RELATIONSHIP BETWEEN TOMATO PRODUCTION AND HOUSEHOLD POVERTY REDUCTION IN HAI DISTRICT, TANZANIA

RELATIONSHIP BETWEEN TOMATO PRODUCTION AND HOUSEHOLD POVERTY REDUCTION IN HAI DISTRICT, TANZANIA

By

Martha Msimbe

A Dissertation Submitted to the Faculty of Social Science in partial fulfillment of the Requirements for Award of the degree of Master of Science in Economic Policy and Planning (MSc. EPP) of Mzumbe University

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CERTIFICATION

We, the undersigned, certify that we have read and hereby recommend for acceptance by The Mzumbe University, a dissertation entitled: "**Relationship between Tomato Production and Household Poverty Reduction in Hai District, Tanzania"** in partial fulfillment of the requirements for award of the degree of Master of Science in Economic Policy and Planning (MSc. EPP).

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Major Supervisor

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DECLARATION AND COPYRIGHT

I, **Martha Msimbe,** declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

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Date _____

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DEDICATION

I dedicate this dissertation to my lovely husband Peter Joram Kaale and my lovely son Raveen Peter Kaale for their daily backup prayers and encouragement during my entire course and research.

LIST OF ABBREVIATIONS

ADB	-	Africa Development Bank
AIDS	-	Acquired Immune Deficiency Syndrome
ALP	-	Agricultural and Livestock Policy
AMP	-	Agricultural Marketing Policy
ASDS	-	Agricultural Sector Development Strategy
AVRDC	-	Asian Vegetable Research and Development Center
BEST	-	Business Environment Strengthening
CRDB	-	Cooperative Rural Development Bank
DAEOs	-	District Agricultural Agricultural extension officers
DRC	-	Democratic Republic of Congo
FAO	-	Food and Agriculture Organisation
FAOSTAT	-	Food and Agriculture Organisation Statistics
HIPC	-	Highly Indebted Poor Countries
HIV	-	Human Immunodeficiency Virus
IFAD	-	International Fund for Agriculture Development
MDGs	-	Millennium Development Goals
NBS	-	National Bureau of Statistics
NDV	-	National Development Vision
NMB	-	National Microfinance Bank
NPEs	-	National Poverty Eradication Strategy
NSGRP	-	National Strategy for Growth and Reduction of Poverty
PHSDP	-	Primary Health Sector Development Programme
PRSP	-	Poverty Reduction Strategy Paper
RGZ	-	Revolution Government of Zanzibar
SPSS	-	Statistical Package for Social Sciencess
TAS	-	Tanzania Assistant Strategy
TASAF	-	Tanzania Social Action Fund
UN	-	United Nations
UNDP	-	United Nations Development Programme
UNICEF	-	United Nations Children's Fund

URT	-	United Republic of Tanzania
USA	-	United States of America
USAID	-	United States Agency for International Development
WAEOs	-	Ward Agricultural Agricultural extension officers
WEOs	-	Ward Executive Officers
WSDP	-	Water Sector Development Programme
ZATI	-	Transformation Initiative
ZAWA	-	Zanzibar Water Authority
ZSGRP	-	Zanzibar Strategy for Growth and Reduction of Poverty

ABSTRACT

The purpose of the study was to examine the relationship between tomato production and households' poverty reduction in Hai District, Tanzania. Specifically, to determine the contribution of tomato production level on poverty reduction, the contribution of household income from tomatoes on poverty reduction, the contribution of household expenditures from tomato income on poverty reduction, the contribution of household assets from tomato income on poverty reduction and the challenges facing tomato production.

The study employed a case research design, whereby the questionnaires and interview were used as methods for data collection. Thematic analysis techniques, multiple regression model, Spearman Correlation analysis and descriptive statistics were used to analyse the data collected from the field.

The study concluded that tomato production had great contribution to poverty reduction in Hai District, more than 61% of households generate income ranging 24,000,000 - 29,000,000 TZS every year from tomato production. In addition, most households use the income generated from tomato for social services expenditure, such as paying school fee, health care, electricity and water bills, and purchasing household assets, such as plot of land, business houses, residential houses and electronic equipment.

Lastly, weak extension support, limited input supply, pests and diseases were found to be the challenges affecting tomato production in Hai district. This calls for the government intervention to provide tomato farmers with adequate supply of pesticides, improve the extension services in Hai district by posting sufficient number of agricultural extension officers, and improving their working environment through providing agricultural extension officers with resident houses and reliable means of transport.

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CHAPTER ONE

OVERVIEW OF THE STUDY

1.1. Introduction

Agriculture has been playing an important role on poverty reduction in Tanzania. For instance, tomato production has reliable market and its production is done in short period of time, thus considered to increase income of farmers.

This section outlines the processes, which prompted the initiation of the study on relationship between tomato production and poverty reduction in Hai district. It covers the background, statement of the problem, major questions, research objectives and scope of the study.

1.2. Background of the study

One of the major development problems facing the world today is growing phenomenon of poverty (Peralta, 2017). It is estimated that over 1.3 billion people live on less than one dollar per day, and one billion people cannot meet basic requirements (Peralta, 2015). 315 million people in Sub Saharan Africa survive on less than one dollar per day and 184 million people (33% of the African population) suffer from malnutrition (UNDP, 2015).

In Tanzania, the proportion of the population below the national food poverty line is 18.9 % and that below the national basic needs poverty line of 35.7%. Indicators of income poverty also shows growing disparities between urban and rural population, as well as across and within regions and districts; the urban poor constitute about 13% compared to 87 % in rural areas (World Bank, 2016).

The poverty in Tanzania is indicated by high rates of morbidity and mortality, prevalence of malnutrition, illiteracy, high infant and maternal mortality rates, low life expectancy, poor quality housing, inadequate clothing, low per capital income and expenditure, and poor infrastructure. Others include high fertility rate, lack of access to basic services such as safe water, food insecurity and poor technology.

These features have been used to identify poor and non-poor individuals, households or communities in Tanzania (Nyamba et al., 2017).

Empowering rural people especially through agriculture is an essential step toward poverty alleviation in Sub Saharan Africa (Warr, 2001). Since agriculture is the foundation and bedrock upon which the development of stable human community has depended on throughout the universe such as rural and urban communities (Tochuwu, 2012).

Tomato production as one of agricultural activities has contributed to poverty reduction in different Sub Saharan African Countries. For instance, in Nigeria, tomato production has increased jobs in rural areas and reduced poverty for 48 million tomato farmers across the country, whereby Nigeria produces about 1.8 million metric tons annually. In Kenya, Tomato is one of the important horticultural crops that contribute to poverty reduction. In the year 2017, an area of 24,074 ha was used to produce 400,204 metric tons of tomato that had a value amounting to Kenyan Shillings 1.8 billion (USAID, 2018)

Tomato production in Uganda has contributed to improvement of the living standard of people, the number of people in extreme poverty in Uganda (those living on less than $1.90 per day) has fallen from 53.2% in 2017, to 34.6% in 2018 (Mukiibi, 2019). The tomato producers in Uganda have the reliable tomato market in Kampala and Juba which has been influencing tomato production in Uganda, where the tomatoes are bought directly from the farm and a box of tomatoes that weighing 50 kilograms is sold at 150, 000 Ugandan shillings but the price can reach 250, 000 Ugandan shillings during scarcity (Sanga and Hella, 2015).

In Tanzania, the total of 45,604 hectares of land is used for tomato production while the annual average production of tomato is 247,135 hectares; this is higher than any other fruit and vegetable crop in Tanzania, which represents 51% of the total vegetable production (URT, 2018). Despite the crucial role of tomato production to the economy and poverty reduction in different Sub African countries, Tomato production in Tanzania is 2.2 to 3.3 ton/ha which is far below the world average of

27.5 ton/ha, due to limited access to extension services (URT, 2017). Weak market linkages due to poor infrastructure, lack of market knowledge and information necessary to facilitate market diversification, lack of storage facilities access, limited the financial means to buy productivity enhancing inputs, such as seeds, fertilizers, chemicals and pesticides have been negatively affecting tomato production in Tanzania (Lynch 2018). Thus, majority of farmers in Tanzania are still poor living under poverty line, not able to cover schooling cost for their children, afford health care as well as upgrading their mud and grass thatch houses to a more secure brick home (Eskola, 2015).

1.3. Statement of Problem

In spite of the low tomato production in Tanzania with average production of 2.2 to 3.3 ton/ha which is below the world average of 27.5 ton/ha, Hai District has been doing well in tomato production with 70% of cultivated land used for tomato production that produce average of 13ton/ha (Sere, 2018). The district has been successful because of practicing tomato production in both dry and rain reasons with more than 22% of the cultivate area under irrigation, also credits are easily accessible in commercial banks, such as Cooperative Rural Development Bank (CRDB) and National Microfinance Bank (NMB) for expanding production and improve quality of tomato produces. Further, tomatoes from Hai district has huge market in Arusha, Ngorongoro, Serengeti and Moshi, and some tomatoes are exported to Kenya, thus the farmers have been able to generate an income of more than 100,000 Tanzania shillings for 40 kilograms of container (Lynch, 2018). However, the relationship between tomato production and household poverty reduction in Hai district has not been empirically studied. The present study, therefore, examine the relationship between tomato production and households' poverty reduction in Hai District, Tanzania.

1.4. Research Objectives

The study was guided by the following research objectives:

1.4.1. General Objective

To examine the relationship between tomato production and household poverty reduction in Hai District.

1.4.2. Specific Objective

i. To determine the contribution of tomato production level on poverty reduction.
ii. To determine the contribution of household income from tomato on poverty reduction.
iii. To examine contribution of household expenditures from tomato income and others sources on poverty reduction.
iv. To examine the contribution of household assets from tomato income and other sources on poverty reduction.
v. To find out challenges facing tomato production

1.5. Research Questions

i. What is the contribution of tomato production level on poverty reduction?
ii. What is the contribution of household income from tomato on poverty reduction?
iii. What is the contribution of household expenditure from tomato on poverty reduction?
iv. What is the contribution of household assets from tomato income on poverty reduction?
v. What are the challenges facing tomato production?

1.6. Significance of the Study

The findings of this study will fill the existing gap in knowledge of the less known about the relationship between tomato production and reduction of household poverty. The findings will also provide awareness to the government of Tanzania about the contribution of tomato production on household revenue and poverty reduction. Lastly, this study will be useful to the researcher since it serves as the partial fulfillment of the requirement for the award of the Degree of the Master of Sciences in Economic Policy and Planning from Mzumbe University.

1.7. Scope of the Study

This study attempted to examine the relationship between tomato production and household poverty reduction. Specifically, it was aimed at determining the contribution of tomato production level on poverty reduction, the contribution of household income from tomatoes on poverty reduction, the contribution of household expenditures from tomato income on poverty reduction, the contribution of household assets from tomato income on poverty reduction and the challenges facing tomato production.

1.8. Limitations of the Study

In the course of pursuing this study, the researcher faced the following limitations:

1.8.1. Financial constraints

The researcher expected to face financial constraints for surveying a big sample. To overcome the financial constraints, the researcher surveyed a reasonable small number of respondents in favor of the limited budget.

1.8.2. Poor Response from Participants

Poor responses were due to some respondents being busy with farm activities and some of them did not consider filling the questionnaire as a serious matter. There was also a delay in returning the questionnaires as some of the respondents failed to return the questionnaires on time, hence hindered the researcher from completing the study on time. To minimize the problems the researcher seriously made a constant follow up and repeatedly reminded the respondents to fill the questionnaires.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

The literature review helps the researcher to familiarise with theoretical and empirical literatures about tomato production and poverty reduction; it will help the researcher to sharpen the research objectives and research questions, methodology of the study including research design and approaches to data analysis. The review of literature is also essential in identifying the gaps in previous studies.

2.2. Concept of Key Terms

2.2.1. Poverty

Poverty is a denial of choices and opportunities, a violation of human dignity. It means lack of basic capacity to participate in social economic activities. It means not having enough to feed the family, not able to get social services, such as education and health services, not having the land on which to grow one's food or a job to earn one's living, and not having access to credit. It means insecurity, powerlessness and exclusion of individuals, households and communities. It means susceptibility to violence, and it often implies living on marginal or fragile environments, without access to clean water or sanitation (UN, 1988).

2.2.2. Poverty line

Poverty line is the amount of income a person or family needs in order to maintain an acceptable living standard, and below which they are considered poor. Poverty line changes from one country to another. In developed countries, where there is advanced standard of living and welfare concepts, poverty line is high as basic standard to live include higher consumption requirements and accessibility to many goods and services. For example, the poverty line for lower income, such as Sub Saharan African countries is $1.90 per pay, for middle income countries, such as

Egypt and India is $3.20 and for upper income, such USA, at $21.70 a day (ADB, 2001).

2.2.3. Relative Poverty

Relative poverty is the condition in which people lack the minimum amount of income needed in order to maintain the average standard of living in the society in which they live. Relative poverty is considered the easiest way to measure the level of poverty in an individual country. Relative poverty is defined relative to the members of a society and, therefore, differs across countries. People are said to be impoverished if they cannot keep up with the standard of living as determined by society (Okurut, Banga and Mukungu, 2004).

Relative poverty also changes over time. As the wealth of a society increases, so does the amount of income and resources that the society deems necessary for proper conditions of living. For example, if you were a family of four (two adults and two children) living in United States of America in 1963 with a yearly income less than $3,100, you would have been living in relative poverty. By 1992, this amount had increased to $14,228 a year (Hulme and Shepherd, 2003).

2.2.4. Poverty Reduction

Makombe et al. (1999) define poverty reduction as lifting the poor out of poverty. According to Limbu (1995), poverty reduction entails increasing the ability of people to acquire necessities, namely adequate food, adequate and decent clothing and better shelter/housing that include better places to sleep.

The term poverty reduction was first conceived as a procedure or process of transforming the poor from one level to the other across a given threshold of income or consumption (Jazairy et al., 1992). Poverty alleviation strategy is one of the means that were considered for adoption in the new paradigm of a sustained development as stipulated in the human development report of 1994 of United Nations Development Programme (UNDP, 1994). The present new paradigm conceives of poverty

alleviation as a strategy for achieving a sustained increase in productivity and an integration of the poor into the process of growth (Jazairy et al., 1992).

The strategy has initially received a global attention in order to replace the failed "trickle-down contribution" approach for reducing poverty amongst Third World Countries (Mtatifikolo, 2015). This was based on the assumption that governments should concentrate on growth policies; and the result of growth would trickle down to the poor through primary and secondary incomes.

According to Ravallion and Datt (2014), absolute poverty can be alleviated or reduced if at least two conditions are met. First, if economic growth and /or mean income rise on a sustained basis. Second, if economic growth is neutral with respect to income distribution or reduce income inequality. Generally, poverty cannot be reduced if economic growth does not occur. However, the persistence of poverty of a substantial population can dampen the prospects for economic growth.

The initial distribution of income and wealth can greatly affect the prospects for economic growth and reduction of mass poverty (Ravallion and Datt, 2014). There is substantial evidence that a very unequal distribution of income is not conducive for either economic growth or poverty reduction. Current experience of economic growth has shown that if developing countries put in place incentive structures and complementary investments to ensure that better health and education lead to higher incomes, then the poor benefit doubly through increased consumption and higher future incomes.

2.3. Restricted Opportunity Theory

The restricted opportunity theory was developed by Economist Bradley Schiller in 1972. The theory asserts that poverty results from absence of economic opportunities or the lack of access to economic opportunities. Central to the theory is an argument that poor people lack suitable and relatively abundant access to economic opportunities. They cannot avoid poverty or would not be able to get out of their impoverished conditions unless they have access to the economic opportunities. The restricted opportunity theory explains that economic opportunities such as an

agricultural, business and industrial activities are factors that can determine the socioeconomic status of an individual. The theory implies that if individuals involve in agricultural activities, such as tomato production they can be able to get out of their impoverished conditions of poverty. Since, tomato production will provide individuals with income that may be used to meet people's basic needs for food, clothing, and shelter. People can be able to afford social services, such as healthcare, water, electricity, transport and education that will improve their living standard (Schiller, 1972).

2.4. Poverty Reduction in Tanzania

Tanzania like other developing countries has been struggling to fight poverty. There have been many interventions done by government, through social, economic, and financial policies. The government has been intervening in education provision, health services, immunization programs, infrastructure maintenance and creating conducive environment to investors for encouraging foreign investors to come and invest in projects which Tanzanians do not have sufficient capital (finance and human) to invest in. Millennium Development Goals (MDGs) of the United Nations Development Programme (UNDP) are focused on poverty reduction and improving lives. Agreed to by world leaders, all developing countries member of United Nations (UN) the first goal is to eradicate extreme poverty and hunger by 2015. To try to reach the MDGs most governments including ours have come out with various campaign and strategies like The National Strategy for Growth and Reduction of Poverty (NSGRP), was approved by cabinet in February 2005 for implementation over five years and is the successor to the Poverty Reduction Strategy paper (URT, 2014).

