

ASSESSMENT ON FARMERS ADAPTATION STRATEGIES OF CLIMATE CHANGE TOWARDS MAIZE PRODUCTION IN MWANGA DISTRICT- KILIMANJARO, TANZANIA

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ABSTRACT: This study aimed at assessing farmers adaptation strategies to climate change in Mwanga District. Specifically, attention I devote to examine farmers awareness and perception towards climate change; adaptation measures used and their influence on maize crop yield as well as factors which influence adoption of those strategies. The data was collected through interview to Agricultural Officer and Ward executive officer, household surveys and Observation method a questionnaire, it was administered to a sample of 100 farming households in selected wards in Mwanga District. Data was analyzed by using SPSS style by considering all result confirmed from respondents. Data obtained were presented by using different figures, charts and tables. Data obtained from the field was associated with different finding related to the study. To the large extent the obtained information from the study meet the research questions given to the respondents. The impacts of climate change towards crops productions are poor yields and harvest and reduce access to food. The farmers used different adaptations strategies like crops as well as crop rotations and irrigation to cope with climate change. Furthermore, majority of the respondents in the study area have medium understanding about the climate change which

result difficulty for them to encounter the challenges occur due to the climate change. When the farmers have enough knowledge and understanding about the climate change enable them to choose the best adaptations strategic towards climate change in their area.

BACKGROUND

1.1 Introduction

This chapter was comprised with different section, the first section was Background of the problem, statement of the research problem, objectives, research questions, significant of the study, delimitation of the study, definitions operations as well as conceptual framework.

1.2 Background of the Research Problem

Climate change is widely agreed to be already a reality and its adverse impacts in the vulnerability of poor communities are superimposed on existing vulnerability. Arctic, Africa, Small Iceland and Asian and Australia are regions that are likely to be affected by future climatic change because of multiple existing stresses and low adaptive capacity (Chineke, 2018). Changes in Earth's climate have different effects in different areas of the world. Some places were warmed more than others; some regions were received more rainfall while others are exposed to more frequent droughts.

Some countries including Tanzania are more affected by climatic change and farmers try to use different alternatives so as to maintain maize production like before changes. Tanzania just like any other part of the world was impacted by climate change. She regularly suffers from various climate-related hazards, including droughts that have substantial effects on economic performance. Increase in the frequency of droughts and floods are projected to affect local production negatively especially in the subsistence sector. Also, the agricultural and environmental sectors including natural resources such as forests and vast arable lands constitute the economic backbone of many countries in Africa. These sectors provide employment opportunities for majority of the rural population and are the main drivers of economic growth throughout the continent (Manda et al., 2017).

The Kilimanjaro region of Northern Tanzania has experienced significant changes in climate especially in temperature and rainfall variability in recent decades. The most easily recognizable evidence for a steady change in regional climatic conditions on Mount Kilimanjaro, directly influencing landscape characteristics; are the vanishing glaciers. Projections show that the majority of the glaciers on Mount Kilimanjaro could vanish in the next 15 years if the recession of the icecap continues.

In Mwanga District which was found in Kilimanjaro Region was currently suffered from weather problem due to variability in the elements of weather particularly rainfall and temperature. Also, according to Ados (2017) postulated that climate change brought more impact on the natural environment resulting in flooding and dry spells which resulting in droughts.

1.3 Statements of the Research Problem

Tanzania economy is likely to be more vulnerable to climate change adverse impact due to its dependency on climate change, sensitive activity Agriculture According to (BOT 2008) the contribution of Agriculture to the Gross Domestic Product (GDP) has been decreasing in some regions. This is due to fact that Agricultural practice in Tanzania of mainly depend on the seasonal rainfall which is significantly varying from season to season the performance of Agriculture sector which has historically been the backbone of Tanzania's economy, is also projected to drop as result of negative effects of ongoing global climate change , also majority of the maize farmers were male, with a mean age and household size of 44 years respectively (Oyawole et al,2020).

Recently Kilimanjaro Region has been affected much with climate change compare with the past time specifically in temperature and rainfall. Improved understanding of the influence of climate on crop production is needed to cope with expected changes in temperature and precipitation. Adaptation has the potential to significantly contribute to negative impacts from changes in climatic condition as well as others changing socio, economic conditions. Agriculture practice in Tanzania mainly depends on the seasonally rainfall on which are dramatically decreasing seasons to

seasons. The Adverse impacts of climate change in agriculture sectors include reduced maize yield due to drought and floods and reduced water availability.

Due to the seasonal variation of rainfall, temperature increase, reduced water availability, it being some impacts among the farmers in Mwanga District, Kilimanjaro - Tanzania. Recently Kilimanjaro Region has been affected much with climate change compare with the past time specifically in temperature and rainfall. Improved understanding of the influence of climate on maize production is needed to cope with expected changes in temperature and precipitation. Due to variation of rainfall, temperature was increased and decreased, also low volume of water it may led to shortage of food among the farmers in Mwanga District, Kilimanjaro as well as increase hunger among the farmers. Therefore, this study was assessed different farmers' adaptation strategies towards climate change in increasing maize production in Mwanga District Kilimanjaro, Tanzania.

1.4 Research Objectives

1.4.1 General Objective

The main objective of this study was to determine how farmers successes to adapt climate changes on maize production in Mwanga District, Kilimanjaro - Tanzania.

1.4.2 Specific objectives

1. To examine farmer's awareness towards climate change and adaptation measures in Mwanga District, Kilimanjaro - Tanzania.
 1. To what extent maize production affected with climate change.
 2. To identify and examine adaptation strategies used by farmers to cope with climate change in Mwanga District, Kilimanjaro.
 3. To analyse the challenges of adaptation strategies on maize production in Mwanga District, Kilimanjaro.

1.5 Research Questions

1. To what extent farmers aware to climate change and adaptation measures in Mwanga District.
2. What are the impact of climate change towards maize production.

3. What are the strategies used by farmers to cope with climate change in Mwanga District, Kilimanjaro - Tanzania.
4. What are the challenges of adaptation strategies on maize or crop yield in Mwanga District Kilimanjaro Tanzania.

1.6 Significance of the Study

1. This study was said to be important in the Kilimanjaro region (Mwanga District) as the change of climate can create awareness to the people especially farmers to cope with others methods and strategies on crop production.
2. Through this study helped the community, to know what the strategies are should be taken concern climate change.
3. Through this study also important as it can be posed recommendation in order to improve the system of crop production towards the climate change.

1.7 Scope of the Study

The study aims to narrow the scope of the study. This study was carried out at Kilimanjaro Region specifically in Mwanga District to Investigate on farmer's Adaptation strategies of climatic change towards crop production. This study was involved different farmers, WEO, (ward executive officer) and Agricultural officer.

1.8 Conceptual Framework

The conceptual framework shows farmers adaptation process. Adaptation to climate changed was needed only if there are undesirable impacts experienced or predicted climate change risks. The consequences of changing climatic conditions were determined to a considerable extent by the nature of the economic, social and technological domain in which those impacts occur. For example, the extent to which the principles of sustainable development are implemented within the policy framework was affect the choice of adaptation options open to the decision-maker. In the case of these socio-economic scenarios, a society with a vibrant economy may be resilient to climate change because resources were be available to respond to the impacts. Therefore, the adaptation process starts with first farmers being aware of climate change impacts, such as drought, floods and diseases. The possible causes of

these impacts are changes in precipitation and temperature patterns thus perception on climate change. Government policies and institutions; private firms and Non-Governmental Organizations as well as socio-economic, geographical and technological factors together shape farmers' perception towards climate change. Farmers' perceptions along with these factors lead to choice or formulation of coping strategies that help them overcome the impacts and build resilience to climate change. Depending on farmers' knowledge and experience which are important elements of perception; selected strategies may be either changing of their current practices or shift to other income generating activities, rather than agriculture. It is the government policies, institutional, socio-economic, geographical and technological factors which determine adoption of those strategies. This is to say a farmer adopts only practices which are within the existing technologies, applicable to their environment and affordable to them; and which are supported by government policies.

The Conceptual Framework on the climate change impacts on Agriculture and adaptation Measures.

