THE EFFECTS OF CHRONIC DISEASES INCLUDING HIV/AIDS ON AGRICULTURAL COMMERCIALIZATION IN LOWER MOSHI IRRIGATION SCHEME

BY

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ABSTRACT

This study determined the effects of chronic diseases including HIV/AIDS on agricultural commercialization in Lower Moshi Irrigation Scheme. Specifically the study identified and characterized the extent of chronic diseases burden, determined the extent of agricultural commercialisation and compared the extent of commercialisation at varying extents of diseases burden among farming households. A cross sectional design was employed and data were collected through questionnaire, focus group discussions and observations. The population consisted of farming households in all the four villages of the scheme. The sample consisted of 80 rice farming households; 40 with and 40 without a chronically ill person. Data were processed and analyzed using the Statistical Package for Social Sciences computer software (SPSS). A high burden of chronic diseases existed in the study area. Almost half of the key productive members of households, particularly wives/husbands were chronically ill for more than one year. In all aspects of agricultural commercialization considered (i.e. number of inputs used, productivity and product utilization), agricultural commercialization was significantly lower ($p<0.001$) in the affected households than unaffected households. Use of inputs and productivity were reduced and larger proportions were utilized for food while smaller proportions were sold. Disease burden was considered in terms of who was sick, duration of the sickness, type of diseases, degree of sickness and who was the care taker. The extent of agricultural commercialization at varying extents of disease burden did not show significant difference in all aspects except for productivity. Surprisingly, productivity was significantly higher ($p<0.01$) when the care taker was either wife or husband (household heads), than when the care taker was another relative in the household.

However, this observation requires further investigation. The study recommended for education on control of diseases with particular attention on HIV/AIDS, use labour saving technologies and provision of soft loans.

DECLARATION

I, MWANAISHA SALIM KIKARI, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work and has never been submitted or concurrently being submitted for a higher degree award in any other university.

..... 17/10/2008

Mwanaisha Salim Kikari Date

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The above declaration is confirmed:

..... 17/10/2008

Prof. John Msuya Date

(Supervisor)

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DEDICATION

To my late father *Mzee* Salim Kikari and my mother Maua Bakari brought me to this world; my late sister Saumu Salim who took care of my family but God did not let her live to witness the end; and to my beloved children Aika and Maua I dedicate this work.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ASDS	Agricultural Sector Development Strategy
BWI	Bread for the World Institute
CIP	Chronically Ill Person
DFID	Department For International Development
DNA	Dioxyribose Nucleic Acid
ESRF	Economic and Social Research Foundation
FANR	Food Agriculture and Natural Resource
FAO	Food and. Agriculture Organization
FGD	Focus Group Discussion
GDP	Gross Domestic Product
HIV	Hyper Immune Virus
JICA	Japan International Cooperation Agency
KADP	Kilimanjaro Agricultural Development Programme
KATC	Kilimanjaro Agricultural Training Institute
MDG	Millennium Development Goals
NAFCO	National Agriculture and Food Corporation
NSGRP	National Strategy for growth and Reduction of Poverty
SADC	Southern Africa Development Community
SIMA	Systematic Initiative on Malaria and Agriculture
SPSS	Statistical Package for Social Sciences
SUA	Sokoine University of Agriculture
SWARMU	Southern and Western Africa Regional Management Unit

TB	Tuberculosis
TPC	Tanganyika Planting Company
UNAIDS	United Nations AIDS Commission
URT	United Republic of Tanzania
USA	United States of America
WHO	World Health Organization
ZMAC	Zambia Ministry of Agriculture and Cooperatives
ZMHCW	Zimbabwe Ministry of Health and Child Welfare

CHAPTER ONE

INTRODUCTION

1.0 Background Information

According to Hinderink and Sterkenburg (1987) agriculture in the Sub- Saharan Africa is a means of living and for the national economy. Kennedy and Cogil (1987) consider commercialization of agriculture as a cornerstone of economic development in the poor countries. Commercialization of agriculture increases marketable surplus and generates increased income for the farmers (Freeman and Silim, 2002). It is in this respect that Msambichaka *et al.* (1983) denote that to larger extent the agricultural sector determines the pace of economic and social development of these countries.

According to Hawkes and Ruel (2006), the interactions between agriculture and health are a two-way: agriculture affects health, and health affects agriculture (the link is summarized in Fig. 1). If poor health is prevalent among agricultural producers, agriculture will negatively be affected. Illness among members of households imposes significant health costs, leads to absenteeism in productive activities which reduces the ability of households to earn income, and results in losses in the household and national economy. The extent of agricultural commercialization varies from one place to another depending on the resources available, economic, social conditions and government policies. On the other hand, studies have confirmed that poor health and sanitation conditions are serious constraints for agricultural commercialization (Bouis and Haddad, 1990).

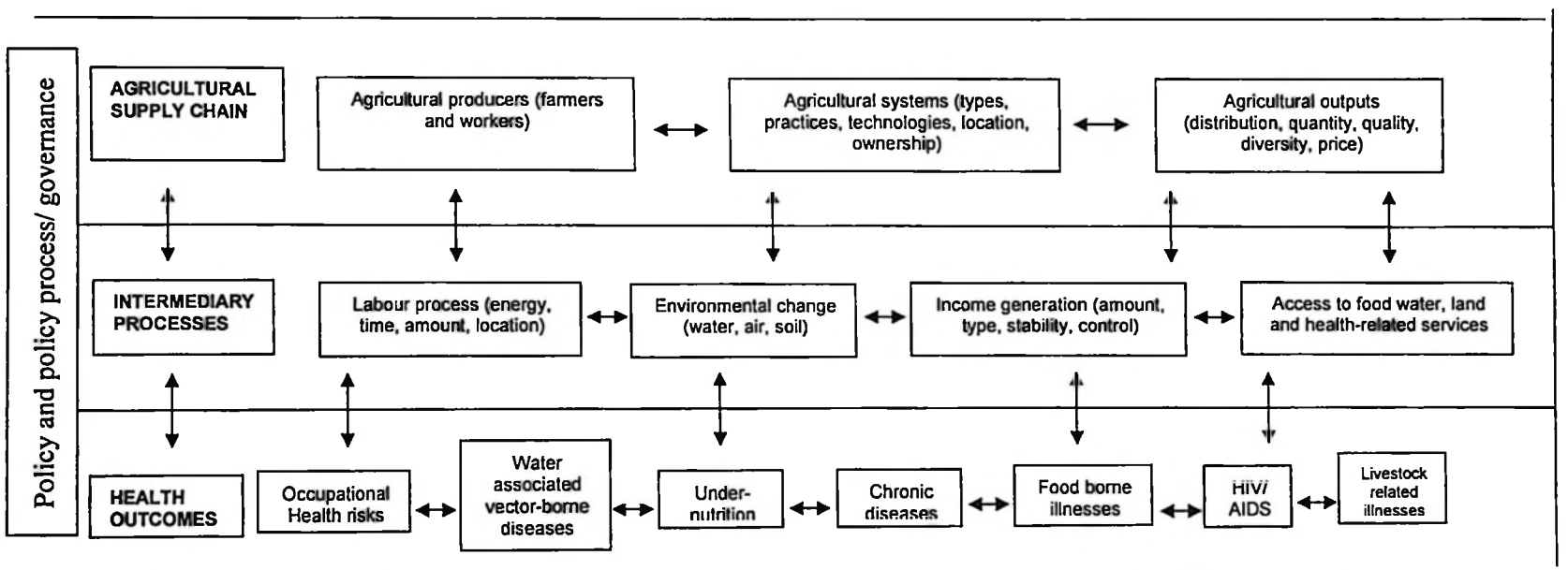


Figure 1: Conceptual Framework for the Linkages between Agriculture and Health

Source: Hawkes and Ruel (2006)

URT (2001) points out that Tanzania is agriculture dependent. Eighty percent of the population lives in rural areas with agriculture as the mainstay of their living. The agricultural sector contributes 50% to the GDP; provides 80% of the employment, 90% of the food, and 70% of foreign currency. It is also the source of industrial raw materials.