According to TAS (2015**)** Poverty in Tanzania is primarily a rural phenomenon, over 90% of those afflicted live in rural areas. Poverty is most rampant among rural households in the arid and semi-arid regions, which depends primarily on the production of food crops. The government of Tanzania is undertaking various initiatives towards poverty reduction and attainment of social and economic development. Founded within a broad policy framework, the vision 2025 stipulates

the vision, mission, goals and targets to be achieved with respect to economic growth and poverty eradication by the year 2025.

In order to operationalise vision 2025, the government formulated the National Poverty Eradication Strategy (NPES), which provides overall guidance and framework for coordination and supervision of the implementation of policies and strategies of poverty eradication. The Poverty Reduction Strategy Paper (PRSP) was then formulated as a medium-term strategy of poverty reduction in the context of the enhanced Highly Indebted Poor Countries (HIPC) initiatives. Lessons from the implementation of PRSP and the recognition of multidimensional nature of poverty informed the approach and focus adopted when forming the National Strategy for Growth and Reduction of Poverty (NSGRP). NSGRP adopts an outcome approach and requires all sectors to contribute to the poverty reduction agenda. It also encourages inter-sectoral collaboration and it was developed under a deeper and broader participation of stakeholders in the formulation (URT, 2014).

2.5. The Role of Agriculture in Poverty Reduction

The role of agriculture in the economy is generally acknowledged. However, there is no consensus on the issue of whether agriculture is the most appropriate way to fight poverty in developing countries. One school of thought argues that since the majority of people in most developing countries are in rural areas and most of them are engaged in agricultural production or agriculture-related activities which have great contribution to poverty reduction. The second school of thought recognizes the contribution of agriculture to poverty alleviation but attaches more importance to non-agricultural activities (example. rural non-farm enterprises and social services). For example, McIntosh and Vaughan (1996) state that “the notion that a broadly based smallholder agriculture can be created, and that it can transform the character of the agricultural production system is an inappropriate premise on which to build policy frameworks designed to improve livelihoods” in South Africa. Noting these divergent views on the role of smallholder agriculture in poverty alleviation, the following section outlines the positive contribution of agriculture, especially smallholder agriculture, to poverty

alleviation. The rural sector can be considered to consist of three sub-sectors: (a) the smallholder (subsistence or semi-subsistence) sector consisting of self-employed farmers producing staple food and some commercial goods; (b) the commercial farm sector comprised of medium and large size farmers and provides employment to a significant number of the landless; and (c) the rural non-farm sector.

Delgado (1998) argues that "smallholder agriculture is simply too important to employment, human welfare, and political stability in Sub-Saharan Africa to be either ignored or treated as just another small adjusting sector of a market economy.

During the 1960s, many African governments paid more attention to large-scale farmers with the encouragement of donors (Eicher, 1994). Middle or 'progressive' and smallholder farmers were not given any attention. Because of the high failure rate of these schemes, many donors turned their attention and financial support to smallholder agriculture in the 1970s. Eicher (1994) argues that middle farmers should be "viewed as a positive force in 'getting agriculture moving'". He suggests that African governments should give priority to the development of both smallholder and middle farmers. With the necessary support, smallholder farmers have the potential to produce a marketable surplus. Smallholder farmers in Kenya with farms of less than two hectares have increased their share of national agricultural production from four percent in 1965 to 49 percent in 1985 (Lele and Agarwal, 1989). Zimbabwe's remarkable increases in maize production by smallholder farmers in the 1980s is another example and is often referred to as Africa's green revolution success story (Eicher, 1994). Smallholder farmers in Zimbabwe tripled maize production between 1980 and 1987 and increased their share of the national marketable maize surplus from ten percent in 1980 to 40 percent in 1987 (Eicher, 1994). This success was attributed to the launch of a government programme to boost maize and cotton production and development of hybrid maize varieties.

Agriculture contributes to poverty alleviation at rural, urban and national levels in three ways: (a) reducing food prices; (b) employment creation; (c) increasing real wages; and (d) improving farm income. Results of studies conducted in several countries indicate that the "pro-poor role of agricultural growth can be dramatic, and much more contributions than other sectors at reducing poverty and hunger in both urban and rural areas. Agricultural growth has strong and positive impact on poverty often significantly greater than that of other economic sectors" (FAO, 2005). Irz et al. (2001) analysed the relationship between agricultural growth and rural poverty. The results show the poverty-alleviation contributions of agricultural growth to be strong. For example, a one-third increase in yield was expected to reduce the number of poor people by a quarter or more.

With regard to food security, the study by Anyiro and Oriaku (2011) concluded that growing the agricultural sector is the primary channel for achieving household food security. The studies also conclude that unless agriculture reaches some degree of commercialization, the impact of agricultural growth on food insecurity and poverty alleviation is limited. Another important observation from the studies is that households (in the rural sector) engaged in agricultural activities tend to be less poor and have better nutritional status than other households. A study conducted by FAO (2005) in Indonesia found that agricultural growth reduced the depth of poverty by 50 percent in rural areas.

2.6. Policy Framework related to Agricultural Sector in Tanzania

The government of Tanzania recognises the challenges and constraints facing the agricultural sector. A number of measures and strategies have been taking place including the establishment of various policies such as the Agricultural and Livestock Policy (ALP) of 1997, the Agricultural Marketing Policy (AMP) of 2008, the Food and Nutrition Policy for Tanzania of 1992, the National Trade Policy of 2003, Cooperative Development Policy of 2002, Rural Development Policy, Agricultural Sector Development Strategy (ASDS) of 2001, and Agricultural Sector Development Programme (ASDP) of 2005 to mention but a few. The focus of the Agricultural and Livestock Policy of 1997 was to

commercialise agriculture so as to increase income levels and wellbeing of the people whose principal occupation and way of life is based on agriculture (URT, 1997). In this policy, the government sought to assure basic food security for the nation, and to improve national standards of nutrition by increasing output, quality and availability of food commodities, to collect and disseminate market information in order to integrate the domestic markets and make foreign markets accessible, to improve the agricultural extension services, and to facilitate the provision of a good infrastructure, especially transport and storage facilities.

Regarding the Agricultural Marketing Policy, the overall objective was to facilitate strategic marketing of agricultural products while ensuring fair returns to all stakeholders based on a competitive, efficient, and equitable marketing system (URT, 2008). The policy was set to overcome the agricultural marketing challenges such as: inadequate value addition in agricultural produce; inadequate adherence to grades, standards, and quality in agricultural products marketing; weak legal, regulatory, and institutional framework on agricultural marketing; inadequate access to financial services for agricultural marketing activities; inadequate marketing linkages; and inadequate capacities to utilize opportunities emerging in the local, regional, and international markets including preferential markets.

On value addition, the government sought to promote and support value addition in agricultural produce by putting in place special programmes and incentives to investors in agro-processing firms, to invest in Research and Development for agro-processing, and to promote the consumption of locally processed agricultural products in the domestic market. While on entrepreneurial and marketing skills, the government sought to enhance the same by supporting and promoting training in entrepreneurial and marketing skills for agricultural marketing stakeholders, to encourage the participation of private sector in the training on entrepreneurial and marketing skills, strengthen the agricultural marketing extension services, and to review and to strengthen entrepreneurial

and marketing curricula in vocational training centres, colleges and learning institutions.

While a number of policies are in place, there appears to be an overlap and lack of coordination among various government ministries and/or authorities. For example, while the Agricultural and Livestock Policy of 1997 extensively addresses about marketing issues, the Agricultural and Marketing Policy of 2008 does the same, and both discuss about agricultural extension services. However, the Agricultural and Livestock Policy was established under the Ministry of Agriculture and Food Security while the Agricultural Marketing Policy was established under the Ministry of Industry, Trade and Marketing. The Food and Nutrition Policy of 1992 also was established under the then Ministry of Health. But there are no clear provisions for which ministry does what, thus leaving a vacuum in terms of implementation.

Poor coordination and lack of implementation strategies is not a new phenomenon in Tanzania. As such, the agricultural sector has continued to face numerous problems. Gabagambi (2009) argued that policy response to agricultural problems has, in most cases, been a shortcut. For example, banning cross border trade so as to assure for food security, and dictating time and the form in which the product should be marketed and waving import duty.

While the Agricultural and Livestock Policy of 1997 also focuses on commercialisation of agriculture, efforts appear to be directed towards major staples where most of the input subsidies are concentrating. However, commercialisation of agriculture in Tanzania means commercialising food crops because smallholder farmers are engaged in the production of such crops. But the government focus has predominantly been on maize and rice production, which means that the government is still concerned about food security rather than commercialization.

2.7. Poverty Reduction Policies in Tanzania

Tanzania joined other nations in the reduction of poverty after its commitment at the World Social Summit in Copenhagen in 1995 (URT, 1995). This culminated in the formulation of poverty-oriented policies. In mainland Tanzania, the National Poverty Eradication Strategy of 1998 was formulated and poverty eradication was also incorporated into the long term vision, Tanzania Development Vision 2025, and the ` m8medium term policy, National Strategy for Growth and Reduction in Poverty (URT, 2010). In Zanzibar, poverty reduction policies were incorporated into the Zanzibar Poverty Reduction Plan, Zanzibar Development Vision 2020 and Zanzibar Strategy for Growth and Reduction of Poverty (RGZ, 2010).

The poverty reduction policies under the NSGRP II and ZSGRP II are three-pronged. First is reduction in income poverty. This is advanced by focusing on growth, sustainable employment generation and adequate infrastructure for production, food security and access to energy by the majority of the population (URT, 2010; RGZ, 2010). This category is classified under Cluster I in the NSGRP II and ZSGRP II (URT, 2010; RGZ, 2010). Second is Cluster II, which focuses on improvement in quality of life. This is advanced through programmes such as education, health and access to clean water and social protection (URT, 2010). Third is Cluster III, which emphasises improved accountability and governance issues, with the goal of ensuring the poor have access to the means of production, among other goals (RGZ, 2010).

In Tanzania mainland, the National Poverty Eradication Strategy provides guidance and a broad framework for poverty alleviation policies and programmes (URT, 1998). The main goal of the strategy is active involvement of the poor in identifying and participating in poverty eradication programmes (URT, 1998). The strategy sets targets for the provision of social services, while sectors such as education and health are expected to set sectorial goals that will enable achievement of the targets set in the National Poverty Eradication Strategy. In Zanzibar, the Zanzibar Poverty Reduction Plan implemented from 2002 to 2006 provided the first step in the implementation of Zanzibar Development Vision 2020 targets related to poverty

(RGZ, 2001). Emphasis under this early policy response to poverty reduction was on supporting priority sectors that bring pro-poor growth (RGZ, 2001).

Policies in support of poverty reduction through increase in income under Cluster I, targeted a number of areas. These were sound macroeconomic environment to realise low inflation; implementation of sustainable and inclusive growth that would increase employment; GDP growth from sectors that have strong links with the poor population, such as the agriculture, manufacturing, mining and tourism sectors; improvement in food security and nutrition; and use of natural resources to increase growth and improve welfare, especially in rural areas (URT, 2010). In Zanzibar, ZSGRP II had the same policy drive of reducing income poverty through the creation of employment and empowerment programmes (RG Z, 2010).

Some of the programmes rolled out by the mainland government in pursuit of Cluster I poverty alleviation intervention include Mini Tiger Plan 2020; Business Environment Strengthening (BEST) Programme; National Multi Sector Strategic Framework on AIDS; various agriculture support programmes; and formation of a ministry that supports women and children. In Zanzibar, programmes pursued include the Zanzibar Growth Strategy 2006-2015; the Business Environment Strengthening (BEST) Programme; the Property and Business Formalisation Programme (Mkurabati); and a number of agriculture support programmes.

The Mini Tiger 2020 is a government strategy in mainland Tanzania that supports export-oriented and import substitution industries (URT, 2011). The main objective of the plan is to put Tanzania on a fast growth path, which is associated with high income and improved living standards (URT, 2011). The Business Environment Strengthening Programme, which was launched in 2005, aims to provide a supportive regulatory and legal framework for business operation (URT, 2011). The programme targets removal of institutional constraints that delay business approval (URT, 2011). The National Multi Sectorial Strategic Framework on AIDS coordinates AIDS programmes relating to prevention, care and impact (URT, 2011). The control of the disease in productive sectors of the economy helps to increase the output and productivity so important for economic growth.

In the Isles, the Zanzibar Growth Strategy implemented from 2006-2015 was formulated to complement Mkuza I, with the main objective of achieving high pro-poor growth (RGZ, 2007). The strategy provided support to key growth drivers identified as agriculture, tourism and trade (RGZ, 2007). The Property and Business Formalisation Programme aims to increase security and improve land ownership in both rural and urban areas (Mkurabita, 2015). The Business Environment Strengthening Programme (BEST) aims to strengthen the investment environment crucial for economic growth.

The Tanzania mainland government implemented support programmes for vulnerable groups composed of children and women through the Ministry of Community Development, Gender and Children, which was formed in 2003. The Ministry plays an important role in increasing women's access to credit facilities and markets (URT, 2015). In an effort to increase ownership of the means of production, the government revised the Land Act of 1995 and enacted the 1999 Land Act and Village Act, which provide for ownership of clan land by women on an equal footing with men (URT, 2015).

A number of agriculture support programmes and policies have been initiated to increase income in mainland Tanzania. These programmes include the Agriculture and Livestock Policy, Agriculture Sector Development Programme and the Micro Small and Medium Enterprise Programme. In Zanzibar, agriculture support programmes include the Agriculture Sector Development Programme-Livestock – an extension of the same programme from the mainland but with special attention to livestock support; the Agriculture Services Support Programme; and the Market Infrastructure, Value Addition and Rural Finance Support Programme. The programmes were aligned to the Agricultural Sector Strategic Plan 2011-2014 in the mainland and the Zanzibar Agriculture Transformation Initiative (ZATI) 2010-2020 in the Isles.

The main objective of the Agricultural and Livestock Policy of 1997 was to transform the agriculture sector to commercial production, increase food security, improve living standards and increase access of vulnerable groups including the poor to land and education (URT, 1997). The Agriculture Sector Development Programme (ASDP) of 2003 provides the operational response to Agriculture Sector Development Strategy (ASDS) (The United Republic of Tanzania, 2003). The main objective of the ASDP was to contribute to ASDS and NSGRP, which aim to increase agriculture productivity, increase employment in rural areas and improve food security (The United Republic of Tanzania, 2003). The Micro, Small and Medium Enterprise Programme aims to increase the livelihoods of smallhold farmers and fisheries (United Republic of Tanzania et al., 2015). This programme has led to an increase in employment and food security and a reduction in rural poverty (United Republic of Tanzania et al., 2015).

In Zanzibar, the Agricultural Sector Development Programme-Livestock targeted herders and agro-pastoralists (International Fund for Agriculture Development (IFAD). The main objective of the programme is to increase the income of communities and increase food security (IFAD, 2015). The Agricultural Services Support Programme, on the other hand, targeted a broad section of the farming community, including the poorest households, women, orphans and HIV/AIDS affected families (IFAD, 2015). The programme aims to strengthen linkages between farmers, government and the private sector (IFAD, 2015). The Market Infrastructure, Value Addition and Rural Finance Support Programme has the objectives of increasing access to financial services and markets, income and food security (IFAD, 2015).

Cluster II covers improvement in quality of life and social protection (URT, 2010). The overall goal of this cluster is equitable and universal access to education; improvement in health and general wellbeing; increased access to clean water and sanitation; and development of human settlements (URT, 2010). Cluster II policy interventions also provide temporary relief to vulnerable and needy groups through the social protection window (Ministry of Finance and Economic Affairs, 2010). In

Zanzibar, the same policy thrust is pursued under ZSGRP II, with the focus on equitable access to basic services such as health, education and water; promotion and preservation of culture; and provision of decent shelter for Zanzibarians (RGZ, 2010). Sectorial policies on education, health, water and sanitation are discussed in the ensuing discussion.

The Tanzanian government also made a concerted effort to improve another basic service, health, as one of the steps towards poverty reduction. The provision of health services is spearheaded by the Ministry of Health and Social Welfare in Tanzania mainland. The Ministry is responsible for the formulation of health policies and supportive legislation, resource allocation, mobilisation and health research in Tanzania mainland (URT, 2015). The health systems in Tanzania mainland and Zanzibar are based on a referral system, with health facilities organised in a pyramid system. The National Health Policy of 2003 in the mainland, a revision of the 1990 Health Policy, includes health sector reforms to realise health for all (URT, 2003). The objectives of the policy include reducing the burden of disease; improving the availability of drugs; increasing access to health; provision of competent health professionals; and promotion of alternative medicine, for example traditional medicine (URT, 2003). The implementation of the Health Policy of 2007 resulted in the Primary Health Sector Development Programme (PHSDP), a ten year programme covering 2007-2017. This aimed to improve primary health infrastructure, medical supplies and staffing (URT, 2018). In Zanzibar, the National Health Policy of 2011 directed health provision. The main objective of the policy is improving health services and social provision (URT, 2013).