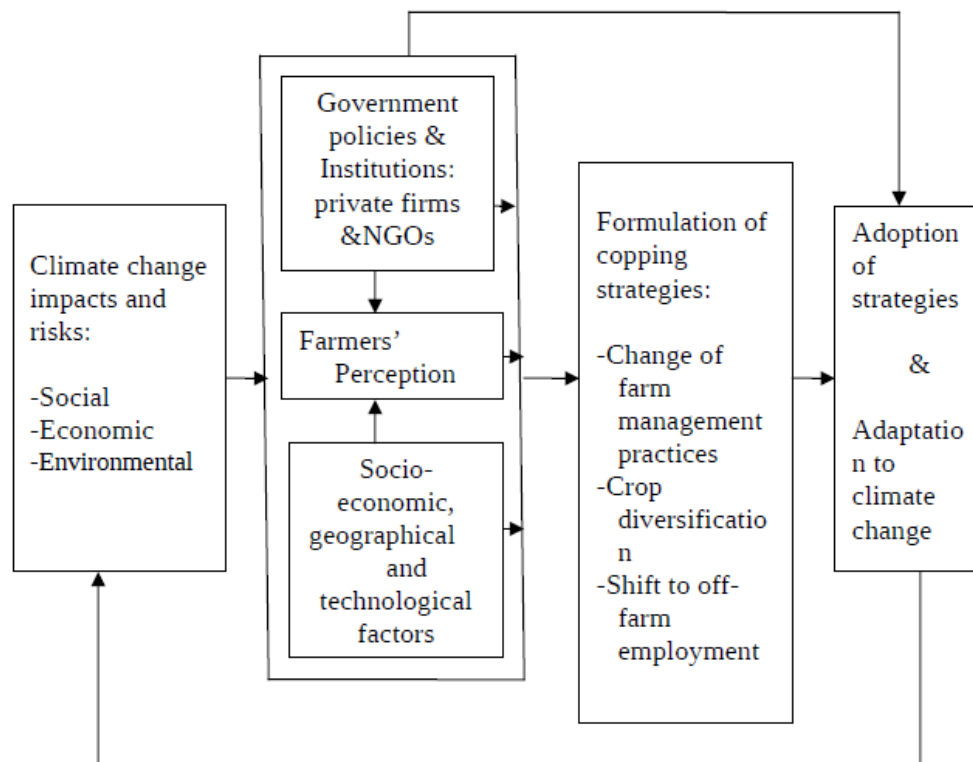


Figure 1.1 Conceptual Framework

Source: Modified from REMA(2011).

LITERATURE REVIEW

2.1 Introduction

This Chapter reviewed the available literature relevant to the study that help to get more insights of documented and already published work that was provide foundation knowledge and concepts concerning to the assessment of farmers adaptation of climate change towards crop production.

2.2 Definition of Key Concepts

2.2.1 Climate change; is the global phenomenon of climate transformation characterized by the changes in the usual climate of the planet (regarding temperature, precipitation, and wind) that are especially caused by human activities. As result of unbalancing the weather of Earth, the sustainability of the planet's ecosystems is under threat as well as future of humankind and the stability of the global economy.

2.2.2 Crop production; Includes all the feed sources that are required to maintain the daily herd and the resources input used to produce the crops (Ados 2017).

2.2.3 Vulnerability; According to Chineke, 2018 Is the in ability to resist a hazard or respond when a disaster has occurred. Adjustment in natural or human systems in response to actual or expected climatic stimuli, or their effects which moderates harm or exploits beneficial opportunities.

2.2.5 Adaptive capacity; Ability of a system to adjust to climate change and extreme to moderate potential damages to take advantages of opportunities or to cope with consequences (Kaffrine 2018).

2.3 Theoretical Review

2.3.1 Anthropogenic Global Warming

Anthropogenic Global Warming was the first theory of climate change contends that human emissions of greenhouse gases, principally carbon dioxide, methane, and nitrous oxide, are causing a catastrophic rise in global temperatures. The mechanism whereby this happens is called the enhanced greenhouse effect.

Earth's climate also responds to several other types of external influences, such as variation in solar radiation and in the planets orbit, but these forcing, according to the proponents of Anthropogenic Global Warming cannot explain the rise in Earth's temperature over the past three decades. The forcing caused directly by man-made greenhouse gases is also small, but the theory posits that positive feedbacks increase the effects of these gases between two- and four-fold.

2.3.2 Assumption of the Theory

The proponents of the Anthropogenic Global warming theory believe Human activities is responsible more, for causes of climate change like flood, drought, severe weather, crop failures, species extinction due to its daily activities that influence more the climate change like Industry operations, Agriculture and others more similar to that.

2.3.3 Strength of the Theory

The theory explained clearly on the mechanisms, effects and, causes of climate change, the theory based much on what are the influence and its mechanism that influence climate change, and explain much that different human activities have the great influence on the climate change.

2.3.4 Weakness of the Theory

1. The theory explains only the causes of global warming and mechanism, and effects, but failed to explain the adaptation measures, to be taken when all the effects occurred
2. The theory based much on the human activities that have the great influence on the causes of climate change.

2.3.5 Theory Relevance to Study

The theory is relevant to my study in the context, that as my study based much on the assessment of farmers adaptation to climate change and the theory was explained much specifically to my specific objective that enhance me to reach to my general

objective, as the theory explain on the mechanism, causes, and the effect of climate change.

2.6 Empirical Review

2.6.1 Farmers Awareness to Climate Change and its Adaptation Measures to Maize Production

According to the Kaffrine (2018) explain that, Climate change is a global critical issue that threatens the livelihood of most farmers, particularly in the developing countries. This study investigates farmer's awareness and adaptation to climate change in Senegal. The study involved a cross-sectional survey of 204 farmer household heads, selected from nine communities through a multi-stage sampling technique.

The study explains much on the farmers awareness and adaptation measure but the theories does not show the challenges that the farmers face during their coping time, but also the research show the different coping method like crop rotation, diversification but did not specify which kind of crops in needed to a given method.

According to Elia (2017), study investigated the farmers awareness and knowledge of climate change and variability farmers in Tanzania. The study applied a qualitative approach in data collection and analysis. It used interviews and focus group discussions as data collection methods. The study population comprised of farmers. The qualitative data was subjected to content analysis. Key findings show that farmers are aware of climate change and variability and have coping and adaptation knowledge.

2.5.2 Adaptation Strategies used by Farmers to cope with the Climate Change

Akinnagble & Irohible (2014), Argue that on the adaptation strategies that are used by difference farmers is due to each effect of climate change so farmers adapt the climate change according to the effects. Climate change is expected to intensify existing problems and create new combinations of risks, particularly in Africa. The situation is made worst due to factor such as widespread poverty, over dependence on rain fed agriculture, inequitable land distribution, limited access to capital and

technology, inadequate public infrastructure, such as roads, long term weather forecasts and inadequate research and extension.

Adelina (2018), Explain also different coping methods that are used by different farmers as Results confirm that farmers are quite aware of climate change and adaptation options. Seasonal drought, temperature change and outbreak of diseases in plant and animals were the most perceived consequences of climate change.

2.6.3 Influence of Adaptation Strategies to Crop yield

According to (Diallo et al 2020), on the case of influence of adaptation strategies to crop yield, in southern Mali, as investigate much on what are the influence of adaptation strategies to crop yield and investigate that. The use of organic fertilizers and short-duration maize varieties promote maize productivity and food security. We conclude that building farmers adaptive capacity tends to reduce their vulnerability to climate change by increasing crop yields and food security.

2.6.4 Challenges those Farmers face during the Adaptation Strategies

It is not easy when the farmers coping with the climate change towards the crop production different authors explain different challenges that farmers are facing during the coping with climate change, according to Anselm (2019) try to explain different challenges that farmers are faces during the coping time with the environmental, the farmers are slow in changing their farming practices such as bush burning, deforestation and rain-fed agriculture and they lack the requisite education, information and training necessary to adapt to climate change. It is recommended that the government should not only decentralize its programs on poverty/HIV-AIDS and agricultural research (funding and activities), but should make them participatory.

2.6.5 Climate Change and Food Security

An overview of food security in Tanzania According to the 2012 Comprehensive Food Security and Vulnerability Analysis (CFSVA), overall, the Tanzania's food security situation appears to be improving over the years. However, Comprehensive Food Security and Vulnerability Analysis reported that rural households are more

exposed to food insecurity than urban households; food shortages more commonly reported by households situated in drought-prone bimodal rainfall zone (north and west); and that the more farming households depend on their own produce, the greater their vulnerability to food insecurity.

RESEARCH METHODOLOGY

3.1 Introduction

This chapter described the research design, description of the study area, population and sampling, data collection procedures, data analysis procedure, and ethic consideration.

3.2 Research Design

The research design that used in this study is a survey research design to collect analyze and measure variables of the research question. The design involves actual field visit and practical data collection, as the data are real and first handed. There is direct orientation between the respondents and the study processes, as the people of Mwanga District was answering questions through the questionnaires and the answers are in quantitative and qualitative manner

3.3 Geographical Description

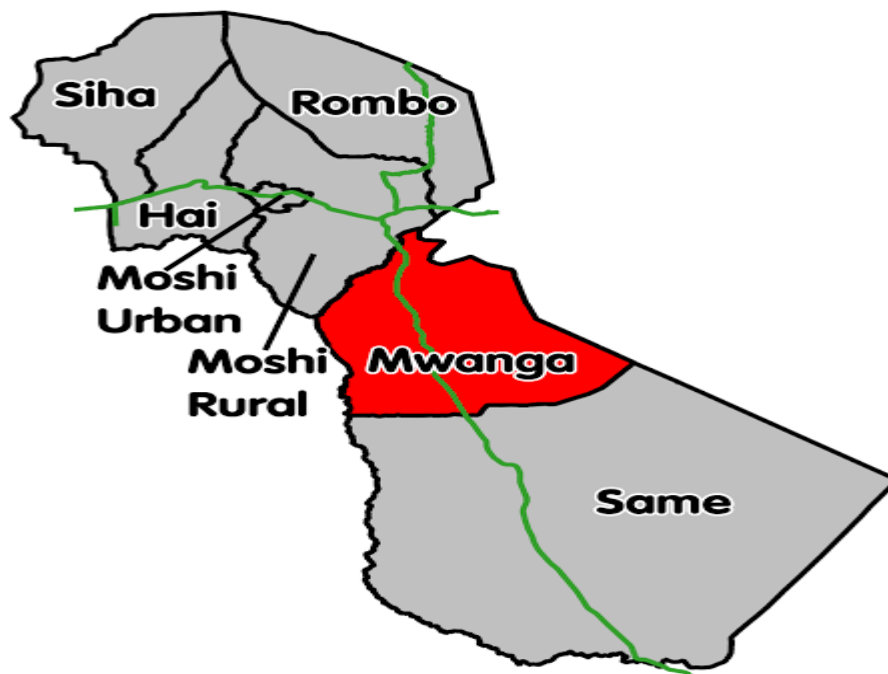
Mwanga District is one of the seven districts of the Kilimanjaro Region of Tanzania. It is bordered to the northeast by Kenya, to the northwest by the Moshi Rural District, to the southwest by the Manyara Region, and to the south by the Same District. Its administrative seat is the town of Mwanga.

