reciprocal gift arrangements.

Results from the probit model also suggest that household access to crop and livestock market information reduces their propensity to be engaged in food gifting. Although I had no a priori expectation on this variable, this finding can be explained for because, households that are more integrated in the formal market with respect to information are less likely to be engaged in gifting if the motive for establishing this gifting relationship is to obtain market information. Therefore there is no need to establish a food gifting network with members outside the household unit for the purpose of obtaining market information.

[10] According to Walder (1988), Social relations – involving the exchange of favors or a reliance on personal connections or petty corruption to obtain a public or private good – substitute for impersonal (formal) market transactions in a setting where such markets are restricted and scarcity prevails.

[11] (Xin & Pearce, 1996) investigated into guanxi (connections) as a substitute for formal institutional support. They found empirical evidence, using interview data in China, to support the argument that business executives develop personal connections in societies with underdeveloped legal support (i.e. formal economy) for private business.

## 4.4. Summary and Conclusion

In this chapter, I set out to model factors that influence households' decision to be engaged in food gifting or not and whether to be engaged in gifting with members within or outside their family network relative to not gifting at all. To explore this objective, I fit a household level data to a probit model known in this thesis as a gifting model. I use this gifting model to relate household food gifting behavior to their socio-economic and demographic characteristics, their location controls, their production of cassava, and their access to formal institutions, facilities or services.

I found empirical evidence to suggest that household socio-economic and demographic characteristics such as household size, the district in which the household live and cassava cultivation experience can significantly affect their food gifting decisions. I also found empirical evidence to suggest that the formal economy is a substitute for social network. Therefore access to facilities or institutions such as savings and credit institutions can be seen as a substitute for social network. Also the existence of pipe water and borehole is strongly associated with food gifting. For instance, I show that installing pipe water, besides providing clean water to villagers, also seem to have the unexpected effect to boost the gifting activity in this village.

# Chapter Five: Impact of Household Food Gifting Behavior on Agricultural Productivity

This chapter presents methods employed and analyses to explore my second objective that aims at modelling the effect of food gifting behavior on agricultural activities of households. The chapter consists of five more parts. Background and hypotheses for this chapter is presented next in section 5.2, followed by an empirical framework for household (agricultural) productivity in section 5.3. In section 5.4, I present a description of the variables employed and their expected signs, followed by Section 5.5 where I present and discuss the results. The chapter ends with section 5.6 where I present a short summary and conclusions for the chapter.

## 5.1. Background and Hypotheses

Recall that an autarky household is one that is not involved in food gifting whereas non-autarky households are engaged in a food gifting. In this chapter, I further sub-group non-autarky households into family gifting households or non-family gifting households based on the social distances (i.e. the relationships that exist) between gifting agents of different household units. Households that only gave to, or received from, another household of friends, acquaintances, strangers, distant relations and others are grouped as non-family gifting households. Households that only gave to, or received from, other households of close family members, such as aunts, uncles, children or parents, are grouped as family gifting households (see Appendix C1 – gifting survey questions). Some households (5 out of 552 households in the data) were engaged in gifting with members both within and outside their family. These

households[12] could have been dropped from these analyses, but because I only started with 83 gifting households (i.e. less than 17 percent of the sampled households), I elected to include these households with family gifting households. These are family gifting households and I am mostly interested in investigating whether there is free riding behavior amongst family gifting households.

I use empirical models that allow me to derive two main testable hypotheses regarding family gifting households, non-family gifting households, and autarky households.

***Hypothesis 1.*** I hypothesize that relative to autarky households, nonfamily gifting households are more productive, either by having higher crop yields or increased weeding effort. I assume that households that engage in food gifting outside family networks have the potential to expand the household's production possibility frontier as a result of increased social capital. As established earlier in the literature review, gifting outside family networks is thought of to be motivated by reciprocity and not reflect an act social norms or altruism. As such reciprocal gift relationships may result in increased social capital and increase readily available inputs for production.

***Hypothesis 2.*** I hypothesize that, relative to autarky households, family gifting households will be less productive, indicated by lower yields or investing less in weeding effort. Following literature reviewed in chapter two, I point out that gifting within family networks can be motivated by altruism or social norms. As such, it is plausible that transfers within family networks involve the

[12] Note that in some of my regressions, I tried putting a separate dummy variable for households that gifted with both family members and non-family members but this variable was not significant.

potential for free-riding behavior. This behavior may serve as a disincentive to household production and therefore result in reduced productivity.

To explore these hypotheses, I estimate determinants of two separate models, which explore my second objective from two different approaches or perspectives; weeding and crop production.

First I estimate regressions on household weeding effort in crop production as a function of the different household types based on their gifting behavior, while holding constant other factors that might affect household weeding effort, and more generally household productivity. This model is referred to as the weeding effort model. The weeding effort model is employed to analyze household agricultural productivity from the input side. Farmers in the study villages mostly practice subsistence agriculture where labor is an important input. Also, most of these farmers have low incomes, so there are few significant differences in terms of capital inputs. Therefore a key source of variability regarding how crops are cultivated is how much they weed. Weeding is usually done in an early crop stage, and can be repeated many times. Frequent weeding can help to loosen the soil and allows infiltration of water more rapidly for better development of cultivated plants roots. As such, the absence of weeding can lead to a substantial reduction in productivity.

Second, I estimate a regression of household crop yields as a function of the type of gifting households while holding constant other factors that affect crop yields. Hence, this model is referred to as the crop yield model. Alternatively to the weeding effort model, I use the crop yield model in analyzing household productivity as an output side approach. I employ this model to help capture other productivity factors and efforts made by farmers that go beyond weeding

effort, such as pest management, investment in planting material, timely harvest and post-harvest efforts.

## 5.2. An Empirical Framework for Household Agricultural Productivity

As stated earlier, in my empirical approach I focus on two dimensions of households' productive effort. First, I examine the determinants of a household weeding effort using a Tobit model. Second, I examine the determinants of household's crop yield using an OLS model. In what follows I describe the econometric specifications for both models.

For these analyses, I employ plot level data, where a household may have multiple plots. Evidence from the data suggests that, there are two difference types of plots: contiguous and non-contiguous plots. Few households (i.e. about 4 households) cultivated the same type of crop on two separate plots. These plots are considered as non-contiguous plots. However, for cases where a plot had more than one type of crop, it was split up into contiguous plots for each crop type.

### 5.2.1. Household weeding effort

I specify the weeding effort of a household as a function of a set of household socio-economic variables, production investments, regional controls, crop specific and farm plot controls, and the gifting variables. Data on these variables are fitted to a Tobit model, because the dependent variable is a computed index which is censored at zero.

The explicit model specification for the weeding effort model that I estimate is;

$$Weeding\ effort_{hs}$$

$$= \alpha_0 + \alpha_1 Family\ gifting\ households_h$$

$$+ \alpha_2 Nonfamily\ gifting\ households_h + \alpha_3 Fertilizer_h + \alpha_4 Gender\ head_h$$

$$+ \alpha_5 Age\ head_h + \alpha_6 Household\ size_h + \alpha_7 Dependency\ ratio_h$$

$$+ \alpha_8 Productivity\ Asset\ Index_h + \alpha_{9-10} Education\ head_h$$

$$+ \alpha_{11} District\ Dummy_h + \alpha_{12-18} Village\ Dummies_h$$

$$+ \alpha_{19-29} Crop\ Dummies_{hs} + \alpha_{30-33} Plot\ Dummies_{hs}$$

$$+ e_{hs} \qquad (\mathbf{5.1})$$

Where;

- $Weeding\ effort_{hs}$ represents the intensity of household *h*'s weeding effort normalized by plot *s* size.

Most of the right hand side variables are defined in equation (4.1) in the previous chapter. Additionally:

- $Family\ gifting\ households_h$ represents household *h* that is engaged in gifting with members within their family network only.
- $Nonfamily\ gifting\ households_h$ represents household *h* that is engaged in gifting with members outside their family network only.
- $Dependency\ ratio_h$ represents the ratio of dependents to non-dependency members in household *h*.
- $Productivity\ Asset\ Index_h$ is an index computed using household *h* physical asset considered as productive assets.
- $Fertilizer_h$ represents household *h* that applied fertilizer on plot *s* on which a crop is cultivated
- $Village\ Dummies_h$ is a vector of dummy variables representing the village in which the household *h* can be found.
- $Plot\ Dummies_{hs}$ is a vector of dummy variables representing plot *s* of household *h*.

- $Crop\ Dummies_{hs}$ is a vector of dummy variables representing each type of crop cultivated by household *h* on plots *s*.
- $\alpha_0$ represents the constant term of the weeding effort model.
- $\alpha_i, i \geq 1$ represent associated parameter estimates of the respective corresponding variables in the weeding effort model.

Detailed description of these variables are contained in table 5.1

Table 5.1: Description of variables used in the weeding and crop yield models

| Variable name | Definition |
|---|---|
| ***Dependent variables*** | |
| *i.* $\boldsymbol{Weeding\ effort_{hs}}$ | Represents the weeding effort by household *h* on the plot *s* measured by the number of weeding times per cropping season normalized by plot size in hectares. |
| *ii.* $\boldsymbol{LnCrop\ Yield_{hs}}$ | Represents the natural log of the yield of crop cultivated on plot *s* of household *h* measured in kilograms per hectare. The crops' outputs were originally recorded in varying units. So I use conversion rates obtained from the International Livestock and Research Institute (ILRI), Nairobi to convert these units to kilograms. |
| ***Policy variables / Type of gifting household*** | |
| *i.* $\boldsymbol{Family\ gifting\ households_h}$ | Represents a dummy variable taking the value 1 if the household is engaged in food gifting with members within their family networks and 0 if not. |
| *ii.* $\boldsymbol{Nonfamily\ gifting\ households_h}$ | Represents a dummy variable taking the value 1 if the household is engaged in food gifting with members outside their family networks and 0 if not. |
| ***Production inputs/ investment*** | |
| *i.* $\boldsymbol{Fertilizer_h}$ | Represents a dummy variable taking the value 1 if household *h* applied fertilizer on plot *s* during the cropping season and 0 if not |
| *ii.* $\boldsymbol{Pesticide_h}$ | Represents a dummy variable taking the value 1 if household *h* applied pesticide on plot *s* during the cropping season and 0 if not |
| *iii.* $\boldsymbol{Improve\ variety_h}$ | Represents a dummy variable taking the value 1 if |

| | |
|---|---|
| | household *h* planted an improved variety of a crop for that cropping season and 0 if not |
| ***Socio-economic and demographic characteristics*** | |
| *i.* $\boldsymbol{Dependency\ Ratio_h}$ | Represents the ratio of the number of household members younger than 15 years or older than 64 years (i.e. dependents) to the number of household members from ages of 15 years to 64 years (i.e. working-age population) (World Bank, 2014). |
| *ii.* $\boldsymbol{Productive\ Asset\ Index_h}$ | Represents an index computed using a formula adapted from Bill and Malinda Gates' funded projects (BMGF, 2010). (Refer to chapter 4 and Appendix B for more details on the BMGF formula and the computation of this index). |
| ***Location, crop, & plot fixed effects*** | |
| *i.* $\boldsymbol{District\ dummy_h}$ | Represents a dummy variable taking the value 1 if household lives in the Mvomero district and 0 if lives in Kongwa district |
| *ii.* $\boldsymbol{Village\ dummies_h}$ | Represents a vector of dummy variables each representing the village in which household *h* is found. There are seven village dummies each representing *Kunke, Wamiluhindo, Mlumbilo, Milama, Ihanda, Masinyeti,* and *Msingisa*. These village dummies were constructed with *Mautya* in Kongwa as the reference village because from discussion and preliminary data enquiry, *Mautya*, can be considered to have the lowest level of development and wealth profiles. |
| *iii.* $\boldsymbol{Crop\ dummies_h}$ | Represents a vector of dummy variables each representing a crop type cultivated by the household. There are eleven crop dummies each representing *beans, cassava, sweet potato, sorghum, pear millet, sunflower, sesame, rice, groundnut,* or *other crops*. These crop dummies were constructed with maize as the reference crop because discussion in the villages suggested that maize is one of their most important and most common staple crops across all these villages. |
| *iv.* $\boldsymbol{Plot\ dummies_h}$ | Represents a vector of dummy variables each representing a household plot unit on which a crop is cultivated. The maximum number of plots cultivated by any household is five. As such there are four plot dummies (i.e. *Plot 2* through *Plot 5*) with plot 1 being the reference plot. |

### 5.2.2. Household crop yield

For the crop yield model, I include all the right hand variables in the weeding effort model as determinants of household crop yield. In addition, I control for other factors such as whether or not a household applied pesticides or cultivated an improved variety.

The explicit model specification for the crop yield model that I estimate is;

$$
\begin{aligned}
LnCrop\ Yield_{hs} &= \beta_0 + \beta_1 Family\ gifting\ households_h \\
&+ \beta_2 Nonfamily\ gifting\ households_h + \beta_3 Fertilizer_h + \beta_4 Pesticide_h \\
&+ \beta_5 Improve\ variety_h + \beta_6 Gender\ head_h + \beta_7 Age\ head_h \\
&+ \beta_8 Household\ size_h + \beta_9 Dependency\ ratio_h \\
&+ \beta_{10} Productivity\ Asset\ Index_h + \beta_{11-12} Education\ head_h \\
&+ \beta_{13-19} Village\ Dummies_h + \beta_{20-31} Crop\ Dummies_{hs} \\
&+ \beta_{32-35} Plot\ Dummies_{hs} \\
&+ e_{hs} \qquad (\mathbf{5.2})
\end{aligned}
$$

Where;

- $LnCrop\ Yield_{hcs}$ represents the natural log of household *h* crop yield measured in Kg/ha cultivated on plot s.

Most of the right hand side variables and subscripts are defined in equations **(4.1)** in the previous chapter and **(5.1)** above. Additionally:

- $Pesticide_h$ represents household *h* that applied pesticide on plot *s* on which a crop is cultivated
- $Improve\ variety_h$ represents household *h* that cultivated improved varieties of a crop
- $\beta_0$ represents the constant term of the crop yield model.

- $\beta_i, i \geq 1$ represent associated parameter estimates of the respective corresponding variables in the crop yield model.

Table 5.1 contains detailed descriptions of these variables.

### 5.3. Variables and Expected Signs

In table 5.2, I present summary statistics and expected signs on variables employed in both models.

