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**COLLEGE OF AGRICULTURAL AND NATURAL RESOURSE**

**DEPARTMENT OF AGRICULTURAL ECONOMICS**

# ANALYSING FACTORS AFFECT MAIZE PRODUCTION: INCASE OF CHEHA WOREDA

**SENIOR RESEARCH PROJICT: - SUBMITTED TO DEPARTMENT OF AGRICULTURAL ECONOMICS: IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR B.SC. DEGREE IN AGRICULTURAL ECONOMICS**

**PREPARED BY:-**

**1. Dafara Tadese**

**2. Defar Bayisa**

**ADVISOR: - Mr. BIRU.G (Msc)**

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# ABSTRACT

The main objective of the study is to assess the factors affecting maize productivity with specific objectives being; to assess major inputs being used in maize productivity and to identify factors that can affect the quantity of maize production in cheha woreda. The research used survey to collect primary data. Secondary sources were also used to gather the data. The primary data employed structured interview and questionnaire for 66 respondents'. These methods would helpful to collect information from farmers (households). The secondary data was collected from different thesis, and bureau of extension agents. Purposive simple random sampling technique is selected to select Woreda. Based on collected data, the researcher identified the factors affecting maize productivity. As such, labour force, land size, sex, and marital status significantly affected maize productivity. Land size and marital status negatively affected maize productivity while sex and labour force positively affected it. In order minimize and alleviate the existed problems, some policy implications are recommended such as agricultural subsidies to make availability of inputs such as fertilizer, improve seed easier for farmers to support them improve maize productivity.

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# ABRIVIATION

| | |
|---|---|
| ANOVA | Analysis of Variance |
| FAO | Food Assessment Organization |
| FAOSTAT | Food and Agriculture Organization Statistics Database |
| GDP | Gross Domestic Product |
| Ha | Hectare |
| IPCC | Intergovernmental Panel on Climate Change |
| IFPRI | International Food Policy Research |
| Kg | Kilogram |
| NALEP | National Agriculture and Livestock Extension Program |
| OLS | Ordinary list square |
| Qt | Quintal |
| USDA | United States Department of Agriculture |
| WFP | World Food Program |
| WMO | World Meteorological Organization |

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# CHAPTER ONE

# INTRODUCTION

## 1.1. Background of the Study

Maize was domesticated in Central America some 6,000 to 10,000 years ago. It spread to the rest of the world in the 16th through18th centuries. World-wide more than 400 million people, primarily in sub-Saharan Africa and Central America, white maize plays a major role in the diet (Morris, 2004). Development of technology, including hybrid technology; increased water availability through government-funded infrastructural projects; and the supply and use of inorganic fertilizer and other farm chemicals are important factors contributing to maize production growth.

In Australia maize production is recognized as a high yield crop provided optimum crop management used. Yield potential of maize is essentially dependent on amount of intercepted solar radiation, water and nitrogen supply moderated by factors that limit physiological processes. The industry is subject to continuing challenges from use of economic and market forces and expectations of the broader community, especially in resource use efficiency and environmental management and needs to maintain a dynamic research and development program to undergo production practices in the long term (Martin et al, 2004).

In Africa perspective Maize cultivation in Nigeria had suffered various problems, rural-urban migration, low yield, pest and diseases, climate change, poor shortage facilities, shortage of key inputs and shortage of irrigation water. Nigeria has experience shortages in maize production in the past. Prices of maize and other product derived from maize boosts up during low production seasons and falls drastically when there is a surplus production, however, due to inadequate marketing facilities in the control, farmers loses some of the product. Since farmers do not know future of maize production and prices while deciding to cultivate this and other crops. There were need to forecast cultivation area, yield and production of maize in Nigeria. (Akande, 2007).

In Zimbabwe generally, communal and smallholder farmers occupy areas of lower natural potential for agriculture in terms of rainfall, soils and water for irrigation. In addition, these areas are of lower economic potential because of the distances from markets and poor communication and social infrastructure. Until recently, the other group comprised roughly 4,000 large-scale

farmers with very sophisticated production systems and occupies about 11 million hectares of land, primarily located in the areas of high agricultural and economic potential. Government of Zimbabwe imports of agricultural products is limited mainly to wheat and maize in drought years.

According to Kaliba (2008) in the study on adoption of maize production technologies in Central Tanzania where several issues require closer attention from research, extension, and policy makers. Research and extension efforts need to be linked and strengthened to increase the flow of information to farmers. In developing improved maize varieties, researchers must consider yield as well as other important traits: drought resistance/tolerance, resistance to storage pests, shelling quality, and taste. For this to occur, farmers must participate in the research process. The formal credit system needs to be altered to address the credit problems faced by small-scale farmers. A more efficient marketing system for inputs and outputs would benefit farmers by providing higher maize prices and reducing fertilizer costs. Such a system would require supporting policies from the government.

In a study conducted in Ethiopia on Enhancing the Contribution of Maize to Food Security in Ethiopia, the increment of production in the 1990s indicates a green revolution for food self-sufficiency in Ethiopia. However, the availability of quality seed with necessary inputs at the right time and place with a reasonable price was crucial. Limiting factors for maize production. Wise utilization and conservation of natural resources were also have a significant impact on maize grain production. (Nigussie, 2006).

### 1.2 Statement of the Problem

Agriculture has been a backbone for developing world both in household consumption and to increase the national GDP. Maize is one of the important crops to cover this aspect. But the declining trends on quantities of maize produced has been evident at the global and regional level with a majority of the world producers of maize recording significant declines in the quantities of maize exported (Pingali, 2001). Importation of maize leads to lack of market to maize farmers regionally and locally which discourages farmers to continue farming this product (Mutunga et al., 2003).

Agricultural markets are characterized by the following constraints among others: long chains of

transactions between the farm-gate and consumers; poor access to appropriate and timely information; small volumes of products of highly varied quality offered by individual smallholder farmers; and poor structured and poor markets (Mude, et al, 2006).