Majority of farming households in Tanzania are subsistent and consume most of their farm products in the household. This mode of production can however be transformed to commercial agriculture. But constraints such as rural to urban migration and diseases, among others, reduce the pace with which transformation can take place (Bouis and Hadad, 1990). Eboh and Okeibunor (2005) report that diseases can greatly undermine agricultural production activities. Chronic illness causes loss of agricultural labour and reduces use of inputs hence resulting into poor productivity and utility (URT, 2001). A chronically ill person is often unable to work, which reduces household income and/or the output from agriculture; and yet other household members are required to spend time caring for this person (O'Donnel, 2004). Malaria disease, for example, increases household expenditure in terms of treatment and control. According to Eboh and Okeibunor (2005), the effects of chronic diseases on households' labour force manifest mainly into reduced quantity and quality of labour.

Irrigation schemes have been established in the struggle to improve agriculture in Tanzania. Among others, Lower Moshi Irrigation Scheme was established for commercial rice production. So far rice is ranking as the second most important cash

crop in Kilimanjaro region after the traditional cash crop of coffee (URT/JICA, 1999). This study was undertaken to determine the effects that chronic disease including HIV/AIDS have on agricultural commercialization among farming households in Lower Moshi Irrigation Scheme, Moshi Rural district in Kilimanjaro region.

1.1. Problem Statement and Justification

Tanzania has high prevalence of diseases resulting into huge burden across all age groups. Eighty percent of the country is malaria endemic and 90% of the population is at risk of the disease. Twelve percent of the population between fifteen and forty nine years old is HIV positive and it is estimated that 50% of the HIV positive population is tuberculosis infected (URT, 2005).

Chronic diseases in farming communities are known to cause great losses (Mhalu, 2005). They include loss of labour days by the sick as well as those of care takers therefore leaving fields unattended and reduce range and diversity of crops grown. These tend to slow down the agricultural transformation process or even to cause turning back to subsistence farming.

High extent of chronic diseases like malaria, HIV/AIDS and tuberculosis is a threat to the efforts of transforming subsistence agriculture to commercial agriculture. They slow down growth of agriculture through reduction of labour force through mortality, morbidity and costs involved (HealthGoods, 2007). Some empirical studies have been conducted in other areas such as assessment of the impact of HIV/AIDS on

Agriculture and Food Security in Botswana by Gobotswang (2006), impact assessment of the malaria burden in land use and agricultural practices in Mvomero district in Tanzania (SIMA, 2007), and the effect of HIV/AIDS on farming systems in Eastern Africa (FAO, 1995). However, not much has been reported specifically on the effect of chronic diseases on agricultural commercialization.

This research is in line with the Millennium Development Goal of reducing diseases like HIV/AIDS, malaria and tuberculosis by the year 2015 (World Bank, 2007). The study determined the extent of disease burden and assessed the various ways in which it has impinched upon agricultural commercialization in the study area.

1.2. Objectives of the Study

1.2.1. Main objective

To determine the effects of chronic diseases, including HIV/AIDS, on agricultural commercialization among farming households at Lower Moshi Irrigation Scheme.

1.2.2. Specific objectives

i) To identify and characterize the existing burden of chronic diseases among farming households in the study area.

ii) To determine extent of agricultural commercialization in terms of levels of production, product utilization, and use of farm inputs in the study area.

iii) To compare the extent of agricultural commercialization at varying extents of disease burden in the study area.

1.2.3. Hypotheses

Null hypotheses (H_o)

i) There is significantly higher burden of disease among affected farming households than the non-affected in the study area.

ii) There is significantly lower extent of agricultural commercialization among the affected farming households than the non-affected in the study area.

iii) There is significant inverse relationship between the extent of disease burden and the extent of commercialization.

Alternative hypotheses (H_1)

i) There is no significantly high burden of disease among affected farming households than the non-affected in the study area.

ii) There is no significantly low burden of agricultural commercialization among the affected farming households than the non-affected in the study area.

iii) There is no significant inverse relationship between the extent of diseases burden and the extent of commercialization.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter reviews relevant literature on chronic diseases and agricultural commercialization. The review includes overview of agricultural commercialization, definition of key concepts, the link between agriculture and health and current situation of agriculture and diseases in Tanzania.

2.1 Overview of Agricultural Commercialization

Most of the world's farmers live in developing countries where their activities are between subsistence and commercial production. Two thirds of the world's agricultural value added is created in developing countries (BWI, 2003). Agriculture is a source of livelihoods for an estimated 86% of rural people. It provides jobs for 1.3 billion smallholders and a foundation for viable rural communities. Of the developing world's 5.5 billion people, 3 billion live in rural areas, whereby the majority are in households involved in agriculture (World Bank, 2007).

Agriculture in the developing countries is operated at household level mainly to provide food. The agricultural sector is also a market for agriculture industrial products including machinery, agrochemicals and fertilizers. Increased agricultural productivity creates a surplus that is sold to earn revenue for reinvestment and to carter for household needs while building the national economy (Biology-online, 2007).

Agriculture is still the major means of living in the Sub- Saharan Africa (Henderink and Sterkenburg, 1987; Kennedy and Cogil, 1987) although it does not extend to the

market, and sometimes fails to meet household food demands (FAO, 2006). Likewise in other regions of the world, the sector accounts for the livelihoods of a sizable proportion of the population, ranging from 50 to 60 % in Asia and 15 to 30 % in Latin America and the Caribbean (FAO, 2004). For the last two decades 80 % of the revenue in Japan is from land with 12 to 22 % of it from agricultural sector.

2.2 Definition of Key Concepts in Agricultural Commercialization

2.2.1 Subsistence and commercial agriculture production

Agriculture refers to the production of goods through the growing of plants and keeping of animals. Agricultural growth is an important step towards economic development (Diao *et al.*, 2007). Agricultural production ranges from subsistence to commercial production depending on the scale. Production is either for sole household consumption, both household consumption and a surplus for the market or for market only (DFID, 2004). So far there is no specific definition for subsistence farming; however most scholars agree that subsistence farming can be associated with poverty, low levels of technology, insufficient production and low levels of commercialization (Diao *et al.*, 2007).

Agricultural commercialization is the process or transition from subsistence or own production to an increasingly complex production and consumption system based on market and other forms of exchange. This process involves transformation of the subsistence agriculture to commercially profitable production systems for improved income whereby small-scale farmers raise productivity to improve their well-being (BWI, 2003).

According to Wikipedia (2007), commercial agriculture produce crops intended for widespread distribution for example in supermarkets, and any non-food crops such as cotton, coffee and tobacco. Commercial agriculture does not include crops grown for household consumption. Von Braun and Kennedy (1994) describe commercialization of agriculture as either being production of cash crops which certainly are for sale only or the traditional food crops which are frequently marketed to a considerable extent. The authors also provided the three ratios by which the extent of commercialization at the household level can be described:

1a. Commercialization of agriculture (output side) = Value of agricultural sales in markets ÷ Total Agricultural production value

1b. Commercialization of agriculture (input side) = Value of inputs acquired from markets ÷ Total Agricultural production value

2. Commercialization of rural economy = Income acquired through market transactions ÷ Total income

3. Degree of integration into cash economy = Value of goods and services acquired by cash transactions ÷ Total income

Factors influencing subsistence and commercialization interact (Mathijs and Noev, 2002) and according to Antel and Gregory (1994) the rates of marketing and consumption of agricultural products depend on factors like the strengths of income, substitution and production levels. A farmer makes investment of capital expecting to realize a profit sufficient for consumption and future investment.

2.2.2 Chronic disease

From the medical point of view, chronic disease is a disease that is long lasting or recurrent. The term chronic describes the course of the disease or its rate of onset and

development. A chronic course is distinguished from a recurrent course whereby recurrent disease relapses repeatedly with periods of remission in between (Wikipedia, 2007). The chronic can refer to persistent and lasting medical condition. Chronicity is usually applied to a condition that lasts more than three months (Webster's, 2003; Marphy, 2003).

A chronic disease very often becomes permanent leaving residual disability caused by non-reversible pathological alterations. It requires a long period of supervision, observation or care and poses a significant burden in mortality, morbidity and cost (HealthGoods, 2007). WHO (2006) defines chronic diseases as diseases of long duration and generally slow progression whereby diseases such as heart diseases, stroke, cancer, chronic respiratory diseases and diabetes are by far the leading course of mortality in the world representing 60% of all deaths.