Access to water is another basic service advanced through the Water Sector Development Programme (WSDP) launched for the period 2005-2025 in the mainland. The programme covers three components, Water Resource Management, the Natural Water Supply and Sanitation Programme, and the Urban Water and Sewage Programme (URT, 2006). The main objective of the programme is to contribute to poverty reduction through improved delivery of water and sanitation and governance of water resources (URT, 2006). In Zanzibar, the government

formed programmes such as Water Supply and Sanitation, which focus on rural and urban areas (ADB, 2012). Supporting programmes include Integrated Water Resource Management and Zanzibar Urban Sanitation and Drainage (RGZ, 2010). The Zanzibar Water Authority (ZAWA), created through Act No 4 of 2006, is responsible for the overall water resource supply and administration of water tariffs (ZAWA, 2015).

In pursuit of social protection as one of the policies for poverty reduction, the mainland government launched the Tanzania Social Action Fund (TASAF) in 2000. The first phase was a pilot project that covered one third of Tanzania mainland (World Bank, 2007). The main objective was to assist in institutional capacity building, socio-economic development, infrastructure provision and support of vulnerable groups like children, with special attention to HIV/AIDS and employment creation (URT, 2010). The Tanzania Social Action Fund II covered 2005 to 2009 and focused on strengthening institutional capacity for implementation of poverty alleviation and engaging community participation in poverty alleviation programmes.

The Tanzania Social Action Fund (TASAF) III commenced in 2010 and the main theme was productive social safety nets. The public works programme is one of the projects under TASAF which provides income to selected poor households by providing temporary employment in labour-intensive projects (TASAF, 2015). Besides public works programmes, the TASAF III has a programme for cash transfers to eligible households selected through community systems (TASAF, 2015). The first category of cash transfer is the Basic Cash Transfer, which is given to all registered households (TASAF, 2015). The second category is the Variable Cash Transfer, which is available to a household if set conditions such as household participation in health programmes and sending children to school are fulfilled (TASAF, 2015).

In Zanzibar, social protection is carried out on a limited basis with small scale cash transfers to vulnerable groups including children; means tested support to elderly; and fee waivers to the poor and vulnerable in health and education (United Nations International Children's Emergency Fund (UNICEF), 2015). The Ministry of

Empowerment, Social Welfare, Youth, Women and Children supervises all non-contributory social protection (UNICEF, 2015). Zanzibar finalised the Social Protection Policy in 2014 and looked into the possibility of rolling out universal pensions for the elderly (UNICEF, 2015).

Social protection in the form of social insurance is provided in Tanzania covering the working class of the Tanzanian population. Some of the social insurance funds are the National Social Security Fund; the Parastatal Pension Fund; the Public Service Pension Fund; the Local Authorities Pension Fund; and the Zanzibar Social Security Fund. The insurance schemes are contributory from the employee and the employer. The National Social Security Policy of 2003 provides a framework for financing of social security, tax issues on benefits and investments, legal framework and standards, and liberalisation in the mainland (URT, 2003).

The third policy intervention covered under Cluster III in NSGRP II and ZSGRP II focuses on building a framework that supports an environment for economic growth, poverty reduction, national unity and good governance, among other objectives. In Tanzania mainland, the overall objective of the Cluster is creating and strengthening institutional structures that support delivery; protection of human rights with special attention to the poor, women and those living with HIV/AIDS; security at national and individual levels; and promotion of a culture of hard work among Tanzanians (URT, 2010). In Zanzibar, the main objective of Cluster III includes rule of law, good governance and national unity (RGZ, 2010).

2.8. Vegetable Production in Tanzania

Tanzania ranked from the twentieth in 2016 to fifteenth position in 2017 (FAOSTAT, 2018). In fact, during this period, Tanzania remained in the top 20 vegetable producers in the world. The greatest bulk of the vegetables produced in Tanzania tomato is the single most dominant vegetable crop (URT, 2017). It is estimated that, the area planted with tomatoes in Tanzania is 26,612 ha. Tomatoes contribute the highest percent of harvested quantity (314,986 tons 64%) to the total harvested quantity of vegetables.

Tanzania's contribution in the global production of tomato shows that between 2007 and 2013, the subsector experienced an increasing growth rate of production (FAOSTAT, 2018). Production of tomatoes was highest in 2013 at 203,909 tons. On the other hand, between the same period, tomato exports showed a fluctuating trend. From 2012 to 2013, exports of tomatoes more than doubled from 1184 tons in 2012 to 2624 tons in 2013. From 2013, exports of tomatoes declined sharply and remained low before the abrupt rise in 2015.

In recent years, Tanzania has started to export horticultural products, including vegetables such as tomatoes. Mnenwa *et al* (2017) reported that export destinations for vegetables from Tanzania include neighbouring countries (Kenya, DRC Congo, Zambia, Comoro), the Middle East and Europe. However the country is struggling to expand exports in competition with world producers whose production and marketing systems are more efficient and meet standards required by the European consumers. Tanzania has a potential to export these produce with trade liberalization under the regime of World Trade Organization.

The potential for increasing production of vegetable in Tanzania is enormous (URT, 2017). Tanzania is endowed with ideal climatic conditions for growing a variety of vegetables, and does not face labour shortages. In spite of this potential, Tanzania's production and export levels of tomatoes are not stable and fall below other countries.

Vegetables such as tomato provide the most input intensive production systems where in most parts of Tanzania with predominantly rainfall tomato production is limited to irrigation practices and therefore two cycles in a year are very common. Generally smallholder farmers are so informed about appropriate farming practices and technologies such as weeding, disease management, pest control, harvesting and fertilizer use as well as about the use of improved land preparation and irrigation technologies (Sabo and Dia, 2017).

Smallholder farmers use different sources of labour as well as different types of fertilizers. For instance, in the study of assessing the major constraints and opportunities to improve vegetable production and marketing, Kiros (2018) observed that farmers use family labour for land preparation, planting, cultivation, weeding, irrigation, fertilizer application, pesticides application, harvesting and transporting of the products to the market. The farmers in the study area also used organic manure to improve the production of vegetables.

Tanzania has a large area suitable for horticultural cultivation but only a small portion of this is under cultivation. Regions with suitable conditions for vegetable cultivation are situated in the area of Morogoro, Tanga, Iringa, Moshi, Arusha and Mbeya. The region near Lake Tanganyika has potential for vegetable cultivation but no information is found that horticultural cultivation takes place here. Arusha and Tanga are situated in the north-eastern part and are bordering Kenya. Mbeya and Iringa are located in the south and bordering to Malawi and Morogoro is situated west of Dar es Salaam. Altitude of these suitable areas is between 1,000 meters and 2,500 meters above the sea level, and the precipitation varies between 500 millimeters and 2,000 millimeters annually.

The regions practicing the horticulture including the coastal zone, central plateau, lake zone and the highlands. The farms in the coastal zone are relatively small and not sufficient for supplying Dar es Salaam. The central plateau suffers too much from drought and poor infrastructure. Crops grown in this area are tomatoes, onions and sweet potatoes. In the lake zone a lot of tropical fruits is grown and exported to the neighbouring countries. The highlands are the best suited for vegetable production due to the varied climatic conditions, reliable and well distributed rainfall and possibilities for irrigation and the presence of relatively good roads for distribution (Swai, 2016).

Tomato production is very important in Tanzania's agricultural sector because of its high potential to generate profits to smallholder farmers. The bulk of fresh market tomatoes are produced by small-scale farmers. Farmers are interested in tomato production more than any other vegetables for its Linear harvests, which result in

high profit per unit area. The realization of profit depends on market revenues. The realization of profit also requires increased production efficiency using modern inputs and technologies (Branson and Norvell, 2015).

Production of tomato is the highest vegetable production with a total production of 247,135 tons in the 2018 of which 237,465 tons (96.1%) were in Tanzania Mainland and 9,670 tons (3.9 %) in Zanzibar, with an average yield of 5.6 tons/ha and 2.9 tons/ha respectively. The second vegetable crop is cabbage and third crop is onion. Carrots are a minor crop with a production of 4,029 tons for home consumption only 10% of the yield is used. The remaining is for selling but for all kind of vegetables losses are high. It is estimated that about 31% of vegetable is lost leaving only 59% for selling. Losses are caused by pest and diseases, inadequate sorting/grading, rough handling, lack of cooled storage facilities and lack of adequate packing material. Besides this also a good quality control system and grading system is lacking. Only 13% of the farmers perform some sort of grading where only rotten or misshaped fruits are removed (NBS, 2018).

The accessibility to extension services, credit, market, farmers' organization is very important for raising tomato production (Bonabana-Wabbi, 2015). Access to credit is regarded as one of the key elements in raising agricultural productivity (Anyiro and Oriaku, 2013). Micro credit is the name given to extremely small loans made to poor borrowers whose role is to enhance the production capacity of the poor resource farmers through financial investment in their human and physical capital (Okurut et al., 2004).

Thus, tomato farmers with access to credit may be of help in obtaining the capital required for adopting the higher profit production technologies and therefore increase productivity (Wachira, 2012). According to Oladeebo (2008), availability of adequate and timely credit help farmers in expanding the scope of operation and adoption of new technology as well as enhancing the purchase and use of some improved inputs which are not available on the farm.

Extension services reflected by the number of extension contacts either through farm visits made or training sessions received prior to and during tomato production

season influence crop productivity (Anyiro and Oriaku, 2011). This is because tomato farmers who get in touch with the extension agent are likely to get the right information not only on a technology but also its profitability. Access to market and availability of market are bound to reduce marketing costs on matters such as transport and other transaction costs and offer favourable price for tomatoes (Wachira, 2012). Access to market may be analyzed in terms of the distance in kilometres to the market reflecting the marketing costs that one incurs in the course of accessing the market and thus thought to have a negative contribution on productivity as it reduces the profits which might be obtained from marketing farm outputs (Wachira, 2012).

Tomato farmers' organization help them to participate in group activities, as they may tend to share ideas on profitable enterprises and adopt them as well as engage in market activities of inputs acquisition or selling of produce and thereby improve their profits. Consequently, organized farmer groups are promoted as useful avenues for increasing tomato production (Lenis, 2012).

Moreover, socio-economic factors have great contribution to increase tomato production (Altarawneh, 2012). The socio-economic factors of tomato farmers include gender, age, income, and level of education, labour availability, farm size, marital status, and household size. (Chapoto et al., 2012).

Household size is among the important socio economic characteristics which influence tomato productivity because a fairly large family size implies more family labour available for the household farm activities (Ogundari, 2008). This was also reported by Igben (2014) that household size is an obvious possible advantage in terms of farm labour supply when it is relatively large.

Education level is a socio economic factor of great importance as it determines one's ability to comprehend and analyse issues before taking any action. Thus, education level is very useful in technology adoption for improved crop productivity. As Ozor and Cynthia (2010) assert, an increase in educational status of farmers positively influence the adoption of improved technologies and practices. Furthermore as Opara (2010) argues, farmers with basic education are better equipped for making more

informed decision for lives and for their communities as well as becoming active participants in economic, social, and cultural dimensions of development. Likewise, the study by Adenuga et al. (2013) found that education, unlike other socio-economic factors like age, labour, gender and farm size, significantly influenced production and productivity of tomato. Evidence on the efficiency of small-scale tomato farmers' production from a study by Abu et al. (2011) shows that socio economic variables of farm size, and labour size significantly influenced tomato output. Moreover, education, and farmers' experience have significant impact on tomato output (Adenuga *et al.*, 2013).

Main source of income is also among the socio-economic factors that influence farming decisions by the farmer because farm practices depend on capital investment especially when the capital is dependent on the existing sources of income (Mathenge and Tschirley, 2008). Under such circumstances, it is plausible that earnings from off the farm may often be used to compensate for the missing and imperfect credit markets by providing ready cash for input purchases as well as other household needs. In addition, off and on farm earnings could be used to spread the risk of using these modern farm inputs to the extent that farmers choose traditional over modern inputs in order to lower their risk. Thus, any mechanism that allows farmers to smoothen consumption will raise the use of modern inputs and increase farm productivity (Ogundari, 2008).

2.9. Tomato Production in Tanzania

According to URAT (2019), in the year 2018, tomato was planted by 184,567 operators of which 163,916 (88.8 %) were in Tanzania Mainland and 20,651 (11.2 %) in Zanzibar. During the short rainy season, the number of operators planted tomato were 90,275 (48.9 %) while in the long rainy season were 94,293 (51.1 %).

The total planted area for Tanzania was 54,520 ha of which 50,645 ha (92.9 %) were in Mainland and 3,876 ha (7.1 %) in Zanzibar. Among regions in Mainland, Morogoro had the largest planted area with tomato which was 19,195 ha (37.9 %),

followed by Iringa (3,890 ha; 7.7 %) and Kilimanjaro 3,890 ha (7.7%). Singida region recorded the lowest planted area with tomato 78 ha (0.2 %).

In Zanzibar, Kaskazini Unguja was leading with 1,423 ha which is 36.7% of planted area with tomato followed by Kusini Unguja 890 ha (23.0%) while the lowest planted area was in, Kusini Pemba 208 ha (5.4%).

The total harvested area with tomato in Tanzania was 45,604 ha of which 42,318 ha (92.8 %) was in Mainland and 3,286 ha (7.2 %) in Zanzibar. Total production of tomato in Tanzania was 247,135 tons of which 237,465 tons (96.1 %) were in Tanzania Mainland and 9,670 tons (3.9 %) in Zanzibar, with an average yield of 5.6 tons/ha and 2.9 tons/ha respectively.

In Mainland, Morogoro region recorded the highest tomato production of 155,745 tons (65.6 %) with crop yield of 9.5 tons/ha, followed by Kilimanjaro 18,630.5 tons (7.8 %) with yield 6.5 tons/ha and Mtwara was 13,336 tons (5.6 %) with a yield of 6.5 tons/ha while Singida region reported the lowest tomato production of 83 tons (0.04 %) with crop yield of 1.1 tons/ha.

In Zanzibar, the total area planted with tomato was 3,876 ha of which 3,286 ha were harvested resulting to a total production of 9,670 tons of tomato with an average yield of 2.9 ton/ha. The highest production of tomato was recorded in Kusini Unguja with 3,444 tons followed by Kaskazini Unguja (2,311 tons), Mjini Magharibi (2,308tons). Kusini Pemba was the least producer of tomato with a total production of 477 tons**.**

2.10. Tomato Production in Kilimanjaro Region

The total production of vegetables was 28,215 tons tons, produced in a total area of 4,847 ha in the year 2017. The most widely cultivated vegetable crop was tomatoes was the most widely grown crop with a production of 17,557 tons (62.2%) of the total vegetables produced, followed by ginger (2,488 tons, 9%), cabbage (1,489 tons, 5.3%), okra (1,367 tons, 4.8%), chillies (1,322 tons 4.7%), onions (1,231 tons, 4.4%) and carrots (634 tons, 2.2%). The production of other vegetable crops grown in the

region was relatively very small amounting to less than a thousand tons each. It is estimated that 8001 households engaged in tomato production in the year 2017, whereby during the long rainy season 2,989 engaged in tomato production and in the short rainy season the number of households was 5012. Hai district had the largest planted area of tomatoes (1680 ha, 45.4% of the total area planted with tomatoes in the region), followed by Moshi rural (456 ha, 25.6%), Same (120 ha, 5.1%), Mwanga (108 ha, 4.1%) and Rombo district have very small planted area (URT, 2017)

2.11. Importance of Tomato Production

Tomatoes contribute to a healthy, well-balanced diet. They are rich in minerals, vitamins, essential amino acids, sugars and dietary fibres. Tomato contains much of the vitamins A, B and C, and minerals such as iron and phosphorus. Tomato fruits are consumed fresh in salads or cooked in sauces, soup and meat or fish dishes. They can be processed into purées, juices and ketchup. Canned and dried tomatoes are economically important processed products (Naika et al., 2005; Tshiala and Olwoch, 2010). In amplifying its importance, Tshiala and Olwoch (2010) observe that tomato is a major vegetable crop and commonly grown by both poor and rich farmers in South Africa. It is used worldwide as a fresh vegetable or as a spice in food preparation. Currently, it is one of the main vegetables used for hawking by small-scale entrepreneurs in the informal sector. In Tanzania, according to Maerere et al. (2006) tomato is the most important vegetable crop in terms of production and use. Vegetables, especially tomatoes, are the best resource for overcoming micronutrient deficiencies and provide smallholder farmers with much higher income and more jobs per hectare than staple crops (AVRDC, 2006). Vegetables generally include sweet pepper, cauliflower, carrot, cabbage, lettuce, spinach, tomato, potato, reddish, onions and cucumbers, which are fresh and edible portions of herbaceous plants. Vegetables are important source of food and highly beneficial for the maintenance of health and prevention of diseases. They contain valuable food ingredients which can be successfully utilized to build up and repair the body (Hanif et al., 2006). Tomato is the next most important vegetable crop after potato in the world (FAO, 2005). It is

used as a cash crop as well as food crop worldwide. Tomato is eaten in various cuisine recipes; it can either be eaten raw or industrially processed into products such as tomato sauce and tomato paste.