Study conducted in Mwanga District (37°25'-37°58' E; 3°25'-3°55' S) in Kilimanjaro region Tanzania. It is one of seven districts in the region. The district covers an area of 2641 km². Land area is 2,558.6 km² and water covers an area of 82.4 km² of Nyumba ya Mungu Dam and Lake Jipe. The district is characterized by lowlands in the east and west that lie between 550-700 meters above sea and complex agroforestry systems. It experiences 400-600 mm of rainfall per annum in the lowland and between 800-1250 mm in the highlands. There are two distinctive rain

seasons, short rainfall from October-December and Long rainfall from March-June. The highlands enjoy both the short and long rain seasons. The district experiences some strong and dry winds blowing normally from the East to the West. Temperatures range between an average of 14°C during June-July and 32°C usually in January. Land is covered by shrubs of acacia species in both eastern and western lowland and forest around the mountain.

Figure 3.1: Shows Map of the Study Area

MWANGA DISTRICT MAP



Source: Modified and Adapted from Google (2025)

3.4 Ethnicity and Economic Activities of the Study Area

The largest ethnic group at Mwanga District was Pare tribe followed by the Sambaa, and Zigua tribes. The Swahili is the major language at Mwanga District then followed by Tribe's languages. In this area people deals with small scale agriculture especially maize production due to rainfall variations, fishing and electricity generating around Nyumba ya Mungu dam and trading activities.

3.5 Population and Sampling

Sample is a number of individual or things selected from a population to present the other. A sample in this study is selecting depending on the characteristics required of the population. In this study simple random sampling and purposive sampling was used for selecting sample in the study, was used so as to avoid the issue of bias. According to Kothari (2016), the use of purposive sampling is entirely aiming at getting reliable information from the selected sample.

3.5.1 Sample Size

This study involved some villages from the study area, whereby based on village households, randomly section was used to present others. According to Creswell (2014), 5% of households are enough to be chosen so as to represent 10% of the total population

3.5.2 Sampling Procedures

Sampling is the process of selecting a smaller group of participants to tell us essentially what a larger population might tell us if we asked every member of the larger population the same question. Or is the process of selecting a given number of people from a population (Gricken, 2003). This study both probability and non-probability sampling used so as to get accurate data and information about the research problem. Purposive sampling was also selected to provide information about the study problem.

3.5.3 Description of Data Collection Methods and Data Sources.

- a) Primary data.
- b) Secondary data.

Primary Data

According to Kothari (2004), primary data are those collected for the first time and origin in quality. Primary data was collected from household by preparing questionnaire, interviews and observation.

Secondary Data

Are data that are gathered from various books, journals, research publications and unpublished materials, also from office written documents concerning the research problem (Kthari,2004).

This study used the observation and questionnaire and documentary method so as to be able to gather more information about the research problem from the rural community. Both primary and secondary data have been used.

3.5.4 Sample size of the Population

The sample is used to generalization about the entire population as long as it was truly representative of the population. The sample size of the study comprised three village which are Kileo, Kivulini and Mbaleni in Kileo ward Mwanga district in Kilimanjaro Tanzania. Sample size was obtained through the use of the following formula.

$$n = \frac{N}{1+N(e)^2} n = \frac{N}{1+N(e)^2}$$

Whereby;

S= is sample size

N= is the total number of population study

e= is the level of precision

Number of respondents

Kileo =5612

Kivulini= 4716

Mbaleni = 3317

Total number of respondents = 13645.

Therefore;

S=

$$S = 13645/1 + 13745 (0.01) = 99.63$$

Kileo = 5612

$$5612 \times 99.63 / 13645 = 40.9$$

Kivulini = 4716

$$4716 \times 99.63 / 13645 = 34.43$$

Mbaleni = 3317

$$3317 \times 99.63 / 13645 = 24.7$$

Table 3.1: Showing summary of the selected sample size

Types of respondents	Sample size	Techniques for selecting
Kileo village	41	Simple random sampling
Kivulini village	34	Simple random sampling
Mbaleni village	25	Simple random sampling
Total	100	

Source: Researcher (2025)

3.6 Data Collection Methods

3.6.1 Questionnaire Method

According to Yuksel Ekincl (2018) Questionnaires are set of questions with completed subject with close ended questions and open-ended questions. These are specific to a certain topic (Kothari, 2004). They are face to face questions as on a group are said to be efficient way of gathering information to the population sample. This technique was focus more to the respondents who were able to read and to write. The accurate data was gathered. On the objective one this was a favourable method during collecting data.

To accomplish my study questionnaire was used as source of primary data to farmers, small holders, WEO (Ward executive officers) and other selected

respondents. The essence applying this method are as suggested by Kothari (2004) who explain that through questionnaires respondents have adequate time to give well thought answers and also respondents who are not easily approachable, can also be reached conveniently. The research questionnaire are 100 papers, the respondents at Mwanga District will be given the opportunity to express their thoughts on the subject matter as freely as possible. The questionnaire was useful in providing both qualitative and quantitative type of data, this method also used by other researchers like Ojoko et al., (2017) who conducted a study about factors influencing the level of use of climate-smart agricultural practices in Sokoto state, Nigeria. A well-structured questionnaire was used for data collection.

3.6. 2 Observation method

Observation is the systematic data collection where a researcher uses all sense organ to examine people situation (McLeod, 2015). It involves participatory and non-participatory observation, whereby the most of the researcher participate by joining a group of people so as to gather more data about the research problem. It also information obtained through non participatory observation, where a researcher obtained the information or data without joining a group. The information was gathered where the few detailed information was obtained during the study. Data on objective one and two was collected through this method.

3.6.3 Interview

This was used to collect data from a small group of a population. Both structured and unstructured interview were used, where the best interview is a personal interview which help to gather more information from the respondent's especially in village areas (Kothari, 2004). The pure information was obtained during data collection, whereby the provided answers by the respondents were relating to the research study and primary data were obtained, interview method was good on collecting the data on objective three in the study.

3.7 Data Analysis Procedures

The data obtained during the research was summarized, coded, analyzed and manipulated by using Social Package for Social Sciences and the data was

presented in different ways including Descriptive Statistics such as standard deviation, median, mode, range, graphs, tables, images, and statements.

INTERPRETATION AND DISCUSSIONS OF THE FINDINGS

4.0 Introduction

This chapter describes the analysis of data followed by a discussion of the research findings. The findings relate to the research questions that guided the study. Data were analyzed to identify, describe and explore the topic which is; “*Assessment on Farmers Adaptation Strategies of Climate Change towards maize Production in Mwanga District, Kilimanjaro Tanzania*”. The first part presents the demographic characteristics of respondents; the second part presents the findings based on the research questions.

4.1 Demographic Characteristics of Respondents

This section presents the analysis and interpretation of the data concerning the demographic characteristics of the respondents including number of family members, gender, age, education level, residence time, and the status of the residence houses.

4.1.1 Gender

Gender refers to the characteristics of women, men, girls and boys that are socially constructed. This includes norms, behaviours and roles associated with being a woman, man, girl or boy, as well as relationships with each other. As a social construct, gender varies from society to society and can change over time.

Table 4.1 Gender of Respondents

		f	%
Gender	Male	45	45.5
	Female	55	55.5

Source: Field data (2025)

The findings in the table 4.1 show that 55 (55.0%) of the respondents participated in the study were female and 45 (45.0%) of the respondents participated in the study

were male. The study noted that majority of respondent in the study area were female indicating that women are dominant group residing in the study area.

These findings collaborate with the study of Katoba (2020) who found that in her study majority of respondent in the study area were female indicating that women are dominant group residing in informal settlement than male. Therefore, due to this finding indicate that female plays important role in providing basic needs of their family rather than male. In addition to this several empowerment strategies can take to female to increase maize production.

4.1.2 Education Level

Education refers to the discipline that is concerned with methods of teaching and learning in schools or school-like environments, as opposed to various nonformal and informal means of socialization. In Tanzania levels of education can be categorized into Primary level, Secondary level College as well as University.