Constraints to credit access have been identified as some of the barriers to adoption and use of sufficient and improved agricultural inputs in developing countries The demand for improved seeds was also relatively low, due mainly to poor promotion and marketing efforts, high prices, and the inability of farmers to purchase complementary inputs, especially fertilizer. Other factors that affect maize production are: - Soil acidity is one of the factors limiting maize production. Farmers lack storage facilities thus maize gets destroyed due to humid, theft and exposure to unworthy conditions. Maize production also affected due to the decrease in land since population increase is on the rise thus land for cultivation is being encroached (Farm Management Handbook,2007). So, the above authors investigate these factors that affect maize production, we will also check these and other hidden factors that affect maize production in the study area.

## 1.3 Objective of the Study

- The overall objective was to analyze factors affecting maize productivity in Cheha Woreda.

### 1.3.1 Specific Objectives

- To assess major inputs being used in maize production in cheha woreda.
- To identify factors that affect maize productivity in cheha woreda.

## 1.4 Research Questions

- Which inputs are being widely used for maize production in cheha woreda?
- What are the factors that affect maize productivity in cheha woreda?

## 1.5. The scope of Study

The study delimited itself to the factors affecting maize production within the boundaries of cheha woreda in order to avoid interference from factors affecting maize production in other regions. These factors include family size, labor and capital and inputs (fertilizer, improved seed). This factors have been identified as the factors to be investigated in the study because of the significant role they play in determining the quantity of maize that a given area or farmer can

produce. This are considered the factors of production that the farmer shall actively manage to harness quantities of production. The study also delimited itself to cheha woreda because of the ability of the woreda to produce maize in large quantities owing to the availability of the factors production in the region and good climate that favors the maize crop.

### 1.6 Significance of the Study

The study was important to a number of stakeholders which include: farmers, researchers, extension agent, policy makers etc. Farmers know reasons why they are not able to maximize maize production; they was the position to know the causes and determining that affect maize production; they will learn best farming practices to enhance sufficient collection of maize quantities. Maize collection and manufacturing plants had insights on determining factors that affect maize production, they advised on ways to maximize quantities of maize quantities and this was result to higher production in their region of operation.

Donor communities would educate to enlighten on the challenges, provide monetary support, and collaborate with farmers on solutions to maize producing farmers on the existing problems. Researchers would add exiting pool of knowledge on the concept of maize, document information on effective ways on maximizing productivity thus vital for the Kenyan economy, would enable future researches built on documented knowledge.

### 1.7 Limitations of the Study

The researcher anticipated the language barrier limitation as some of the respondents who are farmers in the local regions are not in a position to communicate in the same dialect fluently and the researcher solved this by the use of translators who came in handy. The study is also limited geographically owing to the terrain of the region. The study was limit in terms of the willingness of the respondents to participate in the study. They viewed the intentions of the research with a lot of suspicion. The researcher therefore aimed to assure the respondents that the data being collected was for confidential and academic purposes only.

### 1.8 Organization of the Study

The study was organization in to five chapters as discussed below:
In chapter one, it consists of the background of the study, statement of the problem, purpose of the study, objective of the study, research questions, assumptions, significance of the study,

limitations of the study, delimitation of the study, terms and the organization of the study. Chapter two, it reviews the literature review has been categorized under various sub headings. Under this chapter theoretical and empirical literatures re included. Chapter three contains the research design to be used, target population of the study, the sampling design and sample size, data collections. Chapter four should discuss the analysis of the data collected and present it in forms of graphs and tables. The information presented was interpreted and discussed. Relationships are established from the information presented and try to deduce the clear meanings of the data collected in the study. Chapter five was the final chapter it consists of the following: findings, conclusion and recommendation.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Theoretical Literature

### 2.1.1 Definition of maize

Maize (*Zea mays* L.) is an exhaustive cereal crop. It is a multipurpose crop that provides food for human, feed for animals especially poultry and livestock and raw material for the industries (Khaliq *et al*., 2004). It is the third most important cereal crop after wheat and rice

### 2.1.2 Factors of maize production

Factors that influence productivity of a particular producer may be classified into three. These are:-

**A. The quantity and quality of inputs used** including land, labor and capital, fertilizer, seeds farm and farmer characteristics and external factors such as government policy (Wiebe, 2006).

**B. Capital inputs** among others include seed, fertilizer, and farm equipment.

**C. Farm and farmer characteristics** on the other hand include factors such as size and topography of area cultivated, location of the farm with respect to input and output markets, age, gender, education level, household size, access to extension services, and access credit (Michele, 2007).

The amount of land that can be sown and harvested is, clearly, tied to available and affordable labor supply. Planting and harvesting are both activities that require far more labor than the rest of the agricultural cycle. In communities where these activities are shared, productivity on individual plots may be greater than if families had to provide all the labor that they could not afford to hire. Communal farming, although no longer common, provides some of the same advantages (Morris, 2004). High labor costs may discourage extra hand cultivation and marginally lower outputs. But low agricultural wages discourage participation in the agricultural economy, where industrial or other opportunities exist Scarcity of labor more than land is also a major constraint on production in much of Africa, where larger land areas since colonial times have experienced labor bottle necks, as men were drawn off to work in the mines or to do other

waged work and left women to clear, plant, and weed, with peak agricultural labor demands during the hungry season (Richards 2009). In such contexts, the problem of hunger is linked to underproduction in a vicious cycle.

### 2.1.3 Market demand factor on maize production

The maize market in general is characterized by a variety of marketing arrangements. Since the liberalization of the marketing system, several private sector entrepreneurs have joined the various parts of the maize supply chain. These entrepreneurs include companies that are active in regional maize grain trading, informal cross border traders, produce agents, small and medium millers, transporters, wholesalers and retail stores. Virtually all the domestic transactions made by these players are spot market and cash based. They sell the maize grain in l00kg bags without any grading and premiums prices for quality produce. However, for milled maize, there are three major grades. The flour is sold in kilograms and prices differ by grade (Jones, 2007).

