



Perception in Improved Seed Utilization for Potato Production from Perspective of Smallholder Farmers

(The Case of Shashemane District, West Arsi Zone, Oromia National Regional State, Ethiopia)

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Abstract: In Ethiopia, potato crop is produced in different agro-ecological zones through commercial as well as smallholder farmers both as a source of income and food. However, due to perishable nature and biological nature of production process, potato production is risky investment activities. In this context, risk perceptions play a key role in the production and investment behavior of farmers in potato production decisions. However, in Shashemane district, only limited attention has been paid to understand the producers' risk perceptions in potato production. Therefore, in this study, analysis of the major sources of risks in potato production, on the basis of farmers' perceptions, was conducted. For the study, Multi-stage sampling technique was used to select 120 sample households from four sample kebeles. Primary data collected through structured questionnaire and secondary data sources were used. A Likert scale, based on farmers' perception, was used to rank the various sources of potato production by using improved seed varieties. The mean scores results, derived based on Likert scales, indicated that attributes such as, high productivity, early maturity, quality grain/fruit, disease resistance, pest resistance and profitability were positive perception/advantage of utilization improved potato seed for potato production which take the average score of 4.5, 3.28, 4.27, 4.21, 4.18 and 4.52, respectively While, labor demanding, high seed cost and unavailability of quality seeds at the right time were some of the disadvantages. Therefore, increasing access to quality improved potato seed for farmers increases its utilization.

Keywords: Perceptions, Improved Potato Seed, Potato Production, Likert Scale, Shashemane District.

1. INTRODUCTION

Ethiopia is one of the fastest growing economies in Africa. In the last decade, the Ethiopian economy registered a growth of 11 percent per annum on average in Gross Domestic Product (GDP) (MoFED, 2014) compared to 3.8 percent in the previous decades (World Bank, 2015). This growth has largely been supported by a relatively high growth in the agricultural sector. The importance of agriculture in Ethiopia is evidenced by its share in GDP (43%), its employment generation (80%), share of export (70%) and providing about 70% raw material for the industries in the country in 2012/13 (UNDP, 2013).

Despite such policies focus on the sector over the last two decades, its productivity is constrained by lack of appropriate and affordable agricultural technologies, inefficiency in production, poor infrastructure, inefficient marketing systems, land degradation, rapidly expanding population, and inaccessibility to agricultural inputs such as improved/hybrid seeds, fertilizers and agro-chemicals (Yu and Nin-Pratt, 2014).

Ethiopian diversified agro-climatic condition makes it suitable for the production of a broad range of fruits, vegetables and herbs. The wide range of altitude, ranging from below sea level to over 3000m above sea level, gives it a wide range of agro ecological diversity ranging from humid tropics to alpine climates, where most types of vegetable crops can be successfully grown. Holders living near to urban centers largely practice vegetable farming. Most vegetables are not commonly practiced by the rural private peasant holders, hence the small volume of production recorded as well evidenced by the survey results (CSA, 2015).

Vegetable production is practiced both under rainfed and irrigation systems. The irrigated vegetable production system is increasing because of increasing commercial farms and development of small scale irrigation schemes (Baredo, 2013; cited in Bezabih *et al.*, 2014). Ethiopia has a variety of vegetable crops grown in different agro ecological zones by small farmers, mainly as a source of income as well as food. The production of vegetables varies from cultivating a few plants in the backyards, for home consumption, to large-scale production for the domestic and home markets. Oromia National Regional State in general and West Arsi zone in particular is known by its potato production and supplying it to different market centers (CSA, 2015). Shashemene is hub for seed potato supply to SNNPR and Tigray regions (Bezabih and Mengistu, 2011).

According to Kumilachew *et al.* (2014) risks in vegetable production from the perspective of smallholder farmers' results suggest that production and price risks were generally perceived as the most important sources of risks. Of all the risk sources, output price fluctuation, drought, pests/diseases, termites/insect attack, high costs of inputs, flood/high rainfall, illness/injury/death of operator/member, changes in family relations, theft, conflict and violence, changes in policy and rules, and high cost of credit were of important concerns in that order of importance. Generation and transfer of improved technologies are critical prerequisites for agricultural development particularly for an agrarian based economy such as of Ethiopian. Among others, unavailability of quality seeds at the right place and time coupled with poor promotion system, is one of the key factors accounting for limited use of improved seeds, which further contributing for low agricultural productivity. Poor availability and promotion of improved potato seeds is due to inefficiency of the seed systems of the country (Adane *et al.*, 2010).

In general, in Ethiopia, potato crop is produced in different agro-ecological zones through commercial as well as smallholder farmers both as a source of income and food. However, due to perishable nature and biological nature of production process, potato production is risky investment activities. In this context, risk perceptions play a key role in the production and investment behavior of farmers in potato production decisions. However, in Shashemane district, only limited attention has been paid to understand the producers' perceptions in utilization of improved seed for potato production. Therefore, in this study, analysis producers perception in utilization of improved potato seed for potato production in Shashemane area.

Objectives of the study

- a. To access the level of potato production among smallholder farmers and
- b. To identify and analyze producers perception in utilization of improved potato seed for potato production in Shashemane area

2. RESEARCH METHODOLOGY

2.1. Description of study area

This study was conducted in Shashemene district, West Arsi zone of Oromia National Regional State, Ethiopia. Shashemene district is located at 250 km from Addis Ababa towards South direction. The district is located at 7° 12' North and 38° 36' east having an altitude of 1600-2800 meters above sea level with a total area of 467.18 km square. The district has 37 rural kebeles and 8 sub cities. The total rural population of the district was 248,093 was 28, 306 (males 23, 627 and females 4,679) of which more than 83% depend on agriculture for their livelihood and majority of them are smallholders owning a plot of less than 0.5 hectares having featured a crop livestock mixed farming system (DOA, 2016). According to DOA, (2016) the major agro-ecologies of the district were mid-land (51.4%), high land (29.6%) and low land (19%) having clay loam soil type for highland and sandy soil for mid-land and low land soil types. The district receives an annual rainfall ranging from 800 mm to 1200 mm raining twice a year. The district has bi-modal rainfall distribution with small rains starting from March/April to May and the main rainy season extending from June to September/October. Its climate is characterized as temperate with annual temperature ranging from 12°C to 27°C. The district has 1 union and 38 primary cooperative and 30 FTC being operated by 87 development agents. Besides, the district has 6580, 7436 and 14586 number of model, middle, and resource poor farmers respectively having 13,500 radios, 1,510 televisions and 19,899 mobile phones. The major agricultural crops widely grown in the district include barley, potato, garlic, beetroot, carrot, wheat, teff, maize, cabbage, and haricot bean. The districts area used for production during belg and meher season was 11, 616 ha and 41, 184 ha respectively having crop production vegetables, cereals and pulses during meher season and having only pulse and cereals production during belg season. The district is known for its predominance of potato production hub in west Arsi zone.

Table 1. Land use pattern in Shashemane district

Land use	Area coverage (ha)
Arable land	42,400
Cultivated land	40,800
Forest land	3500
Grazing land	1500
Land used for construction	1100
Others	1000
Total	49,500

Source: Shashemane agricultural office, 2016

