Potato Value Chain: Implication for Household Food Security in Shala and Shashemene Districts of West Arsi Zone, Oromia Region, Ethiopia

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ABSTRACT

The study aimed to identify the major potato value chain actors, role, production constraints and its contribution for ensuring household food security. Two-stage sampling procedure was used to select respondents. The main actors were input suppliers, farmers, wholesalers, processors, retailers and consumers. 94% of the produced potato was supplied to the market while 4% of the same was used for seed for the next cropping season. The rest 2% of it was used for consumption of the household. Income from potato contributed 55% of the total household income (as it is vital element in ensuring household food security); the share of potato was 19% in ensuring household food security in the study area while the remaining goes to other crops and livestock as well as nonfarm activities. Inadequacy of inputs, lack of bargaining power and low price of potato were among the constraints. It is recommended that the government and stakeholders along the chain should organize farmers' cooperatives and add value to the crop under investigation. Moreover, pertinent actors should facilitate access for inputs and output

market anther relevant measures that can contribute in production, productivity and profitability of potato so as to fully ensure food security in the study area.

Key Words: food security, household, potato, value chain

1. INTRODUCTION

1.1 Background

Ethiopia is a country of more than 70% of population engaged in the agricultural sector to provide a sustainable food source for its own population and surplus for export (UNDP, 2018). Agricultural sector accounts for about 35.8 percent of the Gross Domestic Product (GDP) and generates about 80 percent of the foreign exchange earnings. Agriculture provides raw materials for 70% of the industries in the country (Dawit A, 2010). According to CSA (2014), agriculture is the source of food and cash for those who engaged in the sector and others. Most agricultural holders acquire the food they consume and the cash they need to cover other expenses only from farming activities.

Food security has been a problem for people in the world because of climatic change and population pressure. Developing countries, such as Ethiopia, have been chronically food insecure over a longer period of time in particular (Giraldo, 2011). According to Zelleke (2010), the limited production and productivity has mainly been attributed to; insufficient rainfall, land degradation, low input application, and market imperfection.

Potato (Solanum tuberosum) is the world's top non-grain food commodity and a highly dependable food security crop that offers important advantages over major food grains (USAID, 2013). In Ethiopia, potato is produced with

an average national yield of 118 quintals or 11.8 tons per hectares in the main cropping season (CSA, 2014). Potato has been considered as a strategic crop by the Ethiopian government aiming at enhancing food security and economic benefits to the country. As the population grows rapidly, increased productivity of potatoes can improve the livelihood of smallholder potato producers and is required to meet the growing demand for food. In addition, potato is regarded a high-potential food security crop because of its ability to provide a high yield of high-quality product per unit input with a shorter crop cycle than major cereal crops like maize(CSA, 2014).

Potato is high yielding tuber crop with a short cropping cycle of about 3-4 months and grown in widely different agro-ecological zones (Gebremedhin, 2008). According to Tesfaye et al. (2010), potato is one of the crops with the highest growth rates in the country as a result of growing markets, especially in urban areas, as eating habits changed. Nutritionally, the crop is considered to be a well-balanced major plant food with a good ratio between protein and calories, and has substantial amounts of vitamins, especially vitamin C, minerals, and trace elements.

According to FAO (2010), many of the poorest producers in developing countries and most undernourished households depend on potatoes as primary or secondary sources of food and nutrition. The crop produces large quantities of dietary energy and has relatively stable yields under conditions in which other crops may fail (FAO, 2010). Their short and highly flexible vegetative cycle, which brings yields within 100 days, fits well with double cropping and intercropping systems.

Beyond food security, Potato cropping is rapidly becoming a valuable source of cash income, as potatoes are increasingly used by the food processing sector to meet the increasing demand of the fast food, snack and convenience food industries. The increased demand for processed products is itself a result of growing urban populations, rising incomes, diversification of diets and the substantial time required to prepare the fresh tuber for consumption (FAO, 2010).

Achieving food security continues to be a challenge as it is affected by a complexity of factors (Derconet.al. 2015). Contrary to zonal agricultural potential, there are four (4) districts located in Rift Valley depression namely Shala, Siraro, Arsi Nagele and Wondo which are chronically food unsecured areas. As a result, productive safety net program (PSNP) in area was designed to transfer resources for 19,542household (HH) and 73,306 family members and total of 92,848 beneficiaries are embraced under PSNP to prevent asset depletion during critical period of food insecure time for those beneficiaries. According to West Arsi Disaster Prevention and Preparedness Office (DPPO) (2017), currently the entire districts within the zone are under emergency food support in which 301,613 beneficiaries are supported to prevent short term food shortage shock (West Arsi Zone Agriculture and Natural resource Office annual report, 2018).