Table 5.2: Summary descriptive statistics and expected signs of variables employed in the weeding effort and crop yield models

| Variable name | *No. Obs.(max): 863* | | | | *Expected sign* | |
|---|---|---|---|---|---|---|
| | **Mean** | **Std. Dev.** | **Min** | **Max** | **Weeding Effort** | **Crop Yield** |
| ***Dependent variable*** | | | | | | |
| *i.* $\boldsymbol{Weeding\ effort_{hs}}$ | 1.0603 | 0.9661 | 0 | 8 | | |
| *ii.* $\boldsymbol{Crop\ Yield_{hs}}$ | 6.0733 | 1.1974 | 0.722 | 10.115 | | |
| ***Household types/ Policy variables*** | | | | | | |
| *i.* $\boldsymbol{Family\ gifting\ households_h}$ | 0.0939 | 0.2918 | 0 | 1 | - | - |
| *ii.* $\boldsymbol{Nonfamily\ gifting\ households_h}$ | 0.0823 | 0.2749 | 0 | 1 | + | + |
| ***Production inputs/ investment*** | | | | | | |
| *i.* $\boldsymbol{Fertilizer_h}$ | 0.0995 | 0.2995 | 0 | 1 | + | + |
| *ii.* $\boldsymbol{Pesticide_h}$ | 0.0363 | 0.1873 | 0 | 1 | | + |
| *iii.* $\boldsymbol{Improve\ Variety_h}$ | 0.192 | 0.3938 | 0 | 1 | | + |
| ***Socio-economic and demographic characteristics*** | | | | | | |
| *i.* $\boldsymbol{Gender\ head_h}$ | 0.82 | 0.39 | 0 | 1 | +/- | +/- |
| *ii.* $\boldsymbol{Age\ head_h}$ | 45.78 | 16.16 | 20 | 97 | +/- | +/- |
| *iii.* $\boldsymbol{Household\ Size_h}$ | 6 | 2.696 | 1 | 18 | +/- | +/- |
| *iv.* $\boldsymbol{Dependency\ Ratio_h}$ | 1.157 | 0.979 | 0 | 6 | +/- | +/- |
| *v.* $\boldsymbol{Productive\ Asset\ Index_h}$ | 26.09 | 55.83 | 0 | 657.9 | +/- | +/- |
| *vi.* $\boldsymbol{Education\ head_h}$* | | | 0 | 2 | +/- | +/- |
| ***Location, crop, & plot fixed effects*** | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *i.* | $\boldsymbol{District\ dummy_h}$ | 0.45 | 0.50 | 0 | 1 | +/- | +/- |
| *ii.* | $\boldsymbol{Village\ dummies_h}$* | | | 0 | 7 | +/- | +/- |
| *iii.* | $\boldsymbol{Crop\ dummies_{hs}}$* | | | 0 | 11 | +/- | +/- |
| *iv.* | $\boldsymbol{Plot\ dummies_{hs}}$* | | | 0 | 4 | +/- | +/- |

*Statistics for these variables are not presented because there are two household head education dummies, seven village dummies, eleven crop dummies and five plot dummies.

Further to the hypotheses discussed above, and as shown in table 5.2, for $Family\ gifting\ households_h$ I expect a negative sign in both models whereas for $Nonfamily\ gifting\ households_h$ I expect a positive sign in both models.

For the weeding model, I expect a positive sign on $Fertilizer_h$ because weeding complements fertilizer application. Weeds take up nutrients from fertilizer that is applied to grow well, and as the need to more weeding effort. For the crop yield model, I expect positive signs on all inputs (i.e. $Fertilizer_h$, $Pesticide_h$, and $Improve\ Variety_h$).

The socio-economic and demographic variables (i.e. $Gender\ head_h$, $Age\ head_h$, $Household\ Size_h$, $Dependency\ Ratio_h$, $Productive\ Asset\ Index_h$ and $Education\ head_h$), are added as controls and I do not have any specific expectation regarding these variables.

I control for regional difference within $District\ dummy_h$. Differences between the two districts include climatic and agro-ecological conditions, access to markets, land quality and access to basic amenities such as electricity and water (e.g. Chen, 2010) (Chapter 3 contain more information about these two districts). For $District\ dummy_h$, I do not have any specific expectations in both models.

I also add seven village dummies, eleven crop dummies, and 4 plot dummies to represent village level, crop types and plots. I add $Plot\ dummies_h$ as controls to check for systematic differences in the numbering of plots by the households and enumerators. When numbers were assigned during the interview process, the numbers could have been influenced by:

- Size (i.e. plot one could be the smallest or largest)
- Distance (i.e. plot one could be the furthest away from or the closest to their settlement)
- Soil quality (i.e. household believes that plot one is more fertile or least fertile)
- Livelihood importance (i.e. the crop cultivated on plot one might be important the household's livelihood or least important, either through income generated from the crop sales or it relevance in their diet)

For all of these regional, plot level and crop specific controls, I do not have expectations in either the crop yield model or weeding effort model.

## 5.4. Results

Table 5.3 reports results for both the weeding effort model (Tobit) and crop yield model (OLS). For the weeding effort model, the reference household is

- autarky
- headed by a female with no formal education
- cultivates only maize
- did not apply fertilizer to plot *s*
- lives in a sub-village of the Mautya village in Kongwa

For the remainder of this chapter, the reference household for the weeding effort model will be known as "Autarky Household A". As shown in table 5.3 below, the underlying weeding propensity Autarky Household A is 1.193 times.

For the crop yield model, the reference household is the same as for the weeding model, with the added characteristics:

- did not plant an improve variety
- did not apply pesticide to plot *s*

For the remainder of this chapter, the reference household will also be known as an "Autarky Household B". As shown in table 5.3, the crop yield of Autarky Household B is 5.77kg per hectare.

Below, I discuss my findings under four main subheadings. First I discuss findings related to the impact of food gifting within family networks on weeding effort and crop yields. Second, I discuss findings related to the impact of food gifting with members outside family networks on weeding effort and crop yields. Third, I discuss findings related to the impact of household production investment/ inputs on weeding effort and crop yields. Finally, I discuss findings related to the impact of household socio-economic and demographic characteristics including location, crop, and plot controls on weeding effort and crop yields. Table 5.3 below reports the results.

Table 5.3: Weeding effort and crop yield models results[13]

| VARIABLES | Weeding Effort Model *(Weeding times / plot size)* | Crop Yield Model *(Ln Crop Yield)* |
|---|---|---|
| Constant | [A]1.193*** | [B] 5.768*** |
| | (0.211) | (0.247) |
| **Household Types** | | |
| $Family\ gifting\ households_h$ | -0.194* | -0.166 |
| | (0.114) | (0.134) |
| $Nonfamily\ gifting\ households_h$ | 0.00989 | 0.325** |
| | (0.114) | (0.131) |
| **Production inputs/ investment** | | |
| $Fertilizer_h$ | -0.0536 | 0.0302 |
| | (0.109) | (0.131) |
| $Pesticide_h$ | | 0.735*** |
| | | (0.198) |
| $Improve\ variety_h$ | | -0.103 |
| | | (0.0999) |
| **Household socio-economic and demographic characteristics** | | |
| $Gender\ head_h$ | -0.131 | 0.255** |
| | (0.0834) | (0.101) |
| $Age\ head_h$ | 0.00627*** | -0.00488* |
| | (0.00220) | (0.00266) |
| $Household\ Size_h$ | -0.0761*** | -0.0122 |
| | (0.0127) | (0.0149) |
| $Dependency\ ratio_h$ | 0.0233 | -0.0258 |
| | (0.0340) | (0.0424) |
| $Productive\ Asset\ Index_h$ | -0.00176*** | -0.000759 |
| | (0.000574) | (0.000677) |
| $Education\ head_h$ (reference village: No formal education) | | |
| Primary Education | -0.0208 | -0.0130 |
| | (0.0712) | (0.0856) |
| Secondary or Higher Education | -0.0746 | -0.557*** |
| | (0.186) | (0.216) |
| **Location, crop, & plot fixed effects** | | |
| $District\ dummy_h$ (1=Mvomero) | 0.0253 | 1.304*** |
| | (0.178) | (0.210) |
| $Village\ dummies_h$ (reference village: Mautya) | | |
| *Kunke* | 0.417*** | -0.570*** |
| | (0.107) | (0.127) |
| *Wamiluhindo* | 0.0973 | -0.645*** |
| | (0.183) | (0.208) |
| *Mlumbilo* | 0.198 | -0.207 |

[13] The models were also estimated with random effects but the estimates were fairly identical. See Appendix C for random effect estimates.

| | | |
|---|---|---|
| | (0.180) | (0.206) |
| *Milama* | -0.0648 | -0.0649 |
| | (0.160) | (0.192) |
| *Ihanda* | -0.0533 | 0.187 |
| | (0.160) | (0.186) |
| *Masinyeti* | 0 | 0 |
| | (0) | (0) |
| *Msingisa* | -0.0319 | 0.911*** |
| | (0.203) | (0.237) |
| $Crop\ dummies_h$ (reference crop: Maize) | | |
| *Beans* | 1.102* | -0.869 |
| | (0.617) | (1.006) |
| *Cassava* | 1.361*** | -0.253 |
| | (0.194) | (0.231) |
| *Sweet Potato* | 1.517*** | -1.508*** |
| | (0.443) | (0.500) |
| *Sorghum* | -0.0537 | -0.224* |
| | (0.111) | (0.133) |
| *Pear Millet* | 0.00759 | 0.0772 |
| | (0.132) | (0.157) |
| *Sunflower* | -0.188 | -0.626*** |
| | (0.137) | (0.162) |
| *Sesame* | -0.527** | -1.079*** |
| | (0.246) | (0.283) |
| *Rice* | 0.00958 | 0.219* |
| | (0.109) | (0.131) |
| *Ground nuts* | -0.00286 | -0.274 |
| | (0.263) | (0.333) |
| *Other Crops* | 0.255 | -1.572*** |
| | (0.232) | (0.279) |
| $Plot\ dummies_h$ | | |
| *Plot 2* | 0.190** | 0.0198 |
| | (0.0822) | (0.0978) |
| *Plot 3* | 0.281** | 0.234 |
| | (0.135) | (0.157) |
| *Plot 4* | 0.827*** | -0.415* |
| | (0.220) | (0.249) |
| *Plot 5* | 0.229 | 0.332 |
| | (0.398) | (0.447) |
| Observations | 787 | 702 |
| R-squared | | 0.365 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

### 5.4.1. Impact of food gifting within family networks on weeding effort and crop yields (Hypothesis 5.1)

To capture the effect of food gifting within family networks, I observe the sign (direction) and magnitude of $\beta_1$ and $\alpha_1$ in equations 5.1 (Weeding effort model) and 5.2 (Crop yield model). Results presented in table 5.3 suggest that my ***Hypothesis 5.1*** is not supported with the crop yield model. This may be because there are many determinants of crop production that makes it hard to identify the effect due to gifting within family networks. However, using weeding effort model, I find support for my ***Hypothesis 5.1***. The finding from this model suggests that a family gifting household reduces the underlying weeding propensity by 19.4 percent relative to Autarky Household A. Hence, according to the weeding effort model, a family gifting household is expected to be less productive relative to the autarky household B.

### 5.4.2. *Impact of gifting with members outside family networks on weeding effort and crop yields (Hypothesis 5.2)*

To capture the effect of gifting outside family networks on household productivity activities, I observe the sign (direction) and magnitude of $\beta_2$ and $\alpha_2$ in equations 5.1 (Weeding effort model) and 5.2 (Crop yield model).

Using the weeding effort model, I find that my ***Hypothesis 5.2*** is not supported in terms of the number of times nonfamily gifting households weeding a hectare of a cultivated plot during a cropping season. It is possible that, household labor allocation or more specifically, weeding decisions are complicated. As such, not having many gifting opportunities because of small sample size can be a reason for not observing a significant effect. However, using the crop

yield model, I find support for my ***Hypothesis 5.2*** that relative to the Autarky Household A, nonfamily gifting households have higher crop yields. The crop yield model result suggests that a nonfamily gifting household produces 32.5 percent more yield relative to an autarky household A.

### 5.4.3. Impact of household production investment/ inputs on weeding effort and crop yields

The weeding effort model and the crop yield model results suggest that the application of fertilizer by households is not a significant determinant of how often they weed during a cropping season, or how much they produce relative to autarky households A, or B respectively. Similarly, the crop yield model shows that whether a household cultivates an improved variety does not significantly affect how much they produce. However, results from the crop yield model suggest that households that apply pesticides to their crop fields produce about 73.5 percent more yields relative to autarky household B.

### 5.4.4. Impact of socio-economic and demographic characteristics including location, crop, and plot controls on weeding effort and crop yields

As shown in table 5.3, $Gender\ head_h$ has a significant effect on crop yields but not weeding effort. Results suggest that male headed households have higher crop yields. More specifically, relative to autarky household A, male headed households produce 25.5 percent more in crop yields. Also, with respect to $Age\ head_h$, results suggest that household with older heads will increase their underlying weeding propensity by 0.63 percent per year of age relative to

autarky household A. However, the crop yield model suggests that households with older heads produce about 0.5 percent per year of age less in crop yields relative to autarky households B. Although, I had no specific expectation for $Age\ head_h$, the results indicate that as household heads get older, they weed more but produce less.

$Household\ Size_h$ has a significant effect on weeding efforts, but not crop yields. According to the weeding effort model, an additional household member reduces the underlying weeding propensity by 7.6 percent.

Results from both models indicate that the household productive asset index significantly affects weeding effort but not crop yield. The household productive asset is inversely related to household weeding effort, though the effect is small. The results suggest that, should a household with a productive asset index of 26.09 units (i.e. the mean index) increase by one standard deviation (i.e. 55.83 units), that household's underlying weeding propensity will reduce by 0.18 percent. It is possible that people with higher productive asset indices are likely to be more efficient and therefore their opportunity cost of time could be higher. If so, the households with higher productive asset indices could be less likely to weed because they value their time more.

Results also show that the level of education of household is significant in explaining crop yields but not weeding effort. The crop yield model results indicate that relative to autarky household B (i.e. households headed by individuals with no formal education), households headed by individuals with secondary or higher forms of formal education will produce about 55.7 percent less in crop yields. But only a few households (i.e. about 3.6 percent) are headed by individuals with secondary or higher forms of education, out of which, only 9 households have heads that principally make living from agriculture. This suggests that, in my study villages, highly educated individuals make their living principally outside their agricultural activities. For

this reason, it is possible that they are less productive in agriculture as most of their resources and involvement are concentrated on other activities that are non-agricultural.

Results from the crop yield model also suggest that, households that live in Mvomero produce about 130 percent more in crop yields relative to autarky household B. It is possible that the really dry condition in Kongwa relative to conditions prevailing in Mvomero is the reason for this large effect.

Results from both models also indicate that the village a household lives in and the type of crop cultivated by a household matters regarding their weeding effort and crop yields. For example, the results suggest that relative to households living in Mautya, living in Kunke increases a household underlying weeding propensity by 41.7 percent but decreases crop yield by 57 percent, whereas living in Msingisa increases crop yield by 91.1 percent. Also the weeding, model suggests that households that cultivate beans, cassava and sweet potato weed more whereas those that cultivate sesame weed less relative to households that cultivate maize. Results from the crop yield model suggest that relative to households that cultivate maize, households that cultivates sweet potato, sorghum, sunflower and sesame produces less crop yield.

Finally, results from both models show that indeed, plot level heterogeneities are significant regarding household weeding effort and crop yield.

## 5.5. Summary and Conclusion

In chapter five, I set out to model how food gifting behavior of household affects their productive activities at the plot level. These plot level data give a snapshot of households undertaking various cropping activities regarding; their crop yields, their weeding efforts,

production investments/ inputs and socio-economic and demographic characteristics of the households.

I find evidence to corroborate my hypotheses, that relative to autarky households, nonfamily gifting households produce higher crop yields whereas family gifting households weed less. These results hold even after controlling for a wide range of socio-economic and demographic characteristics, and fixed effects on plot, crop, household and village controls.

In conclusion, this chapter ends with one main contribution. I provide empirical evidence to suggest that food gifting behavior among farmer households in the study rural villages can affect their agricultural productivity and as such the livelihood of people in my study villages.

# Chapter Six: Summary, Conclusions and Policy Recommendations

In the introductory chapter (i.e. chapter one), I stated that the main objectives of this thesis were to analyze household food gifting decisions and also examine how these decisions affect their productive activities. In this closing chapter, I present my concluding remarks regarding these issues. I start by summarizing the thesis and my findings and then follow with policy implications. I conclude this chapter by presenting limitations, and recommendations for future studies.

## 6.1. Summary and conclusions

In rural villages of developing economies, including the study villages, households rely on social networks formed and maintained through gifting to take advantage of production uncertainties and food insecurity. Gifts are often transferred from one household to another. These households may be linked by family bonds or not. In these study villages, family bonds are frequently strong and are characterized by members having obligations to one another. As such, wealthier family members transfer gifts to other members. Following literature reviewed, there are three key reasons or motivations for gifting – altruism, reciprocity, and social norms. Although all three motivations may be for any gifting between households, each motivation is more associated with different types of households than others. In this thesis, I assume gifting between households of the same family network is more likely motivated by altruism, or social norms that create obligations, whereas gifting between households of different families is more likely motivated by reciprocity. However, following this literature reviewed, these gifting behaviors may involve behavior such as free-riding or investment in social capital. Therefore,

gift transfers within or outside family networks can affect the productivity activities of those who give and receive gifts.