2.12. Challenges facing tomato production in Tanzania

Like other vegetables, tomato production and productivity are faced with a number of constraints; as a horticultural crop, tomato is faced by biotic factors such as lack of improved seeds, pests and diseases and abiotic factors which include drought, markets, input supply and soil nutrients (Anang et al., 2017). Pests and diseases are one of the critical challenges in tomato production systems (Maerere et al., 2015). As Nouhoheflin et al. (2017) point out that pests and diseases caused by bacteria, nematodes, fungi and viruses cause significant losses of tomato in West Africa. It is argued that the main disease reported by most farmers is tomato leaf curl viruses transmitted by whitefly (Bemissia tabaci) (ibid). Furthermore, in Kenya, Masinde et al, (2018) points out that the most ubiquitous and devastating pathogen that infects tomatoes in the North Rift Kenya is Phytophthora infestans that causes late blight and Alternaria solani that causes early blight. In Tanzania, bacterial speck and bacterial spot diseases of tomato caused by Pseudomonas syringae and Xanthomonas vesicatoria respectively are considered to be the most important foliar diseases of tomato in most production areas (Shenge et al., 2017).

Tomato is also particularly sensitive to pest pressure and is therefore subject to intensive application of chemical pesticides including toxic ones. Resistance to pests, low awareness about risks, and availability of cheap but high toxic pesticides has increased the risks in tomato production. The misuse of pesticides has raised concerns about health hazards linked to intoxications resulting in morbidity, deaths and environmental pollution (Coulibaly et al., 2017; Sibuga et al., 2016).

Similarly, it is also argued that tomato productivity, like the productivity of most other vegetables is severely affected by poor weather conditions and the inherent low capacity of most smallholder farmers in tackling moisture stress making them failing to capitalize on the production and market potentials for vegetables (Tshiala and

Olwoch, 2018). Apart from excessive insects and disease damage, other constraints that prevent farmers from achieving potential yields are unavailability of quality seed, the use of unadapted varieties, low soil fertility, postharvest losses and the lack of appropriate cultural practices (Ayandiji and Adeniyi, 2016).

2.13. Indicators of Poverty in Tanzania

2.13.1. Illiteracy

One of the signs of poverty in the country are those low level literacy and numeracy. The literacy level is now estimated to be 68% down from 90% achieved n the 1980s. This testifies to the worsening trend of poverty and to the reversal of gains made earlier in human development efforts. Among low income families the literacy rate is 59% which lower than the national average (Bagachwa, 2017).

2.13.2. Inadequate clean and safe water supply

Availability of clean and safe water supply and sanitation services is one of the basic indicators of human development. Water for the majority of Tanzania is not within easy reach. Only about 11% of households have water services at the door. About 38% % have to walk up to 15 minutes in order to reach water sources; while about 27% of households spend up to 30 minutes to get to a source of water (Bagachwa, 2017)

2.13.3. Poor Health Services

Inadequate health services reflect the extent of poverty of the country and households. For example, the ration of population per health facility in 2012 was 7,421; there is one hospital bed per 1000 people and one physician per 23,188 people, while about 30% of the people live more than 5 kilometers from the nearest health centre (NBS, 2012).

2.13.4. High Mortality Rate

The average life expectancy of 77 year in developed countries and 62 years in other developing countries. The infant rate mortality rate (IMR) is 96 per 1,000 live birth compared to 7 in developed countries. The under-five mortality rate of per 1,000 and maternal mortality rate is 95 per 100,000 live birth. These mortality rates for Tanzania are clear expression of poverty (NBS, 2012).

2.13.5. Malnutrition

Many Tanzanian suffers from malnutrition particularly under nutrition. Thus, several Tanzanians are affected by micro nutrient deficiencies due to nutritional illiteracy especially as it relates to best use of fruits and vegetables and proper methods of planning cereal based diets. Malnutrition among under-fives shows the prevalence of stunting to be 43.4% underweight 30.6% and wasting 7.2% Adult malnutrition especially maternal malnutrition is widespread. Indicative of maternal malnutrition is the high prevalence of low birth weight (NBS, 2013).

2.13.6. Environment Degradation

Environment degradation which is caused by over exploitation of land perpetuates poverty. Poverty has led to small holder farm house holds and pastoral groups to intensify exploitation of land with the aim to survive. This has led to widespread soil erosion; in the absence of alternative energy source, firewood remains the dominant sources of domestic fuel all over the country. Thus, cutting trees for fuel wood has led to widespread deforestation and drought, hence increasing the danger of desertification (Bagachwa, 2017).

2.13.7. Unemployment

High incidence of unemployment is among key distinguishing features of poverty. Largely because of poverty, the economy cannot generate enough employment opportunities to meet the needs of the labour force. Poor living conditions of the rural areas serve centripetal force to push the youth to urban areas where most of them

remain unemployed. The near 30% of youth unemployment reflects, in part, the ability of the economy to create sufficient employment opportunities for the growing population, also the inability of the rural areas to create gainful employment opportunities and incentives to retain youth after graduation from primary education. Alongside this situation is the growing problem of street children who are a manifestation of worsening poverty (Bagachwa, 2017).

2.13.8. Low Incomes

The basic needs poverty line is 36,482 Tanzanian Shillings per adult equivalent per month and food poverty line is 26,085 Tanzanian Shillings per adult equivalent per month. Using these two poverty lines, more than a quarter (28.2 %) of the Tanzanian population fall below the basic needs poverty line and 9.7 % falls below the food poverty. NBS (2012). Although the economy has been growing at an average animal rate of 6.8% in 2018, this rate of growth is insufficient to generate an income level considered adequate to meet basic needs (URT, 2018).

2.13.9. Homeless and Poor Housing

Many Tanzanian live in poor quality houses; 70% of the population in Dar es Salaam city live in squatter settlements. Arusha and Mbeya municipalities have 70% of their population living in similar situation. Mwanza had 40% of its population living in squatter settlements (NBS, 2012).

2.14. Empirical Literature Review

The study by Mende (2014) employed interview, Focus Group Discussion and questionnaire to collect data from the 80 respondents, also the study employed thematic and descriptive techniques to analyse the data. The study revealed that the major crops grown in Mbeya nad Makete Districts, tomato was the main source of income to the households. Other sources of household income were non-agricultural activities which included casual labour, local brewing, petty business, remittances, lumbering, loan seeking, renting out houses and livestock keeping. The study also revealed that there were constraints for tomato production and other crops included

inadequate land, high prices of inputs (fertilizers, pesticides), lack of capital, and inadequate knowledge of improved technologies. However, the relationship between tomato production and households' poverty reduction was not well clarified in this study.

The study by Mutayoba and Ngaruko (2018) used the sample size of 100 respondents and questionnaire was used as main data collection instrument for the study. Other methods employed included structured and semi structured interviews, checklists for focus group discussions and field observations. The descriptive statistics and thematic techniques were used to analyse the data. The study revealed that profits generated from tomato production differ across marketing channels that farmers use. Production technology employed suggests the intensive nature of sustained and profitable production of the crop where lack or inadequate availability of inputs could greatly constrain tomato production and lead to low income. However, the study did not explain in details the findings. There is a need to know exact income generated by tomato production across in market channels that have been used by farmers, and which technology was used by farmers on tomato production. The relationship between tomato production and households' poverty reduction was also not well clarified.

The study by Masung (2014) used a combination of methods to collect primary data for this study, and the combination included smallholder tomato farmer's interviews using structured questionnaire, focused group discussion and key informant interview to collect primary data from 124 respondents. The study also employed Chi-square test and cross tabulations to compare productivity levels of various categories of respondents and were used to obtain inferential statistics to determine if there were significant differences among the different categories of farmers in terms of tomato productivity and to determine the influence of different socio-economic factors in tomato productivity among farmers in Musoma municipality. The study revealed tomato production was the source of income for 53.3% of the farmers in the study area, and contributed to the poverty reduction of households in Musoma Municipality, whereby tomato farmers now can afford the cost of social services for

their families. However, the validity and ratability of the study instruments were not tested, thus there is a question on whether the research instruments provided accurate and consistent information for the study.

The study by Indah (2014) used a combination of four methods; Questionnaire, Focus Group Discussion and Interviews to collect information from 100 respondents. The study also used thematic and descriptive statistics techniques to analyse data. The study revealed that tomato as an alternative crop for income through participatory community need assessment. The tomato production had great role in income generation, but the industry is like to be neglected, this might due to unreliable data on its contribution to the economy of the country. The study recommended that to strengthen the existing market chain systems, the market centers or marketing agencies should give proper attention to enhance tomato production. Though, the study did not describe in detail about the amount of income generated by household farmers and its relationship with households' poverty reduction, also the relationship between tomato production and households' poverty reduction was not well clarified.

The study by Machethe (2017) used survey to collect 59 respondents from the field, and had employed descriptive statistics and chi- square to reveal the relationship between Agriculture and Poverty alleviation. The study found agriculture as a major source of income for many rural communities in South Africa, and therefore, plays a major role in poverty alleviation. This role can be enhanced by making appropriate investments in the prime movers of agricultural development: human capital, agricultural research, biophysical capital formation, and rural institutions. Such investments have proved contributions in promoting smallholder agricultural growth in other countries and largely explain the success achieved in developing the commercial agricultural sector in South Africa. The study also found that access to agricultural support services remains a major factor constraining the growth of smallholder agriculture in the former homelands. Experience from other countries indicates that a comprehensive approach to the provision of farmer support services is required to achieve growth in the smallholder agricultural sector. However, the

study focused generally on the role of agriculture in poverty alleviation. There is a need of a study to study the role of each crop production on poverty reduction so as have wide understating of contribution of agriculture on poverty reduction, lastly the study employed only survey as a tool for data collection, this implies that researcher was not able to triangulate the information collected from the field due to limited use of tools of data collection.

2.15. Research Gap

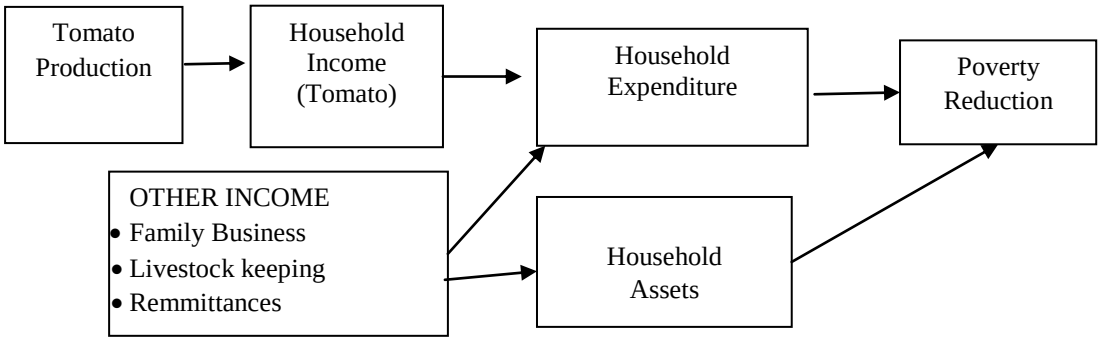
Different studies were reviewed, such as Mutayoba and Ngarururo (2018), Inda (2014) and Mallongo (2017) to get insight on tomato production and households' poverty reduction. However, the relationship between tomato production and households' poverty reduction was not well clarified in the reviewed studies, so it is not obvious clear on how the income generated from tomato production reduces household poverty. Therefore, the goal of this study is to examine relationship between tomato production and households' poverty reduction in Hai District.

2.16. Conceptual Framework

Conceptual framework is the system of concepts, assumptions, expectations, belief and theories that support the study (Milles and Hubernman, 1994). This section presents a conceptual framework from which the analysis of this study will be made. The purpose of the study was to examine the relationship between tomato production and households' poverty reduction in Hai District. The framework was developed for the study to indicate a relationship of variables based on the assumptions derived from the reviewed literatures. The framework assumes tomato production and other sources of income (family business, livestock keeping, wage and remittances) contribute to household annual income. Therefore the increase of income from tomato production and other sources of income will increase the household annual income. The households will be able to do major expenditure, such as paying school fees, medical fee, electricity and water bills. The households will also be able to acquire assets, such houses, cars, and plots of land. However, the tomato production

level per hectare will not increase if tomato production will face challenges, such as pests and diseases, weak extension support and lack of credit facilities.

Figure 2.1: Conceptual Framework: Relationship between Tomato Production and Household Poverty Reduction



Source: Researcher (2019)

CHAPTER THREE

RESEARCH METHODOLOGY

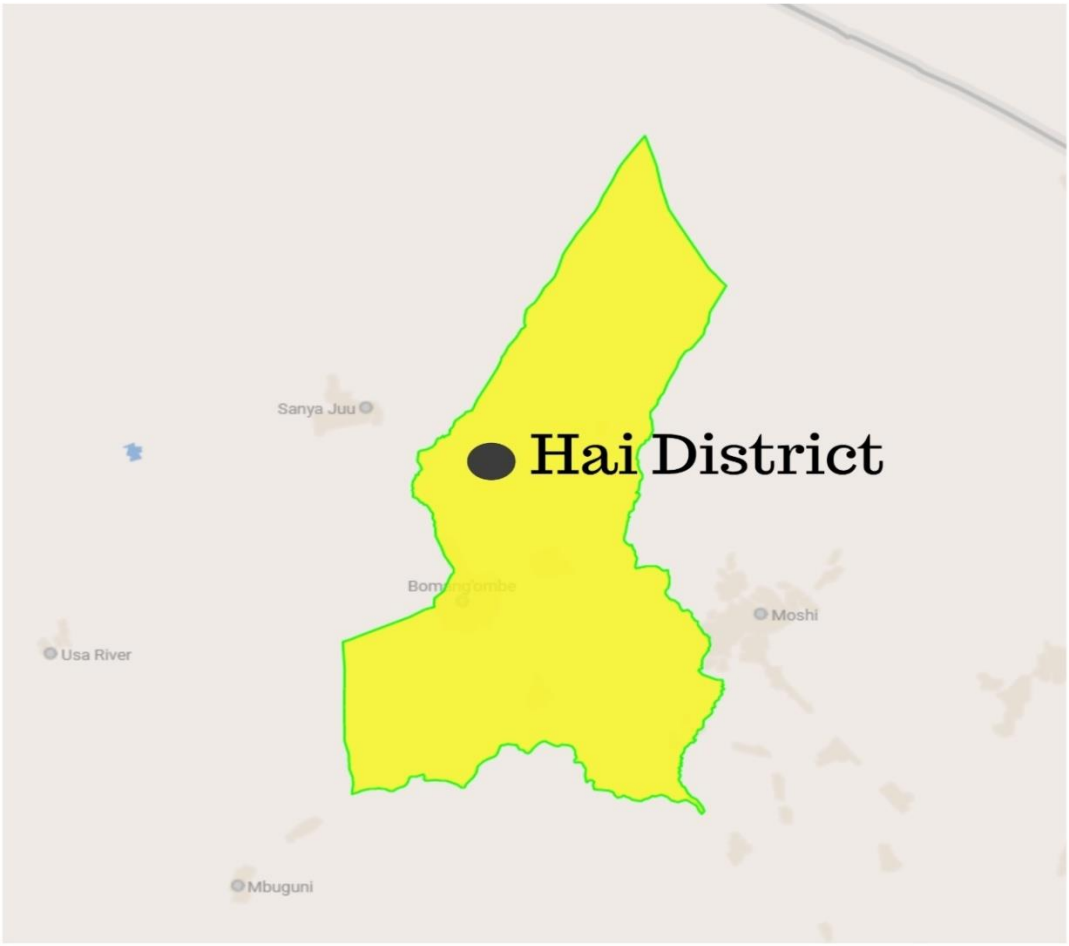
3.1. Research Design

This section describes the plan, structure and strategy of investigation that was employed so as to obtain answers to research questions in this study (Kumar, 2002). Kothari (2009) defines research design as the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. There are four research designs: the experimental design, case study, longitudinal design and survey. This study used case study design because of the quest of the study for an in-depth examination of the relationship between tomato production and households' poverty reduction.