To the best of researchers' knowledge, there is little or no study conducted which combines the value chain aspect and household food security in Oromia or other parts of the country. Hence, to empower farmers and ensure their household food security through strategic staple crop like potato, one has to consider the situations from value chain perspective. Therefore, this

study is initiated to assess the existing situations of the potato value chain and its contribution in ensuring household food security in the study area.

1.2 Objectives of the study

General objective

The general objective of the study is to analyze potato value chain and its contribution for ensuring household food security in Shala and Shashemene districts of West Arsi Zone, Oromia region, Ethiopia.

Specific objectives

To identify the major potato value chain actors and their role in study area

To estimate the contribution of potato in ensuring household food security

To assess the constraints of potato production

2. MATERIAL AND METHODS

2.1 Sampling Procedure

The study was carried out from beginning of January 2019 to the end of March 2019.A two stage random sampling procedure was used to select representative households in the study area. In the first stage, out of 7 kebeles of Shala district producing potato, Fande Ejersa Kebele (with 400 household heads) was selected randomly and out of 19 potato producing kebeles of Shashemene district, two kebeles (Faji sole and Alache Harabate with household head of 450 and 225 respectively) were selected randomly using lottery method.

2.1.1 Sample size determination

A list of potato producers in study area was prepared by the researchers together with districts' and kebeles' expertise. Finally appropriate numbers of sample farmers from three kebeles were selected after determined by using sample size determination formula suggested by Yamane (1967) for calculation of sample size from a population. According to him, for a 95% confidence level and p = 0.05.Hence;

$$n = \frac{N}{1+N(e)^2} = \frac{1075}{1+1075(0.05)^2} = 292$$

Where: n = is the sample size of households,

N = is the total potato producer households in the districts and e = 0.05 is the level of precision defined to determine the required sample size at 5% level of precision.

Then, ni = nNi/N=292(Table 2.1)

Name of Kebeles	Total number of sheep producers	Proportion (%)	Sample size
Fande Ejersa	400	37	108
Faji Sole	450	42	123
Alache Harabate	225	21	61
Total	1075	100	292

Table 2.1. Proportion of potato producing farmers in three Kebeles

Source: Own computation, 2019

2.1.2 Potato traders and processors sampling

It is obvious that the essential and big wholesalers and processors are found around capital town of the districts and/or zone. Because of this, the researchers randomly selected 2 wholesalers from each district (4 wholesalers in total) and 1 processor from each districts were selected randomly (2 processors in total). Since, there many retailers and more or less the response for the questions posed is assumed to be similar, the researchers selected only 2 of them from each district which sums up 4 retailers.

In addition to this, FGD (Focus Group Discussion) was carried out with 6 potato growers and 2 experts to identify major constraints of the production as they are front line actors as well as well-informed in potato production and marketing.

2.2 Types and methods of data collection

Both secondary and primary data were used in this study. Secondary data was obtained from reports, published documents and websites while the primary data was gathered from potato farmers and other actors using interview schedule to achieve the objectives of the study.

2.3 Method of data analysis

The data was analyzed using descriptive statistics (percentage, mean, minimum and maximum including the value chain approach to identify the major potato value chain actors and their role). SPSS version 22 software was utilized for data analysis.

In order to measure food insecurity, we used a separate food insecurity line developed by WFP (2016) to identify whether the visited households were food secured or not. To achieve this, each food category is given a weight

based on the energy and the macro- and micronutrient content of the food/food group. This weight is multiplied by the number of days in the preceding week each food category was eaten. The sub-scores for each food group are then summed up to produce a composite food consumption score. Generally, a score greater than 35 is considered acceptable; a score between 22 and 35 is considered borderline, and a score of 21 or less is considered poor. The reason why food consumption score preferred over other food security measurement is for its proxy measure of household food access using dietary diversity and food frequency and estimation of food security at household level which is compatible to this study.

3. RESULT AND DISCUSSIONS

3.1. Socio-economic characteristics of potato value chain actors

As presented below in table 3.1 85.3% and 14.7% of farmer households are male and female respectively. From the total sampled traders and processors, male accounts 80% while female accounts only 20%. The result also shows that from the total sampled potato producers, 89.4% of the totals were food secured and 10.6 were food insecure.

