

FACTORS AFFECTING WHEAT PRODUCTIVITY IN OROMIA REGION.

(IN CASE OF YAYA GULALE WOREDA).



SALALE UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

A Thesis Submitted to Department of Economics, College of Business and Economics, Salale university for the partial fulfillment of the requirements for the award of masters of science in Development Economics.

By:

Habtamu Megersa Adare

Main Advisor: Prof Manoj Kumar

Co-Advisor: Solomon Tessema (Senior Lecturer)

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Fitche, Ethiopia

DECLARATION

I Habtamu Megersa Adare, Id. No. 0133/13 do hereby declare that this thesis entitled “Factors affecting wheat productivity in Oromia region in case of Yaya Gulale Woreda” is my original work and that it has not been submitted partially or in full by any other person for an award of degree or publication in any other university/institution.

Submitted by: Habtamu Megersa

Full Name _____ Signature _____ Date _____

CERTIFICATE

This is to certify that the thesis entitled “Factors affecting wheat productivity in oromia Region in case of Yaya Gulale Woreda” submitted to department of economics college of business and economics, Salale university by Habtamu Megersa for the degree of masters of science in Development economics is original work done by the candidate under my supervision. I further certify that the entire thesis represents the independent work of Habtamu Megersa and all the research works were undertaken by the candidate under my Supervision and guidance.

This thesis has been submitted for examination with my approval.

Name of main Advisor; prof. manoj kumar Signature



Date, Aug.7/2022

Name of co-Advisor _____ Signature _____ Date _____

APPROVAL SHEET
SALALE UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ECONOMICS
REVIEWERS APPROVAL SHEET

The undersigned certify that I have read and hereby recommend Department of Economics Salale University, to accept the thesis entitled “Factors affecting wheat productivity in Oromia region in case of Yaya Gulale Woreda” which has been submitted by Habtamu Megersa Adare in partial fulfillment of the requirements for the award of a Master Degree in Development Economics.

Submitted by:


Habtamu Megersa Adare

Name of student

Signature

Date

Approved by:

Name of Main advisor	Signature	Date
prof. manoj kumar		Aug.7/2022
Name of Co-advisor	Signature	Date
_____	_____	_____
Name of External Examiner	Signature	Date
_____	_____	_____
Name of Internal Examiner	Signature	Date
_____	_____	_____
Name of Chairperson	Signature	Date
_____	_____	_____
Name of Department Head	Signature	Date
_____	_____	_____

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ACRONYMS

ARD= Agriculture and Rural development

BoARD = Bureau of Agriculture and Rural development

CIMMYT= Centro International para el Mejoramiento del Maize y el Trigo

CSA = Central Statistics Agency of Ethiopia

DAS = Development Agents

EPID = Extension and Project Implementation Department

EPRDF = Ethiopian People's Revolutionary and Democratic Front

FAO STAT = Food and agricultural organization statistics

FDRE = Federal Democratic Republic of Ethiopia

FGD = Farmers Grain Development

FTC= Farmers Training Centre

GDP = Gross Domestic Product

HH_s=house hold heads

IVS = Improved variety seed

MoARD= Ministry of Agriculture and Rural Development

RDA=rural development association

SNNP = Southern Nation and Nationalities peoples

UNEAT=United Nation Economic Commission of Africa Trade.

VIF = Variance Inflection Factor

WB = World Bank

Y/G/W=yaya gulale woreda

ABSTRACT

This research is done based on the major factors that affect the productivity of wheat crop in the case of Yaya Gulale woreda. The aim of this study is to identify the main factors that affect wheat productivity and to see the linear relationship between production of wheat which is dependent variable and farm experience, Fertilizer's, rented land, borrowed birr, oxen and market distance which are independent variables. The data collection was done through both primary and secondary sources that obtained from Oromia region in of Yaya Gulale woreda agriculture and rural development office, Yaya Gulale woreda agricultural research center and woreda farmers' cooperative association. This research analysis was both descriptive and inferential statistics. From multiple linear regression model analysis result finding indicate that some variables like, market distance from farmers has negative effect on wheat productivity. But other variables like farm experience, Fertilizer's, rented land, borrowed birr and oxen have positive relationship with wheat productivity. And independent variables like; farming experience, fertilizer, rented land, borrowed birr for inputs and oxen in the multiple linear regression analysis in the model is significant. This means maximum variables are significant.

Government and non-government bodies should develop modern farming system, arrange forum, exhibition for experience sharing, give training for farmers and finally, further research should continue.

Keywords--- *Wheat productivity, data collection, multiple linear regression, Yaya Gulale Woreda, Agricultural inputs and Rural development.*

CHAPTER ONE

INTRODUCTION

1.1. Back ground of the study

Agriculture is the backbone of Ethiopian economy. This sector significantly contributes about 27.5 billion dollars or 34.1% to the GDP, employs about 79% of the population, accounts for 79% of foreign currency earnings, and is the major sources of raw material and capital for investment and market (Diriba, 2020).

In Ethiopia, wheat is produced by both small-scale subsistence farmers and large-scale commercial farms (Tadesse et al., 2018). As Minot et al. (2015) indicated, large-scale commercial farms have only 50–80 thousand hectares of land and produced 1.5–2.0 million quintals of wheat.

Ethiopia ranks 31st in the world with 4.2 million quintals produced on 1.7 million hectares of land (Goshu et al., 2019). It is one of the largest sub-Saharan African wheat producers and ranks second to South Africa in terms of total wheat area coverage and the amount produced (Hei et al., 2017). On the other hand, according to CSA (2012) and Ethiopia takes the first rank with an average annual production of 360 million quintals between 2011 and 2014 production seasons.

According to Report of FAOSTAT; indicates that on average wheat production and total area coverage decreases from 2000 to 2017. According to Gebreselassie et al. (2017), the main reason for this significant annual variation is primarily due to variation in rainfall which means that if the rainfall is good, the production is also good, whereas if the rainfall is not sufficient, the status of the production is also insufficient. still Ethiopian wheat production is relatively small by global standards (Hei et al., 2017).

The majority of domestic production of wheat is grown in Oromia and Amhara regions of Ethiopia (Bergh et al., 2012). In terms of regional contribution, the production of wheat originates from Oromia (57%), Amhara (28%), SNNP (8.7%) and Tigray (6.2%) (CSA, 2013).

The average wheat area per farm is also largest in Oromia regional state of the country were farmers plant an average of 0.43 hec per farm. This is the result of the existence of large farms in

Bale and Arsi areas which are the main wheat-growing zones of the country (Minot et al., 2015). Despite of the fact that, Yayya Gulale district has high potential for wheat production, the yield has been 13 quintals per hectare which is below regional average in 2016/17 production season. Its production only increased by .05% and 0.02% in 2016 and 2017, respectively (ARD ,2017). This shows as production and productivity of the crop remain in a question for a long period of time in Ethiopia in general and in study area, Yayya Gulale Woreda in particular this is the main motivation behind this study which aims to find the source of the problem.

1.2 Statement of the Problem

Ethiopia is an agrarian country where more than 80% of the total population depends directly or indirectly on agriculture. Most of the Ethiopian farmers are subsistence wheat producers who follow traditional production system (Tadesse et al., 2018), and they are smallholder farmers who have small size of land (Minot et al., 2015). Wheat is one of the most important staple crops of the country in terms of production and consumption (Rashid, 2010). However, still, the Ethiopian government importing approximately 180 million quintals of wheat per year (World Bank, 2018). Wheat productivity is mostly farm to fork which means the farmers produce more of it for their consumption at home and less of it for the market (Gebreselassie et al., 2017; Mamo et al., 2016). But the main question is why those farmers produce wheat for only consumption. The reason behind this is due to the existence of several production constraints (Heiet al., 2017). These directly lead to less production and productivity, incompetency, rising consumer demand and higher food prices, reduce global supply fluctuations and underdevelopment of the wheat market. Although farmers' low educational level has also a negative influence on their readiness to accept the new wheat varieties (Bekele & Shiberu, 2014; Minot et al., 2015). As the educational level of the farmers is low, their readiness to accept the newly coming wheat seed varieties also becomes low. Wheat rust diseases, the high cost and shortage of input, unpredictable rain, lack of credit access and weed were among the major wheat production constraints Hei et al. (2017) and Tadesse et al. (2018). Specifically, as the researchers discussed, limited availability of rust-resistant varieties exposed wheat products to a variety of diseases.

A study by Willy (2018) using descriptive statistics around Ambo district of Ethiopia indicated that shortage of working capital to start wheat production and trading, lack of appropriate threshing facilities which leads to high post-harvest losses and lack of quality indicators such as grade and standardization of traded wheat were the biggest problems of Ethiopian wheat

production and marketing system. According to the finding of the researcher, the threshing method and the material which the farmers used were primitive and the local type of threshing material causes losses of wheat seed during time of threshing.

Research by Taffesse et al. (2012) on productivity growth in Ethiopia identified that both naturally occurred and human-made gaps that are hindrances for low development of wheat sector include low levels of input use by the farmers, low levels of irrigation, soil degradation and soil erosion and inadequate agricultural research and extension services.

Goshu et al. (2019) investigated that diseases (stem rust, leaf rust and stripe rust), environmental factors (difference in agroecology) and pests (aphids, armyworms and birds) were the primary wheat production constraints in Ethiopia.

Coming to Oromia region, the total area covered by the wheat farm in Ethiopia about (50%) is located in Oromia region. Arsi, Bale, and parts of Shoa are considered the wheat growing belt. The average wheat yields in per hectare was 26.75 quintal in Ethiopia, 29.65 quintal in Oromia Region and 32.09 quintal in Arsi zone (MoFED, 2014).

Oromia region in North Shewa Zone, wheat production is one of the most widely produced cereal crops. According to the Agricultural Office of North Shewa Zone (2020), cereal crop production particularly wheat production in the zone is highly constrained by inadequate transportation network, limited numbers of traders and market outlets, inadequacy of credit access, weak bargaining power of producers, lack of flour industries, price instability, lack of storage facilities, poor-quality mechanism and weak market information. According to the reports of the Bureau of Agriculture and Rural Development of Y/G/W (2021/022) The major crops grown in Yaya Gulale Woreda are wheat, teff, maize, beans, barely and etc. however, low agricultural productivity, land degradation, poverty were severe and closely interrelated problems are highly constrained to cereal crop production in the districts.

Even though studies were undertaken by Willy (2018), Research by Taffesse (2012), and Goshu et al. (2019), they all fail to include the important variables like Access to information and crop rotation. Because these variables are very important variables which can significantly affect the wheat productivity in study area.

Although, various studies were conducted on factors affecting wheat productivity, no one can still use the effect of Access to information and crop rotation. Similarly, most of the studies were conducted at different periods of time, used different methodologies, and also their findings are also varied. Hence, this particular study was trying to fill the gap mentioned above by the inclusion of additional explanatory variable like; Access to information and crop rotation are additional proxies, which were not used.

By considering these and other related concepts the study tries to reduce these research gaps by conducting variables such as; demographic factors like (age, gender, education and farming experience, intuitional factors like (access market and information, extension contact, access to credit); technological factor such as (fertilizer, improved side, crop rotation); socio-economic factor like (farm land size, oxen, family size and rainfall). Wheat is widely produced in Woreda but, in kebeles farmers has been facing different problems like; food shortage, lower income, hand to mouth, cost of fertilizer and improved seed is increasing from time to time and it becomes out of the purchasing capacity of the farmers, rust diseases, unpredictable rain, dependency on traditional farming, poverty, malnutrition, low productivity of crop especially wheat yield, and low standard of living etc.

In line with these facts, study will be benefit able to identify key factors affecting the production of wheat especially for; Rural development association (RDA), Zonal Administration of the Woreda for policy formulation and on planning so as to assist them to build a holistic strategy that help the farmers in the improvement of wheat productivity and finally for future researchers, research institutions, students and other researchers as an empirical literature review in the study area. The scope of this study was conduct to fill the existing gap by examining factors influencing wheat productivity in the study area selected kebeles of Yayya Gulale Woreda.

1.3 Research Question

1. what are the effects of socio-economic factors on wheat productivity in study area?
2. What are the effects of demographic factors on wheat productivity in the study area?
3. what are the effects of institutional factors on wheat productivity in the study area?
4. what are the effects of technological factors on wheat productivity in the study area?

1.4. Objective of The Study

1.4.1. General objective

The general objective of the study was to assess overview of wheat production and factors that affect wheat productivity in Oromia region in case of Yaya Gulale woreda.

1.4.2. Specific objective

This research paper addresses the following specific objectives:

- 1.To examine socio-economic effects on wheat productivity in the study area.
2. To assess demographic factors of wheat productivity in study area.
3. To explore institutional factor that affect wheat productivity in study area.
4. To assess technological factor that affect wheat productivity in study area.

1.5. Significance of the study

The study is significant in providing new findings to provide some important information for local and regional government officials as well as for agricultural sector in general to evaluate the performance of wheat productivity activities to attain their plan i.e to solve the problem.

Thus, the topic of these and its findings is helpful for regional and national levels. It is also one of the critical topics in the areas of development studies as a discipline.

Generally, the importance of the study is accordingly;

- It creates public awareness about factors affecting wheat production.
- It helps people to take care to reduce its effects on wheat production.
- It will increase the productivity of the farmers in Yaya Gulale woreda.
- It also provides recommendation for intervention towards alleviating the problem.
- Finally, it will also give clue for next generation in study area.

1.6. Scope of the study

Even if there are many woredas in Oromia regions, the study would focused only in Yaya Gulale woreda, due to the wideness and complex nature of the study. The researcher only attempts one of woredas due to; the poor performance of agriculture, supply and demand gap for food and poor infrastructure the study delimited its scope in Yaya Gulale woreda. Selected study area such as: Dedenatige, Iluna dire, Nano Chemer and Godajiba, where multiple linear regression data was used and sample respondents selected through simple random sampling technique. This study covers only Yaya Gulele woreda of Noth Shoa zone, Oromia national regional state of Ethiopia with special reference to wheat productivity. Accordingly, any of the analysis, findings and conclusion of the study represents selected districts alone.

1.7. Limitation of the study

In the process of conducting the study, the researcher encountered some hindering factors like; internet access constraint lack of properly organized data and lack of computer application to process large and huge data. On the other hand, lack of giving attention to questions by respondents and lack of giving correct information concerning to study.

