Farming Systems and Household Food Security in Tanzania: the case of Mvomero and Kishapu Districts

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ABBREVIATIONS

CSI	Copping Strategy Index
CRRA	Constant Relative Risk Aversion
CUTS	Consumer Unity and Trust Society
DES	Dietary Energy Supply
DFID	United Kingdom Department for International Development
DFID-SLF	Department for International Development- Sustainable Livelihood Framework
ECOSOC	United Nations Economic and Social Council
ESRF	Economic and Social Research Foundation
EUT	Expected Utility Theory
FANTA	Food and Nutrition Technical Assistance Project
FAD	Food Availability Decline
FAO	Food and Agriculture Organisation of the United Nations
FCS	Food Consumption Score
FCND	Food Consumption and Nutrition Division
FIVIMS	Food Insecurity and Vulnerability Information and Mapping System
HDDS	Household Dietary Diversity Score
HEA	Higher Education Authority in Ireland
HFIAS	Household Food Insecurity Access Scale
HH	Household
HHS	Household Hunger Scale
IA	Irish Aid
IAC	Inter Academy Council
IAWG	Inter-Agency Working Group
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IIA	The Independent Irrelevant Alternative
ILRI	International Livestock Research Institute
IPC	Integrated Phase Classification
ISS	Institute of Social Studies
IUCN	International Union for Conservation of Nature

MAFS & C	Tanzanian Ministry of Agriculture, Food Security and Cooperatives
MCL	Mixed Crop-Livestock
MDGs	Millennium Development Goals
MFC	Mixed Food Crops
MNL	Multinomial Logit
MNP	Multinomial Probit
NBS	National Bureau of Statistics
OECD	Organization for Economic Co-operation and Development
PELUM	Participatory Ecological Land Use Management
PMO	Prime Minister's Office
REPOA	Research on Poverty Alleviation
SAUT	Saint Augustine University of Tanzania
SDGs	Sustainable Development Goals
SFC	Single Food Crop
SUA	Sokoine University of Agriculture
TFNC	Tanzania Food and Nutrition Centre
TLUs	Tropical Livestock Units
TPB	Theory of Planned Behaviour
TZS	Tanzanian Shilling
UCD	University College Dublin
UN	United Nations
UNDP	United Nations Development Programme
UNCEF	United Nations Children's Fund
USAID	United States Agency for International Development
WB	World Bank
WFS	World Food Summit
WFP	World Food Programme
WHO	World Health Organisation

ABSTRACT

About three out of every four income-earners in Tanzania are small-scale farmers and food insecurity remains a chronic problem for many of them. Around 48% of households in rural areas were either moderately or severely food energy deficient in 2011 and 39% of rural children under 5 years were stunted in 2013. To improve food security in Tanzania, it is important to understand the existing farming systems and their relationship with household food security. This study was conducted in two distinctly different agro-ecological zones of Tanzania, namely Kishapu and Mvomero Districts, to determine the main factors which influence farm households' choice of farming systems and how these associate with food security. Data were collected during both pre- and post-harvest seasons in 2014 from 506 farm households, and augmented with market surveys, key informant interviews and focus group discussions. Four main farming systems were identified based on: crops cultivated; degree of market orientation for particular crops; and the number of livestock units owned. Household food security status was measured and a combination of Expected Utility Theory and Theory of Planned Behaviour used to analyse the factors associated with household choice of farming system. The study found that households which diversified their income sources through off-farm activities were more likely to have better food access in the lean (pre-harvest) periods. The factors influencing decisions on farming systems were related to the household size, farming context and farm characteristics. In the semi-arid and remote areas of Kishapu, larger households were more likely to choose a Mixed Crop and Livestock farming system, indicating that larger family size ensured the supply of needed labour for both livestock keeping and cropping activities. In the higher rainfall and more accessible district of Mvomero, households were more likely to practice a Single Food Crop farming system and were compelled to seek out off-farm work. The study recommends that strategies to improve food security in rural areas should attempt to: enhance income from farming, promote off-farm income generating activities, and promote behavioural change communication on what is culturally regarded as food in the study area.

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Finally, regards and blessings go to my beloved wife, Regina and our three children: Gracious, Gian and Giana. They were always there to encourage me during good and bad times.

STATEMENT OF AUTHORSHIP

I hereby certify that the submitted work is my own work, was completed while registered as a candidate for the degree stated on the title page, and I have not obtained a degree elsewhere on the basis of research presented in this submitted work.