Using data collected in 2011 from two districts in Tanzania, I show that the study villages are mostly agrarian composed of subsistence farmers who rely heavily on their agricultural productivity efforts. I employ empirical models to investigate factors that influence household gifting behaviors, and how these gifting behaviors affect agricultural productivity.

To address this objective, I characterize food gifting behavior as whether or not a household engaged in cassava gifting. I analyze factors influencing households' decision to participate in food gifting by estimating a probit model with a binary variable taking the value 1 if a household is engaged in cassava gifting and 0 if not. In accordance with literature emphasizing the substitutability between informal relations or social networks and formal institutions (see e.g. Walder, 1988; Xin & Pearce, 1996), my results support the idea that the formal economy is a substitute to social networks in these rural areas. I find that households used their access to formal institutions, or services such as savings and credit institutions as substitutes for social networks. Also, I find that pipe water and boreholes are strongly associated with food gifting. These results hold even after controlling for household socio-economic and demographic characteristics. To be specific, my results revealed that household size, level of education of household head, cassava cultivation experience and the district in which the household live significantly affect their food gifting decisions.

Next, I investigate the role of food gifting in rural household agricultural productivity. I employ plot level data, where I further divide gifting households into two groups, depending on whether they were engaged in gifting with households of the same family network or outside the family network. Thus, I construct 3 categories of household types regarding food gifting

behavior - i.e. autarky households, family gifting households, and nonfamily gifting households. I focus on two dimensions of households' productivity efforts using two models. I examined the determinants of household's crop yield using an OLS model and also the determinants of a household weeding effort using a Tobit model. These empirical models allow me to derive two main testable hypotheses regarding family gifting households, non-family gifting households, and autarky households.

1. *I hypothesize that relative to autarky households, nonfamily gifting households are more productive, either by having higher crop yields or increased weeding effort.*
2. *I hypothesize that, relative to autarky households, family gifting households will be less productive, indicated by lower yields or investing less in weeding effort.*

I provide estimates that suggest that informal social relations (i.e. social networks established and maintained through gift exchanges) within or outside family networks of farming households have differential effects on households' agricultural productivity. Estimates from the two models suggest that relative to autarky households, productive efforts of farmer households differ depending on whether they are engaged in gifting with members of another household unit but within the same family network, or outside their family network. The empirical evidence suggests that, relative to autarky households, nonfamily gifting households have higher yields whereas family gifting households invest lover productivity efforts by weeding less. These findings hold even after controlling for a wide range of household socio-economic and demographic characteristics, including crop type, plots and regional differences, some of which were significant in explaining the household crop yield or weeding effort.

## 6.2. Policy implications

The findings of this study indicate that household food gifting behavior has significant effect on productive activities. In this section, I emphasize my key findings in the policy implications below.

My results have implications for the Tanzanian economy, and more generally developing countries. As emphasized in the introduction, rural households in these districts of Tanzania are frequently subsistence farmers who rely on informal institutions. These farmers rely on their gifting-driven social networks to take advantage or cope with production uncertainties and food insecurity. As such a critical look into these informal networks, what drives these networks, and the economic behaviors altered by these gifting networks can help decision makers in designing appropriate policies targeted to enhance household livelihoods, food security, and consequently, rural development. For example, to the extent that food gifting is beneficial to household productivity activity and village economies as suggested by my empirical models, it will be beneficial if rural developmental efforts can be directed in a way to encourage networks formation among households. There seem to be some type of facilities that could encourage social networks (e.g. borehole, pipe water, and savings and credit institutions). But, there may be a dark side to these social networks. My results show that social networks may help or hinder development. In this thesis, I provide empirical evidence to suggest that, social networks that exist within family networks could be damaging to productivity because of the potential existence of free riding behavior within family gifting households. However, my estimates also suggest that, social networks outside family networks could help boost household productivity. Therefore, as economies progress, it is possible that these local social networks might play lesser roles that could evolve and serve as important transitions for developing

economies to get past the potential hindrance that some of these networks could have on development.

### 6.3. Limitations and recommendations

This thesis encountered a number of limitations, some of which I now turn to in this section. While exploring the CGP baseline survey data, I learned the potential importance of soil quality, and also the need for extensive information on labor and other inputs in influencing household production. The lack of direct controls for soil quality and other production inputs may have limited the explanatory power of my models.

Also, a limitation encountered is not having enough observations. I find that my data does not contain large number of gifting occurrences. It is possible that, low number of existing household gifting activities, which in turn reduces the degree of freedom of the data, has reduced the significance of variables employed.

Another limitation is the way gifting behavior is operationalized in this thesis. The use of cassava exchanges as a proxy for gifting behavior ignores other forms of gifting and therefore can limit the inductive power of my estimates in defining the nature of more general gift relationships that exist among these households.

There are also a number of different types of economic behaviors which can be explored. I believe that this thesis has only scratched the surface with respect to economic behaviors that social networks can influence. For example, in my data set, there are different kinds of assets, the accumulation of which could change, depending on their gifting behavior or social networks. There is also much more exploring that can be done in the characterization of social networks, not only using gifting occurrences. For example, while I only use gifting within or outside family

proximities to characterize underlying social networks, understanding these relationships within spatial proximities could potentially provide new empirical insights into the existing networks.

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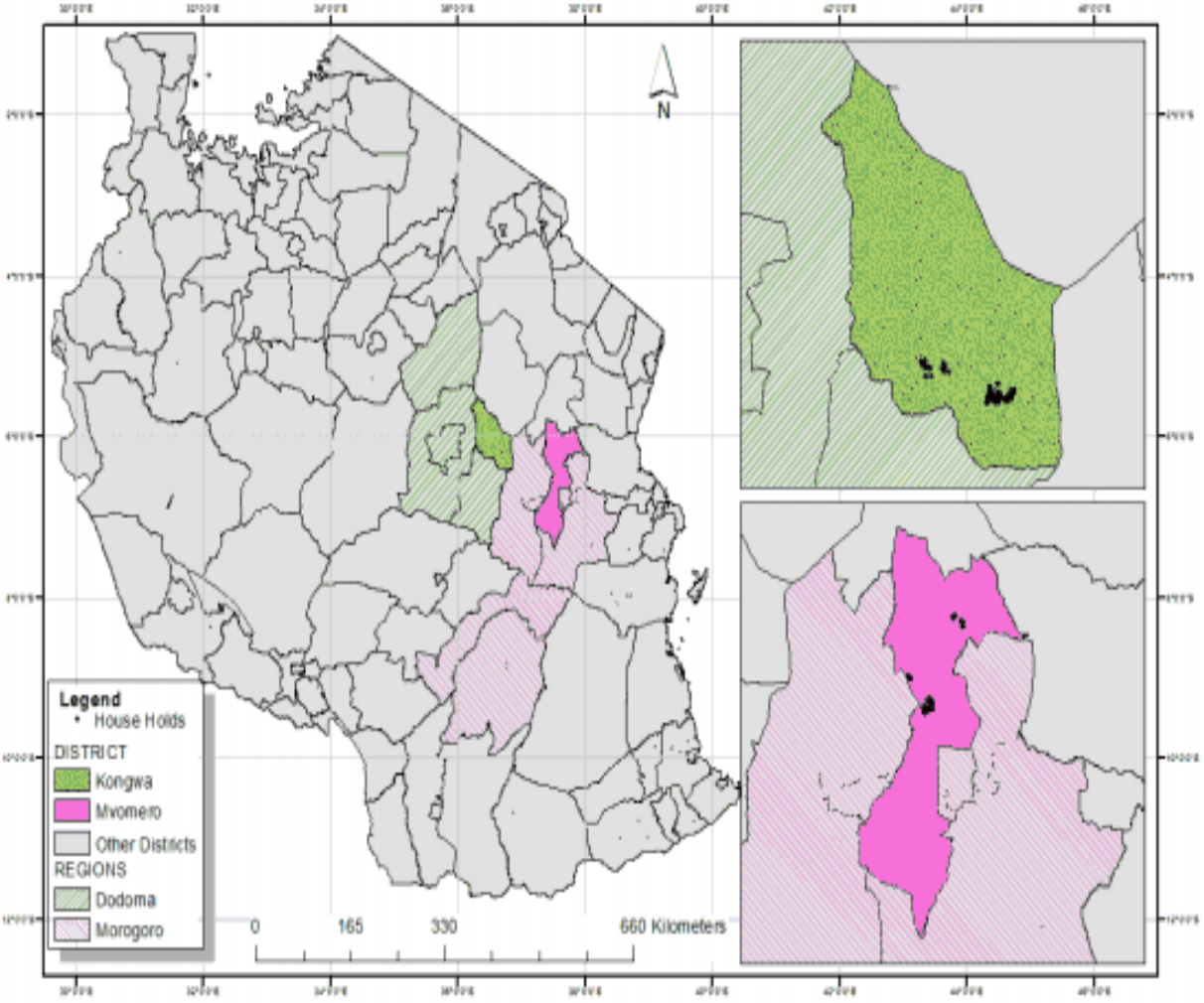
## Appendix

### Appendix A: Map of Study Districts: Kongwa and Mvomero




Source: CGP Tanzania

## Appendix B: Asset index

### Appendix B1 – Household asset weights and age adjustments factors

| Asset *(g)* | Weight of asset *(wg)* | Age (adjustment for age shown in cell) (∝) | | |
|---|---|---|---|---|
| | | **< 3 yrs. old** | **3 – 7 yrs. old** | **> 7 yrs. old** |
| **Animal** | | **Calves** | **Immature male / Heifer** | **Bull / Cow** |
| Cattle | 10 | × 0.4 | × 0.8 | × 1 |
| Sheep/goats | 3 | No adjustment | | |
| Poultry | 1 | | | |
| Pigs | 2 | | | |
| Sheep/goats | 3 | | | |
| **Domestic assets** | | **< 3 yrs. old** | **3 – 7 yrs. old** | **> 7 yrs. old** |
| Cooker | 2 | x 1 | x 0.8 | x 5 |
| Kitchen cupboard | 2 | | | |
| Refrigerator | 4 | | | |
| Radio | 2 | | | |
| Television | 4 | | | |
| DVD player | 4 | | | |
| Cell phone | 3 | | | |
| Chairs | 1 | | | |
| Mosquito nets | 1 | | | |
| Gas stove | 2 | | | |
| **Transport** | | **< 3 yrs. old** | **3 – 7 yrs. old** | **> 7 yrs. old** |
| Car/truck | 160 | x 1 | x 0.8 | x 5 |
| Motorcycle | 48 | | | |
| Bicycle | 6 | | | |
| Cart (animal drawn) | 12 | | | |
| **Productive** | | **< 3 yrs. old** | **3 – 7 yrs. old** | **> 7 yrs. old** |
| Hoes | 1 | x 1 | x 0.8 | x 5 |
| Spades/shovels | 1 | | | |
| Ploughs | 4 | | | |
| Treadle pump | 6 | | | |
| Powered pump | 12 | | | |
| Sewing machine | 4 | | | |

Source: Adapted from Agricultural Development Outcome indicators, 2010

## Appendix B2 – Asset categories

| Portion A: Hideable vs. Non-hideable assets | | | Portion B: Consumptive vs. Productive assets | |
|---|---|---|---|---|
| **Hideable assets** | **Non-hideable assets** | | **Consumptive assets** | **Productive asset** |
| Wood/metallic bed | Bicycle | | Wood/metallic bed | Bicycle |
| Chair | Car/truck | | Chair | Car/truck |
| Cooker/Gas stove | cart(animal drawn) | | Cooker/Gas stove | cart(animal drawn) |
| DVD player | Motorcycle | | DVD player | Motorcycle |
| Hoe | Plough | | Mobile phone | Plough |
| Mobile phone | Refrigerator | | Mosquito net | Seeder |
| Mosquito net | Seeder | | Radio | Sprayer pump |
| Panga | Sewing Machine | | Sofa set | Tractor |
| Radio | Sprayer pump | | Table | Water pump |
| Sofa set | Tractor | | Television | Water tank |
| Spades/shovel | Water pump | | Refrigerator | Weeder |
| Table | Water tank | | Sewing Machine | wheel barrow |
| Television | Weeder | | | hoe |
| axe | wheel barrow | | | panga |
| Bush knife | | | | spade/shovel |
| Hengo | | | | axe |
| Mattock | | | | Bush knife |
| | | | | Hengo |
| | | | | Mattock |

## Appendix B3 - BMGF asset analysis

*Appendix B3.a -Total household asset index*

The BMGF method helps to make adjustments for the age of the asset for comparison purposes. To compute an asset index using this method, household physical assets are assigned weights and then depreciated over years the assets were held (See Appendix B1 - weights and age adjustments for some asset types). For example according to BMGF, motorbikes are assigned a weight of 48 each, and the hoe is assigned a weight of 1. This in a way implies that a motor bike is 48 times more useful than a hoe. Also, any asset held for 3-7 years had its weight depreciated by an age adjusting factor of 0.8 (i.e. multiplied by 0.8). Therefore to compute my

household's total physical asset index, I multiply the number of each type of physical assets by its assigned weight and by the depreciation value. As such, a household with 2 motorbikes and a hoe that have been held for 5 years will have its physical asset index computed as follow;

$$Total\ motorbike\ asset\ index = (2 * 48 * 0.8) = 76.8$$
$$Total\ hoe\ asset\ index = (1 * 1 * 0.8) = 0.8$$
$$Total\ household\ physical\ asset\ index = 77.6$$

Therefore that generic formula suggested by BMGF is

$$Household\ Domestic\ Asset\ Index = \sum_{g=1}^{G}\left[\sum_{i=1}^{N}\left(w_{gi} \times \propto\right)\right]$$
$$i = 1,2,\ldots.,N; g = 1,2,\ldots.,G$$

Where, $w_{gi}$ = weight of the i'th item of asset g, N = number of asset g owned by household, $\propto=$ age adjustment to weight, G = number of assets owned by household. In table 4.2 above, I show that there are some households in my data with no measured physical assets. Also the maximum household index is 658.2 whereas the mean asset index is 31.14.

*Appendix B3.b - Productive asset index*

Using the BMGF formula, I compute the household productive asset index as the proportion of age and weight adjusted household's physical assets that are considered as productive assets. These assets, considered as productive assets can also be thought of as risk reducing productive assets because their availability and usage can help households to take advantage of uncertainty and risks associated with production while easing up productivity efforts. Refer to Appendix B3a for steps to compute asset indices and also see Appendix B1 for weights and age adjustments for some asset types. However, to construct household productive asset index I group assets into productive assets and consumptive assets (See portion B of

Appendix B2). Then I compute household productive asset index using the formula suggested by BMGF.