According to Marphy (2003), FAO (2004) and Garbus (2003), chronic diseases are closely associated with HIV/AIDS. On the other hand, tuberculosis and malaria are especially being considered as HIV/AIDS related chronic illnesses. HIV that causes AIDS acts by weakening the immune system, making the body susceptible to and unable to recover from other diseases (ZMHCW, 2004). SIMA (2007) and ESRF (2004) report malaria as the major disease burden in Africa Southern of Sahara. It is estimated that 42 % of TB cases were also HIV-positive in 2000 in Ethiopia (WHO, 2006).

HIV/AIDS, malaria, tuberculosis, diarrhea, pneumonia and meningitis among others have been reported to threaten the efforts of transformation of subsistence agriculture to commercialized agriculture in different parts of the developing world (Marphy, 2003; Kebede and Retta, 2004; URT, 2005). Others include scabies, endo-parasites, influenza, eye illnesses, arthritis anemia, fungus, mental problems and venereal diseases. Chronic illness results to poor health that reduces the ability of producers to invest and operationalize changes in agricultural systems to increase productivity (Hawkes and Ruel, 2006). In this study, an individual was considered chronically ill if he/she continually or repeatedly/occasionally fell ill as a result of any disease for three months or more prior to this research.

2.3 Conceptual Framework

The conceptual framework (Figure 2) presents summary of the concept of the study. The concept is presented in two levels:

Level 1: Manifestation of the extent of diseases mainly through manpower, time and household resources, and

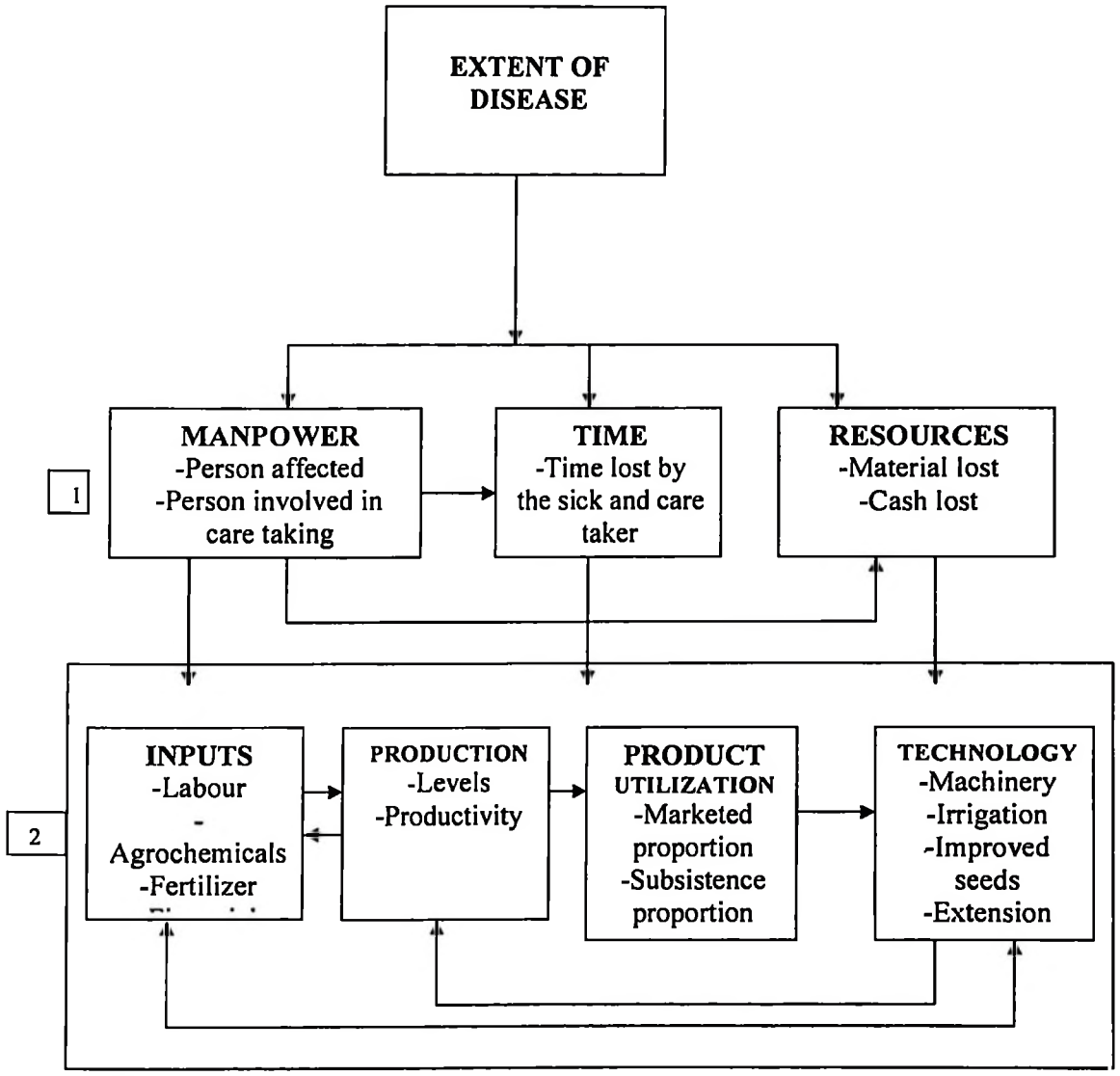
Level 2: The components of agricultural commercialization which are inputs, technology, productivity and product utilization.

2.4 The Link Between Agriculture and Health

Agriculture faces many challenges including natural resource constraints, extreme weather conditions, pests, globalization, environmental degradation, and problems of maintaining production in conflict situations (Hawkes and Ruel, 2006). Agricultural production can also increase the risks of water-related diseases for example malaria,

as well as health hazards linked with specific agricultural systems and practices (Donovan and Massingue, 2007).

Agriculture is tied to human health at the most basic level. Agriculture produces food, fiber, medicine and hence providing livelihoods to farmers. Good health affects agriculture by boosting people's capacity for work and thus increasing production. On the other side, unhealthy farmers are unable to produce enough agricultural goods to earn decent living (Hawkes and Ruel, 2006). Hence the interactions between agriculture and health are two-way: agriculture affects health, and health affects agriculture. The process of agricultural production and the outputs it generates can contribute to both good and poor health.



Key:
1= Manifestation of the extent of disease
2=Components of agricultural commercialization

Figure 2: Conceptual framework-interaction between chronic diseases and agricultural commercialization

Commercial agricultural production requires a combination of various factors, including health, for high productivity. Despite geographic and economic variations, farmers require productive land, water, capital, improved seeds, modern tools,

pesticides, herbicides and fertilizers to boost yields which are sold to earn capital (BWI, 2003).

Households are financially constrained in the presence of chronic illness, which undermine their capacity to purchase agricultural inputs such as fertilizers, chemicals and improved seeds. Poor access to inputs results to decline in soil fertility, increased pests and diseases due to inadequate agronomical management practices (SADC-FANR, 2003). Recurrence of malaria episodes, for example, reduces household productive time causing loss of work capacity, hence lowered agricultural productivity (FAO, 2004). When illness is severe both the sick and care taker have no time to work in the farm resulting into labour shortage and declined agricultural productivity (URT, 2005; Marphy, 2003; DFID, 2004).

2.5 Current Situation of Agriculture and Diseases in Tanzania

Crop farming is the most important activity of the rural population whereby about 68% of the members work full time on farm activities with sale of crops being the most important source of income (URT, 2005). There is a wide variety of crops grown in the country (over 95 types) dominated by maize and other food crops such as cassava, bananas, paddy, beans and groundnuts. The majority of crop growing households in Tanzania practice subsistent farming and is at the low end of moving to self supporting or profit making entities. However, the crop sector plays an important role. It provides jobs, sustenance and income to about 5 million rural crop growing households, which represent 99% of the total number of farming households

in the rural areas and 95% of the total rural households (URT, 2006). In these households a total of almost 25 million individuals are based (URT, 2005).