Lack of many written materials related with this topic and getting other information are other limitations in this study. Some respondents were not volunteer or they might not have time to respond the questionnaire and the other might not be at home while conducting the survey but, the study was undertaken to meet its objectives within the limitations mentioned.

However, the researcher was trying his best to collect right information from different sources to make the research result accurate and reliable.

1.8. Organization of the study

The study would be organized into five parts: chapter one is on introduction part which contains; background of the study, statement of the problem, and objective of the study, significance of the study scope of the study etc, while conceptual, theoretical and empirical works will be provided in the second chapter. The third chapter is related to methodologies of study which contains; description of study area, data sources and types, sample technique, model, description of variables and tools applied for data analysis while chapter four deals with results, data interpretation and analysis. Chapter five discusses about conclusion, suggestions and policy implications.

CHAPTER TWO

LITERATURE REVIEW

2. INTRODUCTION

This chapter presents a review of both theoretical and empirical literature that focuses on factors that affect wheat productivity in Oromia region in case of Yaya Gulale woreda. It includes; theoretical review, empirical literature, summary of related literature, Research gap and conceptual frame work of the literature respectively.

2.1. Theoretical Literature Review

2.1.1 Wheat production and productivity in Ethiopia

Wheat is one of the most important crops in Ethiopia, ranking fourth in total cereals production 13.25% (1.63 million hectares) next to maize, sorghum and teff (CSA, 2013). Wheat is the second cultivated species in the world next to maize 27 million of production (Penal at as 2010). In Ethiopia wheat is mainly growth in heavy black clay loom soil (vet soil) of low lands with altitude ranges of 1800-2800m inclusively under rainfall conditions (Tesfaye and Getachew 2019/2020) thought the degree of production of varies.

Wheat grown is all administrative region of Ethiopia, but 64% of the area and 69% of the production is contracted in the central and northern region. most of the farmers in Ethiopia are smallholder farmers, producing mostly for own consumption and producing only a little marketed surplus; mostly produced for consumption purpose with a meagre contribution for commercialization (Amentae et al., 2017; Endalew et al., 2020).

In Ethiopia wheat is traditionally consumed in different forms (Tesfaye and Getachew 2019) listed the most common recipes in Ethiopia dabo (Ethiopia bread), Ambusha (bread from North Ethiopia), Kitta(unleavened bread), Injera (thin bread), Nitro(boiled grain),Dabokolo(ground and seasoned dough shaped and deep fried), and Kinches(crushed kernels cooked with milk or water and mixed with spiced better). wheat is second only to rice as a source of calories in the diets of consumers in the developing countries. Wheat is an especially critical “stuff of life” for approximately 1.2 billion “wheat dependent” and 2.5 billion “wheat consuming” poor men,

women and children who live on less than USD 2 per day; and for approximately 30 million poor wheat producers and their families (CIMMYT, 2012). In 2010, African countries spent more than US\$ 12.5 billion on importing 32 million tons of wheat.

If population growth continues at double to the growth of wheat production, there will likely be serious difficulties in maintaining wheat food supply for future generations (Dixon *et al.*, 2009; CIMMYT, 2012). wheat is grown mainly by large scale commercial due to the capital-intensive nature of the enterprise. Since wheat can be grown successfully during the dry winter months under irrigation, it means that the crop requires significant initial capital development costs for dam construction, water reservoirs, water mainlines, sprinklers and electricity power or diesel power reticulation (Mutambara et al 2013).

Wheat has high costs of production and it is a capital-intensive enterprise. As a result, the crop is grown mostly by medium to large scale commercial farmers (Mujere et al., 2011). wheat consumption has been consistently increasing over the past two decades reaching a peak of 450, 000 tons in 2014 against a 350, 000 tones requirement in 2013 (Vuteteand Bobo 2015).

Generally, agricultural sector in Ethiopia is dominated by subsistence, low input, low output and rain-fed farming system. If the existing production system is not efficient, introduction of new technology could not bring the expected improvements in the productivity of wheat and other crops. Given the existing technology, improvements in the level of technical efficiency will enable farmers to produce the maximum possible output from a given level of inputs. Hence improvement in the level of technical efficiency will increase productivity. Theoretically, introducing modern technologies can increase agricultural output. However, according to Tarkamani and Hardarkar, (2006, cited in Getu, 2007) in areas where there is inefficiency, trying to increase a new technology may not have the expected impact and “*there is a danger of trying to rediscover the wheel*” if the existing knowledge is not efficient.

2.1.2 Wheat production and productivity in Oromia

Oromia is one of the largest regions in Ethiopia that shares largest area coverage of the country. It is also known for high production of cereal crops in the country. Among zones in Oromia, Bale Arsi and shoa zone is particularly known for its extensive wheat production and sometimes called “wheat belt” of Ethiopia. However, several problems hinder the performance of wheat production and productivity in Bale highlands. Shortage of improved seed variety, low price of

wheat products, high price of fertilizer, pesticides and seed, price instability problems for agricultural products, high costs of combine harvesting, reduced soil fertility, lack of sustainable market outlet, poor infrastructure, grass weed and disease are the major constraints of wheat production (EAAPP,2021).

2.1.3 Factors Affecting Wheat productivity

A researcher identifies many variables that affect wheat productivity of farm in study area significantly. These variables are: Technological factors, demographic factors, socio-economic factors and institutional factors are reviewed below.

Farming experience: This is a continuous independent variable measured in year's household engaged in farming activities. Farmers who have more experience produce more wheat product for market and consumption. Hence, farming experience of the farmers on farming activities positively influences wheat productivity of the farmers.

Education level; Education is believed to stimulate economic growth by enhancing the productive capability of farmers as well as eliminating the customs that are contrary to growth such as traditional farming. To achieve agricultural development, the investment in production techniques and technology should be supported by a comparable investment in human capital. This is because information and knowledge are prerequisites for farmers to adopt technology, access input, and change ways of doing things and to market their production.

Gender; Gender refers to socially constructed roles and relationships of women and men in a given culture or location. In enhancing agricultural production and income, the full participation of men and women is very important. Women tend to be the major players in the farm labour force engaged in production, harvesting and processing activities. It is also known that the majority of food is produced by women farmers and they are responsible for fulfilling the basic needs of the family.

Landholding size; Land is the most critical natural resource for countries like Ethiopia where the agricultural sector is the engine of the national economy. Farm operators with larger landholding sizes would have a better farm income if sufficient family labour was available. This leads to an increased demand for children who can work on the land. It is not possible to expand the landholding size without matching it with an increase in the size of the household. Hence,

households with larger families face a challenge to feed each of the family members and this will have its own negative effect on the nutritional status of the family.

Possession of oxen; The possession of oxen determines the farming ability of farm operators because if farmers do not have oxen, they would be obliged to rent out their land to other farmers. In this case, farmers would enter into sharecropping. This further diminishes the production and income of the household as the yield is shared with oxen owners. There are advantages associated with owning oxen. Oxen owners can cultivate and sow their land at the right time. This has a positive impact on the productivity of land. In addition, oxen could also be rented out on a daily payment basis to till the land for other households. Therefore, they may serve as a source of additional income for the owners.

Chemical fertilizer; the insufficient use of fertilizer in Africa has resulted in the area productivity being below the world average. The major reasons for low fertilizer use could be because of demand and supply factors. On the demand side, farm households may not accept the profitability of fertilizer use; alternatively, they may accept it as profitable but too risky in financial terms. Fertilizer input may also be too risky for farmers because the level of input use is determined before the onset of the rainy season which is uncertain. Possible reasons for the lack of profitability could be attributed to low crop responses because of agro-ecological conditions, unresponsive seed varieties, fertilizer utilization or inappropriate application rates.

Improved seeds; In combination with chemical fertilizers, improved varieties of seeds are critical agricultural inputs that help farmers to obtain improved agricultural yields. The productivity and value of crops is improved through the genetic manipulation of selective breeding. Seeds that fulfil the quality requirements have a positive impact on the productivity of land.

Crop rotation (crop rotation)

Crop rotation is a method of growing different crops in the same plot overtime. Crops are rotated in order to maintain the productivity of land. Hence, farmers applying crop rotation are expected to get a higher farm and crop income.

Access to formal credit (amount borro)

Credit helps farm operators to improve the productivity of their land. It gives them access to farm inputs to benefit more from their land. Access to credit is measure in terms of money borrowed by the household head.

Access to information (radio posse)

Information technologies serve as decision support instruments for farmers to make sound decisions. The proxy variable for access to information is the possession of a radio. A radio is the best means of communication as it is affordable by farm operators and boosts the awareness of farmers concerning different livelihood alternatives.

2.1.4. Wheat production and marketing constraints in Ethiopia

Market: The term market has got a variety of meanings. FAO (2008) defined markets are places where buyers and sellers come together to trade. They are social arrangements that allow buyers and sellers to obtain information and exchange commodities. In some cases, the market may mean the place where buying and selling takes place, an area in which a good is sold, a group of people carrying on buying or selling, or the commodity traded, such as the corn market, or time market.

Agriculture in general and cereals in particular are the means of livelihood for millions of households in Ethiopia (Dessale, 2019). Cereal production is the single largest sub-sector within Ethiopian agriculture far exceeding all others in terms of its share in rural employment, agricultural land use, calorie intake and contribution to national income. Wheat is one of the most important staple crops of the country in terms of production and consumption (Rashid, 2010). However, the Ethiopian government imported approximately 180 million quintals of wheat per year (World Bank, 2018). There are two main reasons for the import of wheat in the country. The first is to stabilize domestic price and the second is to meet the overgrowing wheat demand of the consumer in the country. Wheat production is mostly farm to fork which means the farmers produce more of it for their consumption at home and less of it for the market (Mamo et al., 2016). But the main question is why those farmers produce wheat for only consumption? The reason behind this is due to the existence of several production constraints (Heet al., 2017). These

directly lead to less production and productivity, incompetency and underdevelopment of the wheat market.

Production and marketing problems of wheat start from access to varieties and variety selection systems. There are many factors that are directly or indirectly affecting the rate of adoption of improved wheat varieties. Farmers' low purchasing capacity with that of shortage of required credit results lack of resistance to the increasing cost of improved seed from time to time. Seed quality variability, problems of availability and timely delivery of improved seed and insufficient quantity of delivery were the major problems of the rate of adoption of improved wheat varieties.

According to Diao and Nin Pratt (2007) agricultural production need to be supported by well-structured infrastructural development as well as by a market structure that stood to serve smallholder farmers by minimizing transportation and transaction costs and increasing price of products. Farmers' production motive can highly be determined by favorable market access in such a way that farmers who are nearer to the market and all-weather roads are more probable to produce marketable products unlike their counter parts who produce for consumption alone (Onoja et al., 2012).

According to Abdoulaye and Sanders (2006) and Tabo et al. (2005), farmers in developing countries are seriously challenging by the price fall of agricultural products immediately after harvest. Price fall coupled with the intention of merchants to purchase agricultural products at harvest time and then store to sell later aggravated the improbability for farmers' profitability. These problems can be solved through the provision of storage and inventory credit. The implication is that, if farmers are provided with credit at harvest time so as to cover all the expenses, they will store their products and undoubtedly get higher prices; and would enable to adopt different agricultural technologies.

According to Stephens and Barrett (2011; 2009) farmers' eagerness to sell out their products immediately after harvest makes them improbable to store and sell in a better price. Probably, the reason, according to Stephens and Barrett (2019) is due to shortage of storage or ware house facilities, the risk aversion nature of farmers with the probability of price loss and liquidity constraints. Due to these factors farmers are following the —*sell-low, buy-high* approach.

Moreover, Stephens and Barrett (2011) purport that, storage can be taken as precautionary type of saving whereby farmers would use in time of emergency and sell when price increases. Albeit this, liquidity constraint forced farmers to follow —*sell-low, buy-high* approach.

2.2. Empirical Literature Review

Empirical studies on assessment of factors affecting wheat productivity in Ethiopia particularly in Oromia in case of Yaya Gulale woreda is accordingly;

According to Teshome (2016, p. 17), stated that the focus of the government policy shifted to alternative livelihood activities when it was realized that subsistence farm operators were unable to make a living from agriculture. As a solution, the government sought other means of income for farmers. It was at this juncture that the government introduced livelihood packages to supplement household income.

Assefa Admassie, (1995) showed that, Ethiopia's agriculture is described as one of the most ancient in the world. Majorities of farmers have been using oxen and plough as the basic means of cultivation. The style of agriculture remaining unchanged for centuries. The agricultural production is highly susceptible to frequent natural disasters. He further said that increasing output from rain fed production methods only through area expansion or improvement in efficiencies is exhausted sooner or later. It is basically necessary for raising of agricultural productivity through technological changes. Employing additional inputs and factors of production within the limited land average under cultivation.

Study by Wolelaw (2005) found out the major factors that affect the marketable supply of rice at Fogera district using multiple linear regression model. He investigated the relationship between the determinant factors of supply and the marketable supply of rice and his study revealed that the current price, lagged price, amount of rice production at farm level and consumption at household level had influenced marketable supply of rice at the district.

Study undertaken by Kinde (2007) also indicated the major factors that affect marketable supply of sesame in Metema district by using cross-sectional data and multiple linear regression model to identify the relationship between the marketable supply of sesame and the hypothesized explanatory variables. His study acknowledged that amount of sesame productivity, use of

modern inputs, number of languages spoken by the household head, number of oxen owned, sesame area and time of selling of sesame influenced marketable supply of sesame positively.

Ayelech (2011) identified factors affecting the marketable surplus of fruits by using OLS regression. She found that fruit marketable supply was affected by; education level of household head, quantity of fruit produced, fruit production experience, extension contact, lagged price and distance to market. Study of Mohammed (2011), using multiple linear regression, has identified that quantity of teff produced, access to market information, access to extension and sex of the household head were found to have positive and significant influence on marketable supply of teff. Likewise, quantity of wheat produced, and access to credit were found to influence marketable supply of wheat positively and significantly.