Table 3.1. Gender of sample farmers and traders

Respondents	Frequency	Percent
Farmers- Male	249	85.3
Female	43	14.7
Total	292	100.0
Food insecure farmer households	31	10.6
Food secured farmer households	261	89.4
Total	292	100
Traders & Processors - Male	8	80

	Female	2	20
Total		10	100

Source: Survey result, 2019

As shown in table 3.2 the mean age of the sampled farmer household head is 39.3 years with the minimum and maximum age of 24 and 61 years respectively. The majority of farmers fall under the productive age. The mean household size of the sampled farmers is 4.79 (in adult equivalent) ranging from 2 to 9. The average land allocated for potato production was found to be 0.6 hectares and ranging between 0.25 and 2.5 hectares and fertilizer application rate per hectare on average is 4.8 quintals with minimum and maximum of 2 and 8 quintals respectively.

Moreover, the result shows that the mean age of the sampled traders & processors is 34 while the range is from 25 to 47 years. The mean household size of the sampled traders & processors is 6 adult equivalents, ranging from 2 to 15. They attended grade 6 and had 8 years' experience on average.

Table 3.2 Socioeconomic characteristics of respondents

Variables	Range	Minimum	Maximum	Mean
Socio- economic characteristic of farmers				
Age of farmer household	37	24	61	39.30
Education level of farmer household	10	0	10	5.34
Family size of farmer household	7	2	9	4.79
Size of farm land farmer owned	2.25	.25	2.50	.6066
Fertilizer used per hectare	6	2	8	4.80
Distance from market	10.0	2.0	12.0	5.063
Socio economic characteristic of traders & processors				
Age of actors	22	25	47	34.31
Education	8	2	10	6.54
Family size	13	2	15	5.69
Experience	14	3	17	8.08

Source: Survey result, 2019

3.2. Quantity of potato consumed, reserved for seed and supplied to the market

As indicated in figure 3.1belowof the total potato produced by the households in study area, 2% is used for consumption at home, 4% is reserved for seed (for the following cropping season) and 94% is supplied to market to generate income.

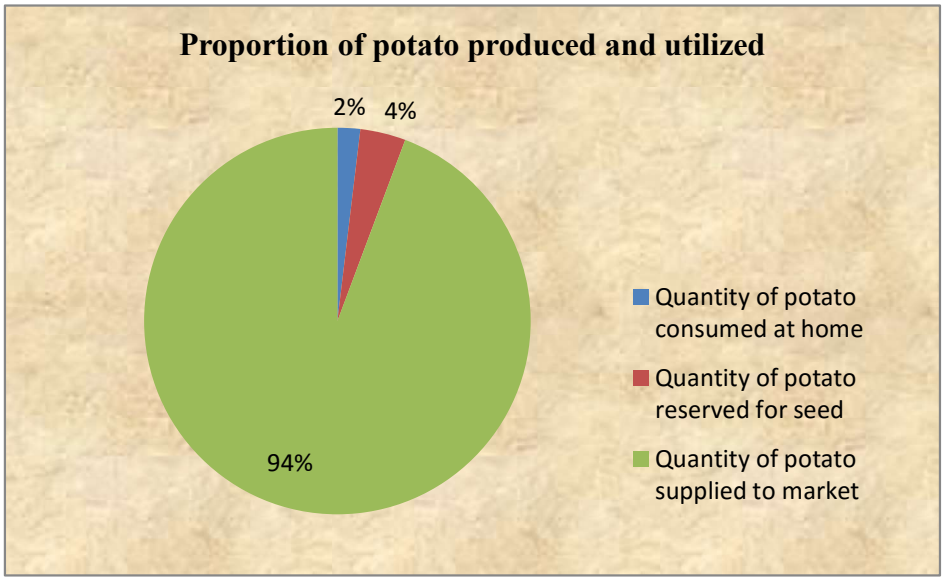

Figure 3.1.Proportion of potato produced, consumed and supplied to the market.

Source: Survey result, 2019

3.3 Potato value chain actors, role and product destination

The primary actors of potato were input suppliers, farmers, traders, processors and retailers. Each of these was adding value along the chain.

As depicted in the figure 3.2 below, potato produced is purchased by wholesalers at the farm gate and temporarily collected at Shashemene town. Then, it is transported to different marketing routes (Wondo Melge Agro processing factory, Mekelle, Addis Ababa, Dire dewa and Harar towns).