3.2. Study Location

Hai District is one of the seven districts of the Kilimanjaro Region of Tanzania. It is bordered to the south and west by the Arusha Region, to the west by the Siha District, and to the east by the Moshi Urban District and Moshi Rural District and the Rombo District. The district was chosen as a study area because is one of the districts which are chief producers of tomato in Tanzania. The district has the largest planted area of tomatoes which is 45% of the total area planted with vegetable in the Kilimanjaro region. The study was conducted in three wards, namely Machame Uroki, Masama kusini and Masama Rundugai.

Figure 3.1: Map of Hai District



Source: HDC (2018)

3.3. Study Approach

There are three main research approaches used in research; namely qualitative, quantitative and mixed approach. Qualitative research is designed to reveal a target audience's range of behaviour and the perceptions that drive it with reference to specific topics or issues. It uses in-depth studies of small groups of people to guide and support the construction of hypotheses. The results of qualitative research are descriptive (Kothari, 2009). On the other hand quantitative approach is the systematic empirical investigation of observable phenomena through statistical, mathematical or computational techniques. It involves the collection and analysing numeral data and applying statistical analysis (Kumar, 2002). Based on the nature of this study, both qualitative and quantitative approaches were employed.

3.4. Targeted Population

The target population is the group of people that a researcher wants to study (Molusa, 1992). The population of the study is composed of households engaging in tomato production from three wards (Machame Uroki, Masama Kusini and Masama Rundugai), District Agricultural Agricultural extension officer (DAEO), Ward Agricultural Agricultural extension officers (WAEO) and Ward Executive Officers (WEO) for each of the three wards (HDC, 2018).

3.5. Respondents' Sampling Techniques

Sampling technique is the method used to draw sample size of the targeted population (Dul and Hak, 2008). The research employed the purposive sampling technique and convenient sampling techniques to select respondents for the study.

3.5.1 Purposive Sampling Techniques

Purposive sampling technique is the method used to select respondents for the study without providing every item of the population the equal chance of selection (Molusa, 1992). The researcher identified and select individuals or groups of individuals that are especially knowledgeable about or experienced with tomato production. The researcher considered their availability and willingness to participate in the study, and the ability to communicate experiences and opinions in an articulate, expressive, and reflective manner. Therefore, the researcher selected the District Agricultural Agricultural extension officer (DAEO) and Ward Agricultural Agricultural extension officers (WAEO), because they have authority and they are government officials responsible for supervision of agricultural activities and have authority in making decisions which can affect relationship between tomato production and households' poverty reduction in Hai District. The purposive sampling technique was used to select 3 wards that has tomato households that engage in tomato production in both short and long rain seasons.

3.5.2. Convenience Sampling Technique

Convenience sampling technique is a non-probability sampling technique where subjects are selected because of their convenient accessibility and proximity to the researcher (Saunders et al, 2007). The researcher identified the tomato producers to include in the study, and conveniently selected 229 tomato producers for the study. Only respondents who were easy accessible, available and ready to take part in the study were selected. Tomato farmers were obtained by the assistance of Ward Agriculture Agricultural extension officers, who helped to locate their farms.

3.6. Sample Size

The sample size consists of 236 respondents; 1 District Agricultural Agricultural extension officer (DAEOs), 3 Ward Agricultural Agricultural extension officers (WAEOs), 3 Ward Executive Officers (WEOs) and 229 Tomato farmers.

The Taro Yamane method was used for sample size calculation. The method was formulated by Yamane (1967) to determine sample size from a given population. The following is mathematical illustration for Taro Yamane method:

$n=N/1+N(e)^2$

Where:

n= sample size

N=population

e= margin error

$n =707/1+707(0.05)^2$

n= 707/1+707(0.0025)

n= 707/1+2

n=707/3

n=236

3.7. Type of Data

3.7.1. Quantitative Data

Quantitative data refers to any quantifiable information that can be used for mathematical calculations and statistical analysis, such that real-life decisions can be made based on these mathematical derivations (Dul and Hak, 2008). The stud collected the quantitative data was from tomato farmers on production level of tomato, household expenditure from tomato income and household assets from tomato income.

3.7.2. Qualitative Data

Qualitative data refers to non-numeric data, such as colors, images and descriptions that can be observed and recorded (Molusa, 1992. The study collected qualitative data from District Agricultural Agricultural extension officers (DAEOs), Ward Agricultural Agricultural extension officers (WAEOs) and Ward Executive Officers (WEO) and tomato farmers.

3.8. Data Collection Method

3.8.1. Interview

Interview is the method of research data collection. The term interview can be dissected into two terms as, ‘inter’ and ‘view’. The essence of interview is that one mind tries to read the other. The interviewer tries to assess the interviewed in terms of the aspects studied or issues analyzed (Molusa, 1992). The interview was held with people who have in-depth understanding and knowledge on tomato production and its contribution to alleviation of poverty among households, and kind of assistance they provide to tomato farmers. The study employed interview method to collect information on tomato production level, and challenges facing tomato production from District Agricultural extension officers (DAEOs), Ward Executive Officers (WAEOs) and Ward Agricultural extension officers (WAEOs).

3.8.2. Questionnaire

A questionnaire is a method for data collection that have a series of questions for the purpose of gathering information from tomato farmers. The questionnaire was administered so as to collect information in a short period of time and in a relatively cost. It was important to ensure that every single questionnaire provided to tomato farmer is filled in and collected as soon as it is completed. For this to be possible, it was necessary for the researcher to make prior arrangements for farmers to have time and place to sit for half an hour or so to fill out the questionnaire. The questionnaire instrument was used to collect primary data from tomato farmers.

3.9 Validity and Reliability of Research Instruments

3.9.1. Validity of the study

The term validity refers to the trustworthiness, credibility or how truthful the research results are (Yin, 2003). Questionnaire and interviewee instruments for this study were subjected to tests for legitimacy to figure out if they require change or not. The researcher conducted a pilot investigation of 2 respondents for interview and 8 respondents for questionnaire to set up validity of the study.

3.9.2. Reliability of the study

Reliability refers to the consistency of the research instruments (Kothari, 2004). The researcher used test-retested method to measure the reliability of the questions used for interview method and questionnaire instrument. The same questions for questionnaire were administered twice to 8 respondents and the same questions for interview were administered to twice to the same 2 respondents in two different occasions within a week. Then the responses of the same questionnaire and interview instruments measured in two different occasions were matched to determine to which extent the responses were consistent.

3.10. Data Analysis

Qualitative data were analysed using content analysis where the data were grouped into themes based on the objectives of the study. The sub themes were merged into larger themes for the conclusion; the qualitative data were presented in form of direct quotations. The descriptive and inferential statistics was also used to analyse quantitative data from the households engaging in tomato production. The data were presented in form of frequency, percentage, tables and pie charts. In addition, Spearman correlation was used to determine the strength of a relationship between tomato production level and poverty reduction, household expenditures from tomato income and poverty reduction, also household assets from tomato income and poverty reduction. Multiple regression model was used for inferential statistics analysis to determine contribution of tomato production and other sources of household annual income, the study used the multiple regression model below.

$$PR = \beta_0 + \beta_1 TY + \beta_2 FB + \beta_3 LK + \beta_4 REM + WG + \beta_5 + \varepsilon$$

Where:

PR= Poverty Reduction
β_0 is the regression constant
β_1, β_2, β_3, β_4 and β_5 are the coefficients of independent variables,
TY= Tomato Production
FB=Family Business
LK= Livestock
Keeping
REM= Remittances
WG= Wage
ε = the Error Term

N.B.

This model shows that Poverty Reduction is not only the function of Tomato Income, rather, it is also a function of other variables i.e. other sources of income which are family business, remittances, wage and livestock keeping.

3.11. Interpretation of Multiple Regression Output

According to the regression equation established, the change in household annual income (increase or decrease) is relative to a one unit change in the respective independent variables (tomato production, family business, livestock keeping, wage and remittances). In the multiple regression analysis, B_1, is the change in household annual income is relative to a one unit change in tomato production, if holding all other independent variables constant.

B_2 is the change in household annual income is relative to a one unit change in family business, if holding all other independent variables constant.

B_3 is the change in household annual income is relative to a one unit change in livestock keeping, if holding all other independent variables constant.

B_4 is the change in household annual income is relative to a one unit change in remittances, if holding all other independent variables constant.

B_5 is the change in household annual income is relative to a one unit change in wage, if holding all other independent variables constant.

3.12. Autocorrelation and Multicollinearity Issues

3.12.1. Autocorrelation

The diagnostic test pertaining on Durbin-Watson was done so as to find out whether the explanatory variables are autocorrelated with each other. The Model Summery Output- the Durbin-Watson statistic is 2.39 which is between 1.5 and 2.5 and therefore the variables are not autocorrelated (Table 4.3).

3.12.2. Multicollinearity

Multicollineality was tested using the Variance Inflator Factor (VIF) so as to find out whether the explanatory variables are correlated with each other. Multicollineality is identified when a variable whose VIF values are greater than 10. The results in Table 4.5 show that all explanatory variables were free from multicollineality because the VIF value was 1.812 which is less than 10.

3.13. Interpretation of Spearman's Correlation Coefficient

The correlation coefficient *r* measures the strength and direction of a linear relationship between two variables. Therefore, Spearman correlation was used in this study to determine the strength of a relationship between tomato production level and poverty reduction, household expenditures from tomato income and poverty reduction, also household assets from tomato income and poverty reduction

The value of *r* is always between +1 and –1. The interpretation is as following:

(i). Exactly –1. A perfect downhill (negative) linear relationship
(ii). –0.70. A strong downhill (negative) linear relationship
(iii). –0.50. A moderate downhill (negative) relationship
(iv). –0.30. A weak downhill (negative) linear relationship
(v). 0. No linear relationship
(vi). +0.30. A weak uphill (positive) linear relationship
(vii). +0.50. A moderate uphill (positive) relationship
(viii). +0.70. A strong uphill (positive) linear relationship
(ix). Exactly +1. A perfect uphill (positive) linear relationship0

3.14. Ethical Consideration

Ethical standards were observed in the planning and conducting of the study. The researcher secured research clearance from Mzumbe University, also researcher requested for research permit from the Department of Human resources and Administration at Hai District Council. The study was conducted with the consent of the respondents after being informed about the purpose of the study, and it was the respondents' choice to participate. The researcher had observed the right to privacy of the respondents and the confidentiality of their information.

CHAPTER FOUR

PRESENTATION OF THE FINDINGS

4.0. Introduction

This chapter presents the results of the study. The proposed study was to examine the relationship between tomato production and households' poverty reduction in Hai District, Tanzania. The results were well presented in response to the research objectives as shown in the next sections.

4.1. Contribution of Tomato Production level on Poverty Reduction

The first objective of the study intended to determine contribution of tomato production level on household income.

Table 4.1: Household Tomato Production Level

Annual Tomato Production Level	Responses	
	Frequency	%
1 ton	15	7
2 tons	36	16
3 tons	19	8
4 tons	36	16
5 tons and above	123	54

Source: Field Data (2019)

The results in Table 4.1. Revealed that 7%, 16%, 8%, 16% and 54% of respondents harvested 1ton, 2tons, 3 tons, 4 tons, 5 tons and above in 2018 respectively indicated. The findings imply majority of households had harvested adequate tomato produces for generating income that would be used for poverty reduction.

Table 4.2: Correlations between Tomato Production Level and Poverty Reduction

			Household Poverty Reduction	Tomato Production Level
Spearman's rho	Tomato Production Level	Correlation Coefficient	1.000	.972
		Sig. (2-tailed)	.	.000
		N	229	229
	Poverty Reduction	Correlation Coefficient	.972	1.000
		Sig. (2-tailed)	.000	.
		N	229	229

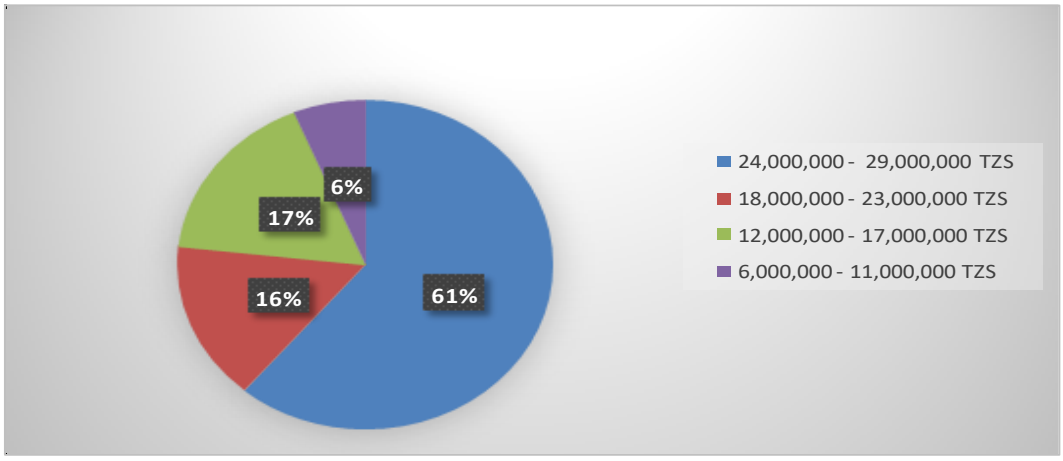
Source: Field Data (2019)

Furthermore, the results from Spearman's correlation in Table 4.2 showed that r = 0.972 which implies that there is very strong positive correlation. Meaning that there is a positive relationship between tomato production level and poverty reduction, thus increase of tomato production will increase the level of poverty reduction in Hai district.

4.2. Contribution of Household Income from Tomato on Poverty Reduction

The second study objective sought to examine the contribution of tomato income to poverty reduction. The study used questionnaire method to collect information from households engaging in tomato production. The respondents were asked about amount of income they annually generate from tomato production and other sources of income (livestock keeping, wage, remittance and family business) and their contribution to household poverty reduction.

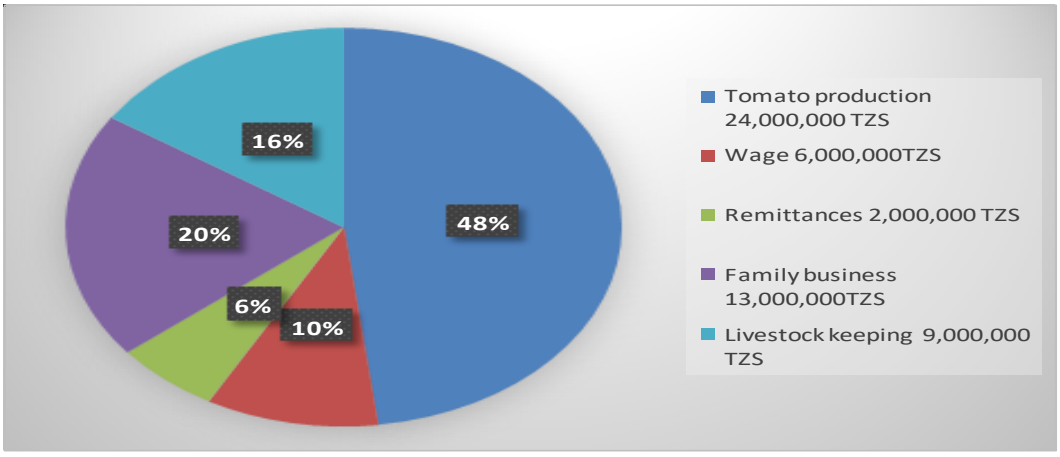
Figure 4.1: Contribution of Household Income from Tomato on Poverty Reduction (N=229)



Source: Field Data (2019)

The results in figure 4.1 revealed that tomato is the greatest contributor to household income, 61% of households generate 24,000,000 - 29, 000, 0000 TZS every year from tomato production. The findings imply that tomato production has great contribution to household income, since increase of income from tomatoes will increase the level of poverty reduction in Hai district.

Figure 4.2: Household annual income from Tomato Production and other Sources (N=229)



Source: Field Data (2019)

In addition, the results in figure 4.2 revealed that tomato production is the major source of income which contributes 48% of household annual income compared to 10% from wage, 6% from remittances, 20% from family business and 16% from livestock keeping.

Table 4.3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.990[a]	.981	.980	.15785	2.390

Source: Field Data (2019)

Moreover, analysis of Model Summary in Table 4.3 revealed that 98.1% of the changes in annual household income could be attributed to the combined effect of the predictor variables (tomato production, family business, livestock keeping, wage and remittances.

Table 4.4: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	122.232	4	30.558	1226.481	.000[a]
	Residual	2.367	95	.025		
	Total	124.599	99			

Source: Field Data (2019)

The analysis of variance (ANOVA) in Table 4.4 shows that there is a significant result. The value of F is 1226.481, which reaches significance with a *p*-value of 0.000(which is less than 0.05 significance level). This means there is a statistically significant difference between the means of the different source of income (tomato production, wage, livestock keeping, remittances and family business).