Table 4.2 Education Level of Respondents

		f	%
Education level	Primary	47	47.0
	Secondary	23	23.0
	College	14	14.0
	University	16	16.0

Source: Field Data (2025)

The findings in the table 4.2 indicate that 47 (47.0%) of the respondents participated in the study have primary education, 23 (23%) of the respondents in the study attained secondary education, 16 (16%) of the respondents participated in the study attained university education and 14 (14%) of the respondents participated in the study attained college education. The finding revealed that level of education among the respondents in the study area have strong link with the awareness on adaptations strategies of climate change towards maize production where by the findings from field survey revealed that majority of respondent in the study area have accessed formal education (primary education and secondary education) therefore they are able to write and read.

This finding show that majority of farmers in Mwanga District they have a low level of education which cause them to face some difficulties while dealing with adaptation strategies. This tend to be against the study of Komba and Muchapondwa (2015), in such that in their study they show that farmers with more education are likely to pursue adaptation strategies than farmers with low education.

4.1.3 Age Group of the Respondents

Age group can be defined as a number of people or things classed together as being of similar age. In research age can grouped with a certain interval depending on the interest of the researcher. It can be classified from 15 -20 years, 21-34 years, 35 -44 years as well 45 years and above.

Table 4.3 Age Group of the Respondents

		f	%
Age group	15 -20 years	7	7.0
	21 -34 years	59	59.0
	35 -44 years	32	32.0
	45 years and above	2	2.0

Source: Field Data (2025)

The findings in the table 4.3 indicated that 59 (59.0%) of the respondents participated in the study have age group of 21 years - 34 years, 32 (32%) of the respondents participated in the study have age group of 35 years - 44 years, 7 (7.0%) of the respondents participated in the study have age group between 15 years - 20 years and 2 (2.0%) of the respondents participated in the study have age group between 45 years and above. The study noted that majority of respondents in the study area is energetic group who conduct different informal activities in order to earn income for their family and also most of them engaged in agricultural activities.

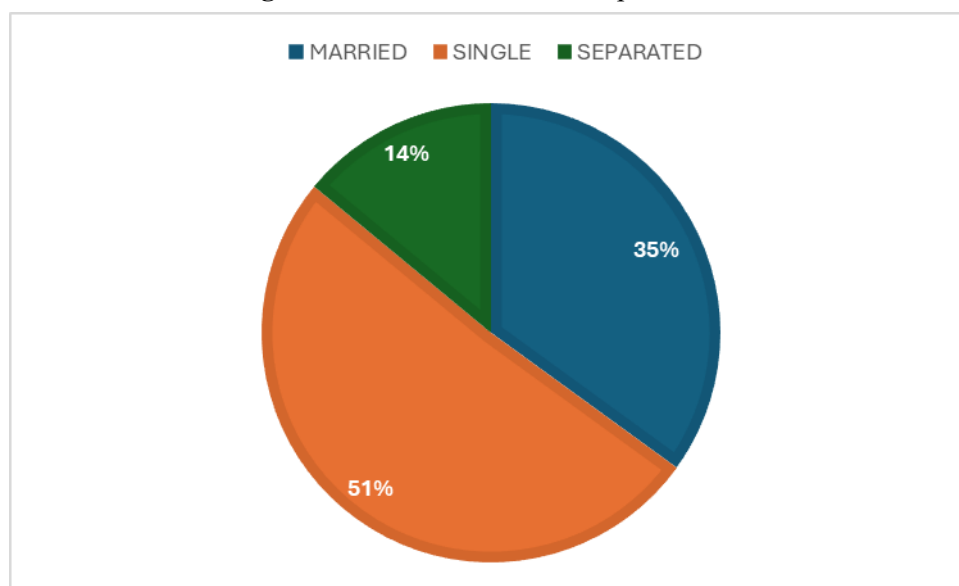
These findings collaborate with the study of (Adebayo et Al 2012) who found that in their study majority of respondent in the study area were young people compare to older people and this indicating that the young people are physically active and they can practice it with to the large extents compare to old people. Also, this study was against the study of (Mounlte et al 2014) to their study which show that the old

people they have enough experience in conducting agricultural activities than the other group.

4.1. Marital Status of Respondents

Marital status is the legally defined marital state. There are several types of marital status: single, married, widowed, divorced, separated and, in certain cases, registered partnership. Never married persons are persons who never got married in concordance with valid regulations.

Figure 4.1 Marital Status of Respondents



Source: Field Data (2025)

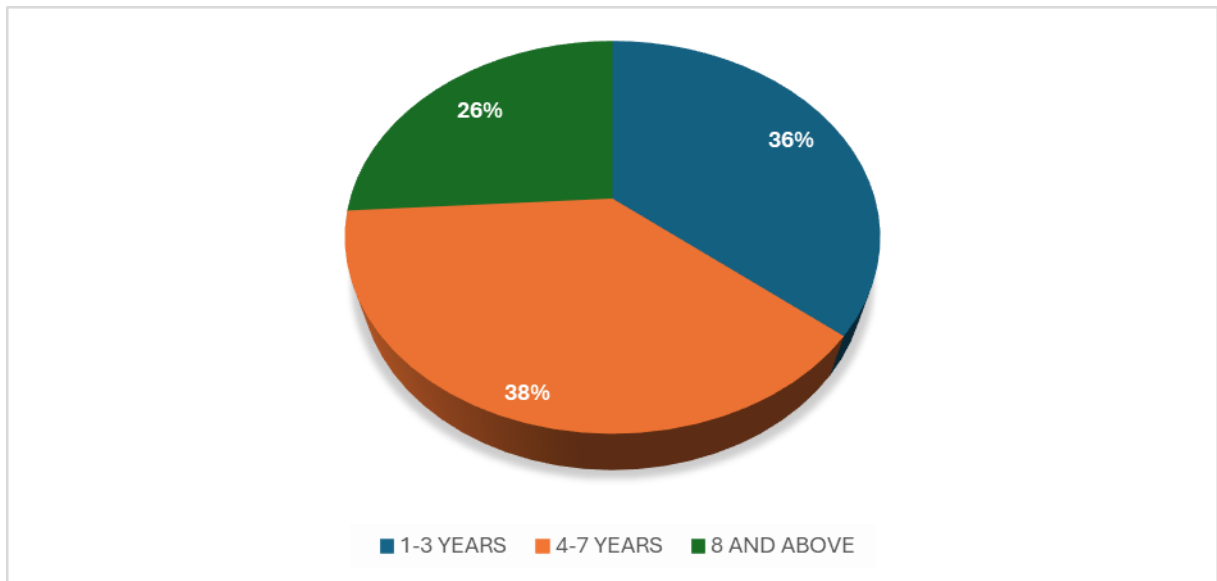
Findings in the figure 4.1 showed that 51 (51%) of the respondents participated in the study were single, 35 (35%) of the respondents participated in the study were married and 14 (14%) of the respondents participated in the study were separated/divorced. The study noted that most of the respondents in the study area are single followed married couples and divorced.

This finding was against Katoba (2020) who found that most of the households in the study area are headed and managed by married couples. Thus, for those people who are single they have enough time to deal with maize production compare to the married couple because some time they were supposed to engage in other family matters.

4.1.5 Residence Time of the Respondents

Residence is the place where a person lives, or the act of living in a place. An example of residence is where you live. An example of residence is someone living in a temporary location for a couple of weeks.

Figure 4.3 Residence of the Respondents



Source: Field Data (2025)

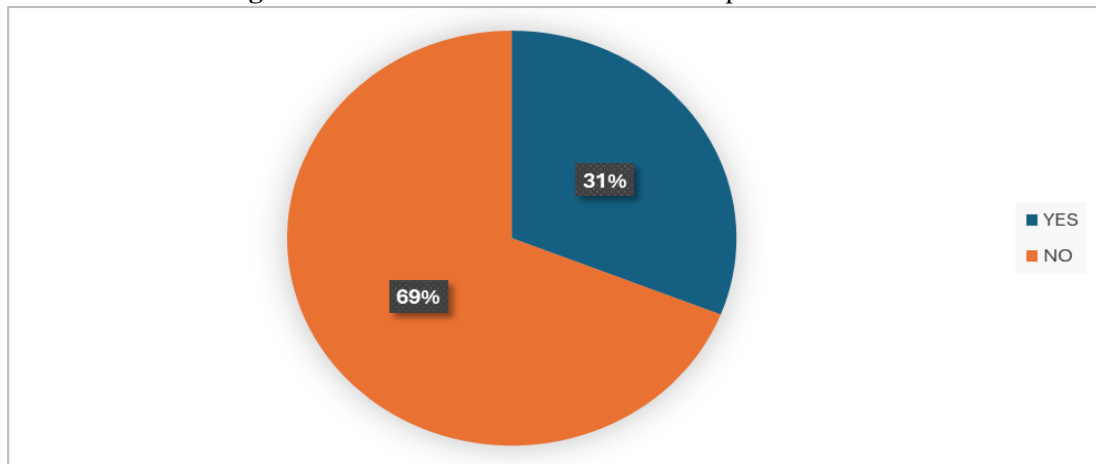
The findings in the figure 4.3 indicated that 38 (38%) of the respondents participated in the study lived in the study area for 4 - 7 years, 36 (36%) of the respondents in the study lived in the study area for 1- 3 years and 26 (26%) of the respondents participated in the study lived in the study area for 8 years and above. The study noted that majority of respondents lived for long time in the study area, so they have enough information about the researched problem and can give valid information and answers on the question posted to them.