2.3. Summary of Related Literature

Based on the above discussion of both the theoretical and empirical literature, it is possible to

Identify various factors that affect wheat productivity in case of yaya gulale woreda. As pointed out in the theoretical literature, Factors can result from either natural or man-made factors like; age, gender, education level, family size, landholding size, possession of oxen, shortage rainfall, technology and lack of credit markets as reviewed above. Based on the literature provided, it is evident that access to agricultural support services including credit remains, access to markets, improved seeds, lack of infrastructure are the major factor constraining the growth of small-scale agriculture in Ethiopia.

Above written Literature shows that farmers with lack of collateral in terms of land and other assets normally access credit through informal lender who normally charges higher interest rates.

Environmental factors such as are; rainfall, erosion, land degradation and soil type of the area are the main factors that affect wheat productivity in different places of Ethiopia.

Many authors try to explain different factors that affect wheat productivity in different areas of the country rather than focusing current study area. Negassa *et al.* (2014) argue that marketing system lacks the capacity to provide timely and accurate price signals, which present special challenges given the price instability.

According to Bezabih (2010), agriculture continues to face a number of problems and challenges in Ethiopia. such as; lack of appropriate land use system resulting in soil and other natural resources degradation; limited use of improved agricultural technologies; the predominance of subsistence agriculture and lack and/or absence of business oriented agricultural production system; limited or no access to market facilities resulting in low participation of the smallholder farmers in value chain or value addition of their produces.

Berhane, Tadesse and Taffesse (2013, p. 466) established that, if other influencing factors were constant, there was no productivity difference between plots possessed by female and male farmers.

According to Stephens and Barrett (2019) is due to shortage of storage or ware house facilities, the risk aversion nature of farmers with the probability of price loss and liquidity constraints. Due to these factors farmers are following the —*sell-low, buy-high* approach. According to Abdoulaye and Sanders (2006) and Tabo et al. (2005), farmers in developing countries are seriously challenging by the price fall of agricultural products immediately after harvest.

Reviewing different researches in one document is very important, and it can be used as a reference for policymakers, researchers and others who want to know about wheat productivity.

Abate (2018) conducted a review paper on market chain analysis of wheat in Ethiopia and Gemedu (2016) reviewed on value chain analysis of wheat and barley in Ethiopia.

Similarly, studies also indicated that smallholder farmers are asset constrained and they have limited access to credit and extension services. They face several barriers such as weak market linkages, and high transaction costs.

Previous studies report finding says that it's possible to reduce factors that affect wheat productivity, while some studies findings says that it's impossible to control factors that affects wheat productivity as a whole in economy, others finding says that these factors that affect wheat productivity are different in different areas of the study.

Specifically, this chapter presents the literature related to factors affecting wheat productivity in different areas of the globe. In a bigger context, the wheat productivity is influenced by the strategy changes at a national. At the community or household level, it is influenced by the

household characteristics, wheat productivity technologies and the availability of agricultural loans.

2.3.1. Research Gap

As the reviewed literature showed there are different factors that affect wheat productivity in different study areas. Many researchers identified various factors that affect wheat productivity and related topics with a different focus and research interest. Some of them reviewed below.

Amentae et al. (2017) analysed wheat value chain focusing on market performance, post-harvest loss, and supply chain management in Arsi zone of Oromia region, Ethiopia. The study identified producers and their cooperatives, collectors, wholesalers, retailers, and processors as primary actors.

Abate et al. (2021) analyzed the determinants of market participation of smallholder wheat farmers and measured its commercialization level in Northern Ethiopia. The descriptive result revealed that the average commercialization level of the sample wheat farmers was 10.26%.

Dessie et al. (2018) investigated the factors that influence market channel choices among wheat producers in North western Ethiopia. The study identified four major wheat market channel choices such as retailers, assemblers, consumers and wholesalers as alternatives to wheat producers to sell majority of their products.

According to Bezabih (2010), agriculture continues to face a number of problems and challenges in Ethiopia. The major ones are adverse climatic conditions; lack of appropriate land use system resulting in soil and other natural resources degradation; limited use of improved agricultural technologies; the predominance of subsistence agriculture and lack and/or absence of business oriented agricultural production system; limited or no access to market facilities resulting in low participation of the smallholder farmers in value chain or value addition of their produces.

Berhane, Tadesse and Taffesse (2013,) established that, if other influencing factors were constant, there was no productivity difference between plots possessed by female and male farmers.

According to Berhane, Tadesse and Taffesse (2013,) is due to shortage of storage or ware house facilities, the risk aversion nature of farmers with the probability of price loss and liquidity constraints. Due to these factors farmers are following the —*sell-low, buy-high* approach.

Tadesse et al. (2018) reviewed on wheat production and breeding challenges and opportunities in face of climate change in sub-Saharan Africa. This indicates little bit is done on reviewing conducted papers on wheat in the country. Therefore, we found that it is important to review additional conducted researches, to identify gaps and give future directions on production, productivity and marketing of wheat.

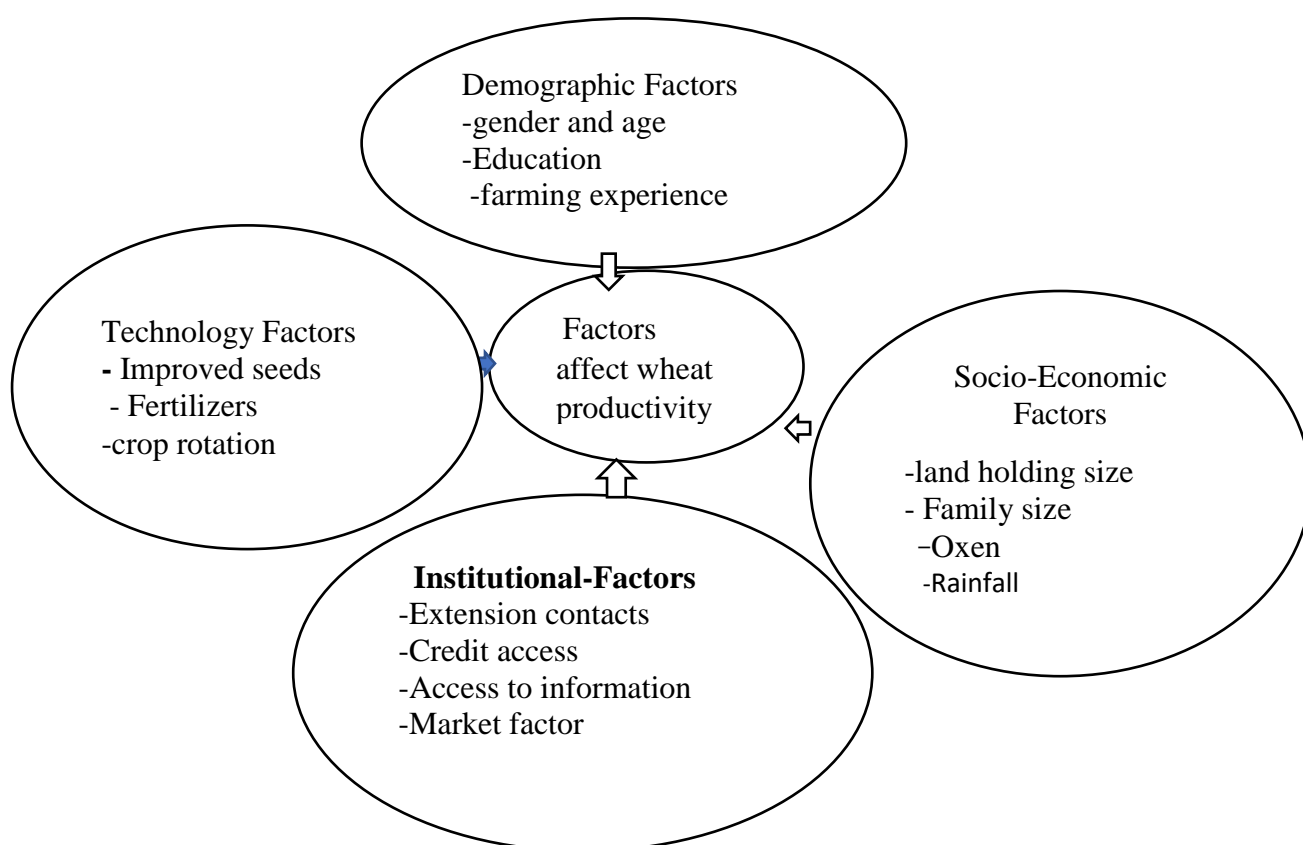
Negassa *et al.* (2014) argue that spatial inefficiency within Ethiopian wheat markets prevents wheat from being transferred from the regions in which surpluses are generated to those in which demand outpaces production. One possible explanation for this failure is that the marketing system lacks the capacity to provide timely and accurate price signals, which present special challenges given the price instability described above. The riskiness of the wheat market may also reduce private sector participation, particularly in rural areas where distribution costs may be higher.

As the researcher try to refer local published studies in this area such studies were under taken by Amentae et al. (2017) on wheat value chain, Abate et al. (2014) on determinants of small holder farmer, Dessie et al.(2018) on factors of wheat market, Bezabih(2010) on problems and challenges of agriculture, Negash et al(2014) on inefficiency of wheat market, Tadase et al (2018) on wheat productivity, Berhane, Tadesse and Taffesse (2013,) on gender factor of production are studied on different variables and interest. Therefore, this gives the reason for this research work to be conducted as bridge for literature gap existing. the gap of this research was inclusion of variables which can influence the wheat productivity in study area.

Even though, various studies were conducted on factors affecting wheat productivity, no one can still use the effect of Access to information and crop rotation. Similarly, most of the studies were conducted at different periods of time, used different methodologies, and also their findings are also varied. Hence, this particular study was trying to fill the gap mentioned above by the inclusion of additional explanatory variable like; Access to information and crop rotation are additional proxies, which were not used.

2.4. Conceptual Framework of Literature Reviews

This section explores the conceptual framework adopted from the reviewed literature. This conceptual framework (Figure 1) which guides the review study is built on the factors affecting wheat productivity and constraints of the wheat sector in the study area. As indicated in the figure below, there are a number of constraints which are the main reasons for the low development of the wheat productivity in Yaya Gulele Woreda. The frame work assumes that wheat productivity was affected by different factors. These factors include variables like; Technological factors, demographic factors, socio-economic factors and institutional factors. The study will be identifying how these variables affects wheat productivity in Yaya Gulele Woreda. The diagram tries to depict various factors affecting wheat productivity performance in study area. The literature review serves as a benchmark to interpret the results obtained from the survey, focus on questionnaire.



Source: own modification from the reviewed paper, 2022

Fig; 1 conceptual frame work

CHAPTER THREE

METHODOLOGY

3.1. Description of the Study Area.

Yaya Gulale is one as the woreda which is located in the northern part of Ethiopia as well as Oromia region that situated at distance of 26 kilometre from north shoa of fitche town. fitche town is 112 kilometres far from the capital city of our country Addis Ababa. Yaya Gulale has seventeen rural districts and two urban Kebeles and Fital is the capital city of the district The total rural population of Yaya Gulele district is 65,975 of which 33,680 are male and 32,295 are female. The total households in urban 3,654 and in rural 62,321 in the district are with an average family size of 6 persons (CSA, 2007).

The majority of the inhabitants practised/believed Ethiopian Orthodox Christianity, with 98.53% of the population reporting they practised that belief. The two largest ethnic groups reported in Yaya Gulele were Oromo populations (83.75%), and the Amhara (16.1%); all other ethnic groups made up 0.15% of the population (CSA, 2007).

The woreda has total area of land is 33,645.55 hectares of land and 25,403 hectares used for farming and the remaining land were used for grazing. The farming system was mixed type of livestock rearing and crop production (Yaya Gulale Agricultural development office, 2019/2021).

Topographically, mountain, hills, plains, valleys and train plateaus characterize in the woreda. The altitude of the woreda ranges between 1200- 2500 m.a.s.l. The woreda is characterized by lowest temperature of 16° C with highest temperature of 23° C. The average rainfall in the area is between 1,000-2025 mm. The woreda has three agro climatic conditions dega (27%), woina dega (41.2%) and kolla (31.8%), even though the major share of crop production is taken by cereals and pulses, and very little proportion by vegetable; mainly onion and potato. Among field crops, teff, wheat, barley, faba bean and chickpea are produced in all agro-ecologies while maize and onion are localized to the lowland little proportion of potato is produced in the highland kebeles. Yaya Gullalle has also a great potential for irrigated crop production in the north Shoa zone.

source (Yaya Gulele Agricultural and Natural resources office, 2021/2022).