**Appendix C: Random effects**

| VARIABLES | Weeding Effort Model | Crop Yield Model |
|---|---|---|
| Constant | 1.326*** | 5.779*** |
| | (0.224) | (0.254) |
| **Household Types** | | |
| $Family\ gifting\ households_h$ | -0.211* | -0.173 |
| | (0.124) | (0.137) |
| $Nonfamily\ gifting\ households_h$ | -0.0135 | 0.340** |
| | (0.128) | (0.136) |
| **Production inputs/ investment** | | |
| $Fertilizer_h$ | -0.0436 | 0.0381 |
| | (0.120) | (0.135) |
| $Pesticide_h$ | | 0.720*** |
| | | (0.199) |
| $Improve\ variety_h$ | | -0.103 |
| | | (0.101) |
| **Household socio-economic and demographic characteristics** | | |
| $Gender\ head_h$ | -0.104 | 0.247** |
| | (0.0906) | (0.103) |
| $Age\ head_h$ | 0.00630*** | -0.00507* |
| | (0.00243) | (0.00273) |
| $Household\ Size_h$ | -0.0739*** | -0.0126 |
| | (0.0141) | (0.0154) |
| $Dependency\ ratio_h$ | 0.0335 | -0.0255 |
| | (0.0380) | (0.0437) |
| $Productive\ Asset\ Index_h$ | -0.00173*** | -0.000771 |
| | (0.000637) | (0.000695) |
| $Education\ head_h$ (reference village: No formal education) | | |
| Primary Education | -0.0367 | -0.0155 |
| | (0.0782) | (0.0877) |
| Secondary or Higher Education | 0.0407 | -0.537** |
| | (0.211) | (0.224) |
| **Location, crop, & plot fixed effects** | | |
| $District\ dummy_h$ (1=Mvomero) | 0.00767 | 1.322*** |
| | (0.197) | (0.217) |
| $Village\ dummies_h$ (reference village: Mautya) | | |
| Kunke | 0.419*** | -0.576*** |
| | (0.116) | (0.130) |
| Wamiluhindo | 0.0774 | -0.640*** |
| | (0.200) | (0.212) |
| Mlumbilo | 0.183 | -0.223 |
| | (0.199) | (0.211) |
| Milama | -0.0966 | -0.0554 |
| | (0.181) | (0.199) |
| Ihanda | -0.0832 | 0.187 |

| | | |
|---|---|---|
| | (0.181) | (0.193) |
| Masinyeti | 0 | 0 |
| | (0) | (0) |
| Msingisa | -0.00784 | 0.906*** |
| | (0.229) | (0.246) |
| $Crop\ dummies_h$ (reference crop: Maize) | | |
| Beans | 1.180** | -0.952 |
| | (0.597) | (0.995) |
| Cassava | 1.268*** | -0.261 |
| | (0.181) | (0.228) |
| Sweet Potato | 1.608*** | -1.479*** |
| | (0.415) | (0.493) |
| Sorghum | -0.0646 | -0.222* |
| | (0.103) | (0.130) |
| Pear Millet | 0.0155 | 0.0825 |
| | (0.122) | (0.154) |
| Sunflower | -0.0967 | -0.615*** |
| | (0.127) | (0.159) |
| Sesame | -0.451* | -1.059*** |
| | (0.231) | (0.279) |
| Rice | 0.0453 | 0.204 |
| | (0.101) | (0.128) |
| Ground nuts | 0.0844 | -0.313 |
| | (0.245) | (0.328) |
| Other Crops | 0.319 | -1.535*** |
| | (0.219) | (0.276) |
| $Plot\ dummies_h$ | | |
| Plot 1 | 0.159** | 0.0164 |
| | (0.0749) | (0.0956) |
| Plot 2 | 0.274** | 0.204 |
| | (0.124) | (0.154) |
| Plot 3 | 0.823*** | -0.437* |
| | (0.202) | (0.245) |
| Plot 4 | 0.305 | 0.299 |
| | (0.364) | (0.440) |
| Sigma u | 0.428*** | |
| | (0.0443) | |
| Sigma e | 0.739*** | |
| | (0.0270) | |
| Observations | 787 | 702 |
| Number of households | 463 | 431 |
| R-squared | | |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Household code* _____

## Appendix D: CGP-Tanzania Household Baseline Survey Questionnaire[14]

# CGP- TANZANIA HOUSEHOLD BASELINE SURVEY

**CGP-Tanzania: Utafiti wa Taarifa za Msingi za Kaya**

Mradi wa Mazao ya chakula na Mbuzi (**CGP**) Tanzania **unahusu kuboresha fursa ya uhakika wa chakula katika kaya kupitia uanzishwaji wa mradi wa mbuzi wa maziwa na uboreshwaji wa mazao ya mizizi katika vijiji vine mkoani Dodoma na Morogoro**. Mradi unatekelezwa na Chuo Kikuu cha Sokoine cha Kilimo, Morogoro ambacho kitafanya utafiti katika kaya ambao utaisaidia kujua hali halisi ya shughuli mbalimbali katika kaya na jinsi gani Mradi huu unaweza kusaidia kuimarisha uhakika wa chakula.

Ushiriki wa kaya katika utafiti huu ni wa kujitolea na hakuna atayelazimishwa kushiriki. Kaya zitakazoshiriki katika utafiti huu zitachaguliwa kwa njia ya bahati na sibu kutoka katika kundi kubwa la wanakijiji. Kama unakubali kushiriki tunakuomba pia ushiriki wako katika tafiti tatu zijazo zinazohusu mradi huu ndani ya miaka mitatu na nusu ijayo. Dodoso hili na nyingine zijazo kila moja inachukua **muda wa takribani masaa mawili**. Katika hatua hii ya **kwanza, takribani kaya 120 toka kijiji hiki zitashiriki katika utafiti huu**. Miezi michache ijayo tutachagua kaya 36 kwa njia ya bahati nasibu pia kushiriki katika awamu ya pili ya utafiti. Kaya hizi 36 zitapokea mbuzi wa maziwa na misaada mingine kutoka katika mradi.

Japo umekubali kushiriki katika mradi huu kwa muda huu, lakini una uhuru wa kujitoa katika muda wowote. Ila kumbuka kuwa ukijitoa hautaweza kushiriki katika awamu ya pili ambayo baadhi ya kaya watapatiwa mbuzi wa maziwa na misaada mingine. **Ukihitaji kujitoa kutoka katika mradi huu, tafadhali wasiliana na wafanyakazi wa mradi huu, na wao wataondoa jina lako kutoka kumbukumbu zetu za kaya zinazoshiriki na kaya nyingine itaingizwa badala yako**.

**Je kwa maelezo haya, unaweza kushiriki katika mradi huu?** Kama ndiyo, kumbuka kuwa hakuna jibu sahihi wala si sahihi wakati wa kujaza dodoso. Tafadhali jibu kwa uhuru kabisa kwasababu majibu yako yote yatatunzwa kwa siri kubwa. Kamahujisikii huru kwa shwali lolote ulililoulizwa, tafadhali mfahamishe mdodosaji ili aliache na kuendela na swali linalofuatia. Mradi huu unataraji kukushirikisha katika matokeo ya mradi huu kwa kupitia mikutano ya mradi na siku za maonyesho ya wakulima. Kama una swali au maoni yoyote kuhusu mradi huu, tafadhali usisite kuwasiliana na mghani aliye karibu nawe ambae anashiriki katika mradi huu**. Je una swali lolote kuhusu mradi huu kabla hatujaanza?**

| | | | | | | |
|---|---|---|---|---|---|---|
| Date of Survey (DD/MM/YYYY) : | / / | | | | | |
| Enumerator Name : | | | | | | |
| Head of Household Name : | | | | | | |
| Did the household consent to the interview? (0= NO; 1=YES) | [ ] | | | | | |
| If no, why? (code a) | | | | | | |
| ***If no, request a replacement household from supervisor (and continue with this questionnaire)*** | | | | | | |
| Time interview started : | HH: | | MM: | | Common currency unit: | **TSH** |
| Time interview ended : | HH: | | MM: | | | |
| | | | | | | |
| District Name : | | | | | District Code: | |
| Village Name : | | | | | Village Code: | |
| Sub village Name | | | | | Sub Village code | |
| Name of survey Respondent : | | | | | HH ID | |
| Relationship of survey respondent to Household Head (code b) : | | | | | | |
| Household GPS waypoint: | | | | | | |
| Main Household Code (AABCCC)*: | | | | | | |
| AA = District, B= Village, CCC = Household | | | | | | |

| **a) No Consent** | **b) Respondent relationship** |
|---|---|
| 1 = Respondent refuses to participate | 1 = household head |
| 2 = Respondent does not have the time | 2 = wife / spouse |
| 3 = Household head (or other knowledgeable members) is not present at the house | 3 = other family member |
| 4 = Other: (specify in cell) | 4 = other non-family member |

Household code* _____

# 1 GENERAL HOUSEHOLD INFORMATION

## 1.1 HOUSEHOLD MEMBERS AND OTHER HOUSEHOLD CHARACTERISTICS

### 1.1.1 Inventory of household members

***Enumerator note:*** *Start with the household head, followed by his wife or wives, children (ranked from old to young) and lastly other household members – include only members who live there at least 3 months per year*

| HH ID | Name | Relationship to HH head **(code a)** | Gender (1 = Male 2 = Female) | Age (completed years) | Highest level of education **(code b)** | Primary activity **(code c)** | Home occupancy **(code d)** |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
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| 14 | | | | | | | |
| 15 | | | | | | | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | | | | | | |
| 20 | | | | | | | |

| **a) RELATIONSHIP TO HEAD** | **b) HIGHEST LEVEL OF EDUCATION** | **c) PRIMARY ACTIVITY** |
|---|---|---|
| 1 = Head<br>2 = Spouse<br>3 = Child<br>4 = Sibling (sister or brother)<br>5 = Parent<br>6 = Grandchild<br>7 = Other relative<br>8 = Non-relative (including employees who live in house)<br>9 = Other (specify) | 0=No formal and illiterate<br>1=No formal but literate<br>2 = Primary school not completed<br>3= Completed primary school<br>4= High / secondary school<br>5 = College<br>6= University<br>7= Infant (<6 years)<br>8 = Other (specify)<br>**d) HOME OCCUPANCY**<br>1= Permanently resident<br>2= Sometimes away (< 3 months/year away) 3= Frequently away (3 – 9 months/year away) 4 = Mostly away (Away for more than 9 months) | 1 = Crop farming<br>2 = Livestock & poultry keeping (including sales)<br>3 = Trading in livestock and livestock products (not own)<br>4 = Trading in agricultural products (excluding livestock!) (not own produce)<br>5 = Formal salaried employee (e.g. civil servant, domestic work)<br>6 = Business – trade / services (non-agric.)<br>7 = Not working / unemployed<br>8 = Old/Retired<br>9 = Infant (<6 years)<br>10 = Student/ pupil<br>11 = Disabled<br>12 = Other (specify) |

Household code* _____

# 2 ASSET, LIVESTOCK, HOME, HOUSEHOLD AND LAND OWNERSHIP

## 2.1 ASSET OWNERSHIP

2.1.1 How many of the following assets do you own and who owns them?

| Name of Asset | Total Number owned | How long have you owned the asset (number in this age group)* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Owned by men | | | Owned by women | | | Owned jointly | | |
| | | < 3 yrs | 3-7 yrs | > 7 yrs | < 3 yrs | 3-7 yrs | > 7 yrs | < 3 yrs | 3-7 yrs | > 7 yrs |
| **Domestic** | | | | | | | | | | |
| Cooker/ Gas Stove | | | | | | | | | | |
| Refrigerator | | | | | | | | | | |
| Radio | | | | | | | | | | |
| Television | | | | | | | | | | |
| DVD Player | | | | | | | | | | |
| Mobile phone | | | | | | | | | | |
| Sofa set | | | | | | | | | | |
| Sewing Machine | | | | | | | | | | |
| Mosquito nets | | | | | | | | | | |
| Water tanks | | | | | | | | | | |
| Wood/metallic bed | | | | | | | | | | |
| Chairs | | | | | | | | | | |
| Tables | | | | | | | | | | |
| **Transport** | | | | | | | | | | |
| Car/Truck | | | | | | | | | | |
| Motorcycle | | | | | | | | | | |
| Bicycle | | | | | | | | | | |
| Cart (Animal drawn) | | | | | | | | | | |
| **Farm** | | | | | | | | | | |
| Hoes | | | | | | | | | | |
| Spades/shovel | | | | | | | | | | |
| Ploughs | | | | | | | | | | |
| Sprayer pump | | | | | | | | | | |
| Water pump | | | | | | | | | | |
| Tractor | | | | | | | | | | |
| Power tiller | | | | | | | | | | |
| Wheel barrow | | | | | | | | | | |
| Weeder | | | | | | | | | | |
| Seeder | | | | | | | | | | |
| Panga | | | | | | | | | | |
| **Other*** | | | | | | | | | | |
| Other | | | | | | | | | | |

* ***Enumerator activity:*** *If possible, under other please prompt the respondent for other assets such as computer, digital camera, bus, water pipe, lantern, irrigation pump*

## 2.2 HOME OWNERSHIP

**Enumerator activity:** If possible, observe the materials rather than asking the farmer.)

2.2.1 What type of main house does the household have and who owns it?

| House ownership **(code a)** | If owned, who owns (code b) | Number of rooms | Floor material **(Code c)** | Wall material **(code d)** | Roofing material **(code e)** |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| **a) Home ownership** | | **b)Who owns** | **c) Floor material** | **d)Wall material** | **e)Roofing material** |
| 1 = Owned<br>2 = Rented<br>3 = Borrowed<br>4 = Other (specify) | | 1=Household head<br>2=Spouse<br>3= Head & spouse jointly<br>4=Other male hh member 5=Other female hh member 6=Other (specify) | 1= earth<br>2= cement<br>3= tiles<br>4 = Other (specify) | 1= earth/mud<br>2= wood/bamboo/iron sheets<br>3= cement/bricks<br>4 = timber<br>5 = stone<br>6 = Other (specify) | 1= thatch grass / palm<br>2= iron sheets/ tin / asbestos<br>3= tiles<br>4 = concrete<br>5 = Other (specify) |

## 2.3 LIVESTOCK OWNED BY THE HOUSEHOLD

2.3.1 Does your household have any livestock (0 = No, 1 = Yes)? | If no to 2.3.1 Please go to 2.4

2.3.2 Inventory of all livestock ownership

| **Livestock Species** | | | Number owned by the household (total) | Number owned by male | Number owned by female | Number owned jointly |
|---|---|---|---|---|---|---|
| **Cattle** | Local | Adult Bull | | | | |
| | | Adult cow | | | | |
| | | Calves | | | | |
| | Cross/ exotic* | Adult Bull | | | | |
| | | Adult Cow | | | | |
| | | Calves | | | | |
| **Goats** | Local | Adult goat | | | | |
| | | Grower/ Kids | | | | |
| | Cross exotic | Adult Dairy | | | | |
| | | Adult meat | | | | |
| | | Grower/Kids | | | | |
| **Sheep** | Local | | | | | |
| | Cross/ exotic | | | | | |
| **Chicken** | Local | | | | | |
| | Cross/ exotic | | | | | |
| **Pig** | Local | | | | | |
| | Cross/ exotic | | | | | |
| **Donkeys** | | | | | | |
| **Rabbits** | | | | | | |
| **Other, specify** | | | | | | |
| | | | | | | |

## 2.4 LAND OWNERSHIP AND USE

2.4.1 How much land does the household own? [_____]

| Plot* ID | Plot Location (Description and name) | Size of this plot | Unit of land **(Code a)** | Tenure system **(Code b)** | If plot **is *owned,*** who owns **(Code c)** | What is this land mainly used for? **(code d)** |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| **a)Unit of land** | | **b)Tenure system** | | | **c)If owned, name on title/certificate:** | **d) Main use of the land** |
| 1= acre<br>2= ha<br>3= sqm$^2$<br>4= other, specify conversion in metric system | | 1= Title deed<br>2= Owned but not titled<br>3= public land<br>4= Rented-in/ sharecropped<br>5=Other (specify) | | | 1=Household head<br>2=Spouse<br>3= Head & spouse jointly<br>4=Other male hh member<br>5=Other female hh member<br>6=Other (specify) | 1=Crop cultivation<br>2=Fodder cultivation<br>3=Homestead<br>4=Grazing<br>5=Woodlot<br>6=Other (Specify) |