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CHAPTER ONE: INTRODUCTION

1.1 Overview

This chapter starts with a general overview of poverty and food security in developing countries and Tanzania. It is followed by discussion on the significance of farming in Tanzania, rationale for undertaking this study as well as its significance. Finally, the general and specific objectives, guiding research questions, overview of the study methodology and utility, and the structure of the thesis are explained.

1.2 Poverty and Food Security Status in Developing Countries

More than one-third of all people in developing countries are poor and live on less than US$ 2 a day while every one person out of six is extremely poor, living on less than US$1.25 a day (Townsend, 2015). Although the contemporary world has seen a shift towards urbanization of populations with an estimated 54% living in urban areas (UN-Department of Economic and Social Affairs, 2014), poverty remains largely a rural phenomenon (FAO, 2015). A World Bank Report estimates that, by 2010, almost three quarters of the extreme poor were living in rural areas (Townsend, 2015). The relative deprivation in rural areas is reflected in a wide range of welfare indicators. For instance, child malnutrition, as measured by wasting in children under five years of age, is worse in rural areas as compared to urban areas in nearly every country for which data were available (FAO, 2015).

Notwithstanding the multiple causes and forms of poverty, strategies to alleviate it predominantly address the problem of malnutrition with emphasis on child and maternal under-nutrition (Bundara et al., 2013: Ruel and Alderman, 2013). This is because poverty is considered as both the cause and consequence of under-nutrition (Bradshaw, 2007; UNICEF, 2013). For instance, insufficient income limits access to social and health services resulting in unhealthy individuals (Black et al., 2008). Good nutrition during the first 1,000 days between the start of a woman's pregnancy and her child's second birthday is considered critical to the future health, wellbeing and success of her child (Save the Children, 2012a). The unhealthy condition, in particular at this

early time of life, entraps the individual to a life cycle of poverty. It is argued that under-nutrition (e.g. stunting) has an impact on the child's cognitive and intellectual development thereby affecting the child's academic performance and ultimately escalating the cycle of poverty (Bradshaw, 2007; UNICEF, 2013).

Global statistics indicate that under-nutrition is one of the key factors contributing to more than a third of all global child deaths amounting to 2.6 million deaths per year (Save the Children, 2012b). Indeed, the Millennium Development Goals (MDGs) Report on Goal Four, which aimed to reduce child mortality indicates that one third of all child deaths in sub-Saharan Africa was caused by hunger (United Nations, 2010). It is with this understanding the United Nations MDGs considered malnutrition as an important dimension of poverty among others that were to be halved by 2015 (Alderman et al., 2006). The global renewed commitment to address malnutrition in all its forms is reflected by the newly enacted 17 Sustainable Development Goals (SDGs). The first goal aims to end poverty in all dimensions by 2030 while the second goals aim to end all forms of hunger and malnutrition by 2030 by making sure that all people, especially children and the more vulnerable, have access to sufficient and nutritious food all year round (UNDP, 2016). The second goal of the SDGs promotes sustainable agricultural practices: improving the livelihoods and capacities of small scale famers, allowing equal access to land, technology and markets (UNDP, 2016).

According to OECD-FAO Agricultural Outlook 2013-2022, global agricultural production is projected to grow by 1.5% annually, compared to 2.1% in the previous decade (OECD and FAO, 2013). It is anticipated that this low growth will be manifested in both crop and livestock sectors. The projected trend of reduced productivity globally is likely to put more pressure on the nutrition status, in particular for people living in the developing world.

1.3 Food Security in Tanzania

The Tanzania Food and Nutrition Policy of 1992 defines nutrition as “the end-result of various processes in society in which food is eaten, followed by subsequent absorption

and utilization of the food nutrients[1] by the body to provide health" (Tanzanian Ministry of Health, 1992). The policy maintains that good nutrition is partly a result of staying free from infectious diseases and eating a well-balanced diet with all necessary nutrients required by the body. The policy goal is, therefore, geared towards ensuring that food, which provides all nutrients, is available and its utilization is in accordance with nutritional requirement of the body to maintain good health. On the other hand, the policy attaches the concept of food security to availability and accessibility of adequate food at all time and to all people, especially special groups such as children, pregnant and lactating women, elderly and sick. The definition of food security focuses much on quantitative aspects by ensuring that food is adequately available and accessible and it makes no mention of the quality of food.