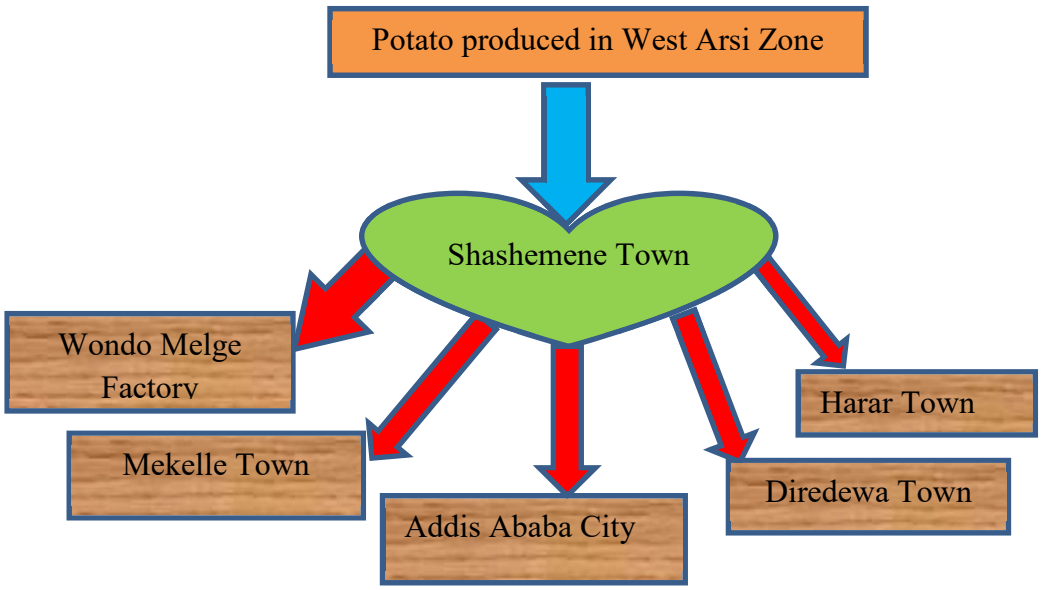

Figure 3.2. Potato production and its flow to major destinations

Source: Survey result, 2019

As indicated in figure 3.3 below, the key actors and their respective roles are the following.

A. Input suppliers

Sampled farmers procure potato seed, fertilizers and other agro chemicals from different sources including own seed, other farmers' seed, private traders and primary cooperatives. Their function is to supply seed, pesticide chemicals and fertilizers for farmer households.

B. Producers

They are smallholder farmers having different land size ranging from 0.25 to 2.5 hectares. The major activities performed by potatoes growers include plough, ridging, planting, fertilization, weeding, pest/disease control, harvesting and postharvest handling.

C. Wholesalers

They are mainly involved in buying potato from farmers and in larger volume and supplying it to retailers and processors. They have better storage, transport and communication access than other traders.

D. Processors

Potato is commonly consumed in the form of boiled and cooked meals in different traditional dishes. Recently, consuming potato chips, crisps, and roasted potato are becoming common practices especially in urban areas. Large scale potato processing is non-existent in Ethiopia. Melge Wondo Agro-processing Plc, the only large scale processor in the study area reported that about 500 quintals volume of potato processed and canned into a can (containing 240gm) and supply for ministry of defense monthly. The organization procures raw potato from own farm, farmers and wholesalers.

E. Retailers

They mostly buy from wholesalers and sell to urban consumers. Sometimes they also directly buy from the producers. They own mini market or sell raw and boiled potato at road side and open market places.

F. Consumers

The survey identified that major consumers were individual households (rural and urban dwellers), federal police and national defense.

Supporters and Enablers

Service providers identified during the survey include the following.

Woreda Agriculture and natural resource offices: They provide various advisory and technical supports to farmers producing potato (by woreda experts and DAs found at grass root level). The offices encourage farmers to use improved agronomic practices, improved seeds and post-harvest handling.

Holota Agricultural Research Centre: Its role is technology generation, adaptation, multiplication and demonstration for up-scaling. The research has also released a variety such as Gudane and Jalane (local farmers are using it) specifically for the highland areas which is resistant to Late Blight.