Diseases such as malaria, typhoid fever, tuberculosis, diarrhea and HIV/AIDS pose a high burden both socially and economically ranging from school absenteeism to low productivity at workplaces in Tanzania (URT, 2005). Tanzania is malaria endemic and the disease is a major public health concern and a leading cause of morbidity and mortality. It has been estimated that 2 899 people were malaria positive among every 10 000 people and a total of 140 156 deaths from the disease in 2003 (URT, 2005). An increase in HIV/AIDS prevalence over the last decade has further aggravated the health of Tanzanians (URT, 2005). By the year 2003, a total of 18 929 AIDS cases were reported and 75% of these were in the productive age (15-49 years old).

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter describes the methodology used for this study. It includes a short description of the study area, research design, sampling procedures and methods of data collection processing and analysis. The chapter also describes the approaches that were used in measuring extents of disease burden and agriculture commercialization.

3.1 Description of the Study Area

3.1.1 Location of the scheme

The study was conducted at Lower Moshi Irrigation Scheme, which is located in Moshi Rural district in Kilimanjaro Region (Fig. 3). The area is located 17 km South East of Moshi town the capital town of Kilimanjaro Region. It is situated at latitude 3 °S and longitude 37.5 °E. The altitude varies from 700 m to 800 m above sea level.

The scheme consists of relatively narrow strip of land along the right bank of Rau River and covers four administrative villages namely Mabogini, Rau Kati, Chekereni and Oria. Rau and Njoro rivers supply the water for irrigation. Boundaries include Rau River on the East, sugarcane plantation belonging to Tanganyika Planting Company (TPC) on the West and North and the former National Agriculture and Food Corporation (NAFCO) farm on the South. The scheme has a total of 995 ha

area used for production of paddy, maize, sugar-cane and other upland crops of which only paddy is grown under irrigation (Fig. 4).

3.1.2 Population and administration

The Lower Moshi Irrigation Scheme is under supervision of Kilimanjaro Agricultural Development Project (KADP). The total population in the scheme villages is 24 403 distributed in 4 509 households located in 31 administrative cells (Table 1). Generally, diseases which commonly occur in the scheme villages according to discussion with health workers in the area include malaria, bilhazia, typhoid, HIV/AIDS, amoeba, chicken pox and tuberculosis. The rainy season (April-May) is peak season for diseases because of unclean water, increased mosquito population and high susceptibility of the people due to weakness caused by labour intensive agricultural activities.

Table 1: Population distribution in the four villages covered by the scheme

Village	Number of administrative cells	Population			Number of households
		Male	Female	Total	
Oria	9	2 840	2 747	5 587	1 394
Chekereni	7	3 044	3 794	6 838	951
Mabogini	5	3 442	3 496	6 938	1 156
Rau	10	2 311	2 729	5 040	1 008
Total	31	11 637	12 766	24 403	4 509

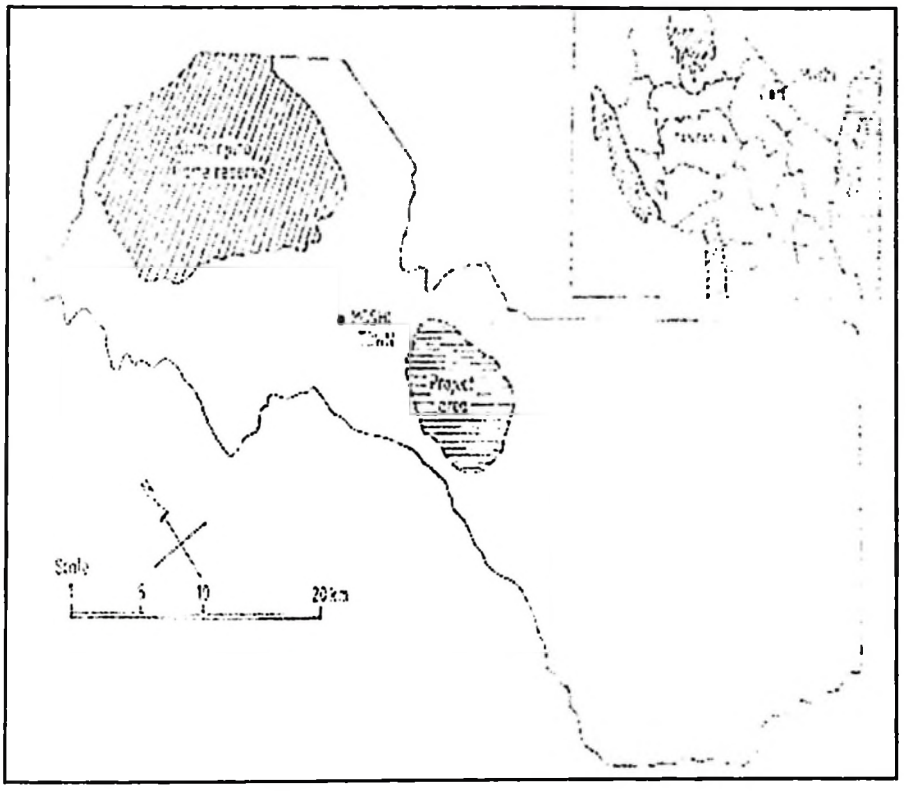
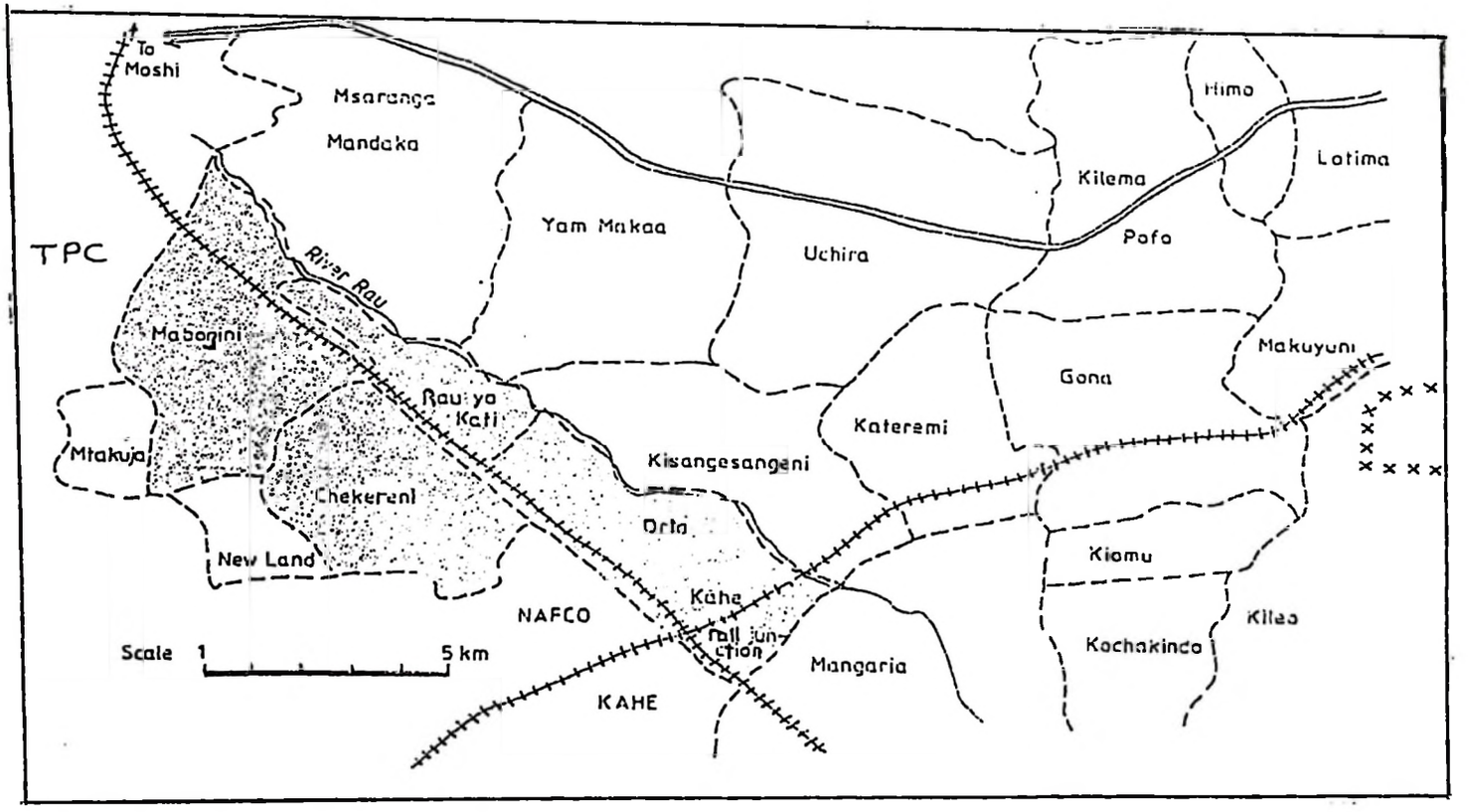


Figure 3: Map of Kilimanjaro Region showing the Lower Moshi Irrigation Scheme

Source: Mapara 2002



Key:

The scheme villages

Figure 4: Map of villages in the Lower Moshi Irrigation Scheme

Source: Mapara (2002).