These findings go against the study of Katoba (2020) who found that in her study majority of respondent in the study area live in the area for the long period of time, so they have enough information about the researched problem and can practice different adaptation strategies to cope with climate change. There for this show that the people who live in the study area for long time they are aware on climate change and the strategies to be taken.

4.1.6 Households Information of Respondents

The household is a family or social unit living together, or everything related to the actions of the household. You and your family members who live with you are an example of your household. The budget and checkbook are examples of the accounting tools of the household.

Figure 4.4 Households Information of Respondents



Source: Field Data (2025)

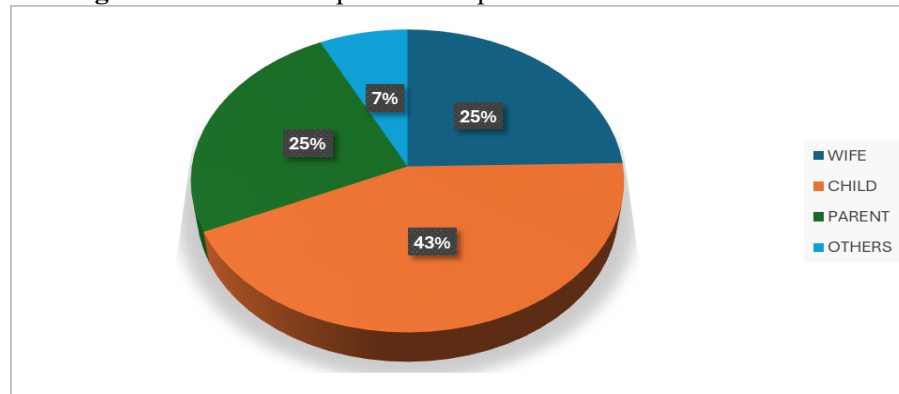
The findings in the figure 4.4 revealed that 69 (69%) of the respondents participated in they are not households and 31 (31%) of the respondents participated in the study are households. this implies in the study area there are few households that live with their siblings.

This finding was against the finding of Komba et al (2015) in a way that in their findings many people were the household and they play the important role to deal with climate change so as to ensure food availability in their families. There for this show that household play important role to ensure food availability in their families while in my study household are very few compare to others which indicate that most of them, they are not yet engaged in married.

4.1.7 Relationship of the Respondents with the Households

The relationship to household head refers to the relationship of each household member to the head of the household. The other member/s of a household can be a spouse, son, daughter, other relative, or non-relative of the household head

Figure 4.5 Relationship of the Respondents with the Households



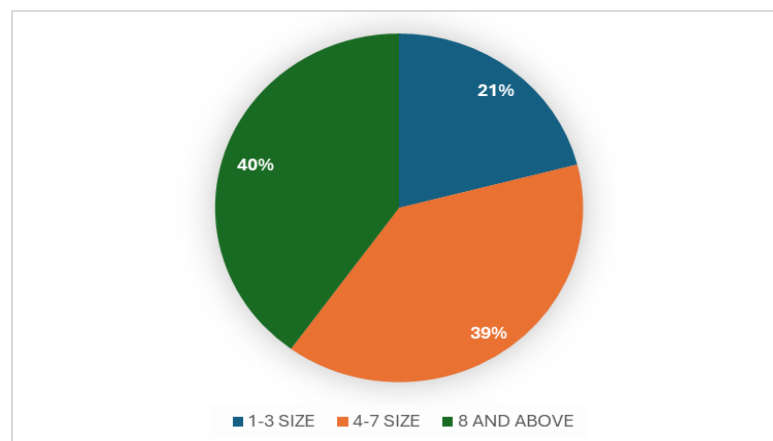
Source: Field Data (2025)

Findings in the study area from the figure 4.5 showed that 43 (43%) of the respondents participated in the study are children of households, 25 (25%) of the respondents in the study area are wives of households, 25 (25%) of the respondents participated in the study area are parents of households and 7 (7%) of the respondents participated in the study area are other relatives and friends of the households. This implies that in the study area many households in the study area are still live with their family and other relatives that most of them engaged in agricultural activities and other economic activities.

4.1.8 Family Size of the Respondents

Family size refers to the number of persons in the family. Economic family refers to a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law union, adoption or a foster relationship.

Figure 4.6 Family Size of the Respondents



Source: Field Data (2025)

The findings in the figure 4.6 showed that 40 (40% of the respondents in the study have a family size of 8 and above members, 39 (39%) of the respondents participated in the study have a family size of 4 - 7 members and 21 (21%) of the respondents participated in the study have a family size of 1 - 3 members. This implies that households in the study area have large family size with large number of family members; households in the study area do not use contraceptive method of birth control as the result of rapid increase of population.

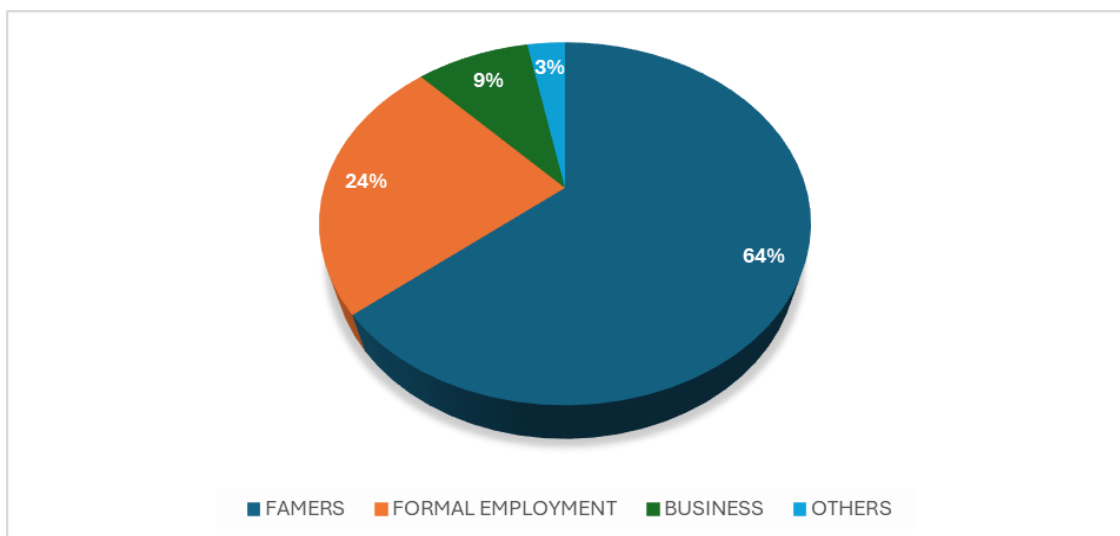
These findings collaborate with the study of Gelibolu (2009) who found that in his study majority of respondent family size is very high in the study area which make the house hold to find more adaptation strategies to cope with climate change compare to those families to which their size is low.

4.1.9 Economic Activities of the Respondents

Economic activities are activities related to production, distribution, exchange and consumption of goods and services. The primary aim of the economic activity is the production of goods and services with a view to make them available to consumer.

Economic activities are carried out by human beings to earn their income and to acquire wealth. For example, a trader, an agriculturist, a manufacturer, a doctor, a teacher, and laborers working in a factory are all examples of economic activities.

Figure 4.7 Economic activities of the respondents



Source: Field Data (2025)

The findings in the figure 4.7 showed that 64 (64%) of the respondents participated in the study are farmers that engaged in the agricultural activities, 24 (24%) of the respondents participated in the study are employed in formal employments, 9 (9.0%) of the respondents in the study are engaged in business activities such as Bodaboda, Mama Ntilie, shoes repairing etc. and 3 (3.0%) of the respondents in the study are engaged in other informal activities.

Similar results were reported by Kangalawe *et al.* (2009) on climate change and variability impacts, vulnerability and adaptive capacity in Kasulu indicating that majority of the respondents (96.6%) accrued their income from crop cultivation as their main occupation but followed by livestock keeping.

Farming System in the Study Area

This section describes for how long households being a farmer, main aim of growing crops, size of land for agricultural activities, system of farming used by respondents and the main crops they cultivate.

Table 4.4 Shows How Long Households Being a Farmers, Main Aim of Growing Crops, Size of Land for Agricultural Activities

		f	%
How long have you been a farmer			
	1-3 years	24	24.0
	3-7 years	44	44.0
	8-11 years	0	0.0
	12 years and above	32	32.0
Main aim of crops growing			
	Commercial	31	31.0
	Food	17	17.0
	Both food and commercial	52	52.0
Size of land that you use (hectares)			
	1 - 3 hectares	27	27.0
	4 -6 hectares	51	51.0
	6 - 9 hectares	12	12.0
	10 and above hectares.	10	10.0

Source: Field Data (2025)

The findings in the table 4.4 show that 44 (44.0%) of the respondents participated in the study being farmers for about 3 - 7 years, 32 (32.0%) of the respondents in the study area being farmers for 12 years and above and 24 (24.0%) of the respondents participated in the study they are being farmers for 1 - 3 years. The study noted that majority of the respondents in the study area being farmers for a long time, so they very well about effects of climate change on crops production and adaptations strategies of climate change on maize production, they can provide important information in this study.

