

Determinants of Food grain Productivity in Developing Countries: An Empirical Study

Prof. Manoj Kumar Mishra¹&Dr.Preeti Mishra²

1. Department of Economics, College of Business and Economics, Salale University, Ethiopia, Email:

mkmishraeco@gmail.com

2. Department of Management, Babu Banarasi Das Institute of Technology and Management, Lucknow,

Email: preetimishra7sep@gmail.com

Abstract

The study tried to measure the relationship between fodgrain productivity and its determinants in Ethiopia with special reference to wheat. It also tested that concerned productivity was managed scientifically in this region or not. The tools of descriptive and econometric methods was applied to know the scientific reasons of wheat productivity and its main determinants for proper planning of agriculture in concerned area. The data collected through primary and secondary methods have been properly presented with the help of tables and diagrams to know more about the research objectives. Data was collected from Oromia regional state based on judgement sampling process. Multiple regression model applied and findings indicated that farm experience, rented land, financial accessibility, availability of oxen, fertiliser, pesticides had positive impact on productivity while more distance from the market had negatively affected the productivity in this region. This study is significant because it finds the scientific observations of productivity and by proper measures; wheat productivity can be enhanced in Ethiopia. Obviously, farmers conditions tend to improve through management of agricultural productivity. Public and private bodies should adopt modern technologies and provide training to farmers for better productivity. Therefore, to achieve the prime aim of sustainable development goals like poverty can't be achieved without improving the agricultural productivity.

Keywords: Productivity determinants, Oromia region, scientific management, Training, agricultural planning etc.

1.1 Overview of The Study

Agriculture is the prime occupation of most of the countries particularly the developing countries in the world and it is the backbone in Ethiopia also. It contributes 36 percent of GDP and about 81 percent employment in the economy. Wheat is an important agricultural product not only in Ethiopia but most of the African countries. Still the productivity is very low in Ethiopia due to unscientific management and lack of infrastructural facilities in this region. Government has tried but it is not sufficient in this direction for improving the productivity of wheat in this region. The scientific study about the factors influencing the wheat productivity is very important not only in this area but whole over the world. Poverty is very high in rural and agricultural areas in developing countries. Therefore, to achieve the prime aim of sustainable development goals like poverty can not be achieved without improving the agricultural productivity.

1.2 Statement of the Problem

Ethiopia is an agrarian economy but agricultural productivity is very low while it is very high in developed countries. Living standard of rural people is determined by agricultural development to cope up with poverty as it has been the prime goal of SDG which have to be achieved upto 2030. It is not possible without improving the productivity of agriculture like wheat in concerned region. Zero hunger and poverty are related to each other

1.3 Objectives of the Study

Specifically, this research addresses the following main questions;

- To study the challenges of the farmers in marketing their wheat productivity in study area
- To determine the factors affect wheat productivity in the study area
- To find the measures to improve productivity in concerned region

1.4 Significance of the study

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

- 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 Gulaleworeda.
- It also provides recommendation for intervention towards alleviating the problem.
- Finally, it will also give a clue for the next generation in the study area.

1.5 Scope of the study

Even though there are many woredas in Oromia regions, but this study would be focused only in Yaya Gulaleworeda, due to the wideness and complex nature of the study. The researcher only attempts one of the woredas due to; the poor performance of agriculture, supply and demand gap for food and poor infrastructure. The study delimited its scope in Yaya Gulaleworeda.

1.6 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 skill to process large and huge data. On the other hand, misunderstanding of questions by respondents and lack of giving correct information concerning the study.

Unavailable of many written materials related with this topic and getting other information are other limitations in this study. However, the researcher was trying his best to collect right information from different sources to make the research result accurate and reliable.

2. Review of Literature

2.1 Related Literature

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 tons requirement in 2013 (Vutete and Bobo 2015). Past literature revealed the main factors for wheat productivity like Farming experience, Education level, Gender, landholding size, Possession of oxen, Chemical fertilizer, Improved seeds, Intercropping, Temperature etc.

Empirical studies on assessment of factors affecting wheat productivity in Ethiopia particularly in Oromia in case of Yaya Gulaleworeda is accordingly. 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%.

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

The framework assumes that wheat productivity were affected by different factors. These factors include variables like; farming experience, land size, gender, education level, fertilizers, improved seeds, rain fall, oxen owned, access to credit and market, pesticides, Temperature and Intercropping. The study would be identifying how these variables affect wheat productivity in Yaya Gulele Woreda.

2.2 Research Gap

Even though, various studies were conducted on factors affecting wheat productivity, no one can still use the effect of Temperature and intercropping. As study (AssefaAdmassie, 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 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.

The gap of this research was inclusion of variables which can influence the wheat productivity in study area. There are variables which did not found by this study such as; police of government, foreign exchange rate and war which can influence the wheat productivity.

3. Research Methodology

3.1. Description of the Study Area

YayaGulale 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. 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 (YayaGulale Agricultural development office, 2019/2021).

3.2. Research design, Data Collection,

This study is based on descriptive as well as inferential statistics. It was conducted on the descriptive and causal research design both as per the requirement of the objectives of the study. Primary and secondary data were collected through different methodologies. It was tried for the accuracy of data for quality results of the study. Econometrics model was applied to capture the value of research objectives and parameters.