Yaya Gulele Woredas

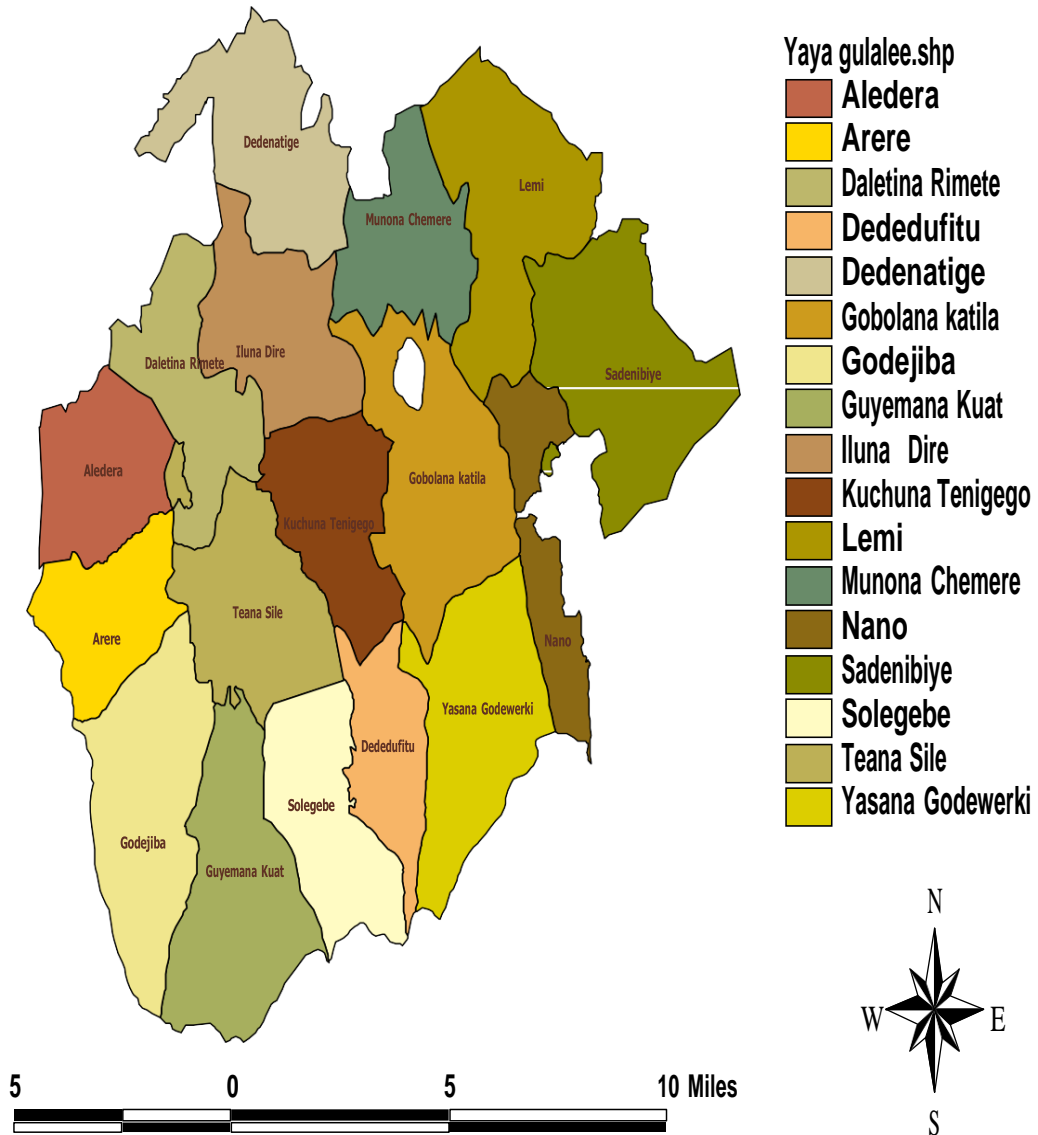


Figure 3: Administration of Yaya Gulele Woreda Map

Source: From Land and Management office North shoa zone

3.2. Research design

To accomplish the objectives of the study both qualitative and quantitative research design were used. Research design provides a logical structure for research data gathering and analysis

(Bryman, 2018, p. 31). The study adopted a cross-sectional survey research design as its framework to guide the process of data collection, because of the data was collected at one point in a time. According to Bryman (2018), cross-sectional survey research design was the collection of data mainly using questionnaires to capture quantitative or qualitative data at a single point in time.

3.3. Data Source and Types

Data was collected from both primary and secondary sources. To address the specific objectives, primary data was collected using formal survey. Original data was collected through questionnaire distribution among households and secondary information was collected from HH heads, DAs, district and sub-districts' crop production personnel. Additionally, Secondary data was collected by reviewing documents of secondary sources such as, published and unpublished documents including journals (annual, quarterly and monthly publications), reports and manuals from Agricultural Marketing and Promotion Agency, Agriculture bureaus (in region and districts). Regarding the data types, the study was used both qualitative and quantitative data types.

3.4. Method of Data Collection

For the purpose of data reliability, the researcher himself has personally administered all data. primary data that the researcher used for this study was collected from the representatives of the target population or sample through questionnaires. These questionnaires were prepared in accordance with the objectives of the study and in a way, it could capture relevant data and information from the respondents.

3.4.1 Data Collection Instruments and Field Work

The most important Instruments by which primary data has been collected was through questionnaire. The questionnaire was contained different items such as; the demographic characteristics of the respondents, information about their gender, age, year of service or experience and education level.

Questions were designed for the sake of collecting both qualitative and quantitative data. In order to collect the necessary information (responses), both closed and open-ended questions were

developed and incorporated in the questionnaire. The questionnaire was designed and has been distributed to respondents. The questionnaires were prepared in English and these translated to “Afaan oromo” (local language) to make clear and understandable for sampled population.

3.4.2 Ethical considerations

The researcher considered the research values of voluntary participation, anonymity and protection of respondents from any possible harm that could arise from participating in the study.

Thus researcher; introduced the purpose of the study as a fulfilment of a Masters’ Study program and not for any other hidden agenda by the researcher and requested the respondents to participate in the study on a voluntary basis and refusal or abstaining from participating was permitted.

The researcher also assured the respondents of confidentiality of the information given and protection from any possible harm that could arise from the study since the findings would be used for the intended purposes only. The respondents were to be provided with feed- back about the findings of the study.

3.5 Sample design

To get households, actually unit of analysis, the researcher has used probability sampling designs. Among the Probability sampling designs simple random sampling was employed while selecting the study sub-districts and four villages where final sample respondents were withdrawn proportionally.

3.5.1 Target population

The target population of the study consists of members of Farmers of (4) kebeles out of (17) kebeles of Yaya Gulale woreda by using simple random sampling techniques. Due to all kebeles in the woreda have identical agricultural activities. These kebeles are: Dedenatige, Iluna dire, Nano Chemer and Godajiba with a total population of 8133 are taken as target population for this study. This is due to the homogenous nature of the society where there is similar plot system and economic bases; as a result, one sub-district can represent the other.

In this study to select sample size, a list of the population formally registered as Farmers in Yaya Gulale woreda. The total rural population of Yaya Gulele district is 65,975 of which 33,680 are male and 32,295 are female (CSA 2007).

3.5.2 Sampling Techniques

Basically, it is very difficult to collect information about the whole population available in the study area. Because of this, the study selects some sample from the total population and then collects information about factors affects wheat productivity in area of the study.

To do so, the study was employed simple random sampling technique, because the population concerned are homogeneous according to their participation in economic activity.

Finally appropriate numbers of sample farmers from four kebeles were selected in proportional to population size using Yamane formula of 1967. Accordingly, the required sample size at 95% confidence level with degree of variability of 5% and level of precision equal to 6% are recommended to obtain a sample size required which represent a true population.

$$n = \frac{N}{1+N(e)^2} = \frac{N}{1+N(e)^2} \quad \text{Where, } n = \text{sample size}$$

N= target population

e = level of precision at 6% or {e= estimated error of sample}

$$\text{Therefore, } n = \frac{N}{1+N(e)^2} = \frac{8133}{1+8133(0.06)^2} = \frac{8133}{30.278} = 268.$$

3.5.3 Sample size

In selecting the study area, the researcher was purposively selected the woreda, because of the presence of large number of wheats producing farmers(potential) and its extent of productivity. As well as the respondents for the survey selected by using simple random sampling technique, because this technique applied as it gives equal chance to all farmers that selected as a sample.

In order to select representative sampling for wheat productivity, this study was implemented two stage purposive random sampling procedure was used.

In the first stage, out of 17 wheats producing kebeles in Yaya Gulale woreda, four (4) kebeles of yaya Gulale woreda, namely Dedenatige, Nano Chemer, Godejiba and Iluna Dire will be selected randomly.

In the second stage, using the list of the farmers from the sampled kebeles, 268 sampled respondents were selected randomly based on proportional to the population size of the selected kebeles.

Based on the result of the sample size, to collect the survey data, questionnaires for 286 rural household heads were distributed. This is done after the questionnaire was translated into the local language, Afaan Oromo. The duration for data collection was from April to May, 2022.

Following this, sample size for each Kebeles was calculated proportionally using number of HHs in each sub-district.

Table 3.1: Targeted Kebeles, their total population size and the Sample Size taken

<u>NO.</u>	Kebeles	Population size(N)	Sample size(n)
1.	Dedenatige	2456	81
2.	<i>Godejiba</i>	<i>1578</i>	52
3.	Nano chemer	1499	50
4.	Iluna Dire	2 600	85
Total	Four	8133	268

Sources; (CSA 2014) and Own Computation,2022

3.6. Pre-Testing (validity& reliability)

Before data collection, the questionnaire was pre-tested on twenty farmers to evaluate the appropriateness of the design, clarity and interpretation of the questions. Hence, appropriate modifications and corrections were made on the questionnaire. The pilot study is conducted to ensure the validity of all questions in the questionnaire. Finally, the test of all assumptions of the

models used and the appropriateness of these models are some of the attempts to ensure the validity of the results.

3.7 Methods of Data Analysis

After collecting data from primary and secondary data like; questionnaire, CSA data and Yaya Gulale Woreda agricultural development office; the next task editing data was undertaken to detect errors that had been committed by the respondents. Then, the edited data were coded and manually entered in to statistical package for social science (SPSS) version 16 computer software. Finally, data was analyzed and interpreted with appropriate descriptive and econometric methods. In the analysis of data, descriptive statistics such as averages, percentages in the form of tables and graphs were used to describe socio-economic, farm characteristics and factors affecting wheat productivity. In order to determine the influence of independent variables on the dependent variables, multiple linear regression model was used.

3.7.1 Descriptive method of data analysis:

Descriptive analyses were employed to meet the main objective of the study. In the case of descriptive analysis ratios, graphs, percentage, means, standard deviation, maximum, minimum and frequency were employed. The responses from questionnaires were analysed qualitatively.

3.7.2 Inferential Analysis

The econometric analysis was done based on multiple Linear regression model to identify the factors that affect wheat productivity. In order to determine the influence of independent variables on the dependent variables, multiple linear regression models were used.

Inferential statistical analysis involves objectively and quantitatively summarizing the data, determining which data patterns are significant, and making inferential statements about system performance. The researcher collected data from a sample, can use inferential statistics to understand the larger population from which the sample is taken.

3.7.3 Model specification

The primary objective of regression is to develop a regression model, to explain the relation between one or more variables in a given population. A particular form of regression model

depends up on the nature of the problem under study and the type of data variables. Multiple linear regressions contain two or more independent variables and one dependent variable.

The general form of a multiple linear regression model is given by

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + \epsilon_i,$$

Where β_0 is the intercept and $\beta_1, \beta_2, \dots, \beta_k$ is coefficient of the variable X_1, X_2, \dots, X_k and $i=1, 2, \dots, n$

Constant (β_0) is the value of dependent variable (Y_i) when the all-independent variables (X_i) are zero. β^1 is the change in dependent variable (Y_i) when the independent variable (X^1) increases by one, keeping other independent variables are constant. β^2 is the change in dependent variable (Y_i) when the independent variable (X^2) increases by one, keeping other independent variables are constant. β^3 is the change in dependent variable (Y_i) when the independent variable (X^3) increases by one, keeping other independent variables are constant...etc

3.7.3.1 Assumptions of the Multiple Linear Regression model

The model based on several simplifying assumptions, which are as follows:

❖ **The regression model is linear in the parameter.**

I. For given X_i 's, the mean value of the disturbance ϵ_i is zero ($E(\epsilon) = 0$) and $Var(\epsilon) = \sigma^2$

II. For given X_i 's, the variance of ϵ_i constant or Homoscedasticity $\sim N(0, \sigma^2)$, σ^2 is constant

III. For given X_i 's, there is no autocorrelation in the disturbances. $E(\epsilon_i \epsilon_j) = 0 \quad i \neq j$

IV. The number of observations must be greater than the number of regress. n observation ($n > k$).

V. There must be sufficient variability in the values taken by the regress.

❖ **The regression model is correctly specified.**

VI. There is no exact linear relationship between the regress. $\sum_{i=1}^k (cix_i) = 1 \neq 0 \forall c_i \neq 0$

VII. The stochastic (disturbance) term ε_i is normally distributed.

3.7.3.2 Model Diagnosis

i. Linear; There is linear relationship between dependent and independent variable is called linearity assumption. Multiple regression models the linear (straight-line) relationship between Y and the X's. Any curvilinear relationship is ignored. This is most easily evaluated by scatter plots early on in your analysis.

ii. Homoscedasticity: Error terms have constant variance and points in the graph are dispersed at random fashion have no any trend; this indicates that the assumptions of homoscedasticity hold.

iii. Normality of Error Term The error terms are normally distributed with mean zero and variance σ^2 can be tested by plotting residual against the cumulative probability.

iv. Autocorrelation A test that the residuals from a linear regression or multiple regressions are independent. The error terms should be independent. There is no relation between successive error terms.

v. Multicollinearity Collinearity, or multicollinearity, is the existence of near-linear relationships among the set of independent variables. The presence of multicollinearity causes all kinds of problems with regression analysis, so you could say that we assume the data do not exhibit it. We can test the presence of multicollinearity by variance inflation factor, given by; $VIF = \frac{1}{1 - R_i^2}$

Where R_i^2 is coefficient of determination obtained from X_i on the other explanatory variables. If value of VIF less than **10**, (tolerance greater than 0.1), then there is no multicollinearity in the data.

3.7.4 Definition of variables and expected sign

The study variables to this research thesis are: Dependent (response) variable: Total wheat harvested (quintal); Independent (factor or explanatory) variables are accordingly:

Farming experience:

This is a continuous independent variable measured in year's household engaged in farming activities. Farmers who have more experience produce more wheat product for market and consumption. Hence, farming experience of the farmers on farming activities positively influences wheat productivity of the farmers.

Land holding size (total land);

This variable is measured in terms of hectares. Those with larger farm size could produce a lot that could potentially increase farm income. Hence, positive sign was proposed.

Oxen (oxen own);

These are the key assets in the rural areas of the country. A household needs two oxen to plough a plot. This has a positive impact on the wheat productivity of land.

Access to credit (amount borrow)

Capital is the scarcest asset in the developing countries in general and rural areas in particular. There is a need for money to adopt new technologies such as yield increasing inputs. In Yaya Gulale, vision fund Credit, sinjee bank, cooperative bank and Saving Institution provides the microfinance accessible to farmers in the rural areas. Farmers may also get "in-kind" loans such as fertilizers and improved seeds from the farmers' cooperatives in their communities. Thus, this variable is measured in terms of the Ethiopian currency (Birr) that the household took in the production year. It is hypothesized that the availability of rural credit is expected to increase agricultural production and income. Hence, positive sign was proposed.

Visits by the extension agents (contact month)

Extension service in agriculture is indispensable and it provides assistance for farmers in improvement of production and productivity, it also enables flow of information and transfer of knowledge and scientific findings to practice. One of the means of this is through the advice provided to farmers by extension agents. This variable takes the average number of contacts of the household head with the extension agents per year in the production year. Therefore, positive was the sign being expected from the final regression analysis.