A typical maize supply chain was noted to have the following shortcomings: This supply chain has too many participants with many speculative traders and agents who make the movement of maize time consuming. There is normally over supply of maize during the harvest season as farmers and traders have no stores. Participants' competition reduces as one goes up the chain. No clear flow of market information. Transactions are 'on spot' market and cash based. The markets are thin and volatile in terms of prices, trading volumes and liquidity.

The marketing arrangement is not well developed leading to inadequate market outlets, high transaction costs and minimal value addition (Anderson, 2002). According to Minten, (2010), maize farming in Africa has faced serious challenges that have led to the overall declines of the quantities of maize produced. Denk, (2011) however explains that Africa is a suitable region for maize farming given the suitability of the climatic conditions of the area but the lack of knowledge on the right practices of maize farming has led to the practice decline trends especially in the quantities of maize produced.

Rural livelihoods in many areas depend on the viability of maize production as a commercial crop. On the other hand, the food security of the growing urban population and many rural households who are buyers of maize depends on keeping maize prices at tolerable levels. For many years, policy makers have attempted to strike a balance between these two competing objectives how to ensure adequate returns for domestic maize production while keeping costs as

low as possible for consumers. Maize marketing and trade policy has been at the centre stage of debates over this food price dilemma, including discussions over the appropriateness of trade barriers and the role of government in ensuring adequate returns to maize production, (Ministry of Trade and Industry, 2010).

### 2.1.4. Theory of production

In economics, Production function represents the relationship between the output and the combination of factors, or inputs, used to obtain it.

$Q=f(L,K)$

Where:

Q= is the quantity of products

- L the quantity of labor applied to the production of Q, for example, hours of labor in a month.
- K the hours of capital applied to the production of Q, for example, hours a machine has been working for the production of Q.

EXAMPLE, The Cobb-Douglas production function represents the relationship between two or more inputs in macroeconomics and forecast production.

The Cobb-Douglas production function is a p- typically physical capital and labor - and the number of outputs that can be produced. It's a commonly used function particular form of the production function. It is widely used because it has many attractive characteristics;

The basic form of the Cobb-Douglas production function is as follows:

$Q(L, K) = A L^{\beta} K^{\alpha}$

## 2.2 Empirical Literature

### 2.2.1 Maize production and productivity globally

Maize production in the global arena can be categorized into white maize production and yellow maize production (Meyer et al., 2006). White maize is biologically and genetically very similar to yellow maize, although there is a difference in appearance due to the absence of carotid oil pigments in the kernel which otherwise cause the yellow color of the grain. Production conditions and cultivation methods are largely identical (Martinez, 2004).

World production of white maize is currently estimated at around 65-70 million tons, representing 12-13 percent of the annual world output of all maize. Over 90 percent of the white maize is produced in the developing countries, where it accounts for around one quarter of total maize output and just under two-fifths of the total maize area. In the developing world, a larger area is planted to white than to yellow maize in the tropical highland and sub-tropical/mid-altitude environments, and it occupies about 40 percent of the lowland tropical maize area (Lopez, 2006).

Maize is widely cultivated throughout the world, and a greater weight of maize is produced each year than any other grain. The United States produces 40% of the world's harvest; other top producing countries include China, Brazil, Mexico, Indonesia, India, France and Argentina. FAO. (2010) FAOSTAT shows that in 2008, North America recorded the largest production of maize with about 38.8% of the global output. This is followed by Asia (28.5%); South America (11.2%); Europe (11.1%); Africa (6.9%); Central America (3.4%); and Oceania (0.07%).

Argentina, Brazil and China account for over 60 percent of total maize output in the developing world, China alone for 45 percent. When these countries are excluded from consideration, white maize constitutes over 60 percent of the maize area in developing countries, and just under 60 percent of total maize output in those countries. By contrast, white maize is a product of much lower importance for the developed world. In the United States, for example, by far the world's largest producer of maize, white maize cultivation accounts for less than one percent of the total domestic maize output, produced to a large extent under contract farming due to the relatively limited market (Martinez, 2000).

Yellow maize is considerably more important in their total cereal production than white maize. White maize tends, however, to be a main staple food in certain areas of these countries (Morris, 2004).

### 2.2.2. Maize production and productivity in Africa

Introduced into Africa by the Portuguese in the 16$^{th}$ to 18$^{th}$ century, maize has become Africa's most staple food and feed system. In 2005, the top exporters of maize in sub-Saharan Africa were South Africa, Tanzania, Uganda, Zambia and Swaziland, with the top importers of maize Zimbabwe (a maize exporter until the late 1990s), Angola, Ghana, Kenya and Mozambique facing a growing population, several studies (Pingali, 2004) (World Bank, 2007) note that it is

critical for Kenya and other African countries to increase maize production in order to feed their people. According to FAO/WFP 2004/2005 crop and food supply assessment, the production of the country's staple food, maize was on a long term decline, dropping by 70% over a period of five years in most areas. This was due to non-cultivation of the arable lands due to delayed rainfall and the high risk of making loss from agriculture as well as shortage of seeds for alternative crops among others.

According to reports of IPCC (2007), factors such as endemic poverty, bureaucracy, lack of physical and financial capital, frequent social unrest and ecosystem degradation contribute to Africa's vulnerability to climate variability. Despite progress made in national and international policies since the first world Conference on women in the International Assessment of Agriculture Knowledge, Science and Technology Development (IAASTD, 2009) reported urgent action is still necessary to implement gender and social equity in policies and practices in order to better address gender issues as integral to the development process especially for maize production.

