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Determinants of Wheat Market Supply in Sinana District

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Abstract
In Ethiopia, cereal production and marketing are the means of livelihood for millions of small holder households and it constitutes the single largest sub-sector in economy. Wheat is among the most important crops in Ethiopia, ranking fourth in total cereals production 13.25% (1.63 million hectares) next to maize, sorghum and teff. Even though there has been an increase in agricultural production, there were drawbacks in the absence of many households participation in the markets. As Bale zone is one of surplus wheat producer in the country, this study was proposed with the objective of identifying factors determining of wheat supply to market in Sinana district of Bale zone. Primary data were collected from120 randomly selected wheat producers and 37 wheat traders. Descriptive and multiple regression were used for analysis. The result indicates that volume of wheat supplied to market is influenced positively and significantly by quantity of wheat produced, livestock ownership (TLU) and total area of farmland owned by farmers. Therefore, in order to enhance volume of wheat supplied to market, these variables should get attention and promoted. Increasing surplus production through promotion of appropriate input technologies such as seed of improved varieties, recommended fertilizer rates, pesticides and other appropriate agronomic recommendations can improve production and productivity of wheat in the study area. Livestock categories like oxen, small ruminants and equines are used as better input that supports wheat production and this lead to surplus produce by farmers in the study area.
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Introduction

Agriculture plays a leading role in the Ethiopia's overall economic development. The government considers agriculture as the pillar of the economy that provides the population with employment, foreign exchange earnings, source of raw materials for industry and source of food for the population and believes it determine the pace and direction of industrial development through financing the industrial sector and generating effective demand for industrial outputs. It accounts for about 45 percent of the Gross Domestic Product (GDP), employs more than 85 percent of the total population that is directly or indirectly engaged in agriculture, generates about 80 percent of the foreign exchange earnings of the country, and provides raw materials for 70% of the industries in the country. About 15-17 percent of the Government of Ethiopia's (GoE) expenditures are committed to the sector (Dawit *et al*., 2010). The role of agriculture in securing the food needs for the fast growing population is considerable.

In Ethiopia, cereal production and marketing are the means of livelihood for millions of small holder households and it constitutes the single largest sub-sector in economy. Wheat is among 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, 2012/13). Development policy of Ethiopia has placed emphasis on increasing agricultural production to serve as a base for rural development. Even though there has been an increase in agricultural production, there were drawbacks in the absence of many households participation in the markets. The lack of market participation that many agricultural households face is considered to be a major constraint to combating poverty (Best *et al*., 2005). This shows that an efficient, integrated and responsive market that is marked with good performance is of crucial importance for optimal allocation of resources and stimulating households to increase output (FAO, 2003). Unless farm households adjust to rapidly changing markets which are characterized by quality and food safety, vertical integration, standards and product traceability, reliability of supply, there will be a risk of competitiveness and inefficiency for the entire value chain (Vermeulen *et al*., 2008).

Commercial transformation of subsistence agriculture is an indispensable pathway towards economic growth and development for many agriculture dependent developing countries (von Braun, 1994; Pingali and Rosegrant, 1995; Timmer, 1997; World Bank, 2008).

Methodology

An overview of Sinana district

Sinana district is located in the north western part of Bale zone. The total area of the district is about 1168 km^2.

The district has 20 peasant associations. The altitude of the district ranges from 1650 to 2950 m a.s.l. From the total area of the district about 73.54 % is plain land, 3.7% is hills, 9.6 % is mountains, 12.3 % is rugged and 0.86 % is gorge. The annual average temperature is 16.5ºc where as the minimum and maximum temperature is 9ºc and 23ºc respectively. The annual average rainfall is 1105mm where as the minimum and maximum rainfall is 1060 and 1150mm respectively (BOFED, 2009). Farmers in the district experienced mixed farming system of both crop and livestock. The major crops produced in the district are wheat, barley, pulses and oil crops. Rainfall pattern of the district is characterized by bi-modal rain fall distribution. The district has two distinct seasons, i.e. Belg which extends from March to July and Meher which extends from August to January (BZADO, 2012).

The presence of Sinana Agricultural Research Center (SARC) and Oromia Seed Enterprise creates good opportunity for the farmers in the study area. Farmers in the study area have access to improved agricultural technologies mainly because of their proximity to Sinana Agricultural Research Center and Oromia Seed Enterprise, Bale branch compared to others which are far from these institutions.