Educational status of the head (educlevel)

Educated households are expected to have better exposure to information that enhances agricultural production. They are also expected to be innovators in accepting new ways of doing things. This variable is measured in terms of the number of years of schooling that is expected to have a positive impact on agricultural production and hence income.

Rainfall

In rural areas farmers highly depend on agricultural production, the level of rainfall and its variability are critical for subsistence. And one of the most important parameters of climate is rainfall. Just as there is a direct relationship between climate and agriculture, So when rainfall patterns change, its effect is directly felt on cropping production.

Pests: The frequency of wheat diseases and weeds is a major issue. There is limited availability - both quality and quantity of pesticides and fungicides and wheat producers have limited knowledge on types and dosage, application techniques, timing, etc. resulting in the use of the same type of chemicals repeatedly, allowing pests and diseases to develop resistance. As a result, negative sign was hypothesized for the final regression result.

fertilizers; The high price of fertilizers (and lack of finance for inputs and machinery) severely affects wheat production in Central-Eastern Oromia. Smallholder producers either refuse to purchase inputs or applying inadequate amounts of fertilizer per hectare.

gender: Wheat production is considered a male activity. Nevertheless, women are involved in most productive tasks throughout the year (including family chores), while men's workload is aligned with crops seasonality, with relatively light engagement off-season. Hence, generally women are exposed to a much heavier work schedule than men. as a result, positive sign was expected.

Improved seed: There is a lack of an adequate seed supply system from seed enterprises and a lack of independent dealers. Growth of a private seed sector is inhibited by the difficulty in predicting the demand accurately (as most producers in rural areas use retained seed for planting). as a result, it was expected to affect farm income positively.

Access to market; According to the report of FAO (2017) due to lack of basic infrastructures which can be a bridge between rural and urban areas, the growth of agro-industry did not reach its required level of development. parallel to this, lack of timely and sufficient market information; low price of the product at harvest time; weak market linkages among value chain actors, trader's price cheating and less bargaining power of farmers in the market and unfair competition from illegal traders were the major marketing constraints faced by wheat farmers and traders. access to market information positively affects wheat productivity.

Crop rotation (crop rotation)

Crop rotation is a method of growing different crops in the same plot overtime. Crops are rotated in order to maintain the productivity of land. Hence, farmers applying crop rotation are expected to get a higher farm and crop income. Positive coefficient was proposed.

Access to information (radioposse); Information technologies serve as decision support instruments for farmers to make sound decisions. the proxy variable for access to information is the possession of a radio. a radio is the best means of communication as it is affordable by farm operators and boosts the awareness of farmers concerning different livelihood alternatives.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF RESULTS

This chapter discusses the analytical results of the study. The first section of this chapter presents the descriptive results of the study. This is followed by the discussion of the econometric model Results. To analyze the collected data in line with the overall objective of the research undertaking, statistical Procedures were carried out using SPSS version 16.

4.1. Response Rate

A total of 268 questionnaires were distributed to household farmers of the four (4) kebeles of Yaya Gulale Woreda to assess the factors that affect wheat productivity and all questionnaires were filled up and returned back making the response rate more than 95 percent. This indicates that; house hold farmers are voluntary to give relevant information to the research understudy.

4.2 Background Information of the Study Participants

4.2.1 Demographic and socio-economic characteristics of sample households

Table 4.2.1: Age of respondents

Age	Frequency	Percentage
20-29	91	33.95
30-39	125	46.64
40-49	40	14.93
50 and above	12	4.48
Total	268	100%

Source: Computed from the field survey data (2022)

The answers of respondents to their age are outlined in the Table 4.1.1 shows respondents age between (20-29) were 91(33.95%) respondents age b/n (30-39) were 125(46.64%), respondents age between (40-49) were 40(14.93%) and respondents age between 50 and above were 12(4.48%). The result indicates that more than 75% of respondents 'members were in their productive age. Age plays a significant role in any kinds of business activity, particularly in agriculture, because the use of child labor on the farms is quite high.

Table 4.2.2. Marital Status of the respondents

Marital Status	Frequency	Percentage
Married	220	82.09
Unmarried	48	17.91
Total	268	100%

Source: Computed from the field survey data (2022)

As shown in table 4.1.2 the majority or 220 (82.09%) of the respondents were married ,48(17.91%) was unmarried. The result shows that most of the farmers in the study area were married people.

Table 4.2.3 Education status of the Respondents

Educational level	Frequency	Percent
Illiterate	153	57.08
Primary	63	23.52
Secondary	36	13.43
Diploma	16	5.97
Degree	0	-
Total	268	100%

(Source own survey 2022)

As indicated in table 4.1.3 concerning educational level, majority of respondents are, illiterate and primary school about 57.08% and 23.52% respectively of the total percentage share. The educational level in the percentage share of the respondents' degree is 0 % and diploma is about 5.97 %. The most majority of the respondents are illiterate for the data collection. The study results depicted that, as the educational level of the sampled respondent's increases, farmers wheat productivity also increases together. Therefore, Education helps to obtain knowledge and skill to direct farming system.

Table 4.2.4 Distribution of oxen ownership among sample households

No.	Oxen ownership Category	Number	Percent
1	None (rented oxen)	18	6.74
2	Ox (2)	130	48.50
3	Oxen (3)	49	18.28
4	Oxen (4)	51	19.02
5	Oxen (5)	20	7.46
Total		268	100%

Source: Own survey (2022)

Conventionally, land preparation is done using a pair of oxen; as a result, 6.74% of the sample households cannot independently plough their farm using own oxen. Hence, as an alternative, they will go for oxen exchange arrangements or rent-in from others. Oxen ownership among farmers in the study area was 93.26%. Generally, above 90 % of sample respondents (households) in the study area have had a pair and above oxen.

Table 4.2.5 Distribution of credit source among sample households

Credit source	Total Sample Households	
	Frequency	Percent
Sinqe Bank	120	44.77
Relatives and neighbors	50	18.67
Cooperatives Bank	98	36.56
Total	268	100%

Source: Own survey (2022)

Credit and saving services

Sinqee bank is formal source of credit in the study area. It provides credit to individual farmers under group collateral system. Out of the total 44.77% sample households who had credit access, 18.67% of them get their credit from informal sources like Relatives and neighbors while the other 36.56% respondents get it from Cooperative Banks. Generally, households used the credit to purchase inputs for wheat productivity, for medication and fulfillment of other basic needs.

Table 4.2.6 Amount of seed and fertilizers used per hectare by the respondents in kilogram

Variables	Minimum	Maximum	Mean	Std. Deviation
Improved seed used	100.00	350.00	201.23	35.28
DAP	50.00	200.00	96.81	17.87
UREA	10.10	100.00	43.65	16.76

Source: own computation from survey result (2022)

Inputs used by farmers of the study area are fertilizer, seed, herbicides and pesticides. These inputs are supplied to farmers either by cooperative/unions and private traders. Cooperatives and unions are major suppliers of fertilizer for producers in the study area. Government (National Input Supply Enterprise) supplies to the unions with DAP and Urea fertilizers and then the unions can either sell to primary cooperatives, state farm, university, national and international research institutions or sell directly to investors who are engaged in agricultural activities.

Fertilizer application is one of the most important agricultural practices that are used by wheat growers in the study area.

Moreover, proper application of the recommended fertilizer rate is important to obtain the required production and marketable supply. However, farmers in the study area apply varying fertilizer rate, which is below the blanket recommendation rate given by woreda Agricultural Research Centre. The recommendation rate given by woreda Agricultural Research Centre is to apply 100kg of DAP and 50kg of UREA per hectare.

The survey result indicated that all sample respondents applied DAP (Di Ammonium Phosphate) and only 62.5% of them used UREA fertilizer on their wheat field. The rate of application was 96.81 and 43.65kg's on average for DAP and UREA respectively as indicated in table above.

Major pesticides used by respondents of the study area were Pallas 45-OD, Topic, 2-4D, Tilt, Rexoudo, Mankozebe, Hela rate and Bumper. Herbicides and insecticides used by farmers of the study area are supplied by sole proprietors, unions and primary cooperatives. Unions deal with herbicides and fungicides only while sole proprietor and primary cooperative trade in herbicides, fungicides and pesticides. Herbicides are supplied by private companies and unions to sole proprietors and primary cooperatives. They are bought from within the district, and from importers in Addis Ababa. Unions supply chemicals like 2, 4- D, Pallas, Topic and Tilt from private companies for users in the study area. Primary cooperatives also supply Pallas 45-OD and Topic chemicals for farmers at their kebele level.

Seed distribution remains largely informal and farmer-to-farmer exchanges account for as much as 90% of the seed trade. The government-owned Ethiopian Seed Enterprise (ESE) and Regional Seed Enterprises are the only public sector organizations involved in seed production, processing, and distribution. Research institutions provide foundation seed and breeding lines for improved varieties to the seed enterprises, which then multiplies seed in response to demand projections from the regional bureaus of agriculture. Seed Enterprises then distributes seed to farmers' cooperative unions via regional, zonal and woreda bureaus of agriculture. Use of improved seed varieties with its appropriate recommendation is also believed to improve production and productivity of wheat crop in the study area.

During the survey respondents were also asked the number of seed they used per hectare. The result in table above depicted that respondent's maximum and minimum use of seed per hectare

was 100 and 350kg's per hectare with an average of 201.23 kg. This is almost 100% higher than the recommended rate (blanket) of seed per hectare which is 100kg per hectare for the area. The area calls for further attention and trainings that will save farmers cost and again improve productivity in the area.

Access to extension services

Table 4.2.7: Access to extension services

Kebeles	Number of contacts per years	Percent (%)
1. Dedenatig	12	4.5
2. Nanochemar	10	3.7
3. Ilunadire	14	5.2
4. Godajiba	8	2.9

Source: Own computation from survey (2022).

Currently in Ethiopia the government has been attempting to fill the required knowledge and achieve food self-sufficiency in the country by placing in each Kebele administration development agents such as; (DAs) and farmer training center (FTC). as result shows, contacts per years are not enough.

Crop rotation.

Table 4.2.8: crop rotation respondents.

Types	Response	Observation	Percent (%)
Crop rotation	Yes	45	16.8
	No	223	83.2

Source: Own computation from survey (2022).

This is the reason that they did not follow any scientific and defined order in the application of crop rotation. Crop rotation was also very important to increase the fertility of the soil. good

crop rotation practices reduce losses of soil and serve to maintain or increase yields. generally, as result shows only 16.8% respondents follow crop rotation farming system but,83.2% does not follow the system.

Rainfall.

Table 4.2.9: The conditions of rainfall.

Type	Response	Observation	Percent (%)
Rainfall	Enough	230	85.8
	Not enough	38	14.2

Source: survey result, 2022.

In the last production season, 14.2 per cent of the respondents did not get enough rainfall (Table 4.2.9). The number of households who faced food deficits was approximately 14 per cent. This indicated that even some of those respondents who had no enough rain faced food deficits. The small landholding size and low productivity of land could be the major contributing factors for the food deficit even given enough rainfall. generally, as result shows only 85.8% has got enough rainfall.

Access to information.

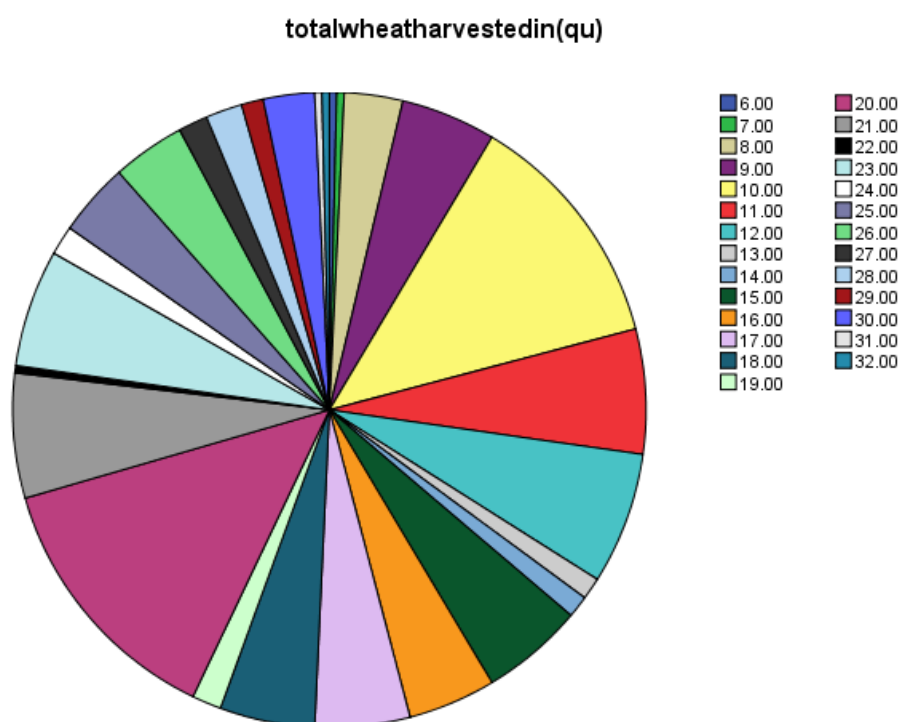
Table4.2.10 access to information respondents.

Type	Response	Observation	Percent (%)
access to information	Yes	23	8.6
	No	245	91.4

Source: survey result, 2022.

Information is very important to make accurate decision on market price of agricultural activities as the result shows only 8.6 respondents have information about their agricultural product prices.

4.3 Presentation of Results



Pie chart diagram 4.3.1; Source Field Survey (2022);

The results in diagram 4.3.1 indicate that the Households respondent are enhance their wheat production through using different modern inputs. Obviously, farmers use different combination of inputs, such as land, fertilizer (organic and/or inorganic), seed (improved and/or local), Chemical (herbicide and pesticide), labor and draft powers in the production process.

Almost all the sample households use their own seed which were originally distributed by district bureau of agriculture and saved from previous harvest.

Regarding the proportion of the area allocated for crops, most respondents had allocated more than half of their total land for the production of Wheat in 2021/22 production season.