3.2 Research Design

In this study a cross-sectional research design was employed in data collection from farming households in the four villages of Lower Moshi Irrigation Scheme. According to Bailey (1998), cross sectional design collects data at a single point in time and can be used for a descriptive study as well as for determination of relationships between variables.

3.2.1 Sampling procedure

The study population consisted of all the farming households in the four villages of the Lower Moshi Irrigation Scheme. Information of the status of the farming households was obtained from village leaders. Sampling frame was within the four villages and the sample consisted of 80 rice farming households. The sampled households were distributed in such a way that 40 households were with a chronically ill member and 40 households were without any chronically ill member (that is 40, affected and 40 unaffected households).

A multiple stage sampling technique was used in selecting the farming households in each of the 4 villages. In the first stage strategic/purposive sampling was used to obtain households involved in commercial rice production through irrigation. This was followed by purposive sampling to obtain affected households (with a chronically ill member within a period not exceeding one year). Lastly from the households without ill members, random sampling technique was applied to obtain 10 households. This was also repeated for the non affected strata or group. Hence the whole sample was composed of 20 households from each village (10 affected and 10

unaffected). Sampling unit was a household and respondents were the household heads or representatives. Selected households were considered representatives of the commercial rice farmers of the Lower Moshi Irrigation Scheme.

3.2.2 Data collection

A questionnaire was formulated and pre-tested for its validity and reliability of the items at Mkindo Irrigation Scheme at Turiani in Morogoro. Ten households (5 affected and 5 unaffected) were selected for questionnaire pre-testing. Thereafter, the initial draft of the questionnaire was revised basing on the pre-testing results. Two research assistants were trained for two days, to assist the researcher in data collection.

The data were collected by the researcher and the research assistants through personal interviews with the household heads or their representatives. A formal introduction of the researchers was done in each village followed by a focus group discussion (FGD) with the village leaders before personal interviews. The researcher also observed and conducted informal discussions when need arose for the purpose of enrichment of the findings. Structured questionnaire with both closed and open ended questions was used for oral questioning (Appendix 1). The questionnaire was designed to capture both quantitative and qualitative type of data.

3.2.3 Data processing and analysis

The record of each respondent was inspected for accuracy immediately after it was completed before proceeding to another village. Data verification was done

immediately after collection in order to make sure that questionnaires were filled in accurately and completely. Data from open ended responses were summarized with similarities and differences noted.

The completed questionnaires were coded and data entered into computer spread sheet using Statistical Package for Social Sciences (SPSS) version 12.0 computer programme. Statistical measures including descriptive statistics (frequency, percent, mean, standard deviation, and range) were calculated in the analysis. Comparison of means by statistical t- test was used to determine and compare the extent of commercialization at varying extents of disease burden, including between the affected and non affected households.

3.3 Measuring the Extents of Disease Burden and Agricultural Commercialization

The parameter of disease burden was measured using five variables, which included:

- Who was sick
- Duration of the period suffered from sickness
- Type of disease
- Condition of the sick
- Who was the care taker

The variable of sick person (who was sick) was based on the relationship with the head of household and categorized into household head or wife, children and parents or sisters and brothers. These were then considered respectively as high extent, moderate and low extent. The duration of suffering from the sickness was

categorized into three to six months as low extent; seven months to one year as moderate extent, and above one year as being high extent. Diseases were categorized as HIV/AIDS (fully blown) and Tuberculosis to be high extent, malaria as moderate extent and lameness/arthritis/high blood pressure/diabetes as low extent. Categories of the condition of the sick were hospitalized as high extent, sick in bed at home as moderate extent and sick while able to work as low extent. Type of care taker was graded to be low extent if it was children or unrelated people either employed or otherwise. It was considered of moderate extent when parents/sisters and brothers were involved and it was high extent when wife/husband were involved.

The extent of agricultural commercialization was measured by considering three aspects namely:

- Use of inputs
- Productivity (production per unit area)
- Product utilization (proportions sold and proportions used for food)

The use of inputs was considered of low extent of agricultural commercialization if only 0 to 2 inputs were used. Use of between 3 to 4 inputs was considered as moderate extent; and more than 4 inputs as high extent. For the case of productivity aspect, those producing less than 2 000 kg of rice per hectare were considered to have low extent of agricultural commercialization; between 2 001 and 4 000 kg/h as moderate extent; and those producing more than 4 000 kg/h as having high extent of commercialization. Product utilization was considered by the proportions sold and proportions used for food. If the proportions sold were between 91 and 100% of the total product it was assigned high extent, between 81 and 90% as moderate extent and 60 to 80% as low extent. Extent of agricultural commercialization at varying

extent of disease burden was compared statistically through comparison of means by t-test. Statistical significance was considered at $p<0.01$.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Overview

This part presents the findings of the study. It includes characteristics of the interviewed households and extents of diseases burden in the affected households. Others are comparison of agricultural commercialization between affected and unaffected households and agricultural commercialization at varying extents of disease burden.

4.1 Characteristics of the Surveyed Households

A total of 80 households (40 affected and 40 unaffected) were interviewed and their characteristics are presented in this section. They include characteristics of the interviewed respondents with regard to age, marital status, and relationship of respondent with household head. Social economic characteristics were considered by type of household (in terms of whether male or female headed households), education level and occupation of the household head. Demographic characteristics of the households were summarized by household size and age distribution.

4.1.1 Characteristics of interviewed respondents

Interviewed respondents were characterized by age, marital status and their relationship to the household head. Results are summarized in Table 2. Majority of respondents were between 36 and 55 years old in both affected and unaffected households (57.5% and 45.0% respectively). About one third of the respondents were above 55 years old. This population indicates to consist of a large proportion of the

productive age segment. Probably most of them were participating in agriculture. Most of the respondents were married (82.5% and 75.0% in affected and unaffected households, respectively). A large proportion of the respondents were household heads (57.5% in affected and 67.5% in unaffected households). This implies that majority of respondents were the bread winners and decision makers in households.