Oromia Credit & Saving S.C. (OCSSCO): It provides loan for farmers on group basis (making group members collateral for each other) to facilitate the repayment of loan. This helps them to alleviate financial problems facing them in purchasing agricultural input required for potato production in study area.

Enabling environment

The Potato value chain has been functioning in the presence of enabling policies and regulations set by different sectors found at different levels including Ministry of Agriculture (MOA), Cooperatives promotion Agency, Holota agricultural research center, Oromia Road Authority (ORA), Oromia Marketing and Trade Bureau and Oromia Transport Agencies are among the others.

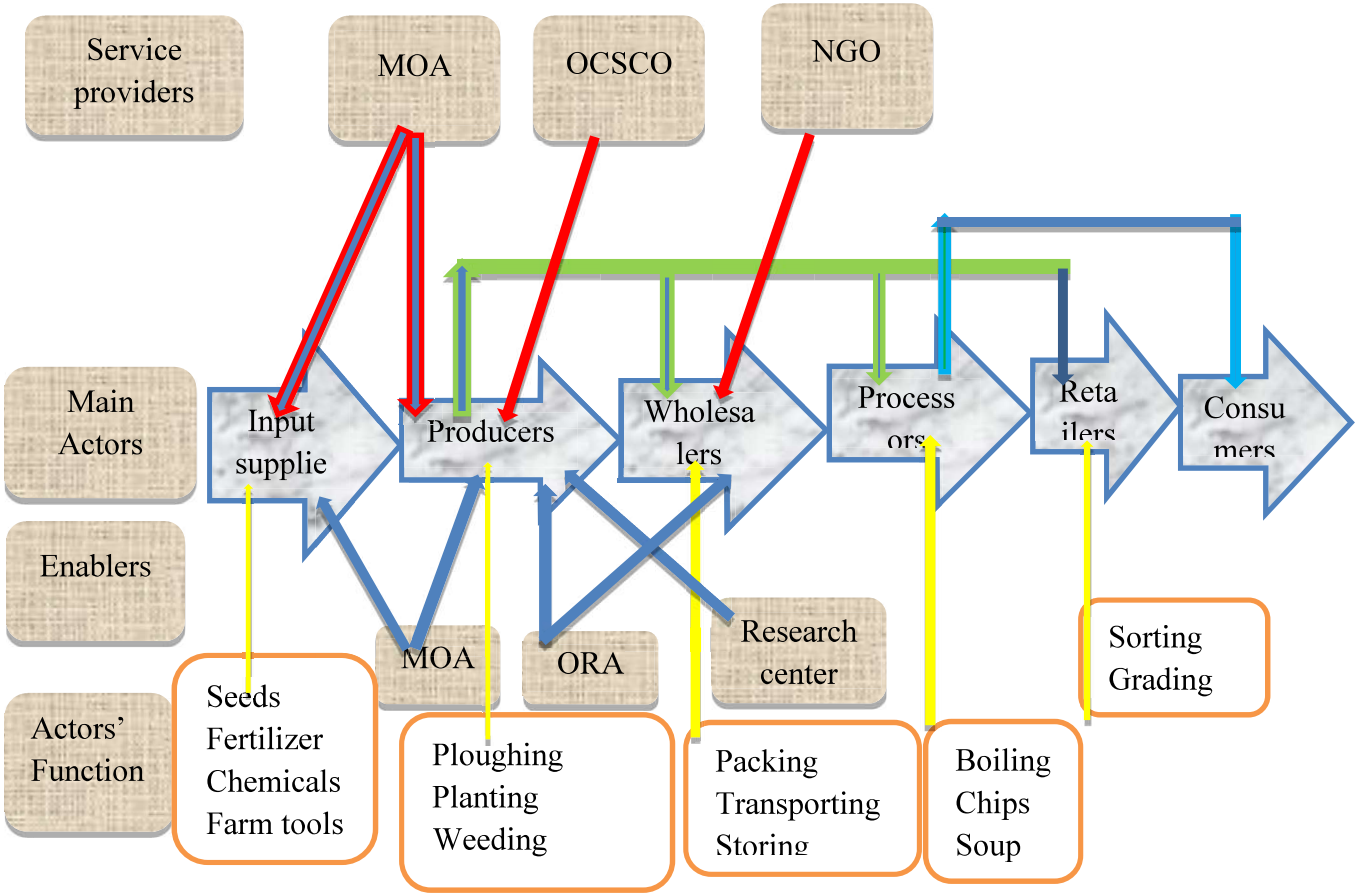

Figure 3.3 Potato value chain map in study area **Source:** Survey result, 201

3.4 Contribution of potato for ensuring food security of farmers studied

Potato is used mainly as cash crop to generate income and also used for home consumption as well. The result shows that the contribution of potato to the household income accounts 55% of the total household income sources. (Figure 3.4)