Most of the maize produced and consumed in Africa comes from smallholder rural farms. Production takes place under difficult conditions characterized inter alia, by poor soils; low-yielding varieties; inadequate access to yield-enhancing inputs such as fertilizers and improved seeds; inadequate access to finance by producers, suppliers and buyers; and variable climatic and environmental conditions. There are also heavy post-harvest losses due to poor storage and processing facilities and technologies. The entire maize value chain, from input supply through production to marketing and consumption, suffers from constraints that could be removed if known technologies and policy and marketing innovations could be harnessed effectively and efficiently (FAOSTAT, 2007).

### 2.2.3 Maize productivity in Ethiopia

Maize is one of Ethiopia's most important cereals in terms of production, with four million tons produced in 2011 by eight million farmers across two million hectares making it a significant contributor to Ethiopia's economic and social development.

Maize is the second most widely cultivated crop in Ethiopia and is grown under diverse agro-ecologies and socio-economic conditions typically under rain-fed production. The maize agro-ecologies in Ethiopia can be broadly divided into six major categories (MOA *2005*), including

Moist and Semi-moist mid-altitudes (1700–2000 m above sea level; 1000–1200 mm rainfall), Moist upper mid-altitudes (2000–2400 m; >1200 mm), Dry mid-altitudes (1000–1600 m; 650–900 mm), Moist lower mid-altitudes (900–1500 m; 900–1200 mm), Moist lowlands (<900 m, 900–1200 mm), and Dry lowlands (<1000 m, <700 mm)). These are mostly located in the SW and W Oromia, W and NW Amhara, parts of the Southern Nations Nationalities and Peoples Region (SNNPR), and Ben Shangul-Gumuz (BSG). Taken together, the Semi-moist and Moist ecologies cover about 75 % of the national maize production area whereas the dry ecologies cover the remaining 25 %.

Agricultural productivity is becoming increasingly important as the world population continues to grow a productive farm is one that provides most of the resources necessary for the farmer's family to live, such as food, etc. It is a farm which ensures food security as well as a way to sustain the well-being of a community (survey result, 2015).

Maize arrived in Ethiopia slightly later, around the late 17th century (Huffnagel 1961), and was mainly grown as a subsistence crop in the mid-altitudes (1500–2000 m above sea level) in southern, south-central, and southwestern parts of the country.

### 2.2.4. Maize production in Cheha woreda

Maize production in Cheha woreda is a source of nutrition to many households providing carbohydrates which is a vital ingredient to human health. food in primary schools for lunch so that student can actually save on time wasting and concentrate on their studies. Another very important aspect with effect of maize production is it supports efforts of the government to make food secure country and alleviate hunger to its citizens. Improving the productivity of maize-based farming could significantly reduce hunger, enhance food security and alleviate poverty through increasing the purchasing power of the farmers. Increases in agricultural productivity lead also to agricultural growth and can help to alleviate poverty in poor and developing countries, where agriculture often employs the greatest portion of the population.

As farms become more productive, the wages earned by those who work in agriculture increases. At the same time, food prices decrease and food supplies become more stable. Laborers therefore have more money to spend on food as well as other products… However, it is not only the people employed in agriculture who benefit from increases in agricultural productivity. Those employed in other sectors also enjoy lower food prices and a more stable food supply. Their

wages may also increase. Agricultural productivity is becoming increasingly important as the world population continues to grow a productive farm is one that provides most of the resources necessary for the farmer's family to live, such as food, etc. It is a farm which ensures food security as well as a way to sustain the well-being of a community (survey result, 2015).

**Definition of terms**

**Income:** A factor of production that is not wanted for itself but for its ability to help in producing other goods (Martinez, 2000). In this study the term income will be used to refer to the monetary requirement in the maize production process.

**Production:** it is the quantity (value) of agricultural output per unit quantity (value) of input(s) used in production (OECD, 2001).

**Input:** Insertion of all the necessities production cycle to bring forth agricultural output in terms of seeds, fertilizers, pesticides, implements, capital, human labor, weeding, harvesting, threshing, all management operations and method of cultivation.

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.1. Site selection and description of the study area

The description of the study area was important for the decision of investors to invest their resources in the woreda. Cheha woreda is found in Gurage Zone of, SNNPR part of Ethiopia. It is located 180km,south west of Addis Ababa and 22km south west of Wolkite town. According to the classification used in Ethiopia, the climatic condition of the cheha woreda was characterized as woina dega climatic zone. The mean annual ambient temperature of this woreda was between 18 $^{o}$c and 32 $^{o}$c. The absolute maximum temperature usually occurs from March to May and the minimum temperature also occurs from June to November. Average annual rainfall was about 1900mm.

The total population of cheha woreda was 137665 for the year 2007. The average growth rates of the population were around 4.1%. Of the total population 50.55% are female while the rest are male.The economic sector of cheha woreda was mainly composed of farm, trade, and urban agriculture, shopping, and cooperatives are major as which characterize the woreda.The major social services available in the woreda are water supply, education, health, road, telecommunication and etc there were clinics both private and public service.

## 3.2 Research design

The study used an explanatory survey design. These enabled the researcher visit the maize production and seek responses from the farmers. Explanatory research helps determine the best research design, data collection method and Selection of subjects (Russell, 2005). The survey research design sought to identify the respondents by selecting the stakeholders in the maize farming activities. The basic idea behind research design is to measure variables by asking the respondents questions and then to examine relationships among the variables. The research design helped attempt to capture attitude or patterns of the questions being sought.

## 3.3 Target population

Target population study was a study of a group of individuals taken from the general population who share a common characteristic, such as age, sex, or health condition (Kombo and Tromp,

2006). The population of respondents that constitute the bulk of the population in the Cheha Woreda were pick in order to evaluate how factors affecting maize production and their effects on the production quantities that target population included the maize farmers, in the Woreda.The study employed simple random sampling technique to select farmers from each ward in Cheha Woreda.

According to the statics of Cheha Woreda office (2015) the total numbers of maize farmers in the woreda of two kebele (Gasorie & jato) are 200 and from this the study targeted 66 the farmers are selected because they are the group of farmers who are know on the factors of production as the farming was mainly done for commercial purposes.