Table 2: Characteristics of interviewed respondents

Characteristic of respondent	Status of household	
	Affected (n=40)	Unaffected (n=40)
Age (years)		
18-35	12.5	20.0
36-55	57.5	45.0
>55	30.0	35.0
Marital status		
Married	82.5	75.0
Single	10.0	10.0
Divorced	2.5	5.0
Widowed	5.0	10.0
Relationship with the head of household		
Wife/Husband	32.5	27.5
Child	5.0	2.5
Sister/Brother	5.0	2.5
Household head	57.5	67.5

4.1.2 Demographic characteristics of surveyed households

Table 3 presents the summary of the demographic characteristics of the affected and unaffected households. These include population and age distribution in the households. There was a slight variation in the total number of between the affected and unaffected households. The total population was 294 in the affected and 310 in the unaffected households. Both affected and unaffected households consisted of over 80% of the population within the productive age segment (between 15 and 59

years old). Only a small proportion was in the dependent population segment of between 1 and 14 years old. According to URT (2001) and Gobotswang (2006), the rural population between 15 and 59 years old is the most active age group in agriculture. This indicates availability of adequate household labour in both affected and unaffected households. Majority of the households were large consisting of more than 3 members

Table 3: Demographic characteristics of surveyed households

Characteristic	Affected households		Unaffected households	
Age of household members in years	Number	%	Number	%
1-14	43	14.62	39	12.58
15-20	101	34.35	97	31.29
21-40	83	28.23	123	39.68
Above 40	67	22.79	51	16.45
Total	294	100.00	310	100.00
Household size (number of members)				
1-3	7	2.5	0	0
4-6	96	32.5	93	30
7-8	88	30.0	93	30
>8	103	35.0	124	40
Total	294	100.0	310	100

4.1.3 Socio-economic characteristics of surveyed households

The socio-economic characteristics of the affected and unaffected households are described by type of household head, education level and occupation of the household head. Table 4 summarizes the results. Majority of the households were male headed (87.5% and 77.5% in affected and unaffected, respectively). Female headed households were twice as much in the unaffected households. More than 7% household heads in the affected households did not receive any formal education

compared to only 5% of the unaffected. Sixty percent of the people aged 10 years and above have been reported to be illiterate in rural Tanzania (URT, 2001). Sambrook (2004) noted education to be an important factor in the transformation of agriculture. In the developing countries education contributes 50% of the variation in total agricultural output.

Majority of the household heads were involved in farming only (85% in affected and 87.5% in unaffected households). Proportion of those involved in business together with farming among the unaffected households was higher than in affected households (10% as opposed to 2.5%). But affected households had a higher proportion of civil servants (12.5% against 2.5%). It can generally be said that although the study was focusing on farming households, there was also diversification of occupation and hence of source of income to a certain extent.

Table 4: Social economic characteristics of surveyed households

	Household	
Characteristic	Affected (%) (n=40)	Unaffected(%) n=40)
(i) Type of household head		
Female	12.5	22.5
Male	87.5	77.5
(ii) Education level of household head		
No formal education	7.5	5.0
Primary school education only	62.5	82.5
Secondary school education	20.0	10.0
Above secondary school education	10.0	2.5
(iii) Occupation of household head		
Farming only	85.0	87.5
Farming and business	2.5	10.0
Farming and civil service	12.5	2.5

4.2 Characteristics and extent of chronic disease burden in the affected households

The disease burden was measured using five aspects including: who was sick, duration of suffering from sickness, type of disease, condition of the sick and who was the care taker (refer section 3.3). Each of these was categorized to consist of high, moderate and low extents. Tables 5 and 6 summarize the results.

Forty five percent of the chronically ill individuals were husbands or wives (high extent) and more than one third (37.5%) had suffered for more than one year (high extent) (Table 5). Long illness results to great stress to the household's livelihood (O'Donnell, 2004). Output from agricultural activities is likely to be reduced because other adult members ought to care for the sick and fail to participate in production. Long persistent of the sickness may result to reduction in the size of land cultivated. Furthermore, Marphy (2003) reports a shift from high value cash crops to low input and low value crops.

Table 5: Characteristics and extent of disease burden: who is sick and duration of suffering from the sickness

Parameter of disease burden	Criteria for categorization	Extent of disease burden	Frequency	Percent
Who is sick (n=40)	Husband/wife	High	18	45.0
	Children	Moderate	5	12.5
	Parents/Brother/Sister	Low	17	42.5
Duration of sickness (n=40)	Above 1year	High	15	37.5
	7months- 1year	Moderate	14	35.0
	3-6 months	Low	11	27.5

Table 6 shows that over 37% of the individuals suffered from HIV/AIDS and/or Tuberculosis (high extent) while 60% were able to work (low extent). Only a small proportion (7.5%) was hospitalized while about one third (32.5%) was bed redden at home. A larger proportion (56.5%) of care takers was either parents, brothers or sisters while 31.2% were children and others who were not closely related to the household. Only 12.5% of care takers were either husbands or wives. The result shows that household adult members were mostly caring the sick, which implies an increased labour demand. Sometimes children and even unrelated people were involved. However, SWARMU (2003) points out that adults in the household care for the sick although children and extended family network is usually a great support.

Table 6: Characteristics and extent of disease burden: type of disease, degree of sickness and care taker.

Parameters of disease burden	Criteria for categorization	Extent of disease burden	Frequency	Percent
Type of disease (n=40)	HIV/AIDS/Tuberculosis	High	15	37.5
	Malaria	Moderate	12	30.0
	Diabetes/High blood pressure/Lameness/Arthritis	Low	13	32.5
Degree of sickness (n=40)	Sick hospitalized	High	3	7.5
	Sick in bed/ home	Moderate	13	32.5
	Sick but working	Low	24	60.0
Care taker (n=16)	Wife/Husband	High	2	12.50
	Sister/Brother/Parents	Moderate	9	56.25
	Children/Unrelated	Low	5	31.25

4.3 Extent of Agricultural Commercialization in the Affected and Non affected Households

The extent of agricultural commercialization in both the affected and unaffected households was measured by the number of inputs used, productivity and the product utilization (proportions sold and used for food). Section 3.3 has described the approach used in the measuring. The results are summarized in Table 7. Sixty percent of the affected households used low extent of inputs (0-2 number of inputs) and only 12.5% used inputs at a high extent (5-6 inputs). On the contrary, none of the unaffected households used low extent of agricultural inputs. This implies that affected households were suffering financial constraint and did not afford to purchase sufficient farm inputs. Only one eighth of the affected households (12.5%) had high productivity while all unaffected households (100%) produced at high extent.

Fifty five percent of the affected households sold the product at a high extent while all the unaffected households sold their product at a high extent. All unaffected households utilized low levels of the product for food as compared to moderate extent in the affected households. Probably affected households did not afford to purchase other food items and instead relied on the product. Also affected households could have experienced increased food demand because of friends and relatives who frequently visited the sick person.

It has been noted by FAO (2004) that chronic illness in the household reduces household productive time causing loss of work capacity and lower agricultural productivity. Financial constraint due to illness and competing cash needs undermine

the capacity to purchase agricultural inputs. In severe illness, a care taker is required and therefore time spent for farm work is reduced and agricultural production and productivity decline (Marphy, 2003; DFID, 2004; ZMAC, 2005; URT, 2005).

Table 7: Extent of commercialization in the affected and unaffected households

Parameter	Criteria for categorization	Extent of agricultural commercialization	Household Group	
			Affected (%) (n=40)	Unaffected (%) (n=40)
Number of farm inputs used	0-2	Low	60.0	0
	3-4	Moderate	37.5	50
	5-6	High	2.5	50
Productivity (kg/h)	Less than 2 000	Low	45.0	0
	2 001-4 000	Moderate	42.5	0
	Above 4 000	High	12.5	100
Proportion sold (%)	60-80	Low	15	0
	81-90	Moderate	30	0
	91-100	High	55	100
Proportion used for food (%)	0-10	Low	60	100
	21-40	Moderate	35	0
	Above 40	High	5	0

4.4 Comparing Agricultural Commercialization Between Affected and Unaffected Households

The mean values of the indicators of extent of agricultural commercialization were compared between affected and unaffected households by t-test statistics. Results are summarized in Table 8. The mean value for the number of inputs used for the affected households was 1.78 compared to 4.45 among the unaffected households. The difference is statistically significant at $p<0.001$. The results indicate lower use of inputs in the affected households. Less use of inputs by the affected households is

likely because they spend much money to care for the sick in the household and therefore fail to afford agricultural inputs like herbicides, improved seeds and hired labour adequately. As noted by ZMAC (2005), burdened households use less fertilizer and fewer improved varieties and chemicals because they lack financial resources to purchase these inputs.

Mean productivity in the affected households was 2 484.88 kg/ha compared to the unaffected households where mean productivity was 5 867.5 kg/ha. The difference in productivity between affected and unaffected households was statistically significant at $p<0.001$. Productivity is lowered in the affected households because of poor use of agricultural inputs. According to URT (1999), productivity in the scheme is between 6 and 7 tons of rice per hectare when sufficient inputs are used, indicating that the unaffected households were producing at almost the recommended levels.