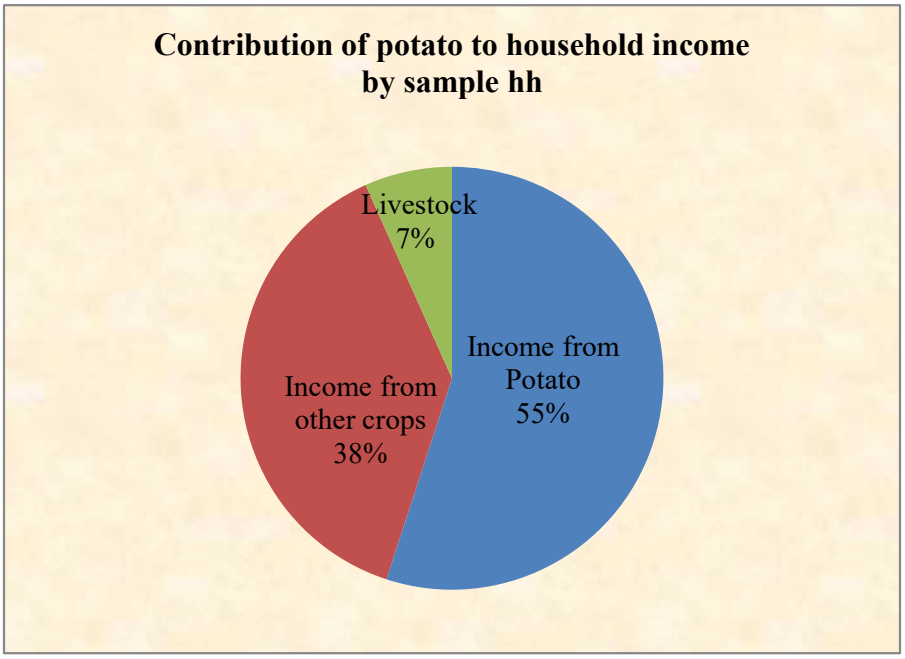

Figure 3.4 Potato share in household income

Source: Survey result, 2019

Potato is commonly used for consumption in the form of boiled and cooked meals and consumed in different traditional dishes. The result of the study presented in figure 3.5 indicates that the contribution of potato for ensuring food security is 19% next to maize and legumes in both districts (After being measured using the weight given to groups of food items by WFP, 2016 based on its energy and macro and micronutrients).

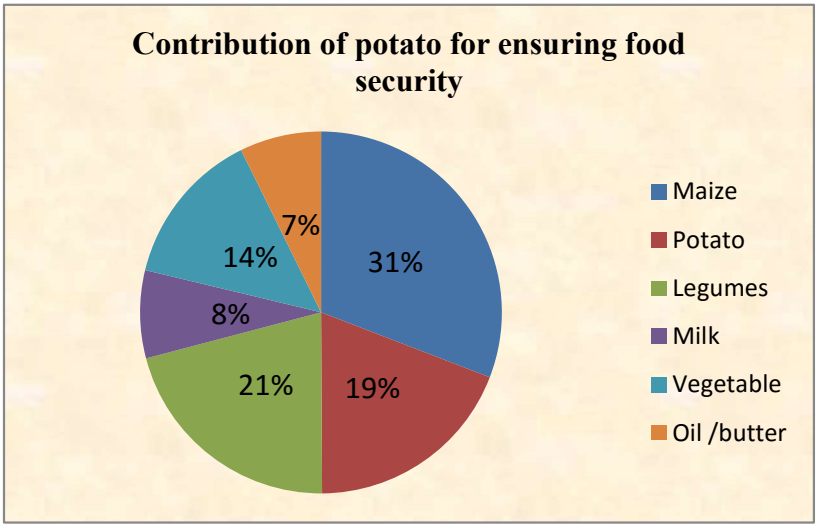

Figure 3.5 Potato contributions for household food security

Source: Survey result, 2019

Remark: The above contribution of potato for household food security is measured using the weight given to groups of food items by WFP, 2016 based on its energy and macro and micronutrients.