Malnutrition, in particular under-nutrition, is one of the big challenges facing Tanzania and the problem is more severe among women and children. For example, a study conducted by the Tanzania Food and Nutrition Centre (TFNC) in 2014 indicated that 38% of children aged 0-59 months were stunted (TFNC, 2015). The Government of Tanzania places strong emphasis on issues related to food security and nutrition. In order to coordinate national efforts against malnutrition in Tanzania, the government has established a High Level Steering Committee on Nutrition with representatives from different sectors including: private sector, NGOs, academics, UN agencies and donors (TFNC, 2015). This committee is chaired by the Permanent Secretary in the Prime Minister's Office and the secretariat is managed by the Tanzania Food and Nutrition Centre. Although district steering committees for nutrition have been established, and District Nutrition Officers appointed, their capacities are still limited and offer considerable scope for improvement (TFNC, 2015). Likewise, a Tanzania National Nutrition Strategy (2011-2015) with a US$520 million budget was developed, but a recent public expenditure review on nutrition has indicated that only 0.22% of total government expenditure was allocated to nutrition in the financial year 2012/13 and, therefore, few nutrition activities are implemented (INNOVEX, 2014).

[1] These nutrients include carbohydrate, minerals, proteins and vitamins (FAO, 1990)

1.4 The Significance of Farming in Tanzania

In Tanzania, the agriculture sector employs about two thirds of the total employed persons, and almost 90% of those employed in the sector are smallholder farmers living in rural areas (Tanzanian NBS, 2014a). Crop production is the dominant farming activity that engages 60% of households; followed by mixed crop-livestock production (39% of farm households) and livestock/pastoralism (1%). On average, farm households cultivate 5 acres of land (Tanzanian NBS, 2012). Farm productivity is generally low; it is estimated that production is 10% less than a decade ago (Irish AID, 2011). The main types of crops grown in Tanzania are cereals (for example: maize, rice and sorghum) which occupy 67% of the land under annual crops, followed by pulses (11%), oil seeds and oil nuts (11%), root and tubers (3%), cash crops (tobacco, cotton, pyrethrum, jute and seaweed) (7%) and vegetables and fruits (1%) (Tanzanian NBS, 2012). However, it should be noted that the land area proportions for every crop as presented here do not reflect intercropping practices. Smallholder farmers in rural areas produce most of Tanzania's food; yet they are poorer and more food insecure than their counterparts in urban areas (Tanzanian NBS, 2012).

It is accepted that the extent to which agriculture can contribute to poverty reduction (e.g. reducing insecurity) depends on the total amount of national resources allocated to the sector (DFID, 2005). The African Union (AU) Heads of State and Government in their meeting in Maputo, Mozambique in July 2003 emphasised the need for each AU member state to place agriculture at the heart of development funding. In what later came to be known as 'Maputo Declaration on Agriculture and Food Security in Africa', they asserted that each AU member state should ensure a

> '...commitment to the allocation of at least 10 percent of national budgetary resources to agriculture and rural development policy implementation within five years' (African Union, 2003).

It is assumed that sustaining such 10% allocations of national budgets to the agriculture sector would translate into 6% percent annual sector growth (African Union, 2003). A review of the agricultural sector budget trends in Tanzania at both national and local

government levels shows that the agricultural budget increased from 3% of the national budget in 2000/01 to 7.8% in 2010/11, but declined to 6.9% in the 2011/12 budget year (Gabagambi, 2013). Although this budget trend was generally positive, the funds allocated to the sector were still below the proposed 10% indicated by the Maputo Declaration. The proportion of funds allocated for agriculture from the national budget was inadequate to run the broad range of activities covered under the sector in order to fight poverty and under-nutrition.

1.5 Significance and Rationale of the Study

One way to achieve greater outcome in poverty reduction strategies in developing countries is to promote growth in the sectors that support the livelihoods of most people (OECD, 2006). It is generally acknowledged that broad-based development of the agricultural sector is an effective approach to reducing poverty and to facilitate the country's economic growth (Amani, 2005; Dixon et al., 2001; Mnenwa and Maliti, 2010; OECD, 2006). Growth in the agricultural sector reduces poverty by harnessing the productive capacity of the poor people's key assets such as land and labour, by providing labour-intensive employment for the poor, by stimulating growth in the rural economy, and by lowering and stabilising food prices (Byerlee et al., 2005; OECD, 2006).