### 3.4. Type and sources of data

In order to collect reliable data, both primary and secondary sources of should use for the researcher. To achieve the purpose of this study, the primary data were collect through questionnaire, interview. Primary data such as what factor maize production in the selected Woreda. Secondary sources of data also gathered from different published and unpublished documents, books, electronic sources, magazines, written documents & reports of agricultural offices about the maize production.

### 3.5. Sample size

The sample size was considered the major part of all statistical analyses. The computation of the appropriate sample size was generally considered the most important and the most difficult step in statistical study. The sample size plays a crucial role in those cases of statistical studies where the statistical studies like sample survey, experiments, observational studies, etc. were involved. the sample size to be employed for the identified target population are scientifically computed ,but due to lack of budget and time, the heaviness of the population to interview, we select 66 respondents to gather the relevant information.The formula that is using to determine class interval for determination of scientifically acceptable sample size, the researcher were prefer to use the following formula

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

Where: n = statistically acceptable sample size

N = Total size of target population

e = level of precision (error level) at 90% confidence level (0.1).

Using this formula, the statistically acceptable sample size from the given population with maintaining a 90% confidence level is found to be 66 maize productions.

$n = 200/1+200(0.1)^2$

n = 66 (The sample size of two kebele,such as Gasorie &Jato) in this case, the target population of gasorie kebele is 85 and Jato kebele is 115. when to get sample size of two kebele using this formula;

nk1= N1/N*n nk2=N2/N*n

nk1=85/200*66 nk2=115/20066

nk1=28 nk2 =38

### 3.6. Data collection procedure

The researcher acquired a permit from the district offices to conduct the research. The permit was used to get permission from the Frontline Extension Agricultural Officers within to administer the questionnaires to the farmers. Primary data included data collected during the actual field study. These methods were used to as obtain specific and current data needed in the study which is not available in previous studies, obtained from the field by use of questionnaires and interviews. Data was collected by the researcher assisted by assistants who administered the questionnaire to the respondents. Secondary data were collect in order to provide the necessary support to the primary data accumulated. Secondary data also gives information that cannot be obtained from primary data. It is mainly gathered from existing literature reports, seminar papers, books, research journals, magazines, publication among others, the internet and past research information.

### 3.7 Data Analysis

The study adopted both the qualitative and quantitative analysis in order to achieve the objective of the study. According to Cooper (2003) qualitative research includes an array of interpretive techniques which seek to describe, decode, translate and otherwise come to terms with the meaning, not the frequency of certain more or less naturally occurring phenomena in the social world. He refers it as interpretive research because it seeks to develop understanding through a detailed description. For quantitative techniques, inferential statistics were applies which dealt with drawing conclusions and, in some cases, making predictions about the properties of a population based on information obtained from a sample.

### 3.8. Analysis of descriptive statistics

Descriptive statistics describe the main features of a collection of data quantitatively. It aims to summarize a data set quantitatively. Descriptive statistical use to describe coefficient of variation, variance, standard deviation, standard error etc. So we used the descriptive statistics to describe how much a variation occurs within the data collected related to maize production. It could also employ to describe variance using t- tests or ANOVA and to describe the standard error of the parameters of our econometric model which is essential to assess how closely our sample related to the population. We used the descriptive statistical analysis simply to describe what was gone on in our data and to present the quantitative description of the maize production i.e. producer, retailers and consumer. We were also determining factor affecting maize production. For descriptive statistical analysis, we were used percentage, average and t-statistics to our quantitative data number.

### 3.9. Econometric Analysis

To analyze the determining factor affecting maize production we were use multiple linear regression model of OLS (ordinary least square) estimation. It could be an essential method of econometric analysis to recognize and realize patterns of the influencing factors. The most important variables that could determine maize productivity include family size, income, land size, labor, fertilizer, oxen and improved seed.

**Definition of dependent variables**

**Productivity (Q)**: It was a continuous variable representing dependent variable. It was the amount of maize produce by the household and measured in quintal. It is the quantity of

agricultural output per unit quantity (value) of input(s) used in production (OECD, 2007).It is affected by different factors, like family size, labor force, inputs...etc.

**The Independent variables are:**

**Family size**– this was the total number of family members that can be taken as a proxy for maize production. This continuous variable was expected to influence production of maize positively. That means as the family size increases the production increases.

**Labor force**– this was a continuous variable representing the availability of economically active labor force in the household (male and female). It was expected to take positive effect. An increase in economically active labor force to increase the farmer's participation in the maize farming.

**Land size:** The total land used for maize production was measured in terms of number of hectares the household owns and it was expected to affect the household level maize production positively because, a farmer who owns a large area of land for maize production than a farmer who own less area of land and under the same input utilization condition can produce more.

**Fertilizer:** Is any material of natural and synthetic origin that applied to soils or plant tissues to supply one more plant nutrient essential to the growth of plants. Fertilizer would artificial or natural (compost).This important is one of the most inputs which increase the quantity of maize.

**Improved Seed**: This is a dummy variable and it refers the availability of improved maize verities. If the producers used improved inputs that would help to improve his/her production. Improved seed varieties are associated with high productivity level (Abay, 2007).Therefore; improved seed is expected to have positive effect on production of maize.

**Education of household head:** it is a continuous variable and refers to the formal schooling of a respondent during the survey period. Those household heads who had formal education determines the readiness to accept new ideas and innovations, and easy to get supply, demand and price information and this enhances farmers' willingness to produce more and increase volume of sales. Therefore, formal education was hypothesized to positively influence maize

production.

**Sex:** Sex of a respondent is one of the variables that can be considered in the model, being categorized as (0) female (1) male

**Age**: it is a continuous variable measured in years. A farmer with longer period of experience in production was assumed to have a better knowledge than who has a lower experience in agriculture because through time producers acquire skill about marketing and supply better than those who are less experienced. It is also assumed that as age increases the production capacity will decrease and amount produced and production decrease. Hence, both inverse and direct relation is assumed to the amount supplied Eleni.Z (2009).