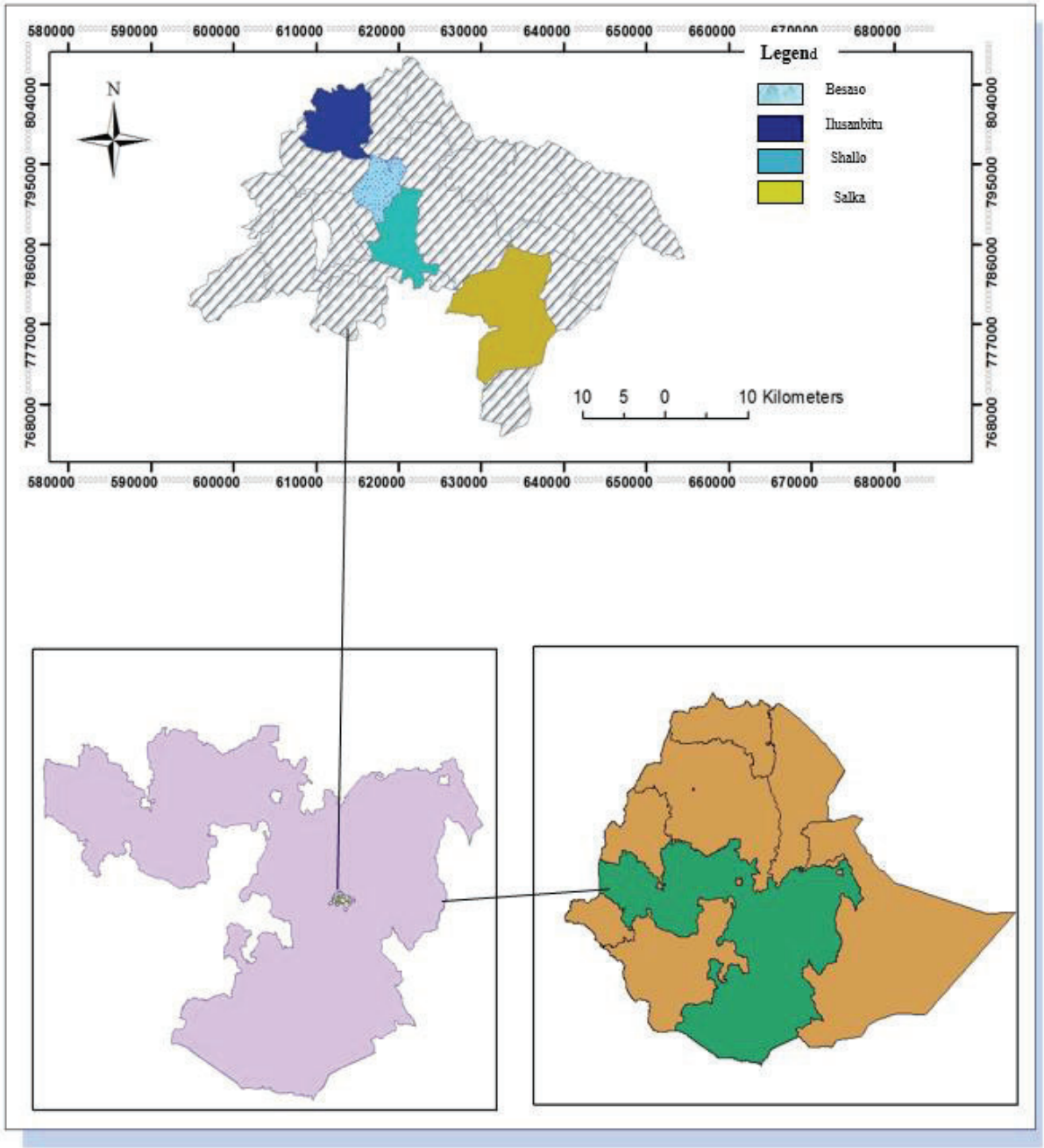

Figure : Map of the study area

Methods of Data Collection and Data Sources

Data Sources and Types

The data for this study were collected from primary and secondary sources. Formal and informal sample survey methods were used to collect both primary and secondary data. Primary data were collected from producers, wholesalers, assemblers, retailers, processors in Robe town, cooperative at each kebele and agricultural input suppliers.

The main data types collected include production, buying and selling, pricing, input delivery and distribution, market supply of wheat, market outlets, constraints and opportunities, etc characteristics of the actors involved in wheat crop production and marketing in the study area.

Secondary information were gathered from sources like (published and unpublished materials), district agriculture and rural development offices, farmers' organizations, input suppliers, marketing agencies and from different development organizations of the study area.

Methods of Data Collection

Primary data were collected using structured interviews through key informant interviews, personal observation, Rapid Market Appraisal (PRA) tools such as formal and informal interviews and through questionnaire preparation. Informal survey was conducted using Rapid Market Appraisal (RMA) technique using checklists. Formal survey was undertaken through structured interviews with randomly selected farmers, wholesalers, retailers, processors, input suppliers and cooperative representatives using a pre-tested structured questionnaire for each group. Secondary data relevant for this study were gathered from published and unpublished materials.