Major constraints of potato production

The result of Focus Group Discussion shows that the main constraints that have been causing inefficiency in potato production in study area were lack of improved potato seed, unfair price of potato, poor road and transport facilities, lack of access to credit, disease (late blight, rotten, rust and aphids) and poor market information systems.

As depicted in the table 3.3, below low price received by potato producers is the sever constraint followed by lack of improved seed, disease, lack of

access to credit, poor road and transport facilities and poor market information system respectively.

Table 3.3 Constraints of potato production ranked in their severity

Core constraints	Rank of mean	Rank
Lack of improved seed	1.9	2
Poor road accessibility	5	5
Low price of potato sale	1.8	1
Poor access to credit	4	4
Disease	2.3	3
Market information	5.6	6

Source: Own computation, 2019

4. CONCLUSION AND RECOMMENDATION

4.1 CONCLUSION

Potato value chain main actors in study area are found to be primary cooperatives and private traders as input suppliers, farmer households as producers, traders buying potato at the farm gate as wholesaler, Melge Wondo agro-processing factory and potato chips makers as processors. The study also shows retailers are mini market owners, road side cooked and raw potato sellers for individual consumers and institutions which included federal police force and national defense. The actors were engaged in different activities in moving the potato from farm gate to its final destination.

The descriptive analysis also indicated that farmers' income from potato contributed 55% of the household income that can support the households to purchase better off food for reduction of food insecurity and upon consumption; potato contributes 19% to household food security. The major constraints identified by the study were unfair selling price of potato, lack of improved seed and disease of the crop among the others.

4.2 RECOMMENDATION

The possible areas of intervention that is drawn from the result of the study are presented as follows:

There is a need to upgrade the existing potato value chain so as to optimize the returns from the product and to ensure food security. The government together with cooperative societies and private traders should improve the supply of agricultural input and market linkage as well as enhancing the bargaining power of the farmers to supply their product to the market channel.

5. REFERENCE

CSA (2014). Agriculture sample survey 2013/14 (2006 EC): Report on area, production and farm management practice of Belg season crops for private peasant holdings. Volume V: Statistical Bulletin 532, Addis Ababa, Ethiopia.

Dawit A. (2010). The political economy of Ethiopian cereal seed systems: State control, market liberalization and decentralization. www.future-agricultures.org/index.php.

Dercon S, Krishnan P (2015). Vulnerability, seasonality and poverty in Ethiopia. J Dev Stud; 36(6):25–53.

FAO (2010). Strengthening potato value chains.Technical and policy options for developing countries.The Food and Agriculture Organization of

the United Nations and the Common Fund for Commodities. Rome, Italy.

Gebremedhin, W., Endale, G. and Lemaga B. (2008). Potato variety development. In Root and tuber crops: The untapped resources, ed.

Gebremedhin, W., Endale, G. and Lemaga, B. 15–32. Addis Ababa: Ethiopian Institute of Agricultural Research.

Giraldo, D. P. (2011). Effect of Food Availability Policies on National Food Security: Colombia case: the 29th International Conference of System Dynamics, Washington.

Tesfaye, A. Lemaga, B. Mwakasendo, J. A. Nzohabonayoz, Z., Mutware, J., Wanda, K.Y., Kinyae, P. M., Ortiz, O., Crissman, C. and Thiele, G. (2010). Markets for fresh and frozen potato chips in the ASARECA region and the potential for regional trade: Ethiopia, Tanzania, Rwanda, Kenya, Burundi and Uganda. International Potato Center (CIP), Lima, Peru. Working Paper, 44 p.

USAID (United States Agency for International Development) (2013). Agricultural Growth Program-Agribusiness and Market Development. Nine Months Report October 2013 June 2013. Addis Ababa, Ethiopia.

UNDP (United Nations Development Program) (2018). Ethiopian economy profile. Third quarter, 2018. Addis Ababa, Ethiopia.

West Arsi Zone Agriculture and Natural Resource Office (2018). Annual report.

West Arsi Zone Disaster Prevention and Preparedness office (2017). Annual report.

WFP (2016). WFP Comprehensive Food Security and Vulnerability Analysis Guidelines.

Yamane, T. (1967). Statistics: An Introductory Analysis. 2nd Ed., New York: Harper and Row.

Zelleke, G. (2010). Fertilizer and Soil Fertility Potential in Ethiopia: Constraints and opportunities for enhancing the system paper prepared for presentation at the international association of Agriculture