Also, the findings in the table 4.4 showed that 52 (52.0%) of the respondents participated in the study growing crops for commercial and food purpose, 31 (31.0%) of the respondents participated in the study produce crops for commercial purpose only and 17 (17.0%) of the respondents in the study area produce crops for food purpose only. The study noted that majority of the respondents in the study area produce crops for both commercial and food purpose and followed by those produce crops for commercial purpose only.

Furthermore the findings in the table 4.4 show that 51 (51%) of the respondents participated in the study used 4 -6 hectares for agricultural activities, 27 (27.0%) of the respondents participated in the study have 1 - 3 hectares of land for agricultural activities, 12 (12.0%) of the respondents in the study area use 6 -9 hectares of land agricultural activities and 10 (10%) of the respondents in the study area used 10 hectares and above for agricultural activities. The findings of the study revealed that majority of respondents in the study are used enough land size for agricultural activities that can produce enough crops for commercial and food purpose.

Table 4.5 Shows System of Farming and the Main Crops Produced in the Study Area

		F	%
Farming system have largely practiced			
	Monoculture	32	32.0
	Mixed farming	56	56.0
	Intercropping	12	12.0

Main crops you grow for years			
	Bananas	16	16.0
	Maize	55	55.0
	Beans	26	26.0
	Coffee	2	2.0
	Cassava	1	1.0
	Others	0	0.0

Source: Field Data (2025)

The findings in the table 4.5 showed that 56 (56%) of the respondents participated in the study practice mixed farming, 32 (32%) of the respondents participated in the study practice monoculture farming and 12 (12%) of the respondents participated in the study area practice intercropping. This implies that majority of the respondents in the study area practice mixed farming. In mixed farming, a farmer decides to combine two or more agricultural activities on the same farm. Mixed farming reduces dependency on external inputs and costs. In the example of mixed cropping of animal husbandry and crop farming the crops and animals' components can complement and support each other.

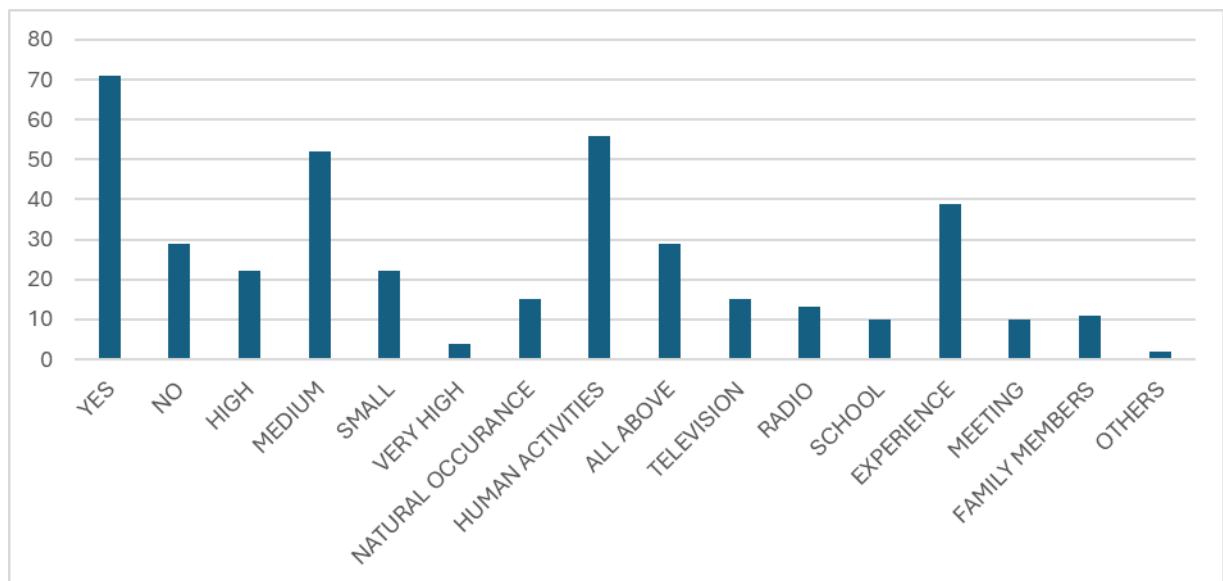
Also the findings in the table 4.5 indicated that 55 (55%) of the respondents participated in the study argued that they cultivate maize, 26 (26%) of the respondents participated in the study cultivate beans, 16 (16%) of the respondents participated in the study cultivate bananas and 2 (2.0%) of the respondents participated in the study cultivate coffee and 1 (1%) of the respondents participated in the study cultivate cassava. The study noted majorities of respondents in the study area largely cultivate maize for commercial purpose and also cultivate beans for and bananas for both commercial and food purpose.

4.2 Findings According to Research Questions

This part includes the interpretation of information obtained from the field data. This study involved four research questions, and the sources of information were households at the study area. The findings are presented and discussed under themes from those research questions:

4.2.1 Farmers Awareness to Climate Change and its Adaptation Measures to Maize Production

Here the researcher wanted to know the respondents' awareness to climate change and its adaptations measures to crops productions in the study area. This question was answered by respondents and their findings are summarized in figure 4.8 below;



Source: Field Data (2025)

The findings in the figure 4.8 revealed that 71 (71%) of the respondents participated in the replied “YES” that they are aware on climate change and 29 (29%) of the respondents in the study area replied “NO” that they are not aware on climate change. The study noted that majority of the respondents in the study they were aware on climate change due to the fact they engaged in farming so they must be aware on climate change in order to find solutions and cultivate the crops that adapt to that new climate occurred. Similar results were reported by Bakari, (2015) results from the study observed that 96% of all respondents were knowledgeable and aware on the term climate change through long period experiences.

Also the findings in the figure 4.8 showed that 52 (52%) of the respondents participated in the study have medium understanding about the climate change, 22 (22%) of the respondents participated in the study have small understanding about the climate change, 22 (22%) of the respondents have high understanding about climate change and 4 (4%) of the respondents participated in the study have very

high understanding about the climate change. The study noted that majority of the respondents in the study area have medium understanding about the climate change which result difficulty for them to encounter the challenges occur due to the climate change.

On the other side the findings in the figure 4.8 found that 56 (56%) of the respondents participated in the study argued that human activities are the possible cause of climate change. This implies that there are activities conducted by human being cause occurrence of climate change. 29 (29%) of the respondents participated in the study replied that both natural occurrence and human activities are possible source of climate change. This implies that natural occurrence of climate change such as seasonal drought and heavy rainfall causes the climate to change and affects crops productivity. And 15 of the respondents in the study area replied natural occurrence as the possible source of climate change. The study noted that climate change in the study area caused largely by occurrence of human activities which involve cutting of trees and cause drought which led low production of crops.

Furthermore, the findings in the figure 4.8 indicated that 39 (39%) of the respondents know the occurrence of climate through their daily life experience. This means that have reliable source of information about the climate change in their areas. This lack of reliable information system and networks created an ill coordination among officials and farmers as they were unable to gain the required information in time and hence farmers invested energy to prepare their fields for cropping for nothing. Factors such as accessibility and usefulness of climate information, the institutional environment and the socio-economic situation of households all affect farmers capacity to adapt to climate change due to the lack of reliable source of information's about climate change.

Also, the finding shows that 15 (15%) of the respondents participated in the study get depend televisions to get the information about climate change and 13 (13%) of the respondents get information about climate through radio. The farmers that get information about climate change through televisions and radios are for those who have access to those media. 11 (11.0%) of the respondents participated in the study get information about climate change through family members that can be a wrong

source of information. 10 (10%) of the respondents participated in the study get information about climate change at school and 10 (10%) get information about climate through village meeting. 2 (2.0%) of the respondents participated in the study get information about the climate change from other sources. The study noted that majority of the respondents in the study area have no reliable source of information about climate change occurrence instead they depend to get information from other sources which are not reliable so it results farmers to use wrong adaptations strategies to the climate change and result low crops yields and low quality of crops produced.

Table 4.6 Shows Indicators of Climate Change

	SD		D		U		A		SA	
	f	%	f	%	F	%	f	%	f	%
High temperature	0	0.0	7	7.0	6	6.0	40	40.0	47	47.0
Floods	8	8.0	8	8.0	6	6.0	39	39.0	39	39.0
Crops damage	3	3.0	9	9.0	7	7.0	40	40.0	41	41.0
Extreme cold	1	1.0	10	10.0	5	5.0	28	28.0	56	56.0
Shortage rainfall	1	1.0	10	10.0	4	4.0	36	36.0	49	49.0
Seasonal drought	5	5.0	6	6.0	8	8.0	35	35.0	46	46.0

Source: Field data (2022)

The findings in the table 4.6 show that 56 (56%) of the respondents participated in the study strongly agreed that extreme cold is the indicator of climate change, 28 (28%) of the respondents participated in the study agreed that extreme cold as the indicator of climate change, 10 (10%) of the respondents participated in the study disagreed that extreme cold is not indicator of climate change 5 (5%) of the respondents undecided that extreme cold is the indicator climate change.