Sampling Procedure and Sample Size

A multistage purposive random sampling procedure was used to select representative households in the study area. In the first stage, Sinana district was selected purposely as it has maximum area under wheat production in the study zone. In second stage out of 20 PAs of Sinana district, four Kebeles were selected randomly as all kebeles are producers of wheat in the district.

Farmers sampling

A list of wheat producers along with area allocated under wheat was prepared by the researcher. Finally appropriate numbers of sample farmers from four kebeles were selected in proportional to population size using Yemane formula. Accordingly, the required sample size at 95% confidence level with degree of variability of 5% and level of precision equal to 9% are recommended to obtain a sample size required which represent a true population.

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

Where, n = sample size, N= Population size and e = level of precision assumed 9%.

Using the above formula, totally 123 farm household heads were selected and interviewed.

Wholesalers, retailers, millers and cooperatives sampling

In addition to farmer households, sample wholesalers, assemblers, millers, and retailers were interviewed. The lists of wholesalers, millers and retailers were obtained from the district Office of Trade and Industry (OoTI). Based on the number of wholesalers available in the district, ten wholesalers and ten assemblers were selected randomly. Since processing/milling of wheat is only conducted in zonal town Robe, all five flour mills available in Robe town were interviewed. In addition, 10 wholesalers, 10 assemblers and 5 retailers from the four peasant associations were randomly selected and interviewed. Finally four cooperatives, one from each PA were interviewed.

Methods of data analysis

In estimating factors that affect household's levels of market participation, OLS model is applicable if and only if all the households participate in the marketing of the commodity of interest. If participation of all households in marketing of the commodity is not expected, using OLS model by excluding non-participants from the analysis introduces selectivity bias to the model. Tobit, Double Hurdle and Hekchman two stage procedures have been suggested to overcome such problems. If only probability of selling is to be analyzed, probit and logit models can adequately address the issue. In Bale highlands almost all farmers produce wheat for selling purpose. Barley and emmer wheat are mostly used for household consumption.

For studying factors affecting wheat market supply in the study area, multiple linear regression model was used since all sample farmers interviewed participated in supplying wheat to the market in 2005/6 production year. This model is also selected for its simplicity and practical applicability (Greene, 2000). Econometric model specification of supply function in matrix notation is given as below.

$$Y = X'\beta + U \quad (6)$$

Where:
Y = quantity of wheat supplied to market
X = a vector of explanatory variables
β = a vector of parameters to be estimated
U = disturbance term

Results and Discussion

Factors that determine supply of wheat to the market was estimated using OLS model was since all respondents used for this study supplied their wheat to the market. Among the potential variables assumed to influence marketable supply were: Access to market information, access to extension service, access to extension service, size of land holding, livestock (TLU), farming experience, quantity produced of wheat, lagged price, educational level of household head, own price of the commodity and age of household head.

Robust regression option was used in stata to analyze and correct heteroscedasticity problem. Multicollinearity problem was also tested using VIF. The result indicated no multicollinearity problem since VIF was less than 10. The independent variables included for analysis explained 92.06% of the variation in dependent variable. Test of endogeneity showed that the quantity of wheat produced is endogenous to the model. This problem can be overcome by using two stages least square (2SLS) method for wheat market supply.

Totally thirteen variables were used to predict producers wheat market supply. From the first stage of 2SLS total livestock owned (in TLU), farmers experience in wheat production, total farmland owned by farmers positively and significantly affect wheat production. Amount of fertilizer applied to wheat per hectare wheat positively and significantly affected wheat production. This shows that as the amount of fertilizer increased, the productivity of wheat per hectare will increase.

Table1: Factors affecting production of wheat

Variables	Coefficient	Robust Std.Err	t-value	$p > \|t\|$
TOTALTLU	5.19***	0.66	7.92	0.00
EXTENCONT	-18.42	13.04	-1.41	0.16
PRICE2006	0.02	0.03	0.74	0.46
MARKETINFO	5.40	6.12	0.88	0.38
ACCESSCRE	-3.81	5.57	-0.68	0.50
TOTAREA	14.54***	2.94	4.95	0.00
FAMILSZ	2.12*	1.11	1.90	0.06
EDUCNLEV	0.36	3.04	0.12	0.90
AGEHH	0.20	0.35	0.55	0.58
DISTMRKT	0.26	0.63	0.41	0.68
SEXHH	-2.47	5.58	-0.44	0.66
$FERTPERH^{IV}$	-0.11*	0.06	-1.90	0.06
$FARMEXP^{IV}$	0.53*	0.29	1.81	0.07
Constant	-17.35	36.93	-0.47	0.63

N=120, F=26.08***, R^2= 0.86, ***, ** and * are statistically significant at 1%, 5% and 10% respectively. $FERTPERHECT^{IV}$ and $FARMEXP^{IV}$ is instrumental variable for quantity of wheat produced.