Table 4.5: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.052	.037		1.399	.040		
	Family business	1.233	.188	1.264	6.568	.000	.552	1.812
	Remittances	.182	.228	.185	.640	.024	.552	1.812
	Tomato production	1.758	.174	1.784	10.076	.000	.552	1.812
	Livestock keeping	.514	.163	.548	3.159	.002	.552	1.812
	Wage	.321	.195	.357	.862	.029	.552	1.812

Source: Field Data (2019)

Lastly, Analysis of coefficient in Table 4.5 revealed that, a unit increase in tomato production will lead to a 1.758 increase in annual household income; a unit increase in family business will lead to a 1.233 increase in annual household income, a unit increase in livestock keeping will lead to a 0.514 increase in household income, a unit increase in wage will lead to 0.321 increase in annual household income and a unit increase in remittances will lead to a 0.182 increase in annual household income. The findings concluded that tomato production contribute most to annual household income, followed by family business, livestock keeping, wage and remittances.

4.3. Contribution of Household Expenditure from Tomato Income and other Sources on Poverty Reduction

The study objective sought to examine the contribution of household expenditure from tomato income and other sources on social services expenditure and relationship to poverty reduction. So as to have a wide understanding of the relationship of each variable with poverty reduction in Hai District.

4.3.1. Contribution of Household Expenditure from Tomato Income on Poverty Reduction

The study intended to examine the contribution of household expenditure from tomato income and other sources on social services expenditure and relationship to poverty reduction.

Table 4.6: Correlations between Household Expenditures from Tomato Income and Poverty Reduction

			Household Expenditure from Tomato Income	Poverty Reduction
Spearman's rho	Household Expenditure from Tomato Income	Correlation Coefficient	1.000	.147*
		Sig. (2-tailed)	.	.026
		N	229	229
	Poverty Reduction	Correlation Coefficient	.147*	1.000
		Sig. (2-tailed)	.026	.
		N	229	229

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Field Data (2019)

The results in Spearman correlation test in Table 4.6 shows that r=0.147 which implies a weak positive correlation. Meaning that there is moderate positive significant relationship between household expenditure from tomato income and poverty reduction. Thus increase expenditure from tomato income on social services will increase the level of poverty reduction in Hai District.

4.3.2. Contribution of Household Expenditure from other Sources of Income on Poverty Reduction

The study aimed to examine the contribution of household expenditure from other sources of income (wage, livestock keeping, remittances and family business) on poverty reduction.

Table 4.7: Correlations between Household Expenditure from Other Sources of Income (Wage, Livestock Keeping, Remittances and Family Business) and Poverty Reduction

			Household Expenditure from Other Sources of Income	Poverty Reduction
Spearman's rho	Household Expenditure from Other Sources of Income	Correlation Coefficient	1.000	.024
		Sig. (2-tailed)	.	.717
		N	229	229
	Poverty Reduction	Correlation Coefficient	.024	1.000
		Sig. (2-tailed)	.717	.
		N	229	229

Source: Field Data (2019)

The results in Spearman correlation test in Table 4.7 shows that r=0.024 which implies a weak positive correlation. Meaning that there is a weak positive significant relationship household expenditure from other sources of income (wage, livestock keeping, remittances and family business) and poverty reduction. Thus increase expenditure from wage, livestock keeping, remittances and family business income will lead to small increase of the level of poverty reduction in Hai District.

4.4. Contribution of Household Assets from Tomato and other Sources of Income on Poverty Reduction

The study objective focused to examine the contribution of household assets purchased from tomato and other sources of income (remittances, wage, family business and livestock keeping) on the assets purchased by the households and relationship to poverty reduction. Questionnaire method was employed to collect information from 229 households engaging in tomato production from three wards (Machame Uroki, Masama Kusini and Masama Rundugai). In addition, the Spearman's correlation was used to determine the relationship between household assets purchased from tomato and other sources of income (remittances, wage, family business and livestock keeping) with poverty reduction in Hai District.

4.4.1. Contribution of Household Assets from Tomato Income on Poverty Reduction

The study focused to examine the contribution of household assets purchased from tomato income on poverty reduction in Hai District. Spearman's correlation was employed to determine the relationship between household assets purchased from tomato income and poverty reduction.

Table 4.8: Correlations between Household Assets from Tomato Income and Poverty Reduction

			Assets from Tomato Income	Poverty Reduction
Spearman's rho	Assets from Tomato Income	Correlation Coefficient	1.000	.062
		Sig. (2-tailed)	.	.348
		N	229	229
	Poverty Reduction	Correlation Coefficient	.062	1.000
		Sig. (2-tailed)	.348	.
		N	229	229

Source: Field Data (2019)

The Spearman correlation test in Table 4.8 shows that r=0.62 which implies a strong positive correlation. Meaning that there is strong positive significant relationship between household assets from tomato income and poverty reduction. Thus increase in assets purchased from tomato income will increase the level of poverty reduction in Hai District.

4.4.2 Contribution of Household Asset from other Sources of Income (Wage, Livestock Keeping, Remittances and Family Business) on Poverty Reduction

The study aimed to examine the contribution of household assets purchased from other sources of income on poverty reduction in Hai District. Spearman's correlation was employed to determine the relationship between household assets purchased from remittances, wage, family business and livestock keeping income with poverty reduction.

Table 4.9: Correlations between Household Asset from Other Sources of Income (Wage, Livestock Keeping, Remittances and Family Business) and Poverty Reduction

			Assets from Other Sources of Income	Poverty Reduction
Spearman's rho	Assets from Other Sources of Income	Correlation Coefficient	1.000	-.001
		Sig. (2-tailed)	.	.992
		N	229	229
	Poverty Reduction	Correlation Coefficient	-.001	1.000
		Sig. (2-tailed)	.992	.
		N	229	229

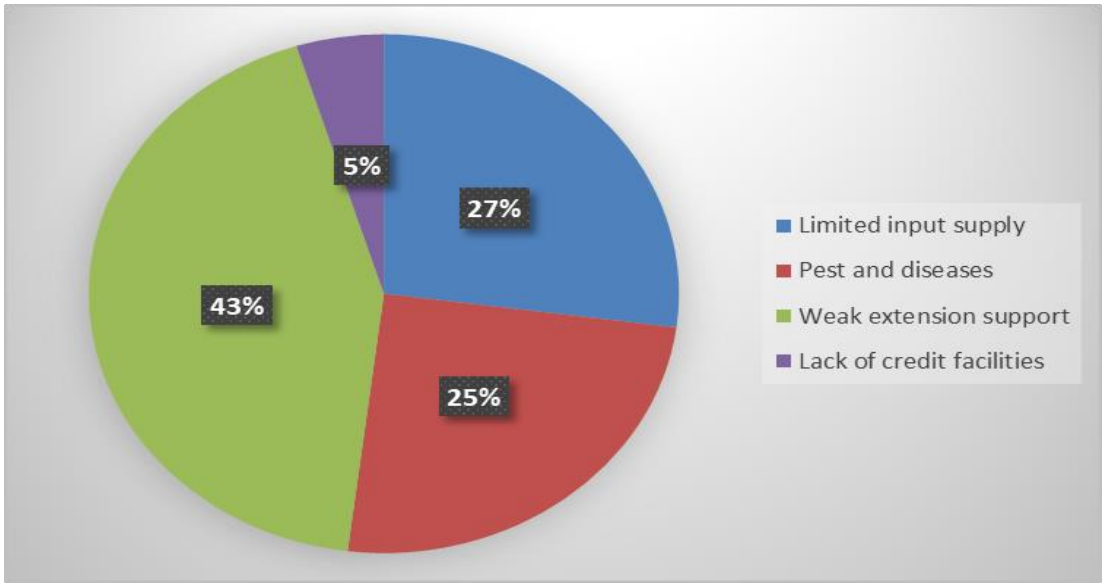
Source: Field Data (2019)

The Spearman correlation test in Table 4.9 shows that r= -0.001 which implies a strong negative correlation. Meaning that there is strong negative significant relationship between household asset from other sources of income (wage, livestock keeping, remittances and family business) and poverty reduction. This entails that most household assets were not purchased from increase in assets purchased from wage, livestock keeping, remittances and family business income.

4.5. Challenges Facing Tomato Production in Hai District

The third study objective aimed to examine the challenges facing tomato production in Hai District. To address the research objective, questionnaire and interview methods were used to collect information from the respondents. The questionnaires were administered to households engaging in tomato production in the selected three wards (Machame Uroki, Masama Kusini and Masama Rundugai). While the interviews were conducted with District Agricultural extension officers (DAEOs), Ward Executive Officers (WAEOs) and Ward Agricultural extension officers (WAEOs). The respondents were asked about the major challenges that have been encountering farmers in tomato production in Hai District.

Figure4.3: Challenges Facing Tomato Production in Hai District



Source: Field Data (2019)

The results in figure 4.3 revealed that 27% of respondents indicated that limited input supply as the most challenge in the production of tomato in Hai District. During interview it was also revealed that there is limited supply of pesticides and seeds, thus farmers have been incurring high cost to import from Kenya. One of respondents had the following to say:

> *"The production cost is very high since there is limited supply of seeds and industrial fertilizers for tomato production, some farmers import fertilizers from Kenya"* (WAEO).

Input availability, such as fertilizers, pesticides and seeds are very important for effective tomato production that increases the quality of harvest and income to the tomato farmers.

Prevalence of pest and disease such as late blight, nematodes and cutworms were revealed as another challenge affecting tomato production in Hai district. One of respondents had the following to say:

> *"The pests and diseases such late blights and cutworms have been keeping the low production of tomato, thus make farmers to get loss..."* (WEO).

Weak extension support services have been the most challenge for tomato production in Hai District as was indicated by 43% of the respondents. Although each ward there is one agricultural extension officer assigned to support farmers from land preparation up to post harvest. But during the interviews it emerged that they are less motivated to support the farmers because. One of the respondents had the following to say:

> *"There is one agricultural extension officer in each ward. Such officers work in a hardship environment some do not have means of transport, thus becomes difficult to reach all farmers. This makes them less motivated with the extension job"* (DAEO).

Lack of credit providers was indicated by 5% of respondents as the challenge facing tomato production in Hai District. This implying that lack of credit providers is a least challenge facing tomato production in Hai District, this may be attributed by easily accessibility of credit in commercial banks, such as CRDB and NMB for expanding production and improve quality of tomato produces. Therefore, the study concluded that weak extension support, limited input supply, pests and diseases were found the challenges affecting tomato production in Hai district.

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.0. Introduction

This chapter discusses the findings of the study. The proposed study was to examine the relationship between tomato production and households' poverty reduction in Hai District, Tanzania.

5.1. Contribution of Tomato Production Level on Poverty Reduction

The study found that more than 54% of households produce five tons of tomato and above (Table 4.1). The findings imply majority of households harvest more tons of tomato for generating income that would be used for poverty reduction. There is also a positive relationship between tomato production level and household income as indicated in the results from Spearman's correlation (r=0.972) in Table 4.2.

This implies that majority of households generate more income as their tomato production level increases. There is also a positive relationship between tomato productions with poverty reduction, thus increase of tomato production will increase the level of poverty reduction in Hai district.

The findings are consistent with the study by Machethe (2017) which found that there is a positive relationship between Agriculture and Poverty alleviation. The study found that agriculture as a major source of income for many rural communities in South Africa, and therefore, plays a major role in poverty alleviation. Another study by Masung (2014) had similar findings. The study revealed tomato production was the source of income for 53.3% of the farmers in Musoma Municipality, and contributed to the poverty reduction of households, as tomato farmers now can afford the cost of social services for their families.

5.2. Contribution of Household Income from Tomato on Poverty Reduction

The study found that tomato is the greatest contributor to household income, more than 61% of households generate income ranging 24,000,000 - 29,000,000 TZS every year from tomato production (Table 4.3). In addition, the results in figure 4.2 revealed that tomato production is the major source of income which contributes 48% of household annual income. Furthermore, the study found that a unit increase in tomato production will lead to a 1.758 increase in annual household income; a unit increase in family business will lead to a 1.233 increase in annual household income, a unit increase in livestock keeping will lead to a 0.514 increase in household income, a unit increase in wage will lead to a 0.321 increase in household income, and a unit increase in remittances will lead to a 0.182 increase in annual household income.

The findings imply that there is a positive relationship between household incomes from tomato with the level of poverty reduction, and thus increase of income from tomato will increase the level of poverty reduction in Hai district. The findings also imply that tomato production contribute most to annual household income, followed by family business, livestock keeping, wage and remittances.

The findings are consistent with the studies by May et al., (2004) and Machethe (2017). The studies found that agriculture is a major source of income for many rural communities in South Africa, and therefore, plays a major role in poverty alleviation. The households engaging in agricultural activities tend to be less poor than those not participating in agricultural production.

Furthermore, the study noted that the level of tomato income increases with total household income suggesting that tomato production remains an important source of income and has great contribution to poverty reduction in Hai District.

5.3. Contribution of Household Expenditure from Tomato Income and other Sources on Poverty Reduction

The study found that household expenditure incurred from tomato income had great contribution to poverty reduction. The results from Spearman correlation test (r= 0.147) in Table 4.6 shows that, there is a positive relationship between household expenditure from tomato income on the social services and poverty reduction. The results in Spearman correlation test (r=0.024) in Table 4.7 shows that, there is a weak positive relationship between household expenditure from other sources of income (wage, livestock keeping, remittances and family business) and poverty reduction.

The findings imply that increase in expenditure from tomato income increase the level of poverty reduction in Hai District. Since, the tomato farmers are now able to access social services, such as to pay school fees for the children, afford cost on water and electricity services, as well as the cost related to health care. The findings also imply that the increase expenditure from wage, livestock keeping, remittances and family business income will lead to small increase of the level of poverty reduction in Hai District.

In general, the findings imply that families of tomato production in Hai district has great contribution to households' poverty reduction. This means that households engaging in tomato production have adequate income, and thus their children can access to necessary social services including food, shelter, and health care (Smeeding et al., 2000).

5.4. Contribution of Household Assets from Tomato Income and other Sources on Poverty Reduction

The study found that majority of farmers acquired plot of land, business houses, residential houses and electronic equipment from tomato income. In addition, the Spearman correlation test results (r = 0.62) in Table 4.8 shows that there is a positive relationship between household assets purchased from tomato income and poverty

reduction. The Spearman results (r= -0.001) in Table 4.9 also shows that there is strong negative relationship between household asset from wage, livestock keeping, remittances and family business income with poverty reduction.

The study findings imply that the increase in tomato production will increase household annual income, and thus increase the level of poverty reduction in Hai District. This means that, the households engaging in tomato production will have adequate income to transform their lives through owning different assets, such as modern house, cars and electronic equipment that will improve their living standard. The findings also imply that households who own assets may decide to sell them and thus converts them into money during periods of hardship to generate additional income to households. Finding is synonymous with earlier results of Etim (2007) and Addison et al. (2008) who reported that assets are important buffers during emergencies and difficulties as they can be sold.

Furthermore, the findings imply that most household assets were not purchased from wage, livestock keeping, remittances and family business income. This entails that income from other sources apart from tomato production has low contribution to household annual income and poverty reduction in Hai District. Therefore, the farmers should invest more capital in tomato production so as to generate more income and liberate themselves from womb of poverty.

5.5. Challenges Facing Tomato Production in Hai District

The study found that weak extension support, limited input supply, pests and diseases were found as the challenges facing tomato producers in Hai district. The study findings are in the same line with previous study that assessed agricultural extension services in Tanzania by Daniel (2013). It found that agricultural extension officers were facing challenges of poor working environments including a lack of reliable means of transport to reach the farmers, limited financial support for carrying out demonstrations and field experiments on new technologies, sub-optimal housing, lack of working facilities and low salaries. As a result, agricultural extension officers are not motivated to perform their duties well.

Nouhoheflin et al. (2017) found that pests and diseases caused by bacteria, nematodes, fungi and viruses cause significant losses of tomato in West Africa. It is argued that the main disease reported by most farmers is tomato leaf curl viruses transmitted by whitefly. Furthermore, in Kenya, Masinde et al, (2018) found out that the most ubiquitous and devastating pathogen that infects tomatoes in the North Rift Kenya is Phytophthora infections that causes late blight and Alternaria solani that causes early blight.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

6.1. Summary

The purpose of the study was to examine the relationship between tomato production and households' poverty reduction in Hai District, Tanzania.

The study had the following specific objectives, first, to determine the contributions of tomato production level per hectare on poverty reduction. Second, to determine the contributions of household annual income from tomato production and other sources, third, to examine the contributions of household major expenditure incurred from tomato income on poverty reduction, forth, to examine the contributions of household assets from tomato income on poverty reduction and fifth, to find out challenges facing tomato production for policy recommendations.