Also, the findings in the table 4.6 indicate that 49 (49%) of the respondents participated in the study strongly agreed that shortage of rainfall is the indicator of

climate change, 36 (36%) of the respondents participated in the study agreed that shortage of rainfall is the indicator of climate change and 10 (10%) of the respondents participated in the study disagreed that shortage of rainfall is the indicator of climate change. The study noted that respondents believed that shortage of rainfall is the indicator of climate change due to the fact that majority of respondents in the study area strongly agreed and agreed that.

The findings in the table 4.6 showed that 47 (47%) and 40 (40%) of the respondents participated in the study strongly agreed and agreed that high temperature is the indicator of climate change. 7 (7%) and (6%) of the respondents participated in the study disagreed and undecided that high temperature is the indicator of climate change. The study noted that majority of the respondents argued that high temperature is the indicator of climate change.

On the other side the findings in the table 4.6 revealed that 46 (46%) and 35 (35%) of the respondents participated in the study strongly agreed and agreed respectively that seasonal drought is the indicator of climate change. 8 (8%) of the respondents participated in the study undecided that seasonal drought is the indicator of climate change. 6 (6%) and 5 (5%) of the respondents at the study area disagreed and strongly disagreed that seasonal drought is the indicator of climate change. Majority of respondents at the study area argued that seasonal drought is the indicator of climate change, because most of them have experienced seasonal drought in their areas and that seasonal drought affect affects crops yields and result shortage of crops for commercial and food purposes.

This study was supported by Gichangi (2017) the study showed that drought is the key climate-related shock with 100% of households reporting that they had experienced drought.

Also, the findings in the table 4.6 showed that 41 (41%) and 40 (40%) of the respondents participated in the study strongly agreed and agreed that crops damage is the indicator of climate change. 9 (9%) and 7 (7%) of the respondents participated in the study disagreed and undecided respectively that crops damage is the indicator of climate change. Furthermore, the findings in the table 4.7 indicated that 39 (39%)

and 39 (39%) of the respondents participated in the study strongly agreed and agreed that floods is the indicator of climate change, 6 (6%) of the respondents participated in the study undecided that floods is the indicator of climate change. 8 (8%) and 8 (8%) of the respondents participated in the study strongly disagree and disagree that floods is an indicator of climate change. The study revealed that majority of respondents in the study argued that floods are an indicator of climate change. Awareness about climate change and adaptation methods, that is, whether farmers are informed about climate change and various adaptation techniques. Findings of the study revealed that farmers in the study areas were aware of climate change and variability.

These findings are similar to the study of Kadi, *et al.* (2011). The farmers awareness could have been created by the training carried out under the CCAA project. Training is one of the effective climate change information communication strategies which foster learning. Such training gives farmers a platform for seeking clarifications and feedback on farming activities related to climate change.

4.2.2 The Major Impacts of Climate Change on maize Production in Mwanza District, Kilimanjaro Tanzania.

Here the researcher wanted to know the major impacts of climate change on crops production in the study area. This question was answered by respondents and their findings are summarized in tables below;

Table 4.7 Shows Responses of Households on the Impacts of Climate Change on Crops Production

		f	%
Are there any impacts of climate change toward the crop production	YES	76	76.0
	NO	24	24.0
Major impacts of climate change towards crops production	Crops damage	15	15.0
	Poor yields harvest	43	43.0
	Disrupt food availability	9	9.0
	Reduce access to foods	7	7.0

	Affect food quality	26	26.0
	Others	0	0.0
To what extent do you affect with these changes			
	High	52	52.0
	Medium	33	33.0
	Low	9	9.0
	Very Low	6	6.0

Source: Field Data (2025)

The findings in the table 4.7 showed that 76 (76%) of the respondents participated in the study replied “YES” that there re impacts of climate change toward the crops production and 24 (24%) of the respondents participated in the study replied “NO” that there are not any impacts of climate change towards production of crops. The study noted that majority of the respondents in the study area argued that there are impacts of climate change towards crops production.

Also, the table 4.7show that 43 (43%) of the respondents participated in the study mentioned poor yields harvest as the major impacts of climate change towards Maize production. The study noted that majority of the respondents in the study area seen low crops yields as the impacts of climate change. 26 (26%) of the respondents participated in the study mentioned affects food quality as the impacts of climate change on the crops production, 15 (15%) of the respondents participated in the study argued that crops damage as the impacts of climate change, this implies that crops get damaged due to high temperature and heavy rains occurrence which results low quality of crops produced and also result shortage of foods in the country.

Also 9 (9%) and 7 (7%) of the respondents participated in the study replied that disruption of food availability and reduce access to foods respectively are the impacts of climate change on the production of crops. This implies that occurrence of climate change such as drought, shortage of rain and high temperature affect the growing of crops and damage crops which result poor yields of crops and result shortage of food in that area.

Furthermore, the findings in the table 4.7 show that 52 (52%) of the respondents participated in the study highly affected by with climate changes. This implies farmers in the study area are highly affected by climate change due to the fact that

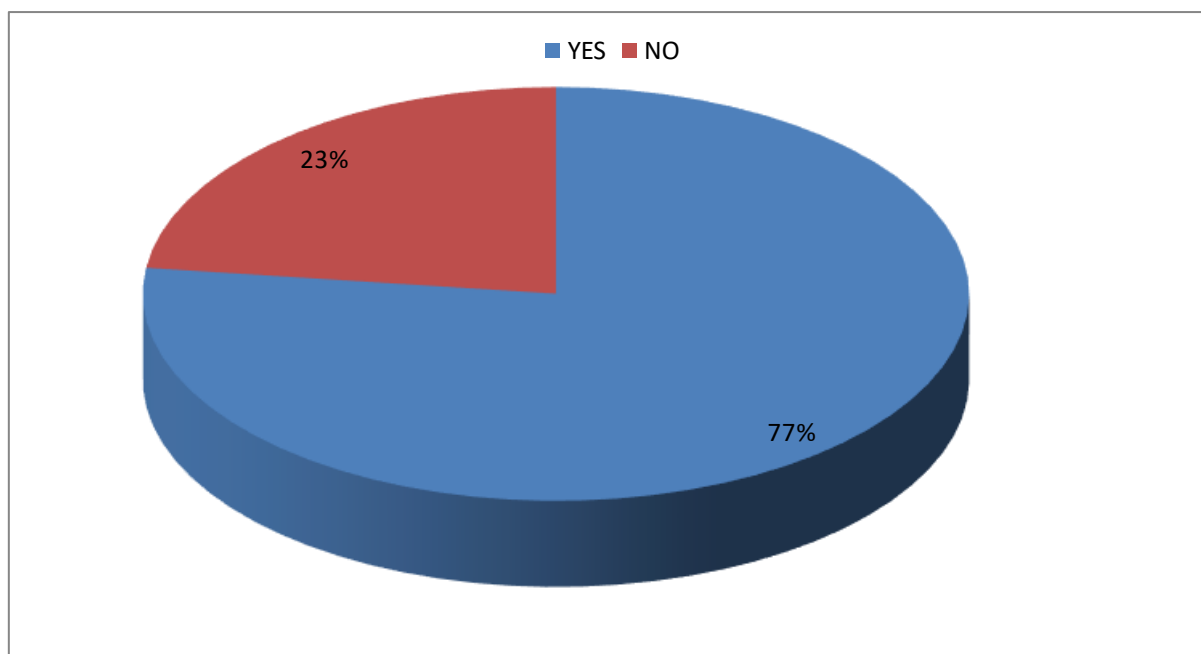
they invest more money and expect high yields of crops at the end of season but the occurrence of climate change result low crops yields and low quality of harvested crops. 33 (33%) of the respondents in the study area medium affected by climate change and 9 (9%) and (6%) of the respondents participated in the study low and very low affected by climate change in the agricultural activities. The study noted that majority of the respondents in the study area are highly affected by climate change and followed by those affected medium.

This finding was supported by World Bank (2010) stated that potential impacts on world food supply have been estimated for several climate change and socio-economic scenarios. The main result of the climate change was a decline in crop yield and in some cases a loss of the entire crop, it was not surprising that the main coping strategy involved the purchase of additional food, reducing consumption, or consuming different foods.

4.2.3 Adaptation Strategies used by Farmers to cope with the Climate Change

Here the researcher wanted to know the adaptations strategies used by farmers to cope with climate change in the study area. This question was answered by respondents and their findings are summarized in figure 4.9 below;

Figure 4.9 Shows Responses of Respondents on the Changing Farming Practice to Adjust Climate Change



Source: Field Data (2025)

The findings in the figure 4.9 show that 77 (77%) of the respondents participated in the study replied “YES” that have changed farming practice to adjust climate change and 23 (23%) of the respondents participated in the study replied “NO” that have not changed their farming practice due to climate change. The study revealed that majority of the respondents in the study area have changed their farming practice to adjust climate change in order to get high crops yields regardless of occurrence climate change. The farmers changed from farming practice that depend on rain and practice irrigation during seasonal drought to encounter that climate change. Climate extreme events introduce numerous uncertainties for the livelihoods of smallholder farming households that depend heavily on the weather and climate. Several technologies and practices such as high yielding varieties, early maturing varieties, conservation agriculture and drought tolerant varieties are available for smallholder farmers to enable them to adapt better to the effects of climate change and variability.