2.4.2 In the last cropping season **(November 2010 – May 2011)**:

| | Area | Unit **(Code a)** |
|---|---|---|
| How much land did you cultivate under crops? | | |
| How much land did you cultivate under fodder? | | |
| How much land did you rent in? | | |
| How much land did you rent out? | | |
| How much land did you leave uncultivated for grazing? | | |
| How much land did you leave uncultivated for other reasons? | | |
| Did you use communal grazing land during the last cropping season? **(0=no, 1=yes)** | | |
| **a) Unit of land:** 1= acre , 2= ha , 3= sqm$^2$ , 4= other, specify conversion in metric system | | |

Household code* _____

# 3 CROP PRODUCTION

## 3.1 GENERAL CROP PRODUCTION

3.1.1 In the last season, what crops did you grow?

| Plot ID | Crop name **(Code a)** | Size of plot used for this crop and unit of land | Cropping system **(Code b)** | Did you use improved variety? **(0= No, 1= Yes)** | Did you use row planting, **(0= No, 1= Yes)** | Seed planting material | | | | Production/output | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Quantity of planting material | Unit **(code c)** | Source of seed /planting material **(code d)** | If purchased, amount spent (Tsh) | Quantity produced | Unit | Quantity sold | Quantity consumed /given away | Quantity remaining |
| | | | | | | | | | | | | | | |
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| **a)crop codes** | b) **cropping system** | **c) Unit code:** | **d)Source of seed, planting material** |
|---|---|---|---|
| 1=Maize, 2=Beans, 3=Cassava, 4=Sweet potatoes, 5=Sorghum 6= Pear Millet (Uwele), 7= Sunflower, 8 = Sesame (Simsim) 9 = Sugarcane 10 = Rice, 11 = groundnuts (Karanga), 12 = (Other Specify) | 1 = Pure stand ( mono cropping)<br>2 = Intercropping ( two crops)<br>3 = Mixed cropping ( more than two crops)<br>4 = Other Specify) | 1=Kg , 2=10 Kg bucket, 3=20 Kg bucket 4=50Kg bag, 5=Ox cart, 6=Medium tubers, 7=Large tubers 8=Hand size bunch, 9=Arm size bunch 10 = small Bundle (up to 20 cuttings) 11 = Large bundle (above 20 cuttings), 12 = Other specify | 1 = Bought, 2 = Saved from own harvest, 3 = Given by nongovernmental organization (NGO), 4 = Given by government, 5 = Given by farmer organization/CBO, 6 = Given by the trader, 7 = Given by a friend/relative, 8 = Other specify |

3.1.2 In the last planting season (November 2010 – May 2011):, how much input did you use?

***Enumerator note:*** *Use the same order for plots and crops as 3.1.1 above*

| Plot ID | Crop name | Is your crop intercropped **(0= No, 1= Yes)** | Land preparation and weeding | | | | | Use of fertilizers | | | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Land preparation method **(code a)** | Cost of land preparation including hiring labor (Tsh) | Number of times weeding is conducted | Total cost of hired labor for weeding (Tsh) | Total Cost of hired labor for other activities (Tsh) | Did you use fertilizer /manure? 0=No, 1=Yes | If yes, type of fertilizer /manure used **(code b)** | Source of fertilizer **(code c)** | If purchased, total cost (TSh) | Did you use pesticides /other chemicals? **0=No, 1=Yes** | If yes, total cost (Tsh) |
| | | | | | | | | | | | | | |
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| **a) Land preparation method:** | **b) Type of fertilizer/ manure:** | **c) Source of fertilizer /manure** |
|---|---|---|
| 1= Hand hoe 2 = Oxen, 3 = Tractor/mechanized, 4 = Chemical, 5 = Slash and burn, 6 = power tiller, 7 = Other (Specify) | 1 = NPK, 2 = Urea, 3 = CAN, 4 = SSP, 5 = Ammonium Phosphate, 6 = DAP, 7 = Green manure, 8=Animal manure, 9=Compost manure 10=Other (specify) | 1=Purchase, 2=From own farm 3=From neighbor/ friends 4=From government /nongovernmental organization (NGO) 5=Other (specify): |

### 3.2 CASSAVA PRODUCTION AND MANAGEMENT PRACTICES

3.2.1 Have you grown cassava in the last five years? [_____] (0=no, 1=yes)

3.2.2 If no, why not? [_____]_____

If no go to 3.3

3.2.3 If Yes to 3.2.1, in which year did you start growing cassava? [_____]

3.2.4 Which are the common varieties of cassava you grow and why?

*Enumerator note: List from the most preferred.*

| No. | Variety **(Code a)** | Year first grown | Reasons for preferring variety (code b) |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| **a)Cassava varieties** | | | **b)reasons for preferring /growing varieties** |
| 1= Kibanga Meno, 2= Agriculture, 3 = Kigoma, 4 = Mponyamkiwa, 5 = Japan, 6 = Kaniki, 7 = kazungu/Canada, 8 = kipera, 9 = Kigogo/Makawea, 10 = Mhogo Mweupe, 11 = Kibongoto, 12 = Other specify | | | 1=High yielding, 2= Resistant to pests and diseases, 3= Good Taste 4=Keeps longer in the soil, 5 = early maturing varieties, 6 = Others (Specify) |

3.2.5 Have you experienced any diseases/pests on your Cassava crop? [_____] (0=no, 1=yes)

If no go to 3.2.7

3.2.6 If yes to 3.2.5, name the disease(s)/pest(s), the year you first experienced it/them and the effect of the disease/pest?

| Pest, diseases symptom code **(code a)** | Year first experienced | Effect (Importance) of the disease/pests on yield reduction **(code b)** |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| **a)Pest /diseases** | | **b) Importance** |
| 1 = Cassava Mosaic disease (batobato), 2 =Cassava brown streak disease (Michirizi ya kahawia), 3 = White fly (Inzi mweupe), 4 = Mealy bug (Vidungato), 5 = Others (Specify) | | 1=not at all important, 2=somewhat important, 3=very important |

3.2.7 What are the alternative ways you utilize cassava in your household?

| Alternative use | (a) Do you utilise cassava in your household this way? (0= No, 1= Yes) | (b) How often do you utilise it? (Number of meals/week) | (c) Quantities utilised per /week in household | Unit code a |
|---|---|---|---|---|
| Boiling | | | | |
| Flour | | | | |
| Dry cassava chips used to prepare food | | | | |
| Blending dry/wet cassava with other crops | | | | |
| mixing cassava and maize flour | | | | |
| Cooking cassava leaves, | | | | |
| animal feed | | | | |
| others (Specify) | | | | |
| **a) Unit code** | | | | |
| 1=Kg , 2=10 Kg bucket, 3=20 Kg bucket, 4=50Kg bag, 5=Ox cart, 6=Medium tubers, 7=Large tubers 8=Hand size bunch, 9=Arm size bunch 10 = small Bundle (up to 20 cuttings) 11 = Large bundle (above 20 cuttings), 12 = Other specify | | | | |

3.2.8 Use of cassava post harvest management and processing technologies

| Post harvest management Technology | (a) Are you aware of this technology? **(0= No, 1= Yes)** | (b) Do you know this technology **(0= No, 1= Yes)** | (d) Where did you learn about the technology? **(code a)** | (c) Have you ever used this technology **(0= No, 1= Yes)** | (e) Year when you first used this technology? | (f) Did you use this technology this year **(2010/11)**? | (g)Why or why technology not used this year? **(code b)** |
|---|---|---|---|---|---|---|---|
| Grating | | | | | | | |
| Chipping | | | | | | | |
| Pressing | | | | | | | |
| Solar drying | | | | | | | |
| Waste management* | | | | | | | |
| Other (Specify) | | | | | | | |
| **a) Source of information on technologies:** | | | | **b) Reasons for not using technology** | | | |
| 1=Government extension, 2=NGOs, 3= other farmers, 4=Agro dealer, 5=others (specify) | | | | 1=Not aware of technology, 2=technology too expensive 3= labor shortage 4=other (specify) | | | |

* Waste management: the method in which cassava peels/effluent from the dewatered roots is disposed to get rid of the cyanide.

### 3.3 SWEET POTATO PRODUCTION AND MANAGEMENT PRACTICES

3.3.1 Have you grown sweet potatoes in the last five years? [_____] (0=no, 1=yes)

3.3.2 If no, why not? [_____]

If **no go to 3.3.8**

3.3.3 If Yes to 3.3.1, in which year did you start growing sweet potatoes? [_____]

3.3.4 Which are the common varieties of sweet potatoes you grow and why?

*Enumerator note: List from the most preferred.*

| No. | Variety **(code a)** | Year first grown | Reasons for preferring variety **(code b)** |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| **a)Sweet potato varieties** | | | **b) Reasons for preferring /growing varieties** |
| 1= Morogoro, 2= Hali ya Mtumwa, 3 = Shangazi 4 = Yebo Yebo, 5 = Kasinia, 6 = Dundugala, 7 = Gairo, 8 = Sindano, 9 = Other specify | | | 1=High yielding, 2= Resistant to pests and diseases, 3= Good Taste 4=Keeps longer in the soil, 5= early maturing variety, 6 = Others (Specify) |

3.3.5 Have you experienced any diseases/pests on the sweet potato crop? [_____] (0=no, 1=yes)

If **No go to 3.3.7**

3.3.6 If **yes to 3.3.5**, name the disease(s)/pest(s), the year you first experienced it/them and importance of the disease or pest?

| Pest, diseases symptom code **(code a)** | Year first experienced | Effect (Importance) of the disease/pests on yield reduction **(code b)** |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| **a)Pest /diseases** 1=Weevil (Bungua), 2=Sweet Potato Mosaic (Majani kunjikuchunja) | **b) Importance** : 1=not at all important, 2=somewhat important, 3=very important | |

3.3.7 What are the alternative ways you utilize sweet potatoes in your household?

| Alternative use | (a) Do you utilise sweet potatoes at your household this way? (0 = No, 1 = Yes) | (b) How often do you utilise it? (Number of meals/week) | (c) Quantities utilised per /week in household | Unit code a |
|---|---|---|---|---|
| Boiling | | | | |
| Dry sweet potato chips | | | | |
| Blending dry/wet sweet potatoes | | | | |
| Cook sweet potato leaves | | | | |
| Others ( Specify) | | | | |
| **Unit code a:** 1=Kg , 2=10 Kg bucket, 3=20 Kg bucket, 4=50Kg bag, 5=Ox cart, 6=Medium tubers, 7=Large tubers 8=Hand size bunch, 9=Arm size bunch 10 = small Bundle (up to 20 cuttings) 11 = Large bundle (above 20 cuttings, 12 = others (Specify) | | | | |

3.3.8 **ROOT CROP SALES:** In the last 3 months, have you or a household member ***sold*** any cassava or sweet potatoes for cash? [ ] (0=No, 1=Yes)

IF YES to 3.3.8, FILL TABLE 3.3.9 for each sale, IF NO, GO TO 3.3.10 (to buy section).

3.3.9 For each root crop sale fill in table 3.3.9 (1 row per sale)

| | | Type of root crop variety sold **(Check codes 3.2.4, 3.3.4)** | Reason for selling **(code a)** | Sold to **(code b)** | ID number of "Sold by" | Who received control of the money that arose from the sale **(code c)** | Where sold **(code d)** | Time for the seller to travel to location of sale **(specify minutes, hours)** | Distance from home to location of sale **(Km)** | Transport mode to location of sale **(code e)** | Transport cost (TSh) | Time spent waiting for sale at location of sale **(specify minutes, hours)** | Other type of marketing costs (TSh), e.g. license for market stall) | Sale price received (TSh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cassava | Sale 1 | | | | | | | | | | | | | |
| | Sale 2 | | | | | | | | | | | | | |
| | Sale 3 | | | | | | | | | | | | | |
| | Sale 4 | | | | | | | | | | | | | |
| | Sale 5 | | | | | | | | | | | | | |
| | Sale 6 | | | | | | | | | | | | | |
| Sweet potatoes | Sale 1 | | | | | | | | | | | | | |
| | Sale 2 | | | | | | | | | | | | | |
| | Sale 3 | | | | | | | | | | | | | |
| | Sale 4 | | | | | | | | | | | | | |
| | Sale 5 | | | | | | | | | | | | | |
| | Sale 6 | | | | | | | | | | | | | |

| **a) Reasons for selling (indicate all applicable)** | **b) Sold to** | **c) Control of money** | **d) Where sold** | **e) Transportation mode** |
|---|---|---|---|---|
| 1=To meet planned household expenses 2=To meet emergency household expenses<br>3=To provide income for household purchases<br>4=Vegetable trading as a business<br>5=Other (specify) | 1= Parents of household member<br>2= Children of household member<br>3=Close Family of household member (e.g. Uncle or Aunt)<br>4=Friends and extended family<br>5=Casual Acquaintance<br>6=Stranger, 7=Others (specify | 1=Household head<br>2=Spouse<br>3= Head & spouse jointly<br>4=Other male hh member, 5=Other female hh member,<br>6=Other (specify) | 1= Farm gate<br>2 = Door step<br>3 = village market in your village<br>4= market outside village<br>5 = Middle man<br>6 = Other (Specify) | 1) walking<br>2) bicycle<br>3) bus<br>4) motorcycle<br>5) Ox cart<br>6) power tiller<br>7) Other (specify) |

Household code* _____

3.3.10 **ROOT CROP PURCHASES**: In the last 3 months, have you or a household member ***bought*** any cassava or sweet potatoes with cash? [ ] (0=No, 1=Yes)

IF YES, FILL TABLE 3.3.11 for each purchase; IF NO, GO TO 3.3.12 (to non-cash section)

3.3.11 For each root crop bought fill in table 3.3.11(1 row per sale)

| | | Type of root crop variety bought **(Check code a in 3.2.4, 3.3.4)** | Reason for buying **(code a)** | Bought from **(code b)** | ID number of bought by | Where bought **(code c)** | Time for the buyer to travel to location of sale **(specify minutes, hours)** | Distance from home to location of sale **(Km)** | Transport mode to location of sale **(code d)** | Transport cost **(TShs)** | Time spent waiting for sale at the location of the sale (Specify minutes and hours) | Quantity bought | Unit **(Code e)** | Buying price paid **(TSh/unit)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cassava | Buy 1 | | | | | | | | | | | | | |
| | Buy 2 | | | | | | | | | | | | | |
| | Buy 3 | | | | | | | | | | | | | |
| | Buy 4 | | | | | | | | | | | | | |
| | Buy 5 | | | | | | | | | | | | | |
| | Buy 6 | | | | | | | | | | | | | |
| Sweet potatoes | Buy 1 | | | | | | | | | | | | | |
| | Buy 2 | | | | | | | | | | | | | |
| | Buy 3 | | | | | | | | | | | | | |
| | Buy 4 | | | | | | | | | | | | | |
| | Buy 5 | | | | | | | | | | | | | |
| | Buy 6 | | | | | | | | | | | | | |

| **a) Reasons for buying** | **b) Bought from** | **c) Where bought** | **d) Transportation mode** | **e) unit code** |
|---|---|---|---|---|
| 1=To meet planned household food consumption<br>2 = To provide to other households as gifts<br>3=Cassava and/or sweet potato trading as a business<br>4=Other (specify) | 1= Parents of household member<br>2= Children of household member<br>3=Close Family of household member (e.g. Uncle or Aunt)<br>4=Friends and extended family<br>5=Casual Acquaintance<br>6=Stranger<br>7=Others (specify | 1= Farm gate<br>2 = Door step<br>3 = Village market in your village<br>4= market outside village<br>5 = Middle man<br>6 = Other (Specify) | 1) walking<br>2) bicycle<br>3) bus<br>4) motorcycle<br>5) Ox cart<br>6) power tiller<br>7) Other (specify) | 1=Kg , 2=10 Kg bucket, 3=20 Kg bucket, 4=50Kg bag, 5=Ox cart, 6=Medium tubers, 7=Large tubers 8=Hand size bunch, 9=Arm size bunch 10 = small Bundle (up to 20 cuttings) 11 = Large bundle (above 20 cuttings, 12 = small heap (up to 3 tubers), 13 = medium heap(4 -10 tubers), 14 = large heap ( 11 - 20 tubers) 15 = others (Specify) |

3.3.12 Did you, or anyone in your household, **give** cassava or sweet potatoes to somebody in the last 3 months for which no money was received? [_____] (0=No, 1=Yes).