**Marital status**; is the condition when the two opposite partners are joint together with agreement. It is one of the determinant variables that influence the production habits of households.

### 3.10. Model Specification

**Multiple Linear Regression Analysis**

Linear regression is a method of estimating or predicting a value on some dependent variable given the values of one or more independent variables. Like correlations, statistical regression examines the association or relationship between variables. Unlike correlations, however, the primary purpose of regression is prediction (Geoffrey M. et al., 2005:224-225). In this study multiple regressions woold employed. Multiple regression analysis takes into account the inter-correlations among all variables involved. This method also takes into account the correlations among the predictor scores (John Adams, et al., 2007:198). They added multiple regression analysis, which means more than one predictor is jointly regressed against the criterion variable. This method is used to determine if the independent variables will explain the variance in dependent variable.

**Regression Functions**

The equation of regressions on this study is generally built around two sets of variables, namely dependent variable (quantity of maize) and independent variables (sex, age, family size, availability of improved seed, land size, labor, marital status, education, fertilizer). The basic

objective of using regression equation on this study is to make the study more effective at describing, understanding and predicting the stated variables.

**Regress Performance on Selected Variables**

$Yi = \beta0 + \beta1X1 + \beta2X2 + \beta3\ X3 + \beta4X4 + \beta5X5 + \beta6X6 + \beta7X7 + \beta8X8 + \beta9X9 +$

Where:

Y is the response or dependent variable- performance

β0, is the intercept term- constant which would be equal to the mean if all slope coefficients are 0.

β1, β2, β3, β4, β5, β6, β7, β8, and β9, are the coefficients associated with each independent variable which measures the change in the mean value of Y, per unit change in their respective independent variables.

$X_1$ =family size, $X_2$ =sex, $X_3$ =land size, $X_4$= labor cost, X5= fertilizer, X6=marital status, X7=improved seed, X8=Education, X9=age, U=Error term/omitted variable.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

This chapter analyzes the data collected for the study. It interprets the data in relation to the research objectives. After data collection procedure, the researcher dealt specifically with data analysis of the collected procedure. The researcher ensured that all the data collected, information was close to the realized issue. The collected data was analyzed and presented in the form of statistic tables.

## 4.1. Results of Descriptive Statistics

The descriptive statistics analysis made use of tools such as mean, percentage, standard deviation and frequency distribution. In addition, T-test and Chi-square test statistics were employed to compare defaulter and non-defaulter groups with respect to some explanatory variables.

## 4.2 Descriptive statistics for continuous variables

The researcher also sought the family size of the respondents. The finding shows that respondents minimum family size of is 1 and the maximum family size is 9. Again also the average number of the family size is 6 (Table 1). And also researcher sought to establish the size of land they practiced farming as revealed by Table 1, The average size of own cultivated land the minimum and the maximum being 0.5 and 4 ha, respectively and standard deviation is 0.82 (Table1). This indicates that most of the farmers have low land size The reason why majority of the respondents had small land size could have been because they consist of a group of small scale farmers hence do not own large tract of land.

Labor shows the economically active and employed people in the household (male and female). The result presented on table1 shows the maximum labor force employed in the maize production is 28 persons.. This when the time of harvesting, weeding and sowing. The minimum amount of labor employed in maize production is 3. The mean average labor force used in the area was 0.93 and its standard deviation is 0.24. Age farmer with longer period of experience in

production was assumed to have a better knowledge than who has a lower experience in agriculture. The maximum age of farmers on this area 62 and minimum age was 26.shows that farmer minimum education level and maximum education level was 0 and 9 respectively.

.**Table1:Summary of descriptive statistics for continuous variable**

| Variable | Minimum | Maximum | Mean | Std.Dev |
|---|---|---|---|---|
| Family size | 1 | 9 | 3.893939 | 2.076453 |
| Land size | 0.5 | 4 | 1.742424 | .828541 |
| labor force | 3 | 28 | 10.3333 | 4.2404347 |
| Age | 26 | 62 | 42.62121 | 8.327462 |
| Education | 0 | 9 | 1.19697 | 1.970706 |

Source: survey result, 2019

**4.2.1 Descriptive statistics for categorical variables**

The researcher sought to find out the fertilizers used by respondents in cheha woreda. The results were as presented on table1 above. From the findings presented on table l, the farmer's have use access fertilizer and not use access fertilizer by 60% and 40% respectively. The result shows most of the respondents in cheha woreda did not use access fertilizer above 40%. This is because; some respondents believed fertilizer has a negative impact on maize production. This due to lack of awareness and knowledge about the importance of using fertilizer.

The researcher also sought to identify weather the available improved seed is accessed to the farmers or not. As below table indicates 52% of the respondents have access to availability of improved seed and the rest 48% of the respondents have not access to availability of improved seed. Sex is one of the variables that can be not more considered female as this study. Means as this study, male is 64% and female is 36%.its indicate when to use access improved seed maize productivity of farmers increased.

The probability condition two opposite partners are joint together with agreement are vary, it's there probability of, married 58%,unmarried 34% and divorced 8% are explain the following

table.

Table2: summary of descriptive statistics for categorical variable

| Variable | Components | Frequency | Percentage |
|---|---|---|---|
| **Sex** | **Male** | **42** | **64%** |
| | **Female** | **24** | **36%** |
| | **Total** | 66 | 100% |
| **Improve seed** | **Yes** | **34** | **52%** |
| | **No** | **32** | **48%** |
| | **Total** | **66** | **100%** |
| **Marital status** | **Married** | **38** | **58%** |
| | **Unmarried** | **23** | **34%** |
| | **Divorced** | **5** | **8%** |
| | **Total** | **66** | **100%** |
| **Fertilizer** | **Yes** | **39** | **60%** |
| | **No** | **27** | **40%** |
| | **Total** | **66** | **100%** |

Source: survey result, 2019

### 4.3 Major inputs being used for maize production in cheha woreda

The major inputs being used for maize production example, the fertilizer, labor, improve seed, weeding, harvesting, threshing, and all management operations, method of cultivation and other factors determine the productivity of maize in the area.