This finding was similar to Dhaka *et al* (2010) supported by farmers, who have recently faced frequent drought, floods or diseases, are more likely to listen and/or accept new farming practices knowledge from experts than those who have not gone through such experiences.

Table 4.8 Shows of Responses of Respondents on Adaptation Strategies used by Farmers to cope with the Climate Change

	SD		D		U		A		SA	
	F	%	f	%	f	%	f	%	f	%
Crops rotations	12	12.0	4	4.0	7	7.0	21	21.0	56	56.0
Water harvesting	7	7.0	5	5.0	4	4.0	41	41.0	43	43.0
Irrigation	2	2.0	2	2.0	5	5.0	42	42.0	49	49.0
Mulching	5	5.0	7	7.0	4	4.0	15	15.0	45	45.0
Crops cover	5	5.0	9	9.0	2	2.0	31	31.0	30	30.0
Terracing	4	4.0	12	12.0	4	4.0	25	25.0	37	37.0
Planting high yields varieties	10	10	7	7.0	4	4.0	35	35.0	38	38.0
Sunken beds (Majaruba)	2	2.0	10	10.0	6	6.0	31	31.0	32	32.0
Agro forestry	0	0.0	6	6.0	3	3.0	38	38.0	37	37.0

Source: Field Data (2025)

The findings in the table 4.8 show that 56 (56%) and 21 (21%) of the respondents participated in the study strongly agreed and agreed respectively used crops rotations as adaptations strategies to cope with the climate change. 12 (12%) and 4 (4%) of the respondents participated in the study strongly disagreed and disagree that did not use crops rotations as adaptations strategies to cope with climate change and 7 (7%) of the respondents in the study area undecided that crops rotations as a method cope with climate change. The study noted that majority of the respondents in the study area used crops rotations as adaptive strategies to encounter climate change. In crops rotations farmers plant crops that tolerant to drought conditions in order to encounter seasonal drought and planting crops that mature fast. Some suggested adaptation practices include choice of disease-/drought-resistant crops and their arrangement in sequential cropping systems (Bello et al., 2013).

Also, the findings in the table 4.8 show that 49 (49%) and 42 (42%) of the respondents participated in the study strongly agreed and agreed respectively that used irrigation system as an adaptive strategy to cope with climate change. 5 (5%) of the respondents participated in the study undecided on usage of irrigation to cope with climate change while 2 (2%) and 2 (2%) of the respondents participated in the study strongly disagree and disagree respectively on the usage of irrigation to encounter climate change in the farming. This implies that majority of respondents in the study area used irrigation system as an adaptive measure to encounter climate change towards crops production.

On the other side the findings in the table 4.8 show that 43 (43%) and 41 (41%) of the respondents in the study strongly agreed and agreed respectively that water harvesting is adaptive strategies to cope with climate change. 7 (7%) and 5 (5%) of the respondents in the study area strongly disagreed and disagreed respectively that did not use water harvesting as an adaptive strategy to cope with climate change and 4 (4%) of the respondents in the study area undecided on using water harvest.

Furthermore, the findings in the table 4.6 indicate that 38 (38%) and 35 (35%) of the respondents participated in the study area strongly agreed and agreed respectively planting high yields varieties to cope with climate change. 10 (10%) and 7 (7%) of the respondents participated in the study strongly disagreed and disagreed that did

not planting high yields varieties and 4 (4%) of the respondents participated in the study undecided on the planting high yields varieties. The study noted that majority of the respondents in the study area used the method of planting high yields varieties as an adaptation strategy to cope with the effects of climate change.

This finding was supported by Deressa et al. (2009) found that agricultural adaptation measures such as the use of crop varieties, planting trees, soil conservation, changing planting dates, diverging from crops production to livestock keeping, and irrigation as the most used adaptation methods in African countries.

4.2.4 Challenges those Farmers Face During the Adaptation Strategies

Here the researcher wanted to know the challenges faced by farmers during adaptation strategies to cope with climate change in the study area. This question was answered by respondents and their findings are summarized in table below;

Table 4.9 (a) Shows Challenges those Farmers Face during the Adaptation Strategies

		f	%
Challenges you face in coping with climate change			
	Poor support from expertise	20	20.0
	Lack of education on coping strategies	36	36.0
	Inadequate funds to cope the situation	12	12.0
	Little government support	11	11.0
	Lack of enough knowledge on climate change	5	5.0
	Low crops yield	16	16.0

Source: Field Data (2025)

The findings in the table 4.9(a) show that 36 (36%) of the respondents participated in the study mentioned lack of education to cope on adaptation strategies as the challenge facing farmers on adaptation strategies to cope with climate change. This

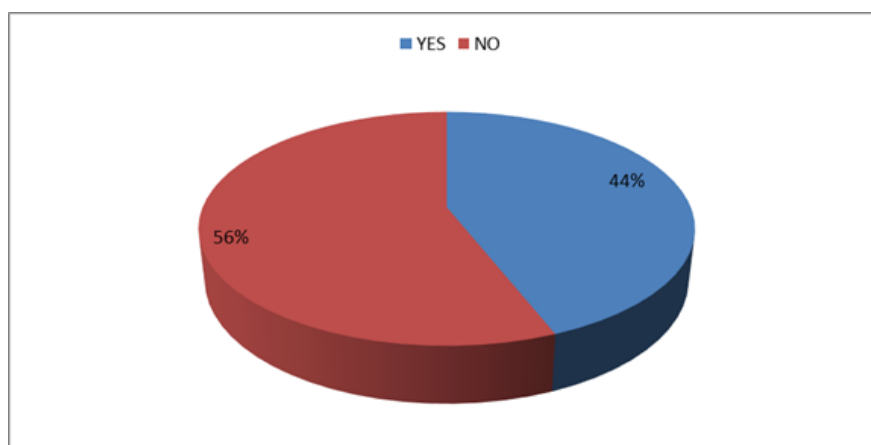
implies that farmers have no enough knowledge on selection of best adaptation strategies to cope with climate change towards crops production and result choice of wrong methods and inefficient methods which lead poor yields crops. 20 (20%) of the respondents participated in the study argued that poor support expertise is the challenge facing during adaptations strategies to cope with climate change. 16 (16%) of the respondents at the study area replied that low crops yields is the challenge farmers face during using the adaptations strategies to cope with climate change. Farmers get low crops yields due the wrong choice and inefficient methods used to cope with climate change. Also the findings in the table show that 12 (12%) and 11(11%) of the respondents participated in the study mentioned inadequate funds and little government support respectively are the challenges facing farmers in adopting strategies to cope with climate change and 5 (5%) of the respondents participated in the study mentioned lack of knowledge on climate change as the challenge on the use of adaptations strategies to encounter climate change towards crops products. Some of the farmers argued that poor access to meteorological information and its low reliability are major obstacles to practice adaptation measures to minimize the shocks of climate variability. The study revealed that farmers lack the technical knowledge on climate variability, its consequences, and adaptation strategies to curb the negative impacts of climate-related disaster.

This result was supported by Edris (2017). Enhancing community resilience to climate change - an investigation of climate impacts and community led adaptation strategies of remote coastal peoples in Bangladesh. Climate Change, households had limited access to the favored adaptation options due to a lack of skills, labour and/or capital.

4.2.5 Effective Policies to Cope with Climate Change

Policy is a law, regulation, procedure, administrative action, incentive, or voluntary practice of governments and other institutions. To cope with different adaptation strategies both individual and the government can introduce some policies to support the adaptation strategies.

Figure 4.3 Shows if Policies Effective to Cope with Adaptations Strategies



Source: Field data (2025)

The findings in the figure 4.10 below show that 56 (56%) of the respondents participated in the study replied “YES” that there is policy that support strategies on coping with climate change and 44 (44%) of the respondents participated in the study replied “NO” that there are no policy that support strategies on coping with climate change. This implies that in the study area there are policies that support adaptations strategies to cope with climate change.

These findings are similar to the study of Kadi, *et al.* (2011) who postulated that in order to help farmers to cope with adaptation strategies there should be some policies which will help farmers to cope with new adaptation strategies.

Table 4.9 (b) Shows Response of Respondents on the Measures to be taken to Overcome Challenges Facing Farmers towards Crops Production.

		f	%
Actions to be done in assisting you to adapt climate change toward Maize production	Provision of education to the farmers concerning climate change	34	34.0
	Government support on peasants on climatic coping strategies	40	40.0
	To have reliable source of information about climate change	26	26.0

Source: Field data (2022)

The findings in the table 4.9(b) show that 40 (40%) of the respondents participated in the study mentioned government support on peasants as the possible solutions to the challenges facing farmers during adoption of strategies on coping with climate change. This implies that the households depend support from government on the applications of measures to encounter effects of climate change such as construction of irrigation system and water harvesting system that was help farmers to conduct farming activities throughout the year. 34 (34%) of the respondents in the study area argued that provision of education to the farmers concerning climate change is the solution to the challenge facing farmers during adoption of strategic measures to encounter effect of climate change towards crops production. The study noted that provision of education to the farmers will make them to be aware on the climate change and the adoption of strategies on coping with climate change. 26 (26%) of the respondents suggest that to have reliable source of information about climate change can help to solve those challenges occur during using the strategies on coping with climate change.

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