The result of study indicates that on average respondents allocated per hector for wheat which is 32qunital of their total average landholding. On average, farmer household produced minimum wheat per hectare is 6qunitalof wheat.

4.4. DISCUSSION OF RESULT

This section presents the major findings of the study. Both descriptive statistics and econometric methods were used to analyse the primary data. Descriptive statistics were employed to describe the demographic characteristics of sample respondents. Econometric models were used to identify factors affecting wheat productivity in the study area.

4.4.1 Descriptive Statistics

4.4.1.1 Demographics and Socioeconomics Characteristics of Households respondents.

The variables used to describe demographic characteristics of sample farmers were, educational level, sex, marital status, age and family size.

Marital status; The results presented in Table 4.2.2 depicts that marital status the sample respondent was around 76.9% of the respondents were married male household heads. While the remaining 14.7% were unmarried male household heads.

Age is one of the important characteristics of the community. age of the household head is a proxy variable for the farming experience of farm operators. Farmers are highly dependent on their previous knowledge of farm practices in cultivating different crops. Age plays a significant role in any kind of business, particularly in agriculture productivity. The results presented in Table 4.1.1 depicts that more than 75% of respondents 'members were in their productive age.

Educational level; Educational level of the household head can influence how he or she views the new technologies and new ways of doing business. It can affect technology adoption decision. Education can also contribute to decision-making processes that alter the paths people take in life. Educational level of the sample household heads in the study area ranges from illiteracy to degree levels. The proportion of household heads that were illiterate was 53.5%. those who can read and write were 20.9%, those who were at primary, secondary and diploma educational levels were 39.2%, 11.7% and 0.8% respectively.

Land holding size; Land is perhaps the single most important factor of production and measure of wealth in the study area. It is the main source of income and increases the status of people in the community. Out of the total land, the respondents allocated most of their plots for wheat production, which was an average of 2.92 hectare on average out of total holding.

Access to extension agent; Provision of adequate services for the communities enhances the communities' socioeconomic development in general and the well-being of individuals in particular. It has important contribution in improving production and productivity and thereby increasing marketable surplus and ultimately for increasing the income of smallholder farmers. As the table 4.2.7 result shows, contacts of extension services of four kebeles per years are not enough.

Access to market and information; Access to agricultural markets and marketing information are essential factors in promoting competitive markets and improving agricultural sector development. A well-organized market intelligence information system helps all the producers and traders freely interact with one another in arriving at prices. Access to reliable market information help farmers sell their surpluses of wheat and choose modes of transaction, each of which yields a different benefit. As the table 4.2.10 result shows, only 8.6 respondents have information about their agricultural product prices.

Access to credit; The availability of financial sources for credit is crucial for farmers. Some farmers are using as an important input for agricultural activities.

Table 4.2.5 shows that Out of the total 44.77% sample households who had credit access, 18.67% of them get their credit from informal sources like Relatives and neighbors while the other 36.56% respondents get it from Cooperative Banks.

Crop rotation; Crop rotation is very important to increase the fertility of the soil. good crop rotation practices reduce losses of soil and serve to maintain or increase yields. generally, as result in table 4.2.8 shows that only 16.8% respondents follow crop rotation farming system but, 83.2% does not follow this farming system.

Oxen; land preparation is done using a pair of oxen; as a result, in table 4.2.4 shows that around 6.74% of the sample households cannot independently plough their farm using own oxen. Hence, as an alternative, they will go for oxen exchange arrangements or rent-in from others. Oxen ownership among farmers in the study area was 93.26%. Generally, above 90 % of sample respondents (households) in the study area have had a pair and above oxen.

4.4.2 Econometrics Analysis

The main objective of this study was to identify factors that affect the yield of wheat crop in Yaya Gulale Woreda. The primary and secondary data were used to collect data on the yield (Total) wheat harvested crop issues during the period of 2021/2022.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Total wheat harvested in(qu)	268	6.00	32.00	17.2463	6.24702
Farm expr in(yrs)	268	1.00	50.00	21.9776	12.50167
Fertilizers in(qu)	268	1.00	7.00	4.7612	1.56353
Rented land in(ximad)	268	.00	12.00	3.9590	2.32761
Borrowed birr for inputs	268	.00	51000.00	9.3168E3	8954.46757
Oxen	268	2.00	5.00	3.1903	1.01910
Mrkt distance per(hrs)	268	1.00	4.00	2.2425	.95446
Valid N (listwise)	268				

Table 4.4.1 Descriptive Statistics

The descriptive statistics of SPSS output of wheat crop production are given in the above table is accordingly.

The maximum yield (Total) wheat harvested crop per hectare was 32qu which is recorded in 2022; at the year of maximum crop yield recorded with maximum amount of mrkt distance per(hrs), farm expr in(yrs), borrowed birr for inputs, fertilizers in(qu), rented land in(ximad) and oxen was 4hrs, 50yrs, 51000br, 7qu, 12xim and 5oxen respectively.

The minimum yield of wheat harvested crop per hectare was 6qu which was recorded with minimum amount of mrkt distance per(hrs), farm expr in(yrs), borrowed birr for inputs, fertilizers in(qu), rented land in(ximad) and oxen was, 1hrs, 1yrs, 0br, 1qu, 0xim and 2oxen respectively.

From the output of the standard deviation of production of wheat in quintal, mrkt distance per(hrs), farm expr in(yrs), borrowed birr for inputs, fertilizers in(qu), rented land in(ximad)and oxen was, 6.24702, 0.95446, 12.50167, 8954.46, 1.56353, 2.32761, and 1.01910 respectively.

4.4.3 Testing the Assumptions of Multiple Linear Regression Normality assumption

The error terms are normally distributed with mean zero and variance σ^2 can be tested by plotting residual against the cumulative probability.

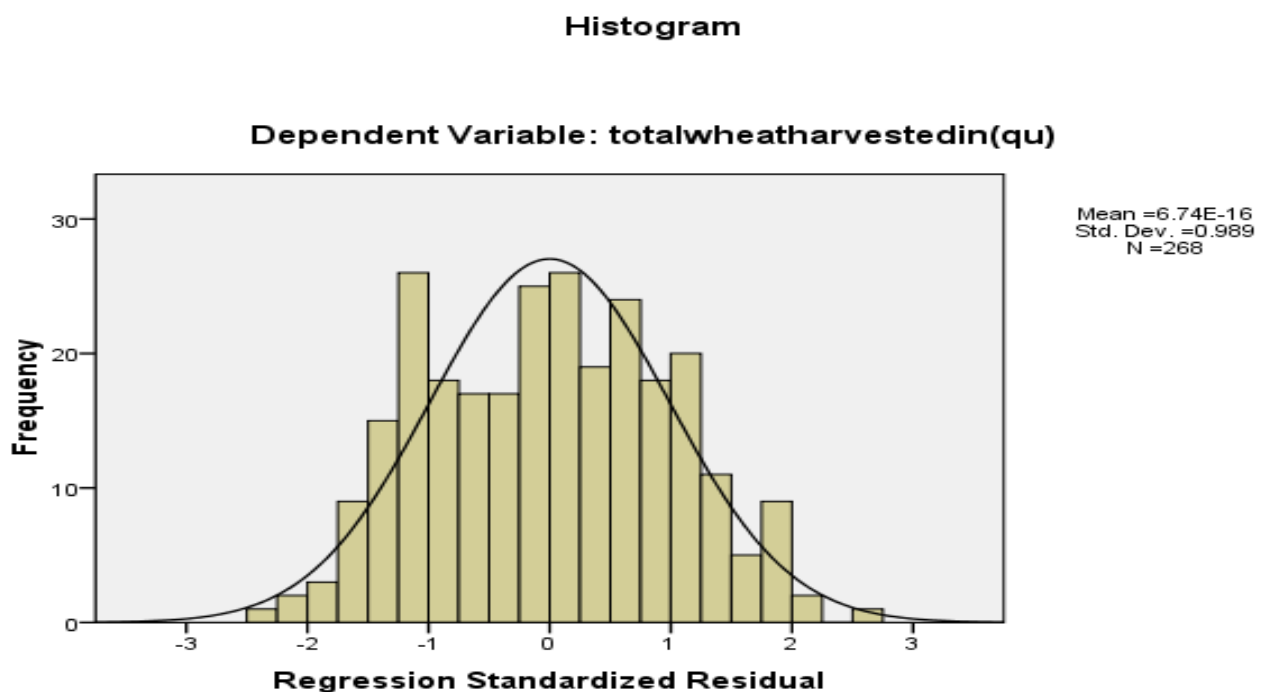


Figure 4.1: Histogram residual

The above Figure shows that the error terms are normally distributed approximately with mean zero and constant variance. This implies that independent variable X and error terms are independent. This means the models are well defined. The shape of the histogram should approximately follow the shape of the normal curve. This histogram is acceptably close to normal curve. Therefore, the assumption of normality holds.

Homoscedasticity: This plot should always be examined. The preferred pattern to look for is a point cloud or a horizontal band. A wedge or bowtie pattern is an indicator of non-constant

variance, a violation of a critical regression assumption. The sloping or curved band signifies inadequate specification of the model.

The sloping band with increasing or decreasing variability suggests non-constant variance and inadequate specification of the model.

The sloping band with increasing or decreasing variability suggests non-constant variance and inadequate specification of the model.

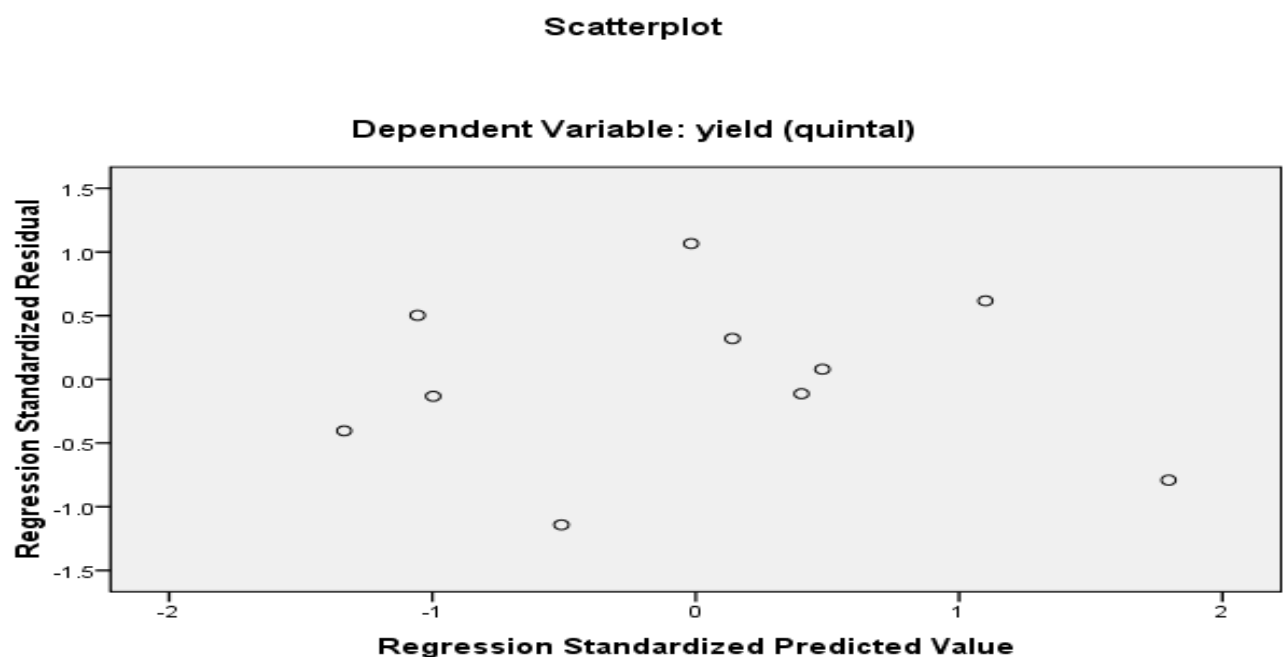


Figure 4.2. scatter plot of residual versus predicted value

As it is seen from the graph of the residuals versus the fitted value (the production of wheat) above, there is no systematic relationship between the residuals and fitted value the fitted value means that the production of wheat. This indicates that there is no heteroscedasticity in the data. That means the error term ε_i 's are independently and identically distributed random variables having normal distribution with mean zero and constant variance σ^2_{ε} .

4.4.4 Inferential Statistics

4.4.4.1 Multiple linear regression analysis

The statistical model that was used in the study is multiple linear regression models. The general model for multiple linear regression analysis is used to check the effects of many qualitative and quantitative independent variables on single response. Mathematically, the model is given as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_K X_K + \epsilon_{ij}$$

Before we use the results and interpret, we have to check model adequacy and whether assumptions are satisfied or not. The model summary table reports the strength of the relationship between the model and the dependent variable.

Table 4.4.2 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin- W atson
1	.990 ^a	.981	.957	9863.850	2.257

- a. Predictors: (Constant), mrkt distance per(hrs), farm expr in(yrs), borrowed birr for inputs, fertilizers in(qu), rented land in(ximad)and oxen
- b. Dependent Variable: total wheat harvested in(qu).

According to the given fitted model, the value of $R = 99\%$ this indicates that there is strong relationship between variables and also the value of $R^2 = 98.1\%$ of the variation in the production of wheat crop is explained by the six explanatory variables; mrkt distance per(hrs), farm expr in(yrs), borrowed birr for inputs, fertilizers in(qu), rented land in(ximad)and oxen. Hence the model is adequate.

4.4.4.2 Hypothesis testing for the model Overall Hypothesis Testing

This method is used to test the effect of the independent variables on the dependent variable.

Table 4.4.3 ANOVA analysis

ANOVA^b

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	2025.292	6	337.549	10.495	.000 ^a
Residual	8394.455	261	32.163		
Total	10419.746	267			

a. Predictors: (Constant), mrkt distance per(hrs), farm expr in(yrs), borrowed birr for inputs, fertilizers in(qu), oxen and rented land in(ximad).

b. Dependent Variable: total wheat harvested in(qu).

ANOVA table is a useful test of model's ability to explain any variation in the dependent variable; it does not directly address the strength of that relationship among variables.