**Fertilizer:** This is important one of the most inputs which increase the quantity and quality of maize production.

**Improve seed:** If the producers used improved inputs that would help to improve his/her production and and also farmers when use improve seed his/her product have quality.

**Labour:** When the number of labor force increases, the quantity of maize production increases. Because, the amount of labour force is determine the productivity of maize.

Generally, all this inputs used for maize production give quality for their product and determine the productivity of maize in this area.

#### 4.3.1 Results of econometrics analysis

Econometric analysis is one of the important methods of analyzing the significance relation of the independent and dependent variable. It uses different testes of significancy, like t-test-value and standard error. In this study, the researcher uses the p-value to test the significant effect of the independent variable on the dependent variable, and the researcher uses multiple linear regression models. Multiple linear regression models are a method of estimating or predicting a value on some dependent variable given the values of one or more independent variables.

The given the R Square value of 0.2169 and adjusted R square value of 0.0910, it may be realized that 21 % of the variation in production can be explained by the independent variables. The remaining 79% of the variance is explained by other variables not included in this study.

### 4.4 Factors affecting maize production

The most important factors that affect the production of maize are land size, education, age, sex, fertilizer, labor force, family size, availability of improved seed and marital status, etc. In order to identify the most determinant variables in this study, an attempt has been made by using multiple linear regression methods.

At 5% significant level**, 10% significant level***

Regress Production function on Selected Variables is equated as follows.

$Yi = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3\ X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7X7 + \beta 8X8 + \beta 9X9 + \mu i$

The unstandardized coefficients column, gives us the coefficients of the independent variables in the regression equation indicated below.

**Quantity of maize**

=Land size (-3.060) + Sex (4.894) + Marital status (-2.999) + labour (12.755) +μi

It was also seen that availability of land size, labor force, sex, and marital status of the farmers were one of the determinant factors of maize production. As Table above illustrates, the most significant factors that affect maize production are sex and labour force. These independent variables have a positive relationship with quantity of maize productivity. This means when labour force of households increases, their maize production increases significantly. The researcher interprets these significant variables as follows.

**Labor force:-** It has significant effect and positive relationship with maize production. It is significant by 5%. When farmers employ 1 labor force per ha of their farm size, maize productivity is increased by 12.7556qt. When the number of labor force increases, the quantity of maize production increases. The reason of these is when the number of employees on land increase, the amount of maize production also increases. Because, the amount of labour force is determine the productivity of maize.

**Sex of household**:-Sex of house hold head has significant and positively relationship with the maize production. Having male headed household increased maize productivity by 4.894 units compared to those of female headed. This could be due to more performances of male at field level and manage more than the female. Most of the time male has also high opportunity to get information about the use of improved maize varieties for improving productivity than female in different mechanisms.

**Land size:-**The model result showed a negative and significant relationship between proportion of cultivated land allocated for maize and probability of production of improved maize productivity at 10% level of significance. Other variables held constant, an increase in proportion of land size for maize by 1% would result in 16.5% decrease on the probability of maize productivity. The reason might be decreased risk taking behavior of farmers with an increase proportion of maize productivity area such, as wedds, pest and herbs.

**Marital status:-** regarding marital status, being a widowed household head decreased maize productivity by about 8.3058qt compared to those who are married. The results were significant and have negative relationship with maize productivity.

The Table further shows that, all the explanatory variables included sex and marital status in this study can significantly explain at 10% significance level to the variation on the dependent variable.

Table3 the most determinant factors of maize production

| **Maize productivity** | **Coef** | **Std.Err** | ***t*-value** | ***p*-value** |
|---|---|---|---|---|
| Age | 0.063 | 0.151 | 0.417 | 0.679 |
| Sex | 4.894 | 2.748 | 1.781 | 0.080*** |
| Education | -0.157 | 0.620 | -0.253 | 0.802 |
| Family size | -0.400 | 0.593 | -0.675 | 0.502 |
| Land size | -3.060 | 1.572 | -1.947 | 0.057*** |
| Availability of improved seed | 0.914 | 2.928 | 0.312 | 0.756 |
| Fertilizer | -2.208 | 3.136 | -0.704 | 0.484 |
| Labour | 12.755 | 5.293 | 2.410 | 0.019** |
| Marital (married) base category | | | | |
| Unmarried | -0.7967 | 2.6450 | -0.30 | 0.764 |
| Divorced | -8.3058 | 3.4775 | -2.39 | 0.020** |
| Constant | 18.370 | 10.346 | 1.776 | 0.081 |

Source: survey result, 2019

# CHAPTER FIVE

# CONCLUSIONS AND RECOMMENDATION

## 5.1 Conclusions

The study shows quantity of maize production is determined by several factors of production in agriculture. The input used for example the fertilizer, labor, available seeds and other factors determine the production of maize in the area.

The descriptive statistics analysis made use of tools such as mean, percentage, standard deviation and frequency distribution. The study indicates that the respondent's minimum family size is1 and the maximum family size is 9, the average number of the family size is 3.89. In the average size of own cultivated land the minimum and the maximum being 0.5 and 4 ha, respectively. The maximum labor force employed in the maize production is 28 peoples. This when the time of harvesting, weeding and sowing. The minimum amount of labor employed in maize production is 3. The mean average labor force used in the area was 10.3. The study sought to investigate the farm inputs which are important for maize production. These are fertilizer and available improved seed. The farmer's to uses access improve seed and not uses access improve seed this area was 52% and 48% respectively. From fifty respondents 52% of the respondents have access to availability of improved seed and the rest 48% of the respondents have not access to availability of improved seed.