IF YES, FILL TABLE 3.3.13 for each donation; IF NO, GO TO 3.3.14 (to receive section)

3.3.13 For each time that cassava or sweet potatoes were **given** fill in table 3.3.13( 1 row per instance)

| | | Variety of root crops **(Check code a in 3.2.4, 3.3.4)** | Reasons for giving **(code a)** | Given to **(code b)** | Id number of "given by" | Did you, or someone else in your household, receive some goods or services in return for the root crops **(0=No, 1=Yes)** | If yes, what? specify) If Yes, what is your estimate of the value of the good or service? **(TSh)** | If you, or a household member receive something, in return for the root crops, who had control over the received good or service? **(code c)** | Where given **(code d)** | Time for the household giver to travel to place of giving **(specify minutes, hours)** | Distance from home to place of giving **(km)** | Transport mode to location of giving **(code e)** | Transport cost **(TSh)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cassava | Instance 1 | | | | | | | | | | | | |
| | Instance 2 | | | | | | | | | | | | |
| | Instance 3 | | | | | | | | | | | | |
| | Instance 4 | | | | | | | | | | | | |
| | Instance 5 | | | | | | | | | | | | |
| | Instance 6 | | | | | | | | | | | | |
| Sweet potatoes | Instance 1 | | | | | | | | | | | | |
| | Instance 2 | | | | | | | | | | | | |
| | Instance 3 | | | | | | | | | | | | |
| | Instance 4 | | | | | | | | | | | | |
| | Instance 5 | | | | | | | | | | | | |
| | Instance 6 | | | | | | | | | | | | |

| **a) Reasons for giving** | **b) Given to:** | **c) Given by / control of good or service** | **d) Where given** | **e) Transportation mode** |
|---|---|---|---|---|
| 1= Favor received in the past (specify)<br>2= Compensation for harming the receiver<br>3 = Expected future favor<br>4 = support for elderly, children or disabled<br>5 = keep good ongoing relationship with buyer/seller<br>6 = Other (specify) | 1= Parents of household member<br>2= Children of household member<br>3=Close Family of household member (e.g. Uncle or Aunt)<br>4=Friends and extended family<br>5=Casual Acquaintance<br>6=Stranger<br>7=Others (specify | 1=Household head<br>2=Spouse<br>3= Head and spouse jointly<br>4=Other male hh member<br>5=Other female hh member<br>6=Other (specify) | 1= in your village<br>2= market outside village<br>3 = Other (specify) | 1) walking<br>2) bicycle<br>3) bus<br>4) motorcycle<br>5) Ox cart<br>6) power tiller<br>7) Other (specify) |

3.3.14 Did you, or anyone in your household, **receive** cassava or sweet potatoes one or more times from somebody in the last 3 months for which no money was given? [_____] (0=No, 1=Yes)

IF YES, FILL TABLE 3.3.15 for each time; IF NO, GO TO 4

3.3.15 For each time cassava or sweet potatoes were **received** fill in table 3.3.15 (1 row per instance)

| | | Variety of root crops**(Check code 3.2.4 & 3.3.4)** | Reasons for receiving **(code a)** | Given by **(code b)** | ID number of "received by" | Did you, or or a household member , give some goods or services in return for the root crops (0=No, 1=Yes) | (if yes, what? specify) If Yes, what is your estimate of the value of the good or service? (TSh) | Where received **(code c)** | Time for the household receiver to travel to place of receiving (specify minutes, hours) | Distance from home to place of receiving (km) | Transport mode to location of receiving **(code d)** | Transport cost (TSh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cassava | Instance 1 | | | | | | | | | | | |
| | Instance 2 | | | | | | | | | | | |
| | Instance 3 | | | | | | | | | | | |
| | Instance 4 | | | | | | | | | | | |
| | Instance 5 | | | | | | | | | | | |
| | Instance 6 | | | | | | | | | | | |
| Sweet potatoes | Instance 1 | | | | | | | | | | | |
| | Instance 2 | | | | | | | | | | | |
| | Instance 3 | | | | | | | | | | | |
| | Instance 4 | | | | | | | | | | | |
| | Instance 5 | | | | | | | | | | | |
| | Instance 6 | | | | | | | | | | | |

| **a) Reasons for receiving** | **b) Given by:** | **c) where received** | **d) transportation mode** |
|---|---|---|---|
| 1= Favor received in the past (specify)<br>2= Expected future favor<br>3= Compensation for being harmed (specify)<br>4 = support for elderly, children or disabled<br>5 = keep good ongoing relationship with buyer/seller<br>6 =Other (specify) | 1= Parents of household member<br>2= Children of household member<br>3=Close Family of household member (e.g. Uncle or Aunt)<br>4=Friends and extended family<br>5=Casual Acquaintance<br>6=Stranger<br>7=Others (specify | 1= in your village<br>2= market outside village<br>3 = Other (specify) | 1) walking<br>2) bicycle<br>3) bus<br>4) Other (specify) |

Household code* _____

# 4 GOAT PRODUCTION, MANAGEMENT AND MARKETING

## 4.1 NUMBER OF GOATS OWNED AND TYPES

### 4.1.1 Number of breeds and types of goats owned by the household

| | | | | |
|---|---|---|---|---|
| Total number of goats owned ***(from Table 2.3)*** | | | | |
| Goat breeds owned : (put code or name if other) | [_____] | [_____] | [_____] | [_____] |
| Total number owned of each breed | | | | |
| Intact Males for breeding (Buck) | | | | |
| Males for other purposes (e.g. meat) | | | | |
| Females for breeding (Doe) | | | | |
| Female for other purposes (e.g. meat) | | | | |
| Kids | | | | |
| **BREEDS** | | | | |
| 1=Local (non-descript, indigenous to Tanzania), 2=Toggenburg (Exotic - milk), 3 = Norwegian 4=Anglo Nubian (exotic - milk), 5=Saanen (Exotic - milk), 6=Kamorai (Exotic meat), 7= Boar (Exotic - meat), 8= Other (specify, if crossbreed, indicate cross of x_ ) | | | | |

## 4.2 GOAT BREEDING

### 4.2.1 Goat breed preferences

| | |
|---|---|
| a) Which breed of goat do you most prefer to keep? **(code a – one type only)** | [___] (if code 8 cross enter name breed(s) below: [_____x_____] |
| b) Why do you prefer this breed? Indicate the top 3 reasons, most important first (**code b)** | [_____], [_____], [_____] |
| **a) BREED PREFERRED** | **b) REASONS FOR BREED PREFERENCE** |
| 1=Local (non-descript, indigenous to Tanzania), 2=Toggenburg (Exotic - milk), 3 = Norwegian 4=Anglo Nubian (exotic - milk), 5=Saanen (Exotic - milk), 6=Kamorai (Exotic meat), 7= Boar (Exotic - meat), 8= Other (specify, if crossbreed, indicate cross of___x_ ) | 1=High number of kids<br>2=Fast growth rate<br>3=Ready market<br>4=Easy feeding<br>5=Does not require housing<br>6=More suitable for cultural reasons<br>7=Not labour intensive<br>8 = Disease tolerance/resistance<br>9 = Drought tolerance/resistance<br>10=Other (specify) – e.g. religious sacrifice |

4.2.2 Breeding / mating strategies

| Question | Response | Codes | |
|---|---|---|---|
| a) Are you or any of your family members involved in any planned breeding practices | | (0=no, 1=yes) **If no go to i** | |
| b) Who makes the main decisions on goat breeding (e.g. when to breed, how etc.)? **(code a)** | | **a) Who makes the main decisions**<br>1=Head of household<br>2=Spouse<br>3=Both head and spouse | 4=Other household member<br>5=Other non-household member<br>6=Other (specify) |
| c) Which type of breeding practices do you use? | | 1 = uncontrolled, 2 = Controlled (***Decide /select which males to mate with which females) If controlled mating is used go to e*** | |
| d) If uncontrolled mating is used, why? **(code b)** | | **b) Reason for uncontrolled mating**<br>1=Lack of knowledge 2=Easier to conduct this practice | 3=Cheaper to practice<br>4=Other (specify)<br>**If uncontrolled go to i.** |
| e) If controlled mating is used, why? **(code c)** | | **c) Reason for controlled mating**<br>1=Increase number of kids produced<br>2=For cross breeding | 3=Improve kid survival<br>4=Other (specify) |
| f) What criteria did you use to choose the buck you used for controlled mating **(code d)** | | **d) Criteria for choice of buck**<br>**1** = Highly prolific<br>2 = Size<br>3 = colour (Specify colour) | 4 = High milk yield<br>5 = Low mortality 6<br>= Others (Specify) |
| g) What is your main source of bucks for mating? **(code e)** | | **e) Main source of bucks**<br>1=Own herd<br>2=Loan / Exchange of breeding male with neighbors / friends<br>3 =Hire breeding male | 4=Use male from research station<br>5 = local market (purchased)<br>6=Other (specify) |
| h) If you do not use bucks from your own herd what is the main reason for this? (code f) | | **f) Reason for not using bucks**<br>0 = Use bucks from my own herd<br>1= Do not own a buck<br>2= For cross-breeding | 3= To avoid mating of relatives (in breeding)<br>4= Doe mates with any buck as they feed<br>5=Other (specify) |
| i) Would you mate your doe with a buck that does not belong to you? | | 0 = no, 1 = yes | |
| j) If no, why? **(code g)** | | **g) Reason for No**<br>1=Introduced males will fight with females<br>2=People do not give their males<br>3=Risk of diseases<br>4= Too expensive | 5= Difficult to transport male because of hilly terrain<br>6= Unavailability of quality breeding male<br>7=Other: (specify in cell) |

4.2.3 In the last 12 months, how much money have you spent **paying** for breeding / mating services? [_____] **TSh (answer = 0 if no payment)**

4.2.4 In the last 12 months, how much money have you **earned from** providing breeding / mating services? [_____] **TSh (Answer = 0 if none received)**

4.2.5 What do you consider the main problems that prevent the improvement of your goats through breeding? List up to 3 reasons (most important first): [ ], [ ], [ ]

*Ask question and then check for the codes that best fit the response)*

| **CONSTRAINTS** | |
|---|---|
| 0 = No constraints<br>1=Lack of knowledge of the best breed / cross-breed to use<br>2=Lack of knowledge of how to identify good breeding animals from your own herd<br>3=Lack of knowledge of breeding practices in general<br>4=Lack of capital to purchase good breeding animals<br>5=Lack of good males to purchase / use | 6=Lack of information about animals that are for sale for mating<br>7=Lack of breeding males for rent / use<br>8=Lack of Artificial Insemination (AI) services<br>9=Unable to control mating<br>10=High mortalities/ deaths<br>11=Other (specify) |

### 4.3 GOAT FEEDING

4.3.1 What main feeding practice do you use for your goats? **Wet season:** [_____] **Dry season** [_____]

1= Intensive (mainly stall feeding), 2=Semi-intensive (both stall feeding, grazing, tethering), 3=Extensive (only grazing), 4= Other, specify

**IF ANSWER = 3, EXTENSIVE (ONLY GRAZING) GO TO 4.3.5**

4.3.2 If not extensive what are the common feeds that you use to feed your goats?

| Feed Type | Type of feed (most common 1st row)- **(code a, b, c)** | Frequency feed is offered: **(code d)** | Quantity per feed **(code e)** | Source of feed **(code f)** | If purchased, total amount spent per month* (TSh) |
|---|---|---|---|---|---|
| Wet season | | | | | |
| Dry Fodder | | | | | |
| | | | | | |
| Green Fodder | | | | | |
| | | | | | |
| Concentrates | | | | | |
| | | | | | |
| Silage | | | | | |
| | | | | | |
| Dry Season | | | | | |
| Dry Fodder | | | | | |
| | | | | | |
| Green Fodder | | | | | |
| | | | | | |
| Concentrates | | | | | |
| | | | | | |
| Silage | | | | | |
| | | | | | |
| **a)Dry fodder** | **b)Green fodder** | **c) Concentrates** | **d)Frequency of feeding** | **e) Unit quantity per feeding codes** | **f)Source of feed** |
| 1 = Sorghum stover 2 = maize stover (dry)<br>3 = dried fodder tree leaves<br>4 = other dry fodder (specify) | 1 = cut grass<br>2= green sorghum stover<br>3= green maize stover<br>4 = banana trunk/leaves<br>5 = tree and shrubs<br>6 = other green fodder (specify) | 1=Maize bran<br>2 = Cotton seed cake<br>3 = sunflower seed cake<br>4 = fish meal<br>5 = Salt lick<br>6 = Bone meal<br>7 = blood meal 8 =other (specify) | 1 = 3 times a day,<br>2 = 2 times a day,<br>3 = once a day,<br>4= Once a week,<br>5 = Occasionally<br>6 = Available 24hrs / day<br>7 = Other (specify) | 1 = Kg<br>2 = Basket<br>3 = Other (Specify) | 1 = Home – grown as feed<br>2 = Home – crop residue<br>3 = Purchased – neighbor<br>4 = Purchased – local market<br>5 = Purchased – regional market<br>6 = Wild<br>7 = Other (specify) |

**including transport costs if applicable*

4.3.3 Rank your three most preferred feed types for goat using the feed type codes (a,b,c) above:

1st = [_____], 2nd = [_____], 3rd = [_____]

4.3.4 What are biggest problems you face in goat feeding? (list up to 4 problems/constraints)

*(Ask the question to the respondent, check for responses in the codes –next, list in order of importance)*

| **1.** | **2.** | **3.** | **4.** |
|---|---|---|---|
| **CONSTRAINTS** | | | |
| 0 = No constraints/problems, 1 = Lack of feeds, 2 =No feeding area, 3 = Too much time spent on collecting of feed stuff, 4 = higher price of feed, 5 = Difficulty in transportation, 6 = Other (specify) | | | |

4.3.5 Do you have access to any of the following community resources?

| **Resource** | Do these exist in the community? **(0 = No 1 = yes)** | Who owns it? **(code a)** | Who manages it? **(code a)** | Who has access? **(code b)** | How would you rate its current state? **(code c)** |
|---|---|---|---|---|---|
| Common grazing land | | | | | |
| Grazed forestland | | | | | |
| Community wood lot | | | | | |
| Fishponds | | | | | |
| Grazed cropland | | | | | |
| Watering dam | | | | | |
| Borehole | | | | | |
| Community tap | | | | | |
| Rivers and streams | | | | | |
| **a) Who owns/manages** | | | | **b) Who has access** | **c) Rating of current state** |
| 1 = Own village<br>2 = neighboring village<br>3 = An individual<br>4 = Others (Specify) | | | | 1 = Some Community members including my household<br>2 = Some community members but not my household<br>3 = Open to all<br>4 = Others ( specify) | 1 = Poor quality<br>2 = Medium quality<br>3 = High quality |

### 4.4 GOAT HOUSING AND MANAGEMENT PRACTICES

4.4.1 Are your goats housed (confined in some way)? [_____}

| 1=No, they are not currently confined in any way or at any time, 2=Yes, but only at night, 3=Yes, all the time, 4 = Other (specify) |
|---|