Test for significance of regression

The objectives are to determine if there is a linear relationship between the response variable and any one of the regress or independent variables. The hypotheses are as follow;

Step 1; **Ho:** $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ VS **H₁:** $\beta_i \neq 0$, for at least one **i** is defer

Step 2; $\alpha = 0.05$

Step 3; Test statistics, $F_{cal} = 11.240$

Step4; P-value = 0.000

Step5; **Decision;** since p-value=0.000 is < α -value= 0.05 we reject Ho.

Therefore, we can conclude that the overall regression model is statistically significant, that means at least one of the parameters or coefficients of explanatory variables are different from zero.

4.4.4.3 Interpretation of the model coefficient

Table 4.4.4 Result of regression coefficient

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	7.214	1.610		4.480	.000		
Farm expr in(yrs)	.072	.029	.144	2.514	.013	.939	1.065
Fertilizers in(qu)	.493	.229	.123	2.148	.033	.936	1.069
Rented land in(ximad)	.414	.160	.154	2.587	.010	.869	1.151
Borrowed birr for inputs	.000	.000	.161	2.771	.006	.918	1.090
oxen	1.101	.364	.180	3.022	.003	.875	1.143
Mrkt distance per(hrs)	-.041	.373	-.006	-.110	.913	.951	1.052

Dependent Variable: total wheat harvested in quintal in (qu).

Fitted model is $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_k X_k + \epsilon_{ij}$

The regression coefficients are the least squares estimates of the parameters. The value indicates how much change in Y occurs for a one-unit change in x when the remaining X's are held constant. These coefficients are often called partial-regression coefficients since the effect of the other X's is removed. These coefficients are the values of β_0 , β_1 , β_2 , β_3 , β_4 and β_k the fitted model for Production Average yield of wheat harvested in quintal(Y) =7.214 +.072*farmexp(yrs) +.493* Fertil(qu) +.414*rented land(xim)+.0*(birr) +1.101 (oxen) -.041mrktdis(hrs).

Or

$$Y = 7.214 + .072 X_1 + .493 X_2 + .414 X_3 + .0 X_4 + 1.101 X_5 - .041 X_6.$$

Firstly, the slope of farmexp $\beta_1 = +.072$ is positive indicating that there is direct relationship between farmexp of hhs and the production of wheat crop. $\beta_1 = +.072$ is the change in yield of wheat crop (Y_i) when the farmexp of hhs (X_1) increases by one, keeping other independent variables are constant.

Secondly, the slope of Fertilizer's $\beta_2 = +.493$ the change in yield of wheat crop (Y_i) when the Fertilizer's usage (X_2) increases by one, keeping other independent variables are constant.

Thirdly, the slope of rented land $\beta_3 = .414$ is positive indicating that there is direct relationship between rented land and the production of wheat crop.

Fourthly, the slope of borrowed birr $\beta_4 = +.0$ is positive indicating that there is direct relationship between borrowed birr and wheat productivity, when remaining independent variables are held constant.

Fifthly, the slope of oxen $\beta_5 = +1.101$ positive indicating that there is direct relationship between oxen and the production of wheat crop. If the effects of remaining independent variable are fixed, then for each change of one unit in Oxen, yield of wheat (y) changes by **+1.101** units.

Sixthly, the slope of market distance $\beta_6 = -.041$ is negative indicating that there is indirect relationship between market distance and the production of wheat crop.

The amount of change in the production of wheat crop when farm experience, Fertilizer's, rented land, borrowed birr, oxen and market distance changed by one unit is, yield of wheat (y) changes by; .072, +.493, +0.414, +.0, +1.101 and -.041 respectively; assuming that the effect of other independent variables on production of wheat crop remains constant.

4.4.4.4 Test of individual parameters

Since we have rejected the null hypothesis on overall test of significance, we have to identify which variable is responsible for the rejection.

Test for farming experience.

Null hypothesis: farmexp has no significant effect on production.

Alternative hypothesis: farmexp has significant effect on production.

Level of significance: $\alpha=0.05$

Test statistics t (p-value= 0.013)

Decision rule Reject H_0 , since p-value is less than α value i.e., $0.013 < 0.05$

We conclude that farmexp has significant effect on yield of wheat crop production.

Test for fertilizer

Null hypothesis: fertilizer has no significant effect on production

Alternative hypothesis: fertilizer has significant effect on production.

Level of significance: $\alpha=0.05$

Test statistics t (p value=.033)

Decision rule: Reject H_0 , since p-value is less than α value i.e., $0.033 < 0.05$.

We conclude that effect the fertilizer is statistically significant on yield of wheat crop. i.e., The parameter is differed from zero.

Test for rented land

Null hypothesis: rented land has no significant effect on production

Alternative hypothesis: rented land has significant effect on production

Level of significance: $\alpha=0.05$

Test statistics t (p-value=0.010)

Decision rule: Reject H_0 since p-value is less than α value i.e., $0.010 < 0.05$

We conclude that the rented land has significant effect on the yield of wheat crops.

Test for borrowed birr for inputs

Null hypothesis: borrowed birr has no significant effect on production

Alternative hypothesis: borrowed birr has significant effect on production

Level of significance: $\alpha=0.05$

Test statistics $t(p\text{-value}=0.006)$

Decision rule: fail to Reject H_0 since p-value is greater than α value i.e., $0.006 < 0.05$

We conclude that borrowed birr is statistically significant i.e., the parameter is differed from zero.

Test for oxen

Null hypothesis: oxen have no significant effect on production

Alternative hypothesis: oxen have significant effect on production

Level of significance: $\alpha=0.05$

Test statistics $t(p\text{-value}=0.003)$

Decision rule: fail to Reject H_0 since p-value is greater than α value i.e., $0.003 < 0.05$

We conclude that oxen are statistically significant i.e., the parameter is differed from zero.

Test for market distance

Null hypothesis: market distance has no significant effect on production

Alternative hypothesis: market distance has significant effect on production

Level of significance: $\alpha=0.05$

Test statistics $t(p\text{-value}=0.913)$

Decision rule: fail to Reject H_0 since p-value is greater than α value i.e., $0.913 > 0.05$

We conclude that market distance from farmers is statistically insignificant (it has no effect on wheat productivity).

From the table of multiple regressions model, farming experience, fertilizer, rented land, borrowed birr for inputs and oxen have a significance effect both individually and in group on the wheat productivity. Because their p - values are less than the significance level value. But, market distance from farmers has insignificant effect on wheat productivity because the p- value is less than significance level value.

4.4.5 Correlation coefficient

In statistical terms, correlation is a method of assessing a possible two-way linear association between two continuous variables. Correlation is measured by a statistic called the correlation coefficient, which represents the strength of the putative linear association between the variables in question. It is a dimensionless quantity that takes a value in the range -1 to $+1$. A correlation coefficient of zero indicates that no linear relationship exists between two continuous variables, and a correlation coefficient of -1 or $+1$ indicates a perfect linear relationship. The strength of relationship can be anywhere between -1 and $+1$. The stronger the correlation, the closer the correlation coefficient comes to ± 1 . If the coefficient is a positive number, the variables are directly related (i.e., as the value of one variable goes up, the value of the other also tends to do so). If, on the other hand, the coefficient is a negative number, the variables are inversely related (i.e., as the value of one variable goes up, the value of the other tends to go down). Any other form of relationship between two continuous variables that is not linear is not correlation in statistical terms. To emphasize this point, a mathematical relationship does not necessarily mean that there is correlation.

Table 4.4.5 Correlation coefficient

Total wheat harvested in(qu)	Pearson Correlation	1	.229	.223	.272	.250	.290	.052
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.401
	N	268	268	268	268	268	268	268
Farm expr in(yrs)	Pearson Correlation	.229**	1	.147*	.130*	.058	.208**	.027
	Sig. (2-tailed)	.000		.016	.033	.344	.001	.655
	N	268	268	268	268	268	268	268
Fertilizers in(qu)	Pearson Correlation	.223**	.147*	1	.154*	.135*	.184**	.039
	Sig. (2-tailed)	.000	.016		.012	.027	.003	.525
	N	268	268	268	268	268	268	268
Rented land in(ximad)	Pearson Correlation	.272**	.130*	.154*	1	.246**	.234**	.158**
	Sig. (2-tailed)	.000	.033	.012		.000	.000	.010
	N	268	268	268	268	268	268	268
Borrowed birr for input	Pearson Correlation	.250**	.058	.135*	.246**	1	.144*	-.030
	Sig. (2-tailed)	.000	.344	.027	.000		.019	.625
	N	268	268	268	268	268	268	268
oxen	Pearson Correlation	.290**	.208**	.184**	.234**	.144*	1	.164**
	Sig. (2-tailed)	.000	.001	.003	.000	.019		.007
	N	268	268	268	268	268	268	268
Mrkt distance per(hrs)	Pearson Correlation	.052	.027	.039	.158**	-.030	.164**	1
	Sig. (2-tailed)	.401	.655	.525	.010	.625	.007	
	N	268	268	268	268	268	268	268

** . Correlation is significant at the 0.01 level (2-tailed)

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

Interpretation

From the above Pearson Correlation Coefficient, we understand the following:

- The Pearson correlation between yield of production and farming experience is 0.229 there is strong positive linear relationship between yield wheat production and farming experience, the other independent variables remain constant.
- The Pearson correlation between yield of production and Fertilizer's usage is 0.223 there is strong positive linear relationship between the yield of production and fertilizer the other independent variables remain constant.
- The Pearson correlation between yield of wheat production and rented land is 0.272 there is strong positive linear relationship between the two variables yield of wheat production and rented land.
- The Pearson correlation between production and borrowed birr for inputs is 0.250 there is a moderate positive linear relationship between the two variables yield of wheat production and borrowed birr for inputs.
- The Pearson correlation between wheat production and oxen is 0.290 there is strong positive linear relationship between the two variables wheat production and oxen.
- The Pearson correlation between wheat production and market distance is 0.052 there is weak positive relationship between the two variables.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

Based on the finding of the study conclusions were drawn and possible recommendations were forwarded. Accordingly, the first section presents the conclusion part and the second section presents the possible recommendation.

5.1 CONCLUSIONS

The major finding of the study from the questionnaire indicated that the existence of many factors that affect wheat productivity in the study area particularly, technological factor (inputs) is beyond the capacity of farmer to purchase because of their expensiveness. So, government should distribute these inputs with low price by subsidizing and providing access to credit with low interest rate to bring desired economic development. Socio economic factor; landholding size of respondents was found to be too small to fulfil the annual food requirements for large family size of households.

The study also indicated that, majority of the respondents of farmers in Yaya Gulale woreda are illiterate and have no awareness about modern farming system such as crop rotation and has no information about his product. Some of farmers have not enough Oxen but, majority of the them practiced ploughing by oxen. demographic factor such as; gender, age, education level and farming experience affects wheat productivity negatively and positively. Institutional factors such as; market distance from home of farmers is very far for most of the farmers. This also affects the farmers wheat productivity negatively.

Depending up on the analysis of econometrics model, we conclude the following main points. The multiple linear regression analysis indicates that the relationships between the amount of wheat production and farming experience, fertilizer, rented land, borrowed birr for inputs and oxen are positive. The average production of wheat in the Yaya Gulale woreda for the past years is 32 quintals per ximad.

From multiple linear regression model analysis result finding indicate that some variable like market distance from farmers is negatively affect wheat productivity, but there is a positive relationship between production and other variables like; farming experience, fertilizer, rented

land, borrowed birr for inputs and oxen. And independent variables like farming experience, fertilizer, rented land, borrowed birr for inputs and oxen in the multiple linear regression analysis the model is significant. We conclude that the overall regression model is statistically significant. That means at least one of the parameters or coefficients of explanatory variables are different from zero.

5.2 RECOMMENDATION

Therefore, based on the above findings, the following recommendations can be made:

Governmental, non-governmental, farmers and other concerned bodies,

- Should make enormous efforts to improve wheat productivity.
- Should motivate, help, give training and advise on how to improve the wheat productivity.
- Develop and disseminate available modern farm machinery to improve wheat productivity.
- Giving farmers awareness on the importance of IVS and how to use this seed.
- Focus on dissemination of not only improved variety of seed but also its management practices. giving access to both formal and informal quality education is need of the time.
- Modern way of sowing method (drilling),
- Follow up of extension agents, support from the government, repeated sessions of training at FTC and village level and in combination with increase in land size, for better production of wheat productivity in the study area.
- The adequate supplies of inputs with clear instructions to the farmers about the quantity as well as timings of putting these inputs in the farm frequent follow up by extension.
- Frequently meet extension agent and farm expertise especially during the production season.
- Improve farmers knowledge in quality seed production;
- Giving training on agricultural issues, arrange forum and exhibition for experience sharing and solve the wheat productivity problem in collaboration.
- Farmers should try again and again to improve their wheat production using their skills and making linkages with different farmers.
- The government should facilitate the infrastructure (especially road) to improve the market network of wheat producer which encourages the farmers to produce effectively

and supply their products to the market with low transportation cost that increase farmers experience in the long run.

- Finally, further research should continue to examine factors associated with the wheat yield productivity from time to time.

policy implications; To improve the production and productivity of wheat in the study area resolving the prevailing production problems deems a necessary condition. Among these increasing farmers' awareness on the importance of integrated crop management packages for increased productivity and sustainable production is one of them.

Additionally, it is important to develop high yielding varieties that combine durable resistance. In order to strengthen farmer's production potential, making available credit to farmers for input purchase also needs attention.

To solve shortage of improved varieties seed, improving farmers' knowledge in quality seed production through training is important. Improving knowledge of farmers on production of quality seed by themselves will solve shortage problem and save expenditures incurred by farmers.

Market information dissemination is an important issue for producers to help them to decide on marketing their products.

Future research direction

This study suggests for future studies to introduce additional information for future researchers, research institutions, students and other researchers as an empirical literature review in order to expand the finding of these result. Also, study will be benefitable to identify key factors affecting the production of wheat especially for; Rural development association (RDA), Zonal Administration of the Woreda for policy formulation and on planning so as to assist them to build a holistic strategy that help the farmers in the improvement of wheat productivity. Moreover, it's better to conduct comparative studies on improvement of wheat productivity.

The current study concentrated on both secondary and primary data and the analysis was made by Econometrics model. However, secondary and primary data was obtained from different sources. Thus, future research is recommended to validate secondary and primary data by adding other data that are more technical factors.