The significant factors that affect maize production are labour and land size. In These independent variables land size have a negative relationship with quantity of maize production and labour have positive relationship with quantity of maize production. This means when labour of households increases, their maize productivity increased significantly. About this area the availability of fertilizer of the farmers have use access fertilizer and not use access fertilizer by 60% and 40% respectively. Marital status also participate on maize productivity in different condition such as, married, unmarried, and divorced at 58%,34% and 8% respectively. So divorced people are decreased maize productivity by 8.3058qt.

## 5.2 Recommendation

Following the findings and conclusions from the study, the following recommendations were drawn:

- The agricultural sector should develop new technologies that will help the farmers to employ more labor and reduces the migration of the active labor force from rural to urban areas.
- The extension workers should pay more attention to the rural farmers how to produce more product on the large farm size and impacting more skills and experience base on how to use modern farm implement and how to maintain the farm produce so as to increase the level of crop production in the local government area of the state.
- In addition, government should help the rural farmers and to educate people how they can be stable and remain productive even when divorced.
- Measures should be put across by the government to ensure farmers to have their own assets the government should allocate more subsidies for the agricultural sector within the national budget to ensure there is an easy working channel by the farmers to improve maize production. This will have a more positive impact in the economy of the country as there will be more products sold.
- The government should address the significant importance of family size and should facilitate the provision of work around the farming area.

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**WOLKITE UNIVERSITY**

**COLLEGE OF AGRICULTURAL AND NATURAL RESOURSE**

**DEPARTEMENT OF AGRI-ECONOMICS**

**QUESTIONNAIRE FOR FARMERS ON ANALYSING OF MAIZE PRODUCTION IN CHEHA WOREDA**

**Background Information**

Dear respondents this questionnaires is designed to investigate the factor affecting maize production you are sincerely and kindly requested to fulfill below questionnaires. You are one of the respondents selected to participate on this study. Please assist us in giving correct and complete information to present a representative finding on the current status of the factors affecting the maize production

Background Information

PART ONE: Demographic characteristics

1. NAME OF RESPONDENT:_____

2. Sex: a. Male b .Female

3. Age of the household head: _____

4. Marital status: a. married b.unmarrid c.divorced d.widwo

5. How many family members do you have? _____.

6. Education (years of schooling)_____

PART TWO: Production activity

7. Have you participate in maize cropping or farming? a. yes b. no

8. If yes in question no 7, for how long have you been practicing maize farming? _____

9. If no in question no 7, why? ----------

10. Farm Land size:_____

11. Size of Land where you practice maize farming _____(hectare)

12. How many quintal of maize do you produce per hectare?_____.

13. Do you use improved seed? a.yes b. no

14. Which types of improve seed you use if your answer is yes for question no 13?

15. Which type of livestock do you have?

a. cow c. donkey

b.oxen d.sheep and goat

e.all f. none

16. If your answer is oxen how many oxen do you have?_____

PART THREE: MARKET CONDITIONS

17. Where do you sell your product?

a. Wolkite c. Woliso

b. Dire dhawa d.To all

18. To whom do you sell your produce?

a. Wholesalers b. Retailers c. consumer d. to all

19. How far is the nearest market place from your village? In km_____, in minutes:_____

PART FOUR: IMPUT APPLICATION

20. Do you use fertilizer? a. Yes b. no

21. If your answer is yes in question no 16 what types of fertilizer you use?

a. Organic fertilizer b. inorganic fertilizer c. both organic and inorganic fertilizer

22. How money quintals of fertilizer per hectare do you use?_____

23. What is the price of fertilizer fluctuates? Yes/no

24. If your answer is yes in question no 23 what is the reason?

25. How many labour force employed?

26. How much do you pay for each labor/day or per hour? _____

27. What is the level of your income per year?

# Appendix A: Regression

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| Model | 1396.06166 | 9 | 155.117962 | Number of obs = | 66 |
| Residual | 5041.75652 | 56 | 90.0313664 | F( 9, 56) = | 1.72 |
| | | | | Prob > F = | 0.1052 |
| Total | 6437.81818 | 65 | 99.0433566 | R-squared = | 0.2169 |
| | | | | Adj R-squared = | 0.0910 |
| | | | | Root MSE = | 9.4885 |

| maize | Coef. | Std. Err. | t | P>\|t\| | [90% Conf. | Interval] |
|---|---|---|---|---|---|---|
| age | 0.063 | 0.151 | 0.417 | 0.679 | -0.189 | 0.315 |
| sex | 4.894 | 2.748 | 1.781 | 0.080 | 0.297 | 9.490 |
| edu | -0.157 | 0.620 | -0.253 | 0.802 | -1.194 | 0.881 |
| fmz | -0.400 | 0.593 | -0.675 | 0.502 | -1.391 | 0.591 |
| Lands | -3.060 | 1.572 | -1.947 | 0.057 | -5.689 | -0.431 |
| imprs | 0.914 | 2.928 | 0.312 | 0.756 | -3.982 | 5.810 |
| ferti | -2.208 | 3.136 | -0.704 | 0.484 | -7.453 | 3.038 |
| Labour | 12.755 | 5.293 | 2.410 | 0.019 | 3.903 | 21.608 |
| marital | -2.999 | 1.760 | -1.704 | 0.094 | -5.943 | -0.055 |
| _cons | 18.370 | 10.346 | 1.776 | 0.081 | 1.067 | 35.674 |

# Appendix B: VIF

```
. vif
```

| Variable | VIF | 1/VIF |
|---|---|---|
| sex | 1.26 | 0.795580 |
| Lands | 1.22 | 0.816503 |
| marital | 1.21 | 0.824022 |
| ferti | 1.21 | 0.829847 |
| Labour | 1.17 | 0.855252 |
| imprs | 1.15 | 0.866652 |
| age | 1.14 | 0.880823 |
| fmz | 1.09 | 0.914750 |
| edu | 1.08 | 0.927552 |
| Mean VIF | 1.17 | |