IF NO, GO TO 4.5.1

4.4.2 If YES to 4.4.1, provide information on mode of housing and period in which the goats are housed during the dry and rainy seasons

| Wet (November - May) | | Dry (June – October) | |
|---|---|---|---|
| Main mode of housing **(code a)** | Frequency of housing **(code b)** | Main mode of housing **(code a)** | Frequency of housing **(code b)** |
| | | | |

| **a)Mode Of Housing** | **b) Period Housed** |
|---|---|
| 1 = Open fenced area<br>2 = Mud walled shed (with grass roof)<br>3 = Mud walled shed (with iron sheets)<br>4 = Wood walled (with grass roof)<br>5 = Wood walled (with iron sheets)<br>6 = Raised goat house with grass roof<br>7 = Raised goat house with iron roof<br>8 = In the house<br>9 = Other (specify) | 1=All the time<br>2=Night only<br>3=Occasionally / when need arises (e.g. mating, sick, rain)<br>4 = Other (specify) |

### 4.5 GOAT HEALTH MANAGEMENT

**4.5.1** Which are the four most significant diseases OR illness symptoms in terms of mortality and morbidity that affect your goats **(code, in order of importance: 1 = most important).**

| Rank | Disease or symptom (code a and b) | How many times in the last 12 months have you noticed this in your goats? |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |

| **a)Diseases** | | **b)Symptoms** | |
|---|---|---|---|
| D1 = Anthrax<br>D2 = Bronchitis<br>D3 = Dysentry<br>D4 = Goat Pox<br>D5 = Parasitic-worm infestation<br>D6 = Enterotoxaemia | D7 = Dematitis<br>D8 = PPR<br>D9 = CCPP<br>D10 = Mastitis<br>D11 = FMD<br>D12 = Pneumonia (not CCPP)<br>D13 = Other (specify) | S1 = Skin problems – lumps, rash, scabs, hair loss<br>S2 = Foot problems – lameness, sores, foot rot<br>S3 = Wounds<br>S4 = Worms<br>S5 = Diarrhea in kids | S6 = Diarrhea in adults<br>S7 = Bloat / constipation<br>S8 = Gradual weight loss and weakness<br>S9 = Abortion<br>S10 = Fever<br>S11 = Sudden death in adults<br>S12 = Sudden death in kids<br>S13 = Other (specify) |

4.5.2 What methods did you use to prevent and treat diseases and symptoms in the last 12 months?

| Disease / symptom **(code a & b from 4.5.1)** | Methods of prevention / treatment **(code a)** | Drugs purchased? **(0 = no, 1 = yes)** | Sources of drugs **(code b)** | Who treated **(Code c)** | Cost of drugs and service* (TSh) |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| **A)Methods of prevention / Treatment** | **B)Sources of Drugs** | **c)Who treated** |
|---|---|---|
| 0 = None<br>1= Treatment with conventional medicine<br>2= Traditional medicine (e.g. herbs)<br>3= Surgery<br>4=De-worming<br>5= Vaccination<br>6 = Change in management (housing, grazing)<br>7 = dipping or spraying<br>8 = Other (specify) | 0 = None, 1 = Local government vet officer<br>2 = Private veterinary officers<br>3 = Other farmers, 4 = Livestock traders<br>5 = Local authorities<br>6 = Farmer organization / association<br>7 = NGO/research<br>8 = Local drug store<br>9 = Local market<br>10 = Para-vet / community animal health worker<br>11 = Other (specify) e.g. government veterinary hospital | 1= Household head<br>2=Spouse<br>3= Head and spouse jointly<br>4=Other male hh member<br>5=Other female hh member<br>6 = Village extension officer<br>7 = private veterinarian<br>8 = Paravet<br>7=Other (specify in cell) |

** Enumerator note: If in-kind payments enter approximate value in local currency*

4.5.3 What are the major problems you face in the prevention and treatment of goat diseases? (list up to 4 constraints) **(code, in order of importance: 1 = most important).**

| **1.** | **2.** | **3.** | **4.** |
|---|---|---|---|
| **Code: Major Constraints** | | | |
| 0 = No constraints, 1 = Unable to correctly diagnose diseases, 2 = Veterinary services not available, 3 = Veterinary services not affordable, 4 = Medicines not available, 5= Medicines not affordable, 6 = Other (specify) | | | |

## 4.6 GOAT PRODUCTIVITY

4.6.1 Select up to 3 goats that have given birth in the last **4 – 12 months**. If only 1 goat has given birth, complete only the 1st column

| | Goat 1 | Goat 2 | Goat 3 |
|---|---|---|---|
| a) Breed of the doe **(A doe is a female mature goat) (code a)** | | | |
| b) Current age of doe in years | | | |
| c) How many times has it given birth in its life? | | | |
| d) How old was the doe when it gave birth for the first time? (months) | | | |
| e) When was the last date the doe gave birth and her kids have reached weaning age? (MM/YY) | | | |
| f) How many kids were born the last time the doe gave birth? | | | |
| g) How many of these kids died at birth or were still-born? | | | |
| h) How many of these kids died before weaning? | | | |
| i) How many of these kids were alive at weaning? | | | |
| During pregnancy management: **(0 = No, 1 = Yes)** | | | |
| j) Was doe housed during the day? | | | |
| k) Was doe vaccinated against any diseases? | | | |
| l) Was doe de-wormed? | | | |
| m) Was doe treated for any external parasites? | | | |
| n) Was doe given any supplementation? | | | |

| **A) Breeds** |
|---|
| 1=Local (non-descript, indigenous to Tanzania), 2=Toggenburg (Exotic - milk), 3 = Norwegian 4=Anglo Nubian (exotic - milk), 5=Saanen (Exotic - milk), 6=Kamorai (Exotic meat), 7= Boar (Exotic - meat), 8= Other (specify, if crossbreed, indicate cross of x_ ) |

4.6.2 **MILKING:** When did you milk your goats? [_____] (0 = Never, 1 = Currently milking, 2 = have milked in the past. If no goat was milked go to 4.7. If you have ever milked goat go to 4.6.3

4.6.3 **If yes to 4.6.2** fill in the table – choose 1 goat that produces most milk from the ones that are milked and from each breed owned. If only 1 breed owned, complete only the 1st column

| | | Goat 1 | Goat 2 | Goat 3 |
|---|---|---|---|---|
| Breed **(code a)** | | | | |
| Age at first kidding | | | | |
| Last kidding date (MM/YY) | | | | |
| Number of times the doe gave birth (Parity) | | | | |
| Kidding interval (between the last and current kidding) - (months) | | | | |
| For the last kid what was the lactation length (number of months doe is milked) | | | | |
| Total daily milk production (morning plus evening) in litres | At kidding - initial milk production | | | |
| | Middle of lactation period | | | |
| | End of lactation | | | |
| | Yesterday | | | |
| **A) Breeds** | | | | |
| 1=Local (non-descript, indigenous to Tanzania), 2=Toggenburg (Exotic - milk), 3 = Norwegian 4=Anglo Nubian (exotic - milk), 5=Saanen (Exotic - milk), 6=Kamorai (Exotic meat), 7= Boar (Exotic - meat), 8= Other (specify, if crossbreed, indicate cross of x_ ) | | | |

## 4.7 LABOUR USE IN GOAT PRODUCTION

4.7.1 Use household recall from the previous 1 week **(7 days)**. ***Enumerator note*** *Enter 0 under "No. people" and "Hrs / person" for activities not carried out*

| Species & Type of Activity | Household | | | | | | Non-Household | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Adult Males | | Adult Females | | Children (< 15 yrs) | | Hired Females | | Hired Males | |
| | No. people | Total Hrs / person/week | No. people | Total Hrs / person/week | No. people | Total Hrs / person/week | No. people | Total Hrs / person/week | No. people | Total Hrs / person/week |
| Grazing***(Indicate 1 here if it was not the households turn to graze)** [ ] | | | | | | | | | | |
| Stall/ House Feeding (+ collecting + preparation) | | | | | | | | | | |
| Watering | | | | | | | | | | |
| Cleaning of animal shed/shelter | | | | | | | | | | |
| Collection of Farm Yard Manure | | | | | | | | | | |
| Milking | | | | | | | | | | |
| Milk processing | | | | | | | | | | |
| Selling animals | | | | | | | | | | |
| Selling Farm Yard Manure | | | | | | | | | | |
| Treating animals | | | | | | | | | | |
| Caring for sick animals | | | | | | | | | | |
| Other: [ ] (e.g. breeding/mating) | | | | | | | | | | |

* If it was not the turn of the household to graze last week, how long do they usually take per week when it is their turn?

4.7.2 If you indicated hired labour above, how much do you pay in total per month? [ ] TSh.

4.7.3 If paying daily wages, how much per day [_____]

4.7.4 For how many days [ ]

4.7.5 Did you hire a laborer last month? [ ] (0=No, 1=Yes)

4.7.6 Was the laborer Male, female, adult or youth. _____

## 4.8 GOAT MARKETING

4.8.1 **LIVE SALES:** In the last 12 months, have you or a household member ***sold*** any live goats/kids for cash? [ ] (0=No, 1=Yes)

If Yes to 4.8, fill 4.8.2 for each sale; **if No, go to 4.8.4 (to buy section).**

4.8.2 If yes how many goats did you sell [_____]

4.8.3 For each goat sold fill in table 4.8.3 (1 row per goat)

| | Type of animal sold **(0=kid, 1=adult)** | Reasons for selling **(codes a)** | Sold to **(code b)** | Id number of 'Sold by' | Who managed the money **(codes c)** | Where sold **(code d)** | Time for the seller to travel to location of sale **(specify minutes, hours)** | Distance from home to location of sale **(km)** | Transport mode to location of sale **(code e)** | Transport cost **(TSh)** | Time spent waiting for sale at location of sale (**specify minutes, hours, etc.)** | Other type of marketing costs (TSh)( e.g. tax/ Ushuru) | Sale price received (TSh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goat 1 | | | | | | | | | | | | | |
| Goat 2 | | | | | | | | | | | | | |
| Goat 3 | | | | | | | | | | | | | |
| Goat 4 | | | | | | | | | | | | | |
| Goat 5 | | | | | | | | | | | | | |
| Goat 6 | | | | | | | | | | | | | |
| Goat 7 | | | | | | | | | | | | | |
| Goat 8 | | | | | | | | | | | | | |
| Goat 9 | | | | | | | | | | | | | |
| Goat 10 | | | | | | | | | | | | | |
| Goat 11 | | | | | | | | | | | | | |

| **a) Reasons for selling (indicate all applicable)** | **b) sold to** | **c) Who managed money** | **d) Where sold** | **e) Transportation mode** |
|---|---|---|---|---|
| 1=To meet planned household expenses (school fees,<br>2=To meet emergency household expenses<br>3=To provide income for household purchases<br>4=Livestock trading as a business<br>5=Culling<br>6= Payment of school fees<br>7 = ill health of goat<br>8 = Other (specify) | 1= Parents of household member<br>2= Children of household member<br>3=Close Family of household member (e.g. Uncle or Aunt)<br>4=Friends and extended family<br>5=Casual Acquaintance<br>6= middleman<br>7 = Other villagers<br>8=Others (specify | 1=Household head<br>2=Spouse<br>3= Head and spouse jointly<br>4=Other male hh member<br>5=Other female hh member<br>6=Other (specify) | 1= Farm gate<br>2 = Door step<br>3 = village market in your village<br>4= market outside village<br>5 = Middle man<br>6 = Other | 1) walking<br>2) bicycle<br>3) bus<br>4) motorcycle<br>5) Ox cart<br>6) power tiller<br>7) Other (specify) |

Household code* _____

4.8.4 LIVE PURCHASES: In the last 12 months, have you or a household member ***bought*** any live goats/kids with cash? [ ] (0=No, 1=Yes).

If Yes, fill table 4.8.5 for each purchase; if No, go to 4.8.6 (to non-cash section)

4.8.5 For each goat bought fill in table 4.8.5 (1 row per goat)

| | Type of animal bought **(0=kid, 1=adult)** | Reasons for buying **(codes a)** | Bought from **(code b)** | ID number of "Bought by" | Who managed the goat that arose from the Purchase **(codes c)** | Where bought **(code d)** | Time for the buyer to travel to location of sale **(specify minutes, hours)** | Distance from home to location of sale (Km) | Transport mode to location of sale **(code e)** | Transport cost (TSh) | Time spent looking for a seller at location of sale (specify minutes, hours, etc.) | Sale price paid (TSh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goat 1 | | | | | | | | | | | | |
| Goat 2 | | | | | | | | | | | | |
| Goat 3 | | | | | | | | | | | | |
| Goat 4 | | | | | | | | | | | | |
| Goat 5 | | | | | | | | | | | | |
| Goat 6 | | | | | | | | | | | | |
| Goat 7 | | | | | | | | | | | | |
| Goat 8 | | | | | | | | | | | | |
| Goat 9 | | | | | | | | | | | | |
| Goat 10 | | | | | | | | | | | | |
| Goat 11 | | | | | | | | | | | | |

| **a) Reasons for buying** | **b) Bought from** | **c) Who managed the goat** | **d) Where bought** | **e) Transportation mode** |
|---|---|---|---|---|
| 1=To increase household milk production<br>2= To eat the meat<br>3=To add to breeding stock<br>4=Livestock trading as a business<br>5=Other (specify) | 1= Parents of household member<br>2= Children of household member<br>3=Close Family of household member (e.g. Uncle or Aunt)<br>4=Friends and extended family<br>5=Casual Acquaintance<br>6= middleman<br>7 = Other villagers<br>8=Others (specify | 1=Household head<br>2=Spouse<br>3= Head and spouse jointly<br>4=Other male hh member<br>5=Other female hh member<br>6=Other (specify) | 1= Farm gate<br>2 = Door step<br>3 = village market in your village<br>4= market outside village<br>5 = Middle man<br>6 = Other (Specify) | 1) walking<br>2) bicycle<br>3) bus<br>4) motorcycle<br>5) Ox cart<br>6) power tiller<br>7) Other (specify) |

4.8.6 Did you, or anyone in your household, **give** one or more live goats/kids to somebody in the last 12 months for which no money was received? [ _____ _](0=No, 1=Yes).

If Yes, fill table 4.8.7 for each purchase; if no, go to 4.8.8 (to receive section)

4.8.7 For each goat given fill in table 4.8.7 (1 row per got)

| | Type of animal **(0=kid, 1=adult)** | Reasons for giving **(code a)** | Received by **(code b)** | Given by **(HH Id)** | Did you, or someone else in your household, give some good or service in return for the animal **(Name of good/service)** | What is your estimate of the value of the good or service? Value **(TSh)** | If you, or someone else in your household, received something, in return for the goat, who managed the good or service? **(codes c)** | Where given **(code d)** | Time for the household giver to travel to place of giving **(specify minutes, hours)** | Distance from home to place of giving/ receiving **(km)** | Transport mode to location of giving/ receiving **(code e)** | Transport cost (TSh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goat 1 | | | | | | | | | | | | |
| Goat 2 | | | | | | | | | | | | |
| Goat 3 | | | | | | | | | | | | |
| Goat 4 | | | | | | | | | | | | |
| Goat 5 | | | | | | | | | | | | |
| Goat 6 | | | | | | | | | | | | |
| Goat 7 | | | | | | | | | | | | |

| **a) Reasons for giving** | **b) Received by** | **c) Given by (indicate all applicable)** | **d) Where given** | **e) Transportation mode** |
|---|---|---|---|---|
| 1= Favor received in the past (specify)<br>2= Expected future favor<br>3= Support for elderly, children or disabled<br>4 = Formal or informal customary penalty<br>5 = Dowry for paying for wives<br>6 = Offertory/Mavuno<br>7 = Ritual/sacrifice (Tambiko)<br>8 = For festivals<br>9 =Other (specify) | 1= Parents of household member<br>2= Children of household member<br>3=Close Family of household member (e.g. Uncle or Aunt)<br>4=Friends and extended family<br>5=Casual Acquaintance<br>6= middleman<br>7 = Other villagers<br>8=Others (specify | 1=Household head<br>2=Spouse<br>3= Head and spouse jointly<br>4=Other male hh member<br>5=Other female hh member<br>6=Other (specify) | 1= In your village<br>2= Market outside village<br>3 = Other (specify) | 1) Walking<br>2) Bicycle<br>3) bus<br>4) Other (specify) |

4.8.8 Did you, or anyone in your household, **receive** one or more live goats/kids from somebody in the last 12 months for which no money was received? [ _____ _] (0=No, 1=Yes).