3.3 Target population and Sampling Techniques and sample Size

The target population of the study consists of members of Farmers of (4) kebeles out of (17) kebeles of YayaGulaleworeda 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. 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.

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

N= target population

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

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

Table 3.1: Sample Determination details in Study area

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

Sources; (CSA 2014) and Own Computation,2022

3.4 Model specification

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

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

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 $i=1, 2, \dots, n$

On the basis of this model, values of all parametres were calculated to find the results of the study. These dependent and independent variables were selected based on past study concerned to this topic but the regions were different.

4. Results and Discussion

4.1 Demographic and socio-economic characteristics of sample households

Table 4.1.1: 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)

Table 4.1.2 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)

Table 4.3 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)

4.2. Descriptive Analysis

The main objective of this study was to identify factors that affect the yield of wheat crop in YayaGulale 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.

Table 4.2.1 Descriptive Statistics
Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
totalwheatharvestedin(qu)	268	6.00	32.00	17.2463	6.24702
farmexpr in(yrs)	268	1.00	50.00	21.9776	12.50167
fertilizersin(qu)	268	1.00	9.00	4.9067	1.75105
rentedlandin(ximad)	268	.00	12.00	3.9590	2.32761
borrowedbirrforinputs	268	.00	51000.00	9.3168E3	8954.46757
oxen	268	2.00	5.00	3.1903	1.01910
mrktdistanceper(hrs)	268	1.00	4.00	2.2425	.95446
Valid N (listwise)	268				

From the output the standard deviation of production ofwheat in quintal, mrkt distance per(hrs), farm expr in(yrs), borrowed birr for inputs, fertilizers in(qu), rented land in(ximad)and oxenwas, 6.24702, 0.95446, 12.50167,8954.46,1.75105, 2.32761,and1.01910 respectively.

4. 3 Interpretation of the model coefficient

Table 4.3.1 Result of regression coefficient

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	7.043	1.537		4.582	.000		
farmexpr in(yrs)	.071	.028	.141	2.482	.014	.941	1.063
fertilizersin(qu)	.592	.206	.166	2.877	.004	.917	1.091
rentedlandin(ximad)	.413	.159	.154	2.606	.010	.872	1.147
borrowedbirrforinputs	.000	.000	.156	2.715	.007	.917	1.091
oxen	1.003	.365	.164	2.747	.006	.858	1.166
mrktdistanceper(hrs)	-.046	.370	-.007	-.125	.901	.951	1.052

a. Dependent Variable: totalwheatharvestedin(qu)

Dependent Variable: total wheat harvested in quintal in ximad.

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

These coefficients are the values of $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ and β_k the fitted model for Production Average yield of wheat harvested in quintal(Y) =7.043 +.71*farmexp(yrs) +.592*Fertil(qu)+.413*rented land(xim)+.0*(birr) +1.003 (oxen) -.046mrktdis(hrs).

Or

Y =7.043+.71X₁+.592X₂+.413X₃+.0X₄+1.003X₅-.046X₆.

Table 4.2.5 Correlation coefficient

			Correlations					
Control Variables			farmexpr in(yrs)	fertilizersi n(qu)	rentedlan din(ximad)	borrowed birrforinpu ts	oxen	mrktdistan ceper(hrs)
totalwheat harveste din(qu)	farmexpr in(yrs)	Correlation	1.000	.092	.072	.001	.152	.016
		Significance (2- tailed)		.132	.238	.987	.013	.793
		df	0	265	265		265	265
fertilizersi n(qu)	fertilizersi n(qu)	Correlation	.092	1.000	.079	.079	.176	.037
		Significance (2- tailed)	.132		.197	.199	.004	.548
		df	265	0	265	265	265	265
rentedlan din(ximad)	rentedlan din(ximad)	Correlation	.072	.079	1.000	.191	.168	.150
		Significance (2- tailed)	.238	.197		.002	.006	.014
		df	265	265	0	265	265	265
borrowed birrforinpu ts	borrowed birrforinpu ts	Correlation	.001	.079	.191	1.000	.077	-.044
		Significance (2- tailed)	.987	.199	.002		.211	.471
		df	265	265	265	0	265	265
oxen	oxen	Correlation	.152	.176	.168	.077156
		Significance (2- tailed)	.013		.006	.211		.011
		df	265	265	265	265	0	265
mrktdistan ceper (hrs)	mrktdistan ceper (hrs)	Correlation	.016	.037	.150	-.044	.156	1.000
		Significance (2- tailed)	.793	.548	.014	.471	.011	
		df	265	265	265	265	265	0

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

5. Concluding Remarks

This study is significant because it finds the scientific observations of productivity and by proper measures; wheat productivity can be enhanced in Ethiopia. Obviously, farmers conditions tend to improve through management of agricultural productivity. Public and private bodies should adopt modern technologies and provide training to farmers for better productivity. Therefore, to achieve the prime aim of sustainable development goals like poverty can't be achieved without improving the agricultural productivity. Therefore, based on the above findings, the following recommendations were provided to governmental, non-governmental, farmers and other concerned bodies like

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

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