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APPENDIX I
SALALE UNIVERSITY
COLLAGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ECONOMICS
QUESTIONNAIRE

I am conducting a study on the factors affecting wheat production in the case of Yaya Gulele Woreda, North Shao zone, Oromia regional state, Ethiopia. The questionnaire items are about the study and I kindly request you to participate in responding to the questions below to give genuine answer getting the information needed in my research. The information given will be treated as confidential and the results of the study will be used for academic research purposes only.

Research site: District-----kebele----- Date-----

Personal information

- Sex: 1) Male [1] 2) Female [0]
- Age: __
- Farming Experience: _
- Marital status: A) Married [1] B) Non-married [0]
- Education level: A) Illiterate B. primary C. Secondary D. Diploma E. Degree

Section I. Factors affecting wheat production related question

1. What is the size of cultivable land possessed by the household ___ in ximad?

1.1 Owned land----- in ximad?

1.2 Rented land-----in ximad?

1.3. Total size of owned land. _____ in ximad?

2. **Total** area allocated for wheat in 2013/2014 E.C production year in ximad----- ?

3. How many quintals of wheat can you produced in the last year production per ximad--- --?

4. How many oxen do you have? ____

5. What do you use to plough your land? 1. Own Oxen [1] 2. Rented oxen [0]

6. Did you use fertilizer inputs in your own land in the recent harvest year (2013/14) E.C.?

Yes

2. No

7. If your answer for question number 6 is yes, how many quintals of fertilizers did you use per hectare of your own land? ____

8. What motivated you to apply chemical fertilizer and/or selected seeds in your own and rented land?

1. To increase the productivity of land ☐

2. Fear of denial of credit opportunities ☐

3. Fear of exclusion from safety net ☐

4. Fear of exclusion from irrigation schemes 5. If other, specify __

9. If you did not use fertilizer inputs, what are the possible reasons? (Multiple answers are possible).

1. High selling price ☐

2. Late arrival of fertilizer to the purchasing points ☐

3. Scarcity of fertilizer supply ☐

4. No credit arrangement

5. Risky if shortage of rain ☐

6. I used animal dung and compost ☐ 7. Other, specify; -----

10. Have you used agricultural inputs (fertilizer, chemicals, improved seeds etc.) for the production of wheat? 1. Yes 2. No

11. What are the major wheat production constraints? Rank (according to their severity of the problem).

	Constraints	Rank (1-3) (1= high priority, 2= medium 3=low priority)
1	Small Size of land	
2	Shortage of Improved seed	
3	Shortage of Rain fall	
4	Lack of Fertilizers	
5	Lack of Pesticides	
6	Lack of Oxen	

12. Did you get enough rain in the last production season? 1. Yes 2. No

13. Have you produced enough products for annual household consumption? 1. Yes 2. No
14. If you did not produce enough products, what solutions would you use to fulfill consumption needs? 1. Purchasing at harvesting time 3. Looking for remittances
2. Looking for food aid 4. Working in off-farm activities
15. Have you face insect problems? 1. Yes 2. No
16. If your answer for question number 15 is yes, how much did you spend to purchase pesticides, herbicides and insecticides? A. 100 (Birr) B. 250 Birr C. 300 Birr D.400 E. If other, specify
17. Did you use improved seeds in your own or rented land in the recent harvest year? 1.Yes 2 No
18. If your answer for question number 17 is yes, in how many *Ximad* of land did you use improved seeds? ____ximad
19. Have you ever used HYV in your own or rented land? 1. Yes 2. No
20. If your answer for question number 19 is yes, would you tell me the yield difference?

Average production before you use HYV-----quintal

Average production after you use HYV----- quintal

Section II. Wheat production marketing related questions Marketing constraints

	Constraints	Rank according to Severity of problem	Rank (1-3) (1= high priority, 2= medium 3=low priority)
1	Low price		
2	Less/no market information		
3	Price instability		
4	No buyer or lack of market		

21. Where do you sale/market place? 1. within village 2. outside village 3. within district 4. outside district 5. If other, -----
22. What is the distance traveled to reach woreda market per hrs----- ?

Section III. Access To Credit Related Questions

23. Do you have credit access for? 1. Yes 2. No

24. Have you taken a credit in 2013/14 E.C cropping year? 1. Yes 2. No

25. How much money did you borrow? ____birr

26. Why do you want to take credit?

1. To cover expenses incurred for weeding

4. If others, specify_____

2. To start new businesses

3. To purchase agricultural inputs

27. If you take a credit, who was your credit source?

1. Relatives/neighbors

3. Sinqee bank

2. Cooperatives Bank

4. Others, specify; -----

28. Do you practice crop rotation? 1yes 2.no

29. Did you have prior price information before taking your agricultural products to the market?

1. Yes

0. No

Section VI. Extension Agents Related Questions

30. Did you get an advice from extension agents in the last production season? 1. Yes 2. No

31. If your answer for question number 30 is yes, what was the average number of contacts per a year? _

32. Do you think the number of contacts with the extension agents was enough? 1. Yes 2. No

33. If the answer for question number 32 is no, what are the reasons for insufficient contact?

Thank you so much!

APPENDIX II

YUNIVARSIITII SALAALEE

KOLAAJII BIZINASII FI DINAGDEE

KUTAA DIINAGDEE

GAAFFIILEE

Naannoo Oromiyaa , Godina Shawaa Kaabaa, Aanaa Yaaya Guleelee, keessatti wantoota oomisha qamadii irratti dhiibbaa geessisan irratti qorannoon gaggeessaa jira. Gaaffileen kun gaaffilee waa'ee qorannichaa yoo ta'an qorannoo koo keessatti odeeffannoo barbaachisu argachuun deebii dhugaa kennuudhaaf gaaffilee armaan gadii deebii kennuu irratti akka hirmaattan kabajaan isin gaafadha. Odeeffannoon kennamu Odeeffannoon sirri fi dhugaarati hunda,ee ta,uu qabaa.sabaabni isaatis bu.aan qorannichaa oomisha qamadii foyyessuf ,rakkichaa furuu keessati fi qorannoo sirri gageessuf gahee olanaa qabaa waan ta,eef.

Bakka qorannoo: ----- Aanaa-----

Odeeffannoo dhuunfaa

- Saala: 1) Dhiira [1] 2) Dubartii [0].
- Umurii: -----
- Muuxannoo Qonnaa: -----
- Haala gaa'ila: A) Gaa'ela kan qabu [1] B) Kan hin fuudhin [0] .
- Sadarkaa barnootaa: A) Dubbisuu fi barreessuu hin dandeenye B. sadarkaa tokkoffaa C. Sadarkaa lammaffaa D. Dippiloomaa E. Digirii

Kutaa I. Qabxiilee oomisha qamadii irratti dhiibbaa geessisan gaaffii

1. lafat abbaa qabeenyummaan qabduu caadaa meeqa?

1.1 .lafat kireeffatee caamadat meeqa ta.aa?

2.Bal'ina waliigalaa lafa abbaa qabeenyummaa caamada meeqa?

3.Waliigala lafa qamadii bara oomishaa 2013/2014 caamada meeqa ta,aa ?

4.Oomisha bara darbee keessatti camadaa tokkoraa qamadii kuntaala meeqa oomishuu dandeessa?

5.Qotiyoo qonna meeqa qabda?

6.Lafa keessan qotuuf maal fayyadamta? 1. Qotiyoo Ofii [1] 2 Qotiyoo kireeffaman

7. Omishaa bara (2013/14) tti galtee xaa'oo lafa ofii keessanitti fayyadamtaniittuu? 1.Eeyyee 2. Lakki

8.Gaaffii lakkoofsa 7ffaaf deebii keessan eeyyee yoo ta'e, lafa mataa keessaniit hektaara tokkoof xaa'oo kuntaala meeqa fayyadamtan?

9.Lafa mataa keessanii fi kireeffattan irratti xaa'oo keemikaalaa fi/ykn sanyii filatamoo akka fayyadamtaan maaltu isin kakaase?

- | | |
|------------------------------------|---|
| 1.Omishtummaa lafaa guddisuuf | 3. Sodaa safety net keessaa baafamuu |
| 2.Carraa liqii dhorkamuu sodaachuu | 4. Sodaa iskiimota jallisii keessaa bahuu |
| | 5. Yoo kan biraa ta'e, ibsi----- |

10.Galtee xaa'oo hin fayyadamne taanaan sababoonni ta'uu danda'an maali?

- | | |
|--|------------------------------|
| 1.Gatii gurgurtaa olaanaa | |
| 2.Xaa'oon gara bakka bittaa yeroon booda dhufuu | 3. Hanqina dhiyeessii xaa'oo |
| 5.Hanqinni rooba yoo ta'e balaa qaba | 4. Qophii liqii hin qabu |
| 6.Fincaa bineensotaa fi kompostii fayyadameen ture | 7. Kan biroo, ibsi----- |

11.Oomisha qamadiitif galteewwan qonnaa (xaa'oo, keemikaala, sanyii fooyya'aa fi kkf) ni fayyadamtaniittuu? 1. Eeyyee 2. Lakki

Rakkoolee gurguddoon oomisha qamadii maal fa'i? Sadarkaa (akkaataa cimina rakkoo isaaniitti).

Rakkoolee gurguddoon	Sadarkaa Danqaa (1-3) . (1= dursa olaanaa, 2= giddu galeessa 3=dursa gadi aanaa)
1. Lafa Xiqqaa	
2. Hanqina sanyii Fooyya'e	
3 .Hanqina Roobaa roobu	
4. Hanqina Xaa'oo	
5. Hanqina Qoricha Aramaa	
6. Q0tiyoo dhabuu	

12.Bara oomishaa darbe keessat rooba gahaa argattaniittuu? 1. Eeyyee 2. Lakki

13.Oomisha waggaa waggaan manaat fayyadamuuf gahaa ta'e oomishtee jirtaa?

1. Eeyyee

2. Lakki

14. Yoo oomisha gahaa hin oomishine ta'e, fedhii fayyadamaa guutuuf furmaata akkamii fayyadamta?

1. Yeroo sassaabbii bitachuu

3. Maallaqa ergamu barbaaduu

2. Gargaarsa nyaataa barbaaduu

4. Hojii qonnaa ala jiru keessatti hojjechuu

15. Rakkoon ilbiisota si mudateeraa?

1. Eeyyee

2. Lakki

16. Gaaffii lakkoofsa 15f deebii keessan eeyyee yoo ta'e, qoricha farra aramaa, qoricha baala mukaa fi qoricha ilbiisota bitachuuf baasii meeqa baastan? A. 100 (Birr) B. Birrii 250 C. Birrii 300 D. 400 E. Kan biraa yoo ta'e ibsi.

17. Bara sassaabbii bara darbeet lafa mataa keessanii ykn kireeffattan irratti sanyii fooyya'aa fayyadamtaniittuu?

1. Eeyyee

2. Lakki

18. Gaaffii lakkoofsa 17 tiif deebii kee eeyyee yoo ta'e, lafa Ximad meeqa keessatti sanyii fooyya'e fayyadamtee?

19. Lafa mataa keessanii ykn kireeffattan irratti HYV fayyadamtanii beektuu?

1. Eeyyee

2. Lakki

20. Gaaffii lakkoofsa 19 tiif deebii kee eeyyee yoo ta'e garaagarummaa oomishaa natti himtaa?

HYV fayyadamuu kee dura oomisha giddu galeessaa kuntalaa-----

Erga HYV fayyadamtanii booda oomisha giddu galeessaa kuntalaa-----

Kutaa II. Gaaffiiwwan gabaa oomisha qamadii wajjin walqabatan Danqaa gabaa.

Danqaawwan	Sadarkaa Danqaawwan	rakkoo Sadarkaa (1-3) (1= dursa olaanaa, 2= giddu galeessa 3=dursa gadi aanaa) .
1. Gatii gadi aanaa		
2. Odeeffannoo gabaa xiqqaa/hin jiru		
3. Tasgabii dhabuu gatii		
4. Bituu hin qabu ykn gabaa dhabuu		

21. Bakka gurgurtaa/gabaa eessatti galchitu? 1. ganda keessa 2. gandan ala 3. aanaa keessa 4. aanaan ala 5. Yoo kan biraa ta'e, -----.

22. gabaa aanaa keessan ga'uuf fageenyi deemamu sa.aa meeqa ?

Kutaa III. Gaaffiiwwan Liqii Waliin Walqabatan Argachuu

23. Liqii argachuuf carraa qabduu? 1. Eeyyee 2. Lakki

24. Bara midhaan 2013/14 E.C keessatti liqii fudhattaniittuu? 1. Eeyyee 2. Lakki

25. Gaffi 24f eyye yoo jatee Maallaqa meeqa liqeefate?

26. Maaliif liqii fudhachuu barbaadda? 1. Baasii marga balleessuuf bahu uwwisuuf

2. Daldala haaraa jalqabuuf 4. Yoo kanneen biroo ta'e, ibsi

3. Galtee qonnaa bitachuuf

27. Yoo liqii fudhatte maddi liqii kee eenyu ture?

1. Fira/ollaa 3. Baankii Sinqee

2. Baankii Waldaa Hojii Gamtaa 4. Kanneen biroo, ibsa; -----.

28. Malaa qonna saanyii waal jijjiraan facaasuu nifayyadamtaa ? 1 eyye 2. lakkii

29. Bu,aa omishaa kee garaa gabaat osoo hin fidnii duraa odeffanoo gaatii qabda? 1, eyye 2. la

Kutaa VI. Gaaffiiwwan Ejentoota Eksteenshinii Walqabatan

30. Bara oomishaa darbe keessa gorsa ejentoota eksteenshinii irraa argattaniittuu? 1. Eeyyee
2. Lakki

31. Gaaffii lakkoofsa 30f deebii keessan eeyyee yoo ta'e, waggaatti giddu galeessaan lakkoofsi quunnamtii meeqa ture?

32. Lakkoofsi quunnamtii ergamtoota eksteenshinii waliin taasifame gahaa ture jettanii yaaddu?
1. Eeyyee 2. Lakki

33. Deebiin gaaffii lakkoofsa 30 lakki yoo ta'e, sababoonni quunnamtii gahaa dhabuu maali?

Baay'ee galatoomii!