Quantity produced of wheat: It is the total amount of wheat produced in quintals in 2013/14 production season in the study area. It was hypothesized that quantity produced of wheat affects marketable supply positively. Accordingly the result indicated that quantity of wheat produced affects market supply positively and significantly at 1% probability level. Positive sign of coefficients indicate that farmers who produce more quantity of wheat supply increase volume of marketable supply. Ayelech (2011) found that the amount of tomato, papaya, avocado and mango produced by farming households has augmented marketable supply of the commodities significantly. Abraham (2013) also found that the amount produced of tomato, potato and cabbage significantly affects quantity supplied to market.

Size of landholding: It is a continuous variable refers to the total area of farmland a farmer owned. It is assumed that the larger the total area of the farmland the farmer owns, the larger land is allocated for wheat and the higher would be the output that influences large quantity of wheat supplied to market. So it is hypothesized that size of land holding positively and significantly at 1% probability level influences volume of wheat supplied to market. Accordingly the size of landholding affects quantity of wheat positively and significantly. As the area of landholding by farmer increased by one hectare, the quantity of wheat supplied to market would increase by 5.25. The finding by Alemayehu (2012) also indicated that a unit increase in land allocated for ginger, would give rise to 11.1qt increase in the amount of ginger supplied to market.

Table 2: 2SLS results for factors influencing volume of wheat supplied to market

Variables	Coefficients	Robust Std.Err	t-value	p > |t|
QUANPRO	0.623**	0.309	2.02	0.046
TOTALTLU	0.374**	0.180	2.08	0.039
EXTENCONT	-2.905	7.506	-0.39	0.700
LAGGPRC	0.021	0.022	0.98	0.328
MARKINFO	2.924	3.342	0.87	0.384
ACCESSCRE	0.536	2.867	0.19	0.852
TOTAREA	4.257**	1.756	2.42	0.017
FAMSZ	-0.051*	0.534	-1.73	0.086
EDULEVEL	0.119	1.312	0.09	0.928
AGEHH	-0.194	0.233	-0.84	0.405
DISTMKT	-0.022	0.031	-0.74	0.464
SEXHH	0.998	2.928	0.35	0.75
Constant	-22.151	23.900	-0.93	0.356

N=120, R^2=0.92, ***, ** and * significant at 1% , 5% and 10% respectively
Source: own computation from survey result

Livestock (TLU): It is a continuous variable measured in tropical livestock unit. It affects quantity of wheat supplied to market positively and significantly. As farmers livestock ownership increased by one unit the amount of wheat supplied to market is increased by 14.9%. This is because livestock ownership in highlands of Bale are an important input for wheat production.

Family size: It is the number of members living household. The variable affects supply of wheat to market negatively and significantly. The negative effect of the variable shows that as the number of household members increased more part of wheat produce is allocated for household consumption. As the member of household is increased by one, volume of wheat supplied to market is decreased by 0.5%.

Conclusion and policy implication

This study was conducted in Sinana district of Bale zone in Oromia region. The main focus of this study was to identify factors determining supply of wheat to market in the study area.

Primary data were collected from 123 sample wheat farmers drawn from four kebeles in Sinana district, 10 wholesalers, 10 assemblers, 5 retailers and 5 processors from three towns (Robe, Selka and Alemgena) were interviewed using structured questionnaire. Additionally, input suppliers at Robe town and cooperatives at each kebele were interviewed. Focus group discussion using Rapid Market Appraisal and key informant interview was also conducted. Secondary data which assisted this study were collected from woreda agriculture office, bureau of development and trade, each kebele offices and from published and unpublished materials. The data were analyzed using econometrics and descriptive statistics tools by employing SPSS and STATA software packages.

The result of econometric analysis indicates that volume of wheat supplied to market is influenced positively and significantly by quantity of wheat produced, livestock ownership (TLU) and total area of farmland owned by farmers. Therefore, in order to enhance volume of wheat supplied to market, these variables should get attention and promoted. Increasing surplus production through promotion of appropriate input technologies such as seed of improved varieties, recommended fertilizer rates, pesticides and other appropriate agronomic recommendations can improve production and productivity of wheat in the study area. Livestock categories like oxen, small ruminants and equines are used as better input that supports wheat production and this lead to surplus produce by farmers in the study area.

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