In the proportions sold, households with a chronically ill person (CIP) sold an average of 88.52% of their produce while households without CIP sold at mean of 97.48%. Affected households were selling less of their produce than the unaffected households due to the fact that the former were producing less and therefore much of it was being used to meet household food needs. Mean proportion used for food by the affected households was 10.84% compared with a mean of 2.55% among the unaffected ones. Difference was statistically significant at $p<0.001$. This implies that affected households fail to earn enough capital for reinvestment and also household needs.

Therefore it can be concluded that, in total, commercialization in the affected households is significantly lower than in the non-affected households ($p<0.001$).

Table 8: T-test results for comparing extent of agricultural commercialization between affected and unaffected households

Parameter	Household status	Mean value	Standard deviation	t-value	Df	Significance level	Mean difference
Number of farm inputs used	Affected Unaffected	1.78 4.45	1.56 0.68	-9.94	78	0.000***	2.67
Productivity (kg/h)	Affected Unaffected	2 484.88 5 867.50	1161.67 357.10	-17.6	78	0.000***	3 382.62
Proportions used for food (%)	Affected Unaffected	10.84 2.55	8.39 2.08	6.07	78	0.000***	-8.29
Proportions sold (%)	Affected Unaffected	88.51 97.48	8.74 2.08	-6.31	78	0.000***	8.97

***Significant $p<0.001$

4.5 Agricultural Commercialization at Varying Extents of Disease Burden

The mean values of agricultural commercialization (use of inputs, productivity, proportions sold and proportions used for food) at varying extents of disease burden were compared using t-test statistics. High extents of the disease burden were taken as reference to compare with the low and moderate extents. All the parameters of disease burden that is who was sick, duration of sickness, type of disease, degree of the sickness and who was the care taker were considered.

4.5.1 The sick person

Agricultural commercialization at the moderate and low extents of the sick person were compared to that in the high extent. Results are summarized in Tables 9 and 10. The mean values of commercialization at high extent of disease burden in terms of the sick person did not have any difference that was statistically significant ($p<0.05$) with that of either moderate or low.

This was true considering all the parameters of commercialization included. The results indicate that whoever was sick in the household it did not make much difference probably because households were composed of large numbers of people in the working category. Otherwise the affected households were probably using hired labour or were getting support from relatives and friends. Marphy (2003) reports that disease burdened households increased their use of hired labour for all major farming activities.

Table 9: T-test results for comparing agricultural commercialization between moderate and high extents of the sick person

Parameter of commercializatio n	Compared extents of the sick person	Mean value	Std deviation	t-value	Df	Significance level	Mean difference
Number of farm inputs used	High Moderate	1.83 1.40	1.69 1.52	0.517	21	0.610	0.43
Productivity (kg/h)	High Moderate	2 611.06 2 465.00	1 099.78 1 294.77	0.254	21	0.802	146.06
Proportions sold (%)	High Moderate	88.62 89.17	9.26 8.85	-0.117	21	0.908	-0.54
Proportions used for food (%)	High Moderate	11.38 10.83	9.26 8.85	0.378	21	0.908	-0.54

Table 10: T-test results for comparing agricultural commercialization between low and high extents of the sick person

Parameters of commercialization	Compared extents of the sick person	Mean value	Std deviation	t-value	df	Significance level	Mean difference
Number of farm inputs used	High	1.83	1.69	0.018	33	0.99	0.01
	Low	1.82	1.51				
Productivity (kg/h)	High	2 611.06	1 099.78	0.640	33	0.53	253.94
	Low	2 357.12	1 244.88				
Proportions sold (%)	High	88.62	9.26	0.137	33	0.89	0.41
	Low	88.21	8.68				
Proportion used for food (%)	High	11.38	9.26	0.378	33	0.71	1.10
	Low	10.28	7.76				

4.5.2 Duration of disease

Agricultural commercialization at the moderate and low extents of the duration of the disease were compared to that of the high extent. Results are summarized in Tables 11 and 12. The differences in mean values of commercialization at varying extents of the disease burden in terms of duration of disease were not statistically significant ($p<0.05$). In other words commercialization did not differ with varying durations of the disease. This is probably associated with the long illness whereby friends and neighbours tend to come out to assist the households in agricultural activities.

Table 11: T-test results for comparison of commercialization between moderate and high extents of duration of disease

Parameters of commercialization	Compared extents of duration of disease	Mean value	Std deviation	t-value	df	Significance level	Mean difference
Number of farm inputs used	High Moderate	2.09 1.86	1.64 1.51	0.370	23	0.715	0.234
Productivity (kg/h)	High Moderate	2 642.82 2 635.50	1 074.29 1 115.95	0.017	23	0.98	7.32
Proportions sold (%)	High Moderate	90.13 89.33	9.86 7.56	0.229	23	0.821	0.80
Proportion used for food (%)	High Moderate	9.87 10.67	9.86 7.56	-0.229	23	0.821	-0.80

Table 12: T-test results for comparison of commercialization between low and high extents of duration of disease

Parameters of commercialization	Compared extents of duration of disease	Mean value	Std deviation	t-value	df	Significance level	Mean difference
Number of farm inputs used	High Low	2.09 1.47	1.64 1.60	0.97	24	0.34	0.62
Productivity (kg/h)	High Low	2 642.82 2 228.47	1074.29 1290.65	0.87	24	0.40	414.35
Proportions sold (%)	High Low	90.13 86.57	9.86 9.14	0.95	24	0.35	3.56
Proportion used for food (%)	High Low	9.87 11.71	9.86 8.48	-0.51	24	0.61	-1.84

4.5.3 Type of disease

Commercializations at the moderate and low extents of type of disease suffered were compared with that of high extent (Tables 13 and 14). However the differences noted were not statistically significant ($p<0.05$).

Table 13: T-test results for comparison of commercialization between moderate and high extents of type of disease.

Parameters of commercialization	Compared extents of type of disease	Mean value	Std deviation	t-value	df	Significance level	Mean difference
Number of farm inputs used	High Moderate	1.82 1.86	1.67 1.22	-0.05	22	0.962	0.34
Productivity (kg/h)	High Moderate	2417.12 3051.43	1 097.61 950.95	-1.33	22	0.196	-634.31
Proportions sold (%)	High Moderate	87.08 92.42	10.55 2.95	-1.30	22	0.206	-5.34
Proportion used for food (%)	High Moderate	11.41 11.67	10.0 8.18	0.98	22	0.336	3.83

Table 14: T-test results for comparison of commercialization between low and high extents of type of disease.

Parameters of commercialization	Compared extents of type of disease	Mean value	Std deviation	t-value	df	Significance level	Mean difference
Number of farm inputs used	High Low	1.82 1.69	1.67 1.66	0.24	31	0.816	0.14
Productivity (kg/h)	High Low	2 417.2 2 309.0	1 097.61 1 293.78	0.26	31	0.797	108.12
Proportions sold (%)	High Low	87.08 88.33	10.55 8.18	-0.38	31	0.708	-1.25
Proportion used for food (%)	High Low	11.41 11.67	10.0 8.18	-0.08	31	0.934	-0.27

4.5.4 Condition of the sick

Comparisons of commercialization between moderate and high and low and high extents of condition of the sick were done. Results show that there were no statistical significant ($p<0.05$) differences in each of the tested categories (Tables 15 and 16). This depicts the same loss whether the person is sick in bed, hospitalized or working probably because the ability of a sick person to work is all together reduced. ZMAC (2003) and Hawkes and Ruel (2006) report that unhealthy farmers are unable to produce adequately.