Poverty remains an overwhelmingly rural and, by implication, an agricultural phenomenon in Tanzania, and particularly among households whose major source of income is farming (Amani, 2013). As noted earlier, almost two thirds of the total employed persons in Tanzania, and almost 90% of all agricultural employed persons are smallholder farmers living in rural areas (Tanzanian NBS, 2014a). However, agriculture is the least remunerative sector (i.e. has low return to labour remuneration) in the economy (Amani, 2013). In 2012, the basic needs poverty rate in rural areas was 33%, compared with 22% in other urban areas and 4% in Dar es Salaam (Tanzanian NBS, 2014b). Likewise, in 2011, an estimated 48% of households in rural areas compared to 39% in urban areas of Tanzania were either 'moderately' or 'highly' food energy deficient (United Nations World Food Programme, 2013). Moreover, in 2013, about 39% of children under five in rural Tanzania were stunted, in contrast to 30% in urban

areas (Tanzanian NBS, 2014b). The large proportion of the population engaged in agriculture in rural areas implies that agriculture has potential to do more in poverty alleviation. Therefore, addressing poverty and hunger for most people in Tanzania implies confronting problems experienced by smallholder farmers in their daily lives in making decisions about farming.

The agricultural sector in Tanzania has a number of strengths, which offer significant potential for future growth and poverty reduction. Firstly, Tanzania still has a relative abundance of natural resources (including arable land and rangeland), which can be used for productive purposes. For instance, there is about 7.1 million ha of high and medium potential land (2.3 and 4.8 million ha, respectively) suitable for irrigation (URT, 2016). Of the 2.3 million ha classified as high potential, only 461,326 ha had improved irrigation infrastructure in 2015, accounting for only 1.6% of the total land with irrigation potential. Likewise, an estimated 55% of the land may be used for agriculture and more than 51% for pasture (URT, 2016). However, only about 6% of the agricultural land is cultivated. Secondly, Tanzania has an expanding domestic and regional food market opportunities, especially for livestock products and crops with high-income elasticity of demand (URT, 2016, 2001). Similarly, Tanzania's membership in regional communities (Southern African Development Community and East African Community) and as a signatory to international trade protocols is improving market opportunities for agricultural food and none food commodities at both regional and global level. Thirdly, Tanzania has a comparative advantage in the production of traditional food crops (maize, rice, cassava, sorghum, sweet potatoes, legumes), horticultural crops, wheat and almost all traditional industrial export crops (cotton, cashew, tea, coffee, and tobacco) (Tanzanian NBS, 2012). This advantage can be improved through enhanced productivity and market efficiency.

Tanzania’s diverse farming environment (Kavishe and Mushi 1993; Mnenwa and Maliti, 2010; Thornton et al., 2010) means that household farming decisions are influenced by a numerous production challenges. The key challenges which hamper the agricultural growth and overall poverty reduction among smallholder farm households include: firstly, significant exposure to variability in weather patterns with periodic droughts (Tanzanian MAFS & C, 2013; URT, 2016). The impact of variability in

weather patterns is amplified by the dependency on rain-fed agriculture and the smallholder farmers' limited capacity to manage land and water resources. Secondly, the use of productivity enhancing agricultural inputs among smallholder farmers in Tanzania is one of the lowest in the region. For example, Tanzanian farmers use about 8–10 kg of fertilizer per hectare compared with an average of 16 kg/ha for Southern African Development Community (SADC) countries and 279 kg/ha for China (URT, 2016); Other factors include: underdeveloped markets, market infrastructure and farm-level value addition; high transaction costs due to the poor state or lack of rural infrastructures such as rural roads, communications and electricity; inadequate agricultural finance, including public expenditure; and inadequate agricultural extension services (Tanzanian MAFS & C, 2013; URT, 2016). The challenges outlined here influence farm households' production and resource allocation decisions (Dixon et al., 2001; Garrity et al., 2012). Part of the decisions considered by farm households include the choice of farming system[2], normally in terms of the enterprise pattern such as livestock, crops, non-farm businesses, foodstuffs consumed and the way farm households interact with markets. The farm household decision-making process about their farming system is usually complicated, and many factors such as institutional or farming context characteristics, farmer or household characteristics and natural or farm characteristics (see discussion in Section 2.9) are considered simultaneously (Borges et al., 2015a; Dixon et al., 2001; Edwards-Jones, 2006).

The Government of Tanzania recognises that agricultural extension services have great potential to facilitate informed decision-making about the choice of farming system and are crucial for reducing household food insecurity and poverty in rural areas (United Republic of Tanzania, 2015). This is because the extension services facilitate the flow of advice, information, technical know-how and transfer of technology as well as inputs to farmers which are needed to increase and sustain agricultural production (CUTS International, 2011). In Tanzania, the agricultural extension services have been vested in local government authorities for them to foster effective participation of all stakeholders including beneficiaries, and motivate private sector participation in service delivery

[2] Since decision-making processes about the choice of farming systems is usually undertaken at the farm household level, this study defines a farming system as the totality of all decisions made by a particular farm household in relation to what, how and when to produce and how to consume what is produced (Dixon et al., 2001; Köbrich et al., 2003).