Data collection was guided by the following main research questions. First, what is the contribution of tomato production level on poverty reduction? Second, what is the contribution of household income from tomato on poverty reduction? Third, what is the contribution of household expenditure from tomato on poverty reduction? Forth, what is the contribution of household assets from tomato income on poverty reduction? And Fifth, what are the challenges facing tomato production?

The study employed a case research design, whereby the questionnaires and interview were used as methods for data collection. Spearman correlation analysis, descriptive statistics, thematic and multiple regression model were techniques used to analyse the data collected from the field.

The study found that there is relationship between tomato production and households' poverty reduction in Hai District. The income generated from tomato had most contribution to household annual income, the income was used to support most household expenditure on important social services; paying electricity and

water bills, school fees and health care, as well as acquiring assets; plot of land, business houses, residential houses and electronic equipment.

6.2. Conclusions

6.2.1. Contribution of Tomato Production Level on Poverty Reduction

The study concluded that majority of tomato farmers indicated that tomato production had contribution on poverty reduction. The results from Spearman's correlation (r=0.972) also showed that, there is a positive relationship between tomato productions with poverty reduction, thus increase of tomato production will increase the level of poverty reduction in Hai District.

6.2.2. Contribution of household income from tomato on poverty reduction

The study concluded that tomato is the greatest contributor to household income, more than 61% of households generate income ranging 24,000,000 - 29,000,000 TZS every year from tomato production. Furthermore, tomato production is the major source of income which contributes 48% of most households' annual income. Therefore, there is a positive relationship between household income from tomatoes with the level of poverty reduction, and thus increase of income from tomatoes will increase the level of poverty reduction in Hai district. Furthermore, there is a positive relationship between income generated from tomato and poverty reduction. This entails that the income generated from Tomato have changed the lives of most households, since they are able to incur social services bills/ charge and purchase different assets to improve their standard of living.

6.2.3. Contribution of Household Expenditures from Tomatoes Income and other Sources on Poverty Reduction

The study concluded that the income generated from tomato production had great contribution to poverty alleviation in the households engaging in tomato production, since majority of respondents use the most income from tomato for household expenditure on school fee, healthcare, electricity and water bills, and farm activities.

There is also a positive relationship between household expenditure from household income with the level of poverty reduction, thus increase in expenditure from tomato income increase the level of poverty reduction in Hai District. However, there is a weak positive relationship between household expenditure from other sources of income (wage, livestock keeping, remittances and family business) and poverty reduction in Hai District.

6.2.4. Contribution of Household Assets from Tomato Income and other Sources on Poverty Reduction

The study concluded that majority of tomato farmers acquired plot of land, business houses, residential houses and electronic equipment from tomato income indicated to reduce poverty, also, there is positive relationship between household assets from tomatoes income with the level of poverty reduction. Thus increase in tomato production will increase household annual income, and increase the level of poverty reduction in Hai District. This means that, the households engaging in tomato production will have adequate income to transform their lives through owning different assets, such as modern house, cars and electronic equipment that will improve their living standard.

However, there is strong negative relationship between household asset from wage, livestock keeping, remittances and family business income with poverty reduction. Thus, the most household assets were not purchased from wage, livestock keeping, remittances and family business income. This means that income from other sources apart from tomato production has low contribution to household annual income and poverty reduction in Hai District.

6.2.5. Challenges Facing Tomato Production and Marketing in Hai District

The study concluded that weak extension support, limited input supply, pests and diseases were found the challenges affecting tomato production in Hai district. This implies that farmers in Hai District can generate more annual income than 29,000,000 TZS from tomato production if the given challenges would be addressed

6.3. Policy Recommendations

Tomato has a big potential of becoming one of the major commercial crop in Tanzania. Although the exact number of people who are employed or employing themselves in the tomato crop sub-sector in Tanzania is not known, many are benefiting from it. This includes farmers themselves, traders, wholesalers and retailers. The potential also exists for exportation to neighboring countries. Given this potentiality and in the light of the results of this study key policy issues appear to be input supply, extension services, pest and diseases. Whereby, weak extension support, limited input supply, pests and diseases were found the challenges affecting tomato production in Hai district.

It was revealed that there is great shortage of agricultural extension officers, who are only found at ward level, and most agricultural extension officers had low job satisfaction due to difficult working environment. Where, majority of them do not have means of transport. Therefore, strengthening and improving extension service should be a priority by government increasing the number of extension workers and provide them with resident houses, reliable means of transport, and adequate resource to enable agricultural extension officers to perform to their best. Furthermore, the few available agricultural extension officers can assist tomato farmers in acquiring basic knowledge on the management of their tomato farms in places where there are inadequate agricultural extension officers.

The government should provide subsidies to agricultural input supply so that their prices become affordable to all tomato farmers. If this is done, tomato production will raise. Tomato production will raise if farmers switch over from “traditional” to “modern” agriculture in very large numbers, involving the use of high-yielding varieties of seeds, organic manure, chemical fertilizers, insecticides, better implements and tractors.

While tomato production plays a major role in poverty alleviation, the poverty problem in Hai District cannot be solved by depending on tomato production alone. The households should also involve in nonfarm activities, such as agroindustry, particularly those that are linked to the smallholder agricultural sector. A strategy that pays attention to the strengthening of farm/nonfarm linkages is likely to yield better results in terms of employment and income generation.

6.4. Area for Further Study

The study was conducted in Hai District to examine the relationship between tomato production and households' poverty reduction. The study covered small area, Hai District. Therefore, the relationship between tomato production and poverty reduction in Hai District may not be the same for all districts in Tanzania. Because the challenges facing tomato production differ from one district to another. This provide importance for conducting the similar studies in other districts, so as to have a wider understanding about relationship between tomato production and households' poverty reduction. In Tanzania.

REFERENCES

ADB (2001). Asian Development Bank. Impact Evaluation Study on ADB'S Rural Credit Assistance in Bangladesh, People's Republic of China, Indonesia, Nepal, Srilanka, and Thailand. IES: REG 2001-04, ADB.

ADB(2012). Agriculture and Rural Institutions Support Project Appraisal Report. Agriculture and Rural Development in Zanzibar. *African Journal of Agriculture*, 7(4):302-309

Adenuga, A.H., Muhammad-Lawal, A. and Rotimi, O.A. (2013). Economics and Technical Efficiency of Dry Season Tomato Production in Selected Areas in Kwara State, Nigeria. *American Journal of Agriculture*, 7 (2): 201-206.

Altarawneh, M. (2012). Evaluation of vegetables farmers participation in agricultural extension activities. *American Journal of Agricultural and Biological Sciencess* 7 (2): 201-206.

Anang, B.T., Zulkamain, Z.A. and Yusif, S. (2017). Production Constraints and Measures to Enhance the Competitiveness of the Tomato Industry in Wenchi Municipal District of Ghana. *American Journal of Experimental Agriculture* 3(4): 824-838.

Anderson, W. L. and Ross, R. L. (2005). The Methodology of Profit Maximisation: An Austrian Alternative. *The Quarterly Journal of Austrian Economics* 8(4): 31-44.

Angelina Wenceslaus Masunga, A. W. (2014). Assessment of Socio-Economic and Institutional Factors Influencing Tomato Productivity amongst Smallholder Farmers: A Case Study of Musoma Municipality, *Tanzania. Journal of Agricultural Extension and Rural Development,* 4(14): 385-391.

Anyiro, C.O. and Oriaku, B.N. (2011). Access and Investment of Formal Micro Credit by Smallholder Farmers in Abia State, *Nigeria. Journal of Agricultural Sciencess* Vol.6 (2) pp69-76: 1391-9318.

AVRDC (2006). Vegetables Matter, The World Vegetable Center. Shanhua, Taiwan.

Ayandiji, A.O.R. and Adeniyi, O.D. (2016). Determinant Post Harvest Losses among Tomato Farmers in Imeko-Afon Local Government Area of Ogun State, Nigeria. *Global Journal of Sciences Frontier Research*. Vol.11, No.5:23-27.[http://globaljournals.org/GJSFR_Volume11/5-Determinant-Post-Harvest Losses among-Tomato.pdf] site visited on 15/3/2019.

Bagachwa M.S.D. (2014), Poverty Alleciation in Tanzania, DSM: Dar es Salaam University Press.

Baumol, W. J. and Blinder, A. S. (1991). *Economics: Principles and Policy*, 5th edition. New York: Harcourt Brace Javanovich.

Bonabana-Wabbi, J (2015). Assessing Factors Affecting Adoption of Agricultural Technologies: The Case of Integrated Pest Management (IPM) in Kumi District, Eastern Uganda. Retrieved on 16/03/2019 from http://www.cibtech.org/j life sciencess/publications/

Branson, R., & Norvell, D. G. (1983). *Introduction to Agricultural Marketing.* McGraw-Hill Inc, USA.

Chapoto, A., Haggblade, S., Hichaambwa, M., Kabwe, S., Longabaugh, S., Sitko, N. and Tschirley, D. (2012). Agricultural Transformation in Zambia: Alternative Institutional Models for Accelerating Agricultural Productivity Growth and Commercialization. Retrieved on 10/09/2019 from http://fsg.afre.msu. edu/zambia/ wp64.pdf

Coulibaly, O., Cherry, A.J., Nouhoheflin, T., Aitchedji, C.C. and Hassan, R.A. (2017). Vegetable Producer Perception and Willingness to Pay for Biopesticides. *Journal of Vegetable Sciences* Vol.12 (3): 27-42.

Delgado, P. (1998). Reducing Poverty through agricultural sector strategies in Eastern and Southern Africa. Wageningen: the Netherlands.

Eicher, D. (1994). Impact of Farmer Field Schools on Agricultural Productivity and Poverty in East Africa. *World Development*, 40(2): 402-413.

FAO (2005). Agriculture Production in Indonesia. FAO Publication.

FAO (2006). Agriculture, Biosecurity, Nutrition and Consumer Protection. Retrieved on 12/28/2018 from http:// www.fao.org.telefood.

FAO. (2013). International Year of Tomato. Retrieved on 27/12/2018 from http://www.fao.org/food.

FAO. (2017). International Year of Tomato. Retrieved on 30/012/2018 from http://www.fao.org/tomato.

Godfrey , N., Mwakaje, A. E.G. (2016). Analysis of tomato Marketing in Tanzania: The Case of Rungwe District, Tanzania. *International Journal of Business and Social Sciences, 3* (23): 200-309.

Hanif, R., Iqbal, Z., Iqbal, M., Hanif, S. and Rasheed, M. (2006). Use of Vegetables as Nutritional Food: Role in Human Health. *Journal of Agricultural and Biological Sciences.* Vol.1, No.1, 1990-6145.

Hulme, T. and Shepherd, F. (2003). Poverty: the Past, Present and Future. *Global Journals* vol. 2

IFAD (2015). Operations in Tanzania. Retrieved on 18 January 2019 from: http://www.operations.ifad.org.

Igben, M.S. (2014). The Nigerian farmer and agricultural institutions: An assessment. Ibadan: *Nigerian Institute of Social and Economic Research* (NISER).

Indah, B. W.T. (2014). Tomato production as an Alternative Source of Income: A Case of Bukanga Hamlet in Musoma Municipality. *International Agricultural Journal,* 5 (14): 90-138.

Jazairy, T.,Foster, J., Greer, J., Thorbecke, E. Christiaensen, D.,Luc, T., Demery, M., Lionel. R. (1992). The role of agriculture in poverty reduction in Sub Saharan Africa. Econometrica 52 (4), 761-5.

Kiros, A. (2008) Opportunities and Challenges of Vegetable Marketing in Kilte Awlaelo Woreda, Ethiopia. Mekelle University, Ethiopia.

Kothari, C.R. (2009). *Research Methodology: Methods and Techniques* (2nd Ed). New Delhi: New Age International.

Kumar, A. (2002). *Research Methodology in Social Sciencess.* New Delhi: Sarup and Sons.

Lenis, S. (2012). Farmer Groups, Input Access, and Intra group Dynamics: A Case Study of Targeted Subsidies in East Africa. *African Journal of Agriculture, Food and Environment*. 8(3):1-8.

Li, H. and Danyang Xie, H. (1999). Dynamics of Income Distribution, Development Research Group. Washington: World Bank.

Maerere, A.P., Sibuga, K.P., Mwajombe, K.K., Kovach, J. and Erbaugh, M. (2015). Baseline Survey Report of Tomato Production in Mvomero District-Morogoro Region, Tanzania. Sokoine University of Agriculture Faculty of Agriculture, Morogoro, pp. 1-31. [http:// www.oired. vt.edu/ ipmcrsp/Publications/IPMAnnualMeet2008/Posters/Baseline%20SurveyTomato.pdf]site visited on 15/3/2019.

Makiibi, M.K. (2016). *Uganda Poverty Assessment.* Kampala: Makerere University Press.

Makombe, K., Christiaensen, L., Weerdt, J. and Kanbur, R. Hughes, D., Brown, C., Miller, S. and McConell, C. (2015). Urbanization and Poverty Reduction in Africa. *Journal of Agricultural and Applied Economics* 40(1): 253–265.

Mallongo, P.D. (2017). Employment and Income Opportunities in Tomato Sub Sector in Ilula, Kilolo District, Tanzania. *Food Sciences and Quality Management*, 37(5): 2- 9.

Masinde, A.O.A., Kwambai, K.T. and Wambani, N.H. (2018). Evaluation of Tomato (Lycopersicon esculentum L.) Variety Tolerance to Foliar Diseases at Kenya Agricultural Research Institute Centre Kitale in North West Kenya. [http://www.academicjournals.org/article/article1380100745_Masinde%20et %20al.pdf] site visited on 13/3/2019.

Mende, H. D. (2014). Contribution of Tomato Production to Household Income in Mbeya and Makete Districts, Tanzania. *Journal of Biology, Agriculture and Healthcare,* 4(18): 1-12

Mkurabita (2015). *Goals and Objectives.* Retrieved on 20th February 2019 from: www.mkurabita.go.tz.

Mnenwa, T., Onyebueke, V.E., Eze, I.L., Suryahadi A. and Hadiwidjaja G. (2017). Export Destinations for Vegetables in East Africa. Journal of African Macroeconomic Review, Vol. 4, No. 1, pp. 265 – 282

Molusa, T. (1992). Evaluation Research for Beginners. German Foundation for International Development. Bonn: Elsevier Butterworth-Heinemann Publications.

Mtafitikolo, F.P. (2015). Implications of public policies on poverty alleviatuion. The case of Tanzania. *Journal of Agricultural Economics* 40, 103-128.

Mutayoba and Deus Ngaruko (2018).Assessing tomato production and marketing among smallholders in high potential agricultural areas of Tanzania. *International Journal of Economics, Commerce and Management United Kingdom*, 8 (4): 577 590.

Naika, S., de Jeude, J.L., de Goffau, M., Hilmi, M. and van Dam, B. (2005). Cultivation of Tomato Production. Processing and Marketing. [http:// journey to forever. org/farm_library/AD17.pdf] site visited on 13/3/2019.

NBS (2012). National Census of 2012: Health Services and Mortality Rate in Tanzania. DSM: Government Printer.

NBS (2013). National Cesus of 2012: Malnutrition in Tanzania. Dar es Salaam. Government Printer.

NBS (2017). The United republic of Tanzania: Annual Agriculture Report. DSM Government Printer.

Nouhoheflin, T., Coulibaly, O., Norton, G., Soumare, S. and Sissoko, P. (2017). Impact Assessment of Agricultural Research and Development to Reduce Virus Problems in Tomato Production in Mali: Farmers perceptions. IITA, Biological Control Center for Africa, BP 08-0932 Cotonou, Bénin. [http://ageconsearch.umn.edu/bitstream/52092/2/Nouhoheflin.pdf] site visited on 13/3/2019.

Nyamba, S., Martin, R., Kalungwizi, V., Busindeli, I., Kilima, F., Msuya-Bengesi, C., Chija, B., Mvena, Z., Mlozi, M., Gjotterud, S. and Kiranga, E. (2017). Power Dynamics between Farmers and Market Masters: A Case of Tomato Value Chain in Kilolo District and Dodoma Municipality, Tanzania.

International Journal of Information and Communication Technology Research 6(8): 1- 6.

Ogundari, K. (2008). Resource Productivity Allocative Efficiency and Determinants of Technical Efficiency of Rain-fed rice Farmers: A guide for food security policy in Nigeria. *Journal for Sustainable Development in Agriculture and Environment* Vol. 3 (2). 20-33.

Okurut, F. N., Banga, M. and Mukungu, A. (2004). Micro Finance and Poverty Reduction in Africa. *Journal of Social Sciences* Vol 17 (1): 59-62.