If Yes to 4.8.8, fill table 4.8.9 for each purchase; if no, go to 5

4.8.9 For each goat given fill in table 4.8.9 (1 row per goat)

| | Type of goat (0=kid, 1=adult) | Reasons for receiving **(code a)** | Given by **(code b)** | Received by **(code c)** | Did you, or someone else in your household, receive some good or service in return for the animal **(Name of good/service)** | What is your estimate of the value of the good or service? Value (TSh) | If you, or someone else in your household, received something, in return for the goat, who managed the good or service? **(codes c)** | Where receive **(code d)** | Time for the household receiver to travel to place of giving (specify minutes, hours, etc.) | Distance from home to place of giving/ receiving (km) | Transport mode to location of giving/ receiving **(code e)** | Transport cost (TSh) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goat 1 | | | | | | | | | | | | |
| Goat 2 | | | | | | | | | | | | |
| Goat 3 | | | | | | | | | | | | |
| Goat 4 | | | | | | | | | | | | |
| Goat 5 | | | | | | | | | | | | |
| Goat 6 | | | | | | | | | | | | |
| Goat 7 | | | | | | | | | | | | |
| Goat 8 | | | | | | | | | | | | |
| Goat 9 | | | | | | | | | | | | |
| Goat 10 | | | | | | | | | | | | |
| Goat 11 | | | | | | | | | | | | |

| **a) Reasons for receiving** | **b) Given by (indicate all applicable)** | **c) Received by / managed the goat** | **d) where given/received** | **e) transportation mode** |
|---|---|---|---|---|
| 1= Favor received in the past (specify)<br>2= Expected future favor<br>3= Support for elderly, children or disabled<br>4 = Keep good ongoing relationship with buyer/seller<br>5 = Formal or informal customary penalty<br>6 = For friendship purposes (not buyer/seller relationship)<br>7=Other (specify) | 1= Parents of household member<br>2= Children of household member<br>3=Close Family of household member (e.g. Uncle or Aunt)<br>4=Friends and extended family<br>5=Casual Acquaintance<br>6= middleman<br>7 = Other villagers<br>8=Others (specify | 1= Household head<br>2= Spouse<br>3= Head and spouse jointly<br>4= Other male hh member<br>5= Other female hh member<br>6= Other (specify) | 1= Farm gate<br>2 = Door step<br>3 = village market in your village<br>4= market outside village<br>5 = Middle man | 1) walking<br>2) bicycle<br>3) bus<br>4) motorcycle<br>5) Ox cart<br>6) power tiller<br>7) Other (specify) |

Household code* _____

# 5 SERVICES, INFORMATION SOURCES AND CAPACITY BUILDING

## 5.1 ACCESS TO SERVICES

**5.1.1** Have you received /used any of the following services in the last 12 months?

| Type of services | Is the service available? **0=No, 1=Yes** | Have you used this service in the last 12 months? **0=No, 1=Yes** | Who requested/used this service? **(code a)** | |
|---|---|---|---|---|
| | | | Requested | Used |
| **Information (other than extension and training)** | | | | |
| Crop and livestock market information | | | | |
| Dispensary | | | | |
| Health centre | | | | |
| **Financial services** | | | | |
| Savings and credit societies | | | | |
| Health insurance | | | | |
| Crop insurance | | | | |
| Livestock insurance | | | | |
| Electricity | | | | |
| Solar | | | | |
| Piped water available at village level | | | | |
| Borehole | | | | |
| **a) WHO MAKES THE DECISION TO USE THE SERVICE / WHO USED THE SERVICE:** 1 = household male, 2 = household female, 3 = joint household (male & female), 4 = non-household member, 5 = other (specify) | | | | |

**5.1.2** In the last 12 months, have you contacted any veterinary office, community animal health worker, and government or NGO staff about your goats? [ ] (0=No, 1=Yes). **IF NO, GO TO 5.1.4 IF YES, FILL IN TABLE 5.1.3**

5.1.3 How many times did you contact a veterinary officer or livestock extension staff in the last 12 months about your goats? (both paying or free visits)

| | Government veterinary staff | Private veterinary staff | Extension staff | Community animal health workers / Paravet |
|---|---|---|---|---|
| Number of times you contacted them in the last 12 months | | | | |
| Who made the contact **(code a)** | | | | |
| Topic of last contact? **(code b)** | | | | |
| Did you pay for these services? **0=no, 1=yes** | | | | |
| How much did you pay for these services? **TSH** | | | | |
| **a)WHO MADE THE CONTACT:** 1= Household head, 2=Spouse, 3= Head and spouse jointly, 4=Other male hh member, 5=Other female hh member, 6=Other (specify in cell) | | | | |
| **b)TOPIC OF LAST CONTACT:** 1= Feeding, 2= Health, 3= Water, 4=Breeding / mating, 5=Housing, 6 = Other (specify) | | | | |

**5.1.4** Has anyone in your household ever received training in goat production and management? [____] (0=No, 1=yes). **IF NO, GO TO SECTION 6**

5.1.5 If yes to 5.1.4, fill in the table

| Area / Topic of training **(code a)** | When was training? **(code b)** | Where was training done **(code c)** | How long was the training **(days)** | Who attended training **(code d)** |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| **a)TRAINING AREA / TOPIC** | **b) WHEN** | **c)WHERE DONE** | | **d)WHO ATTENDED** |

| | | | |
|---|---|---|---|
| 1=Feeding, 2=Breeding / Mating, 3=Disease management, 4=Housing, 5=General Goat Management, 6 = Record keeping, 6=Other (specify) | 1 = in last 12 months<br>2 = 1 to 5 years ago<br>3 = more than 5 years ago | 1=Own home<br>2=Outside home but within village<br>3=District/ regional town<br>4=Research station<br>5 = Other (specify) | 1=Household head<br>2=Spouse<br>3=Other male hh member 4=Other female hh member<br>5=Hired laborer, 6 = Other (specify) |

# 6 HOUSEHOLD INCOME, EXPENDITURE AND FOOD SECURITY

## 5.2 HOUSEHOLD INCOME AND EXPENDITURE

**5.2.1** In the last 12 months, has your household received any income from any of the following sources?

***(Enumerator note: First fill in the second column to get all sources that household got income from before filling in the other columns)*** Income sources and levels should include income from all members of the household. Enter X in income amount column if farmer has income from source but cannot estimate the value.

***Enumerator note:*** *+ most important source = rank 1*

| Income Source | Did anyone in the household earn income from source in last 12 months? **(0 = No, 1 = Yes)** | Who earned **(code a)** | Total HH income in past 12 months from this source **(Approximate amount)** | Rank of Source+ | Who mainly controls source? **(code a)** |
|---|---|---|---|---|---|
| Sale of own crop and crop products | | | | | |
| Sale of own livestock (excluding goats)<br>(Include cattle, poultry, and all other mentioned livestock) | | | | | |
| Sale of own goats and goat products | | | | | |
| Sale of own livestock products (e.g. Eggs – not including goat products) | | | | | |
| Sale of own livestock services (e.g. for traction – not including goat) | | | | | |
| Trading in livestock and livestock products (not own produce) | | | | | |
| Trading in agricultural products (excluding livestock!) (not own produce) | | | | | |
| Formal salaried employment (non-farming, e.g. civil servant, private sector employee, labourer, domestic work in other home) | | | | | |
| Business – Trade or services (non-agricultural) | | | | | |
| Working on other farms (including herding) | | | | | |
| Sale of products of natural resources (forest and sea/rivers products – incl. hunting & fishing) | | | | | |
| Pensions | | | | | |
| Rent out land / sharecropping (cash value of share crop or rent) | | | | | |
| Remittances | | | | | |
| Other 1: (specify) [ ] | | | | | |
| Other 2: (specify) [ ] | | | | | |
| Other 3: (specify) [ ] | | | | | |
| **a) WHO EARNED/ CONTROLS THE MONEY:** 1 = household male, 2 = household female, 3 = joint household (male & female), 4 = non-household member, 5 = Other, specify | | | | | |

## 5.3 WILLINGNESS TO PAY FOR GOAT HOUSING

### 5.3.1 Willingness to pay

| Respondent (HH ID) | Which is more important to you? **Code a) (Rank)** | How much would you be willing to pay for **(TSh)** | How much would you be willing to pay for **the following goat houses** | Amount **(TSh)** |
|---|---|---|---|---|
| | | | Open fenced area | |
| | | | Mud walled shed (with grass roof) | |
| | | | Wood walled (with iron sheets) | |
| | | | Raised goat house with grass roof | |
| | | | Raised goat house with iron roof | |

**a) Which is important?**
1 = Bicycle, 2 = Goat housing, 3 = Mobile phone, 4 = Radio, 5 = Jewellery

## 6.3 FOOD AND NUTRITION SECURITY

### 6.3.1 Food adequacy in the last 12 months

| | |
|---|---|
| In the last 12 months, did you have enough food to eat during all the months? | [ ] 0=No, 1=yes |
| If no, which were the months in the last 12 months that you did not have enough food to meet your family's needs<br><br>**DO NOT READ THE LIST OF MONTHS. (Please tick)**<br>WORKING BACKWARD FROM THE CURRENT MONTH, PLACE **1** IN THE BOX IF THE RESPONDENT IDENTIFIES THAT MONTH AS ONE IN WHICH THE HOUSEHOLD DID NOT HAVE ENOUGH FOOD TO MEET THEIR NEEDS. | Jan [ ] Feb [ ] March [ ] April [ ]<br><br>May [ ] June [ ] July [ ] Aug [ ]<br><br>Sept [ ] Oct [ ] Nov [ ] Dec [ ] |

### 6.3.2 During the past 30 days …..(**code a)**

| | |
|---|---|
| Did you worry that your household would not have enough food? | [_____] |
| Were you or any household member not able to eat the kinds of foods you preferred because of lack of money? | [_____] |
| Were you or any household member not able to eat the kinds of foods you preferred because of lack of food availability? | [_____] |
| Did you or any household member eat just a few kinds of food day after day due to a lack of resources? | [_____] |
| Did you or any household member eat food that you preferred not to eat because of a lack of resources to obtain other types of food? | [_____] |
| Did you or any household member eat a smaller meal than you felt you needed because there was not enough food? | [_____] |
| Did you or any other household member eat fewer meals in a day because there was not enough to eat? | [_____] |
| Was there ever no food at all in your household because there were no resources to get more? | [_____] |
| Did you or any household member go to sleep at night hungry because there was not enough food? | [_____] |
| Did you or any household member go a whole day without eating anything because there was not enough food? | [_____] |
| In the last 30 days, how often did adults in your household go without milk, even in tea, because no milk was produced or you could not afford to buy milk? | [_____] |
| In the last 30 days, how often did your youngest child go without milk, even in tea, because no milk was produced or you could not afford to buy milk? | [_____] |

**Code a):** 1 = Never, 2 = Rarely (1-2 times in the last 30 days), 3 = Sometimes (3-10 times in the last 30 days), 4 = Often (>10 times in the past 30 days), 5 = always (all the time)

## 6.4 HOUSEHOLD DIETARY DIVERSITY & FOOD CONSUMPTION

### 6.4.1 Household dietary diversity & food consumption

**Note:** Ask this question to 2 people in the household, a male adult or head of household, female adult and an index child of (below or equal to 5 years). **The female adult answers for the index child. If two or more children qualify to be index please select the oldest child who is closest to but less than 5 years. If there is no child who is less than or equal to 5 years DO NOT FILL IN THE INDEX CHILD SECTION**

| | | Respondent | | Female or male Adult (Opposite gender adult) | | Index child below or equal to 5 years)* | |
|---|---|---|---|---|---|---|---|
| **Types of foods** | How was the item obtained? **(Code a)** | In the last **24 hours,** have you consumed (1=Yes, 0=No) | In the last **7 days**, how many **times** have you consumed these? | In the last **24 hours**, have you consumed (1=Yes, 0=No) | In the last **7 days,** how many **times** have you consumed these? | In the last **24 hours,** has your child consumed (1=Yes, 0=No) | In the last **7 days**, how many **times** has the child consumed these? |
| Staples or food made from staples including millet, sorghum, maize, rice, wheat, or other local grains, e.g. ugali, bread, rice noodles, biscuits, or other foods | | | | | | | |
| Potatoes, yams, cassava or any other foods made from roots or tubers | | | | | | | |
| Vegetables | | | | | | | |
| Fruits | | | | | | | |
| Beans, peas, lentils, or nuts | | | | | | | |
| Beef, pork, lamb, goat, rabbit wild game, liver, kidney, heart, or other organ meats | | | | | | | |
| Chicken, duck, or other poultry | | | | | | | |
| Eggs | | | | | | | |
| Fresh or dried fish or shellfish | | | | | | | |
| Milk, cheese, yoghurt, or other milk product | | | | | | | |
| Oils and fats | | | | | | | |
| Sweets, sugar, honey | | | | | | | |
| Any other foods, such as coffee, tea including milk in tea | | | | | | | |
| **Code a: How was the item obtained?** | | | | | | | |
| 0 = Not obtained, 1=Mainly produced, 2=Mainly purchased, 3=Gift, 4= Other (specify) | | | | | | | |

*To be asked to female adult

# 7 USE OF ENVIRONMENTAL CONSERVATION TECHNOLOGIES

## 7.1 USE OF ENVIRONMENTAL CONSERVATION TECHNOLOGIES

7.1.1 Do you use any of the following environmental conservation technologies /practices?

| Environmental conservation technology | (b) Do you know this technology /practice **(1=Yes, 0=No)** | (c) Have you ever used this technology /practice **(1=Yes, 0=No)** | (d) Where did you learn about the technology? **(code a)** | (e) In what year did you first use this technology /practice? | (f) Did you use this technology /practice the last year? **(1=Yes, 0=No)** | (g)If no, why was the technology not used? **(code b)** |
|---|---|---|---|---|---|---|
| Terracing | | | | | | |
| Controlled grazing | | | | | | |
| Pasture rehabilitation | | | | | | |
| Ridging | | | | | | |
| Wood lots | | | | | | |
| Tree planting | | | | | | |
| Agro forestry shrubs | | | | | | |
| Others (Specify) | | | | | | |

| **a) source of information on technologies:** | **b) Reasons for not using technology** |
|---|---|
| 1=Government extension, 2=NGOs, 3= other farmers, 4=Agro dealer, 5=others (specify) | 1=Not aware of technology, 2=technology too expensive 3= labor shortage, 4 = No Time, 5=other (specify) |

*The box below should be completed after the interview & shows the data movement process from the field to the computer:*

| | |
|---|---|
| Name of Field Supervisor: | |
| Survey checked by Field Supervisor (sign & date – DD/MM/YYYY): | Signature: Date: / / |
| Comments by the field supervisor | |
| | |
| Name of Data Entry clerk: | |
| Date of data entry (DD/MM/YYYY): | / / |
| Comments by the data entry clerk | |

| | |
|---|---|
| **Data manager**<br>Computerized survey checked against paper survey? (tick when done) – checker should sign and date | Checked (tick):<br>**Comments from the data manager**<br><br>Signature: Date: / / |