Table 15: T-test results for comparison of commercialization between moderate and high extents of condition of the sick

Parameters of commercialization	Compared extents of condition of the sick	Mean value	Std deviation	t-value	df	Significance level	Mean difference
Number of farm inputs used	High Moderate	1.00 1.08	1.73 1.19	-0.09	14	0.93	0.77
Productivity (kg/h)	High Moderate	1 725.00 1 964.69	468.38 848.22	-0.47	14	0.65	239.69
Proportions sold (%)	High Moderate	85.10 83.25	14.62 9.35	28	14	0.78	1.85
Proportion used for food (%)	High Moderate	14.90 14.77	14.62 9.36	1.53	25	0.14	6.70

Table 16: T-test results for comparison of commercialization between low and high extents of condition of the sick

Parameters of commercialization	Compared extents of condition of the sick	Mean value	Std deviation	t-value	df	Significance level	Mean difference
Number of farm inputs used	High	1.00	1.73	-1.27	25	0.22	-1.25
	Low	2.25	1.60				
Productivity (kg/h)	High	1 725.0	468.38	-1.56	25	0.13	-1136.63
	Low	2 861.63	1 231.83				
Proportions sold (%)	High	85.10	14.62	-1.53	25	0.14	-6.70
	Low	91.80	6.07				
Proportion used for food (%)	High	14.90	14.62	1.53	25	0.14	6.70
	Low	8.21	6.07				

4.5.5 Care taker

Commercialization at the low and moderate extents of type of care taker were compared with that of high extent. Results are summarized in Tables 17 and 18. In both cases, commercialization in terms of productivity was higher when the care taker of a sick person in the household was either the wife or husband (high extent of disease burden) than when were sister/brother/parents (moderate extent) or children/unrelated person (low extent). The increase may be due to the use of hired labour as to cover the gap left by the sick and care taker. It was reported by ZMAC (2005) that affected households increase the use of hired labour. However, it is necessary to undertake further research to be able to explain actual reasons for those unexpected findings.

Table 17: T-test results for comparison of commercialization between moderate and high extents of care taker

Parameters of commercialization	Compared extents of care taker	Mean value	Std deviation	t-value	df	Significance level	Mean difference
Number of farm inputs used	High Moderate	1.50 1.33	2.12 1.23	0.16	9	0.878	0.17
Productivity (kg/h)	High Moderate	3 717.50 1 944.44	802.57 890.47	2.57	9	0.03*	1 773.01
Proportions sold (%)	High Moderate	91.06 84.77	9.81 8.02	0.98	9	0.354	6.3
Proportion used for food (%)	High Moderate	8.94 12.38	9.81 7.22	-0.58	9	0.574	-3.44

*Significant $p<0.05$

Table 18: T-test results for comparison of commercialization between low and high extents of care taker

Parameters of commercializatio n	Compared extents of care taker	Mean value	Std deviation	t-value	df	Significance level	Mean difference
Number of farm inputs used	High Low	1.50 1.00	2.12 1.41	0.38	5	0.721	-0.10
Productivity (kg/h)	High Low	3 717.5 1 698.2	802.57 496.43	4.23	5	0.008**	2 019.3
Proportions sold (%)	High Low	91.06 84.45	9.81 13.41	0.62	5	0.563	6.61
Proportion used for food (%)	High Low	8.94 15.55	9.81 13.41	-0.62	5	0.563	-6.61

**Significant $p<0.01$

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

It is clear from the findings that, generally, occurrence of chronic diseases tends to reduce agricultural commercialization. Other key findings of this study include the following:

(i) A high burden of chronic diseases exists among the farming households in the study area. Almost half of the key production members of households, particularly wives/husbands (household heads), were chronically ill for more than one year.

(ii) In all aspects of agricultural commercialization that were considered in this study (i.e. in terms of number of inputs, productivity and product utilization), the extent of agricultural commercialization is significantly lower ($p<0.001$) in the affected households than among the unaffected households. The presence of chronic diseases caused the affected households to fail to purchase farm inputs such as fertilizer, pesticides, herbicides, improved seeds and fungicides. As a result, productivity is reduced significantly ($p<0.05$). Due to low productivity, larger proportions are utilized for food while smaller proportions are made available for selling.

(iii) In this study, disease burden was considered in terms of who was sick, duration of the sickness, type of disease, degree of the sickness and who was the care taker. The extent of agricultural commercialization at varying extents of disease burden did

not show significant difference in all aspects except for productivity. Surprisingly, productivity was significantly higher ($p<0.01$) when the care taker was either wife or husband, than when the care taker was another relative. This finding requires further investigation.

5.2 Recommendations

HIV/AIDS, tuberculosis and malaria are the most commonly occurring diseases in the study area. These diseases hinder the efforts of farmers to improve their agriculture. Control of diseases is an important issue to be addressed for the success of agricultural commercialization. Special attention should be paid to the control of chronic diseases including HIV/AIDS.

Appropriate labour saving technology is important to reduce dependence on human labour. Such technology will raise productivity and increase the pace in the transformation of agriculture.

Majority of the farmers in the study area depend on agriculture as their sole source of income and suffer capital constraints. As a result agricultural production activities are highly impaired when the capital is diverged to caring for a chronically ill person. It is recommended that soft loans to be provided especially to the affected households. This will strengthen their agricultural capital and enable diversification of activities.

It is recommended that a more detailed and longer study be undertaken in this area to determine the actual linkages of chronic diseases and their impact on agricultural production.

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APPENDICES

Appendix: 1 Focus group discussion (FGD) checklist

i) What is the disease situation in the area?

ii) What types of disease exist in the area?

iii) Who are the most vulnerable groups to the common diseases?

iv) Which crops are produced by irrigation in the area?

v) In which ways do you think diseases affect agriculture?

Appendix: 2 Respondents questionnaire

Section A: Background information (To be answered by affected and unaffected households)

1. What is the name of the respondent?

2. Which is the village of the respondent?

   i) Mabogini

   ii) Rau Kati

   iii) Oria

   iv) Chekereni

3. Sex of the respondent (tick one)

   i) Male

   ii) Female

4. Age of the respondent..... (In full years)

5. What is the education level of the respondent?

   i) No formal education

ii) Primary education

iii) Secondary education

6. What is the marital status of the respondent?

i) Married

ii) Single

iii) Divorced

iv) Widowed

v) Widower

7. Relationship of the respondent with household head

i) Wife

ii) Husband

iii) Child

iii) Sister

iv) Brother

v) Household head

8. What is the education level of the household head?

i) No formal education

ii) Primary education only

iii) Secondary education only

iv) Above secondary education

9. What is the occupation of the household head?

i) Farmer

ii) Businessman

iii) Civil servant

10. How many members are in your household? (give number)

11. What is the age distribution of the household members (give number)

i) Individuals between 1-12 years

ii) Individuals between 13-18 years

iii) Individuals between 19-25 years

iv) Individuals between 26-60 years

12. Is there a chronically sick member in the household (3 months and above)

i) Yes

ii) No

If yes go to question 13 and if no proceed to question 21

Section B: Information on the disease burden (To be answered by affected households)

13. Who is/was the chronically ill person?

i) Household head

ii) Wife

iii) Child

ii) Father

iii) Mother

iv) Brother

v) Sister

14. For how long was this person ill?

i) 3-6months

ii) 7months-1year

ii) More than one year

15. What type of disease was/is the individual suffering from? (Tick one or more)

i) Malaria

ii) Confirmed HIV/AIDS

iii) Tuberculosis

iv) Diabetes

v) High blood pressure

vi) Lameness

vii) Arthritis

16. What is the condition of the sick?

i) Sick in hospital

ii) Sick in bed at home

iii) Sick but working

17. If working which farm operations were performed?

i) Land preparation

ii) Weeding

iii) Harvesting

iv) Threshing

v) Winnowing

vi) Supervision

18. If sick in bed who are the care taker?

i) Men

ii) Women

iii) Children

19. What is the age of the care taker?

i) Adult

ii) Child

iii) Elderly

20. What is the relationship of the sick with the care taker?

i) Wife

ii) Husband

iii) Child

iv) Father

v) Mother

vi) Brother

vii) Sister

viii) Unrelated person

21. Which household resources were sold to care for the sick?

i) Land

ii) Crops

iii) Farm implements

iv) None

Section C: Information on agricultural commercialization (To be answered by affected and unaffected households)

22. What is the total area (hectares) cultivated by the household? .....

23. Did your household use farm inputs?

i) Yes

ii) No

24. If yes, list them:

.....

25. What is the total amount of rice (kg) was harvested by the household in one season?.....

26. How was the product utilized?

i) for market

ii) for food

iii) others (specify)

27. What proportion (%) of the product was sold?

28. What proportion of the product was used for food?