Opara, U.N. (2010). Personal and Socio-Economic Determinants of Agricultural Information Use by Farmers in the Agricultural Development Programme (ADP) Zones of Imo State, Nigeria. Retrieved on27/02/2019 from [http://unllib.unl.edu/ LPP/

Ozor, N and Cynthia, N. (2010). Difficulties in adaptation to climate change by farmers in Enugu State, Nigeria. *Journal of Agricultural Extension*; Vol. 14(2): 106- 122.

Prince, T. (2005). *Research Methods in Sociology*. New York: New York Philosophical Library.

Rahko, J. (2012). *Tomato Value Chain in Tanzania.* University of Helsinki, 23(5): 100-267

Ravallion, Y. and Datt, C. (2014).The Role of Agriculture in Economic Development and poverty Reduction: an Empirical and Conceptual Foundation. *American Journal of Agricultural Economics* 72(6): 1146-50.

RGZ (2001). Zanzibar Poverty Reduction Plan 2002-2006. Retrieved on 7th January 2019 from Worldwide Web: tzonline.org.

RGZ (2007). Zanzibar Growth Strategy. Retrieved on 16 January 2019 from: http://www.zanzibaremploymentservices.go.tz.

RGZ (2010). Zanzibar Strategy for Growth and Reduction of Poverty. Zanzibar: Government Printer.

Rwegoshora H, M.M. (2006). *A guide to social sciences research.* Dar es Salaam: Mkuki na Nyota publishers.

Sabo E. and Dia, Y. Z. (2009) Awareness and effectiveness of vegetable technology information packages by vegetable farmers in Adamawa State, Nigeria. *African Journal of Agricultural Research* Vol. 4 (2), pp. 065-070.

Sanga, T. and Hella, K., (2015). Agriculture in Uganda. *Journal of Development and Agricultural Economics*,1(2):49-54.

Saunders, J.M. (2003). *Research Methods for Business students*. New York: Oxford University Press.

Schiller, B. (1972). *The Economics of Poverty and Discrimination.* 1st ed. New Jersey: Prentice-Halle

Sere, P.T. (2018). Can Small-scale Tomato Farmers Flourish in Kilimanjaro Region, Tanzania? *Journal of Agricultural Sciences* vol. 2 (2): 77-82.

Swai, J. (2016). Indigenous vegetable of Tanzania: Significant Prospects Technical Bulletin No 31, Shanhua: AVRDC. The World Vegetable Center.

TAS (2015). Economic Growth, Sectoral Linkages and Poverty Reduction In Tanzania. *Journal of Development Economics* 5(17), 56-72.

TASAF (2015). TASAF Components. Retrieved on 3rd March 2019 from http://www.tasaf.org.

Tochuwu, O.M. (2012). "The Impact of Agricultural Development on Nigeria Economic Growth (1980 – 2010). A B.Sc. project submitted to the Department of Economics, Caritas University, Enugu, Nigeria

Tshiala, M.F. and Olwoch, J.M. (2010). Impact of climate variability on tomato production in Limpopo Province, South Africa. *African Journal of Agricultural Research* Vol. 5(21).

UN (1988). Statement of Commitment for Action to Eradicate Poverty Adopted By Administrative Committee on Coordination. Retrieved on 4th January 2019 from WorldWideWeb:https://www.un.org/press/en/1998/19980520.eco5759.html

UNDP (1994). Household Poverty in Rural Africa. Washington, DC: UNDP

UNICEF (2015). Social Protection in Tanzania: Establishing a National system Through Consolidation, Coordination and Reform of Existing Measures. Retrieved on 6th February 2019 from: http:/www.unicef.org.

United Republic of Tanzania (2003). The Agriculture Sector Development Programme (ASDP) of 2003. Dar es Salaam. Government Printer.

United Republic of Tanzania, African Union and New Partnership for Africa's Development (2015). Creating an Enabling Agricultural Policy Environment. Retrieved on 9th February 2019 from: http://www.kilimo.go.tz.

URT (1995) National Report for World Summit for Social Development. The United Republic of Tanzania. Copenhagen, Denmark 6-12 March, 2019.

URT (1997). Agricultural and Development Policy of 1997. DSM: Government Printer.

URT (1998). The National Poverty Eradication Strategy. The United Republic of Tanzania, Vice-President's Office. January 2019. Dar-es-Salaam

URT (2003. National Health Policy of 2003. DSM: Government Printer

URT (2006). Water Sector Development Programme (2005-2025). DSM: Government Printer.

URT (2009) Iringa Tomato Value Chain Analysis for Local (National) Market and Value Chain Development Investment Plan. Small Industries Development Organization. Ministry of Industries, Trade and Marketing and International Fund for Agricultural Development. Dar es Salaam. Tanzania.

URT (2010). National Strategy for Growth and Reduction of Poverty II. Dar Es Salaam: Government Printer.

URT (2013). National Agricultural Policy. DSM: Government Printer.

URT (2013). National Health Policy of 2007. Dar Es Salaam: Government Printer.

URT (2014). Tanzania Human Development Report 2014. UNDP, URT and ESRF. Dar es Salaam: Government Printer

URT (2015). Poverty Alleviation Policies in Tanzania: Progress and Challenges. Dar es Salaam: Government Printer.

URT (2016). National Census of Agriculture, Kilimanjaro Regional. DSM: Government Printer.

URT (2017). 2016/17 Annual Agriculture Sample Survey Initial Report. DSM: Government Printer

URT (2018). Annual Agriculture Sample Survey Initial Report (2016/2018). DSM: Government Printer

URT (2011). National Processes, Reforms and Programmes Implementation Kukupa II: Budget Document. Retrieved on 15th January 2019 from: http://www.mof.go.tz.

USAID (2018) Agriculture: Africa's Engine for Growth. Washington, DC: USAID.

Wachira, V. (2012). Credit Financing of Small and Medium Scale Enterprises. Retrieved on 24/03/2019 from [http://www.ebay.com/ctg

Warr, P. (2001). Poverty reduction and sectoral growth, results from South East Asia. Australia National University: Canberra, Australia.

World Bank (2000). World Development Report. New York and Washington: Oxford University Press and World Bank.

World Bank (2016). Tanzania Mainland Poverty Assessment. New York: Oxford University Press

World Bank (2019).Tanzania's Growth through Policy Analysis, Gants, and Credits, with a Focus on Infrastructure and the Private Sector. Washington, DC: World Bank.

Yamane, T. (1967). Statistics, an Introductory Analysis, 2nd Ed., New York: Harper and Row.

Yin, R. (2011). Qualitative Research from Start to Finish. New York: Guilford Press.

ZAWA (2015). Zanzibar Water Authority. Retrieved on 15th January 2019 from: http:/www.zawa.go.tz.

APPENDICES

Appendix I

QUESTIONNAIRE FOR TOMATO FARMERS

I am a student at Mzumbe University pursuing degree of the Master of Sciences in Economic Policy and Planning from Mzumbe University. I am doing a research study as a compulsory part of my programme. The purpose of the research is to examine the relationship between tomato production and households' poverty reduction in Hai District, Tanzania. Thus, I would be very grateful if you would spare some few minutes to fill in this questionnaire. The information that you provide will be treated confidential for academic purpose only and your identity will not be exposed.

A. Respondents' Characteristics

*Please tick the appropriate answer

	Age	
b.	18-30 years	( )
c.	31-40 years	( )
d.	41-50 years	( )
e.	51-60 years	( )
1.	Sex	
a.	Male	( )
b.	Female	( )
2.	Level of Education	
a.	Primary Education	( )
b.	Secondary education	( )
c.	Diploma	( )
d.	Bachelor's degree	( )
e.	Master's degree	( )
f.	Any other (specify) …….	

B.Contribution of Tomato Production level on Poverty Reduction

5. What was your tomato production level in 2018?

Annual Tomato Production / ton (s)	Tick where appropriate	
1 ton		
2 tons		
3 tons		
4 tons		
5 tons above		

C. Contribution of Household Income from Tomato on Poverty Reduction

6. What was the income you generated in the year 2018 from tomato?

……..

7. What is the annual income you generate from tomato production and other sources of your income?

…….

D. Contribution of Household Expenditures from Tomato Income on Poverty Reduction

7**.** Indicate whether you use income from tomato for your expenditure on school fee, health care, farm activities and electricity and water bills. Tick where appropriate

I have been spending income generated from tomato production for pay social services bills/ charges (school fees, health care, water and electricity)	Responses	
	Yes	No

8. Contribution of Household Assets from Tomato Income on Poverty Reduction

8.Indicate whether you use income from tomato for purchasing household assets school fee,

I have been spending income generated from tomato production for purchasing assets(houses, car, motorcycle, electronic equipment and bicycle)	Tick where appropriate	
	Yes	No

Source: Field Data (2019)

C. The Challenges Facing Tomato Production

9. What are the challenges facing tomato production in Hai District?

Challenges	Tick where appropriate
Limited input supply	
Pests and diseases	
Weak extension support	
Lack of credit facilities	

Thanks for your Cooperation

Appendix II

INTERVIEW GUIDE FOR WARD AGRICULTURAL EXTENSION OFFICERS (WAEOS) AND WARD EXECUTIVE OFFICERS (WEO)

1. How old are you?
2. What is the level of your education?
3. What is your position?
4. How long have you worked in the same position?
5. What kind of assistance do you provide to tomato farmers for raise their tomato production
6. How many hectare of land used for tomato production in 2018?
7. How much household annual income generated from tomato production and other sources?
8. What are household major expenditure incurred from tomato income
9. What are the challenges facing tomato production?

Appendix III

INTERVIEW GUIDE FOR DISTRICT AGRICULTURAL EXTENSION OFFICERS (DAEOS)

1. How old are you?
2. What is the level of your education?
3. What is your position?
4. How long have you worked in the same position?
5. What kind of assistance do you provide to tomato farmers for raise their production level and income?
6. How many hectare of land used for tomato production in 2018?
7. How much household annual income generated from tomato production and other sources?
8. What are household major expenditure incurred from tomato income
9. What are the challenges facing tomato production?

Appendix IV

SPSS Output

(i)Nonparametric Correlations

Notes

Output Created		02-NOV-2019 16:23:01
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	229
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=Tomato Income Social Services /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01
	Number of Cases Allowed	174762 cases[a]

a. Based on availability of workspace memory

Correlations

			Poverty reduction	Household expenditure from tomato income
Spearman's rho	Poverty reduction	Correlation Coefficient	1.000	.147*
		Sig. (2-tailed)	.	.026
		N	229	229
	Household expenditure from tomato income	Correlation Coefficient	.147*	1.000
		Sig. (2-tailed)	.026	.
		N	229	229

*. Correlation is significant at the 0.05 level (2-tailed).

Notes

Output Created		02-NOV-2019 16:44:19
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	229
	Definition of Missing	User-defined missing values are treated as missing.
Missing Value Handling	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=Tomato Income ASSETs /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00
	Number of Cases Allowed	174762 cases[a]

a. Based on availability of workspace memory

NONPAR CORR
/VARIABLES= Poverty reduction Household asset from tomato income
/PRINT=SPEARMAN TWOTAIL SIG
/MISSING=PAIRWISE.

Notes

Output Created		02-NOV-2019 16:46:57
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	229
	Definition of Missing	User-defined missing values are treated as missing.
Missing Value Handling	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=TomatoIncome ASSETs /PRINT=SPEARMAN TWOTAIL SIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01
	Number of Cases Allowed	174762 cases[a]

a. Based on availability of workspace memory

[DataSet0]

```
NONPAR CORR
  /VARIABLES= Poverty reduction Household assets purchased from tomato income
  /PRINT=SPEARMAN TWOTAIL SIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Notes

Output Created		02-NOV-2019 16:58:11
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	229
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=Tomato Income ASSETs /PRINT=SPEARMAN TWOTAIL SIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.00
	Number of Cases Allowed	174762 cases[a]

a. Based on availability of workspace memory

[DataSet0]

Correlations

			Tomato Income	ASSETs
Spearman's rho	Tomato Income	Correlation Coefficient	1.000	.062
		Sig. (2-tailed)	.	.348
		N	229	229
	ASSETs	Correlation Coefficient	.062	1.000
		Sig. (2-tailed)	.348	.
		N	229	229

```
NONPAR CORR
  /VARIABLES=Poverty Reduction Tomato Production Level
  /PRINT=SPEARMAN TWOTAIL SIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Notes

Output Created		02-NOV-2019 17:08:06
Comments		
Input	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	229
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=Tomato Income Tomato Production /PRINT=SPEARMAN TWOTAIL SIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01
	Number of Cases Allowed	174762 cases[a]

a. Based on availability of workspace memory

[DataSet0]

Correlations

			Poverty Reduction	Tomato Production
Spearman's rho	Poverty reduction	Correlation Coefficient	1.000	.972
		Sig. (2-tailed)	.	.000
		N	229	229
	Tomato production level	Correlation Coefficient	.972	1.000
		Sig. (2-tailed)	.000	.
		N	229	229

NONPAR CORR
/VARIABLES=Poverty reduction Household expenditure from tomato income Household assets from tomato income
/PRINT=SPEARMAN TWOTAIL NOSIG
/MISSING=PAIRWISE.

Nonparametric Correlations

Notes

Output Created		04-NOV-2019 11:56:39
Comments		
Input	Data	D:\RESEARCH REPORTS1\Martha\SPSS OUTPUT.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	229
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=Tomato Income Social Services ASSETs /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02
	Number of Cases Allowed	142987 cases[a]

a. Based on availability of workspace memory

[DataSet1] D:\RESEARCH REPORTS1\Martha\SPSS OUTPUT.sav

Correlations

			Poverty Reduction	Household expenditure from tomato income	Household Asset from tomato income
Spearman's rho	Poverty reduction	Correlation Coefficient	1.000	.147*	.062
		Sig. (2-tailed)	.	.026	.348
		N	229	229	229
	Household expenditure from tomato income	Correlation Coefficient	.147*	1.000	.079
		Sig. (2-tailed)	.026	.	.235
		N	229	229	229
	Household expenditure from tomato income	Correlation Coefficient	.062	.079	1.000
		Sig. (2-tailed)	.348	.235	.
		N	229	229	229

*. Correlation is significant at the 0.05 level (2-tailed).

(ii) Multiple regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.990[a]	.981	.980	.15785	2.390

a. Predictors: (Constant), tomato production, family business, livestock keeping, wages, remittances

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	122.232	4	30.558	1226.481	.000[a]
	Residual	2.367	95	.025		
	Total	124.599	99			

a. Predictors: (Constant), tomato production, wages, livestock keeping, remittances and family business

b. Dependent Variable: household annual income

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.052	.037		1.399	.040		
	Family business	1.233	.188	1.264	6.568	.000	.552	1.812
	Remittances	.182	.228	.185	.640	.024	.552	1.812
	Tomato production	1.758	.174	1.784	10.076	.000	.552	1.812
	Livestock keeping	.514	.163	.548	3.159	.002	.552	1.812
	Wage	.321	.195	.357	.862	.029	.552	1.812

a. Dependent Variable: household annual income

NONPAR CORR

/VARIABLES= Household expenditure from other sources of income Poverty Reduction

/PRINT=SPEARMAN TWOTAIL NOSIG

/MISSING=PAIRWISE.

[DataSet1] D:\RESEARCH REPORTS1\Martha\SPSS OUTPUT.sav

Nonparametric Correlations

Notes

Output Created		26-NOV-2019 02:37:16
Comments		
Input	Data	D:\RESEARCH REPORTS1\Martha\SPSS OUTPUT.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	229
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=Othersources SocialServices /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01
	Number of Cases Allowed	174762 cases[a]

a. Based on availability of workspace memory

Correlations

			Household expenditure from other sources of income	Poverty Reduction
Spearman's rho	Household expenditure from other sources of income	Correlation Coefficient	1.000	.024
		Sig. (2-tailed)	.	.717
		N	229	229
	Poverty Reduction	Correlation Coefficient	.024	1.000
		Sig. (2-tailed)	.717	.
		N	229	229

Nonparametric Correlations

Notes

Output Created		26-NOV-2019 02:40:15
Comments		
Input	Data	D:\RESEARCH REPORTS1\Martha\SPSS OUTPUT.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	229
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		NONPAR CORR /VARIABLES=Othersources SocialServices /PRINT=SPEARMAN TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01
	Number of Cases Allowed	174762 cases[a]

a. Based on availability of workspace memory

[DataSet1] D:\RESEARCH REPORTS1\Martha\SPSS OUTPUT.sav

NONPAR CORR

/VARIABLES=Household expenditure from other sources of income Poverty reduction

/PRINT=SPEARMAN TWOTAIL NOSIG

/MISSING=PAIRWISE.

Correlations

			Household expenditure from other sources of income	Poverty Reduction
Spearman's rho	Household expenditure from other sources of income	Correlation Coefficient	1.000	.024
		Sig. (2-tailed)	.	.717
		N	229	229
	Poverty Reduction	Correlation Coefficient	.024	1.000
		Sig. (2-tailed)	.717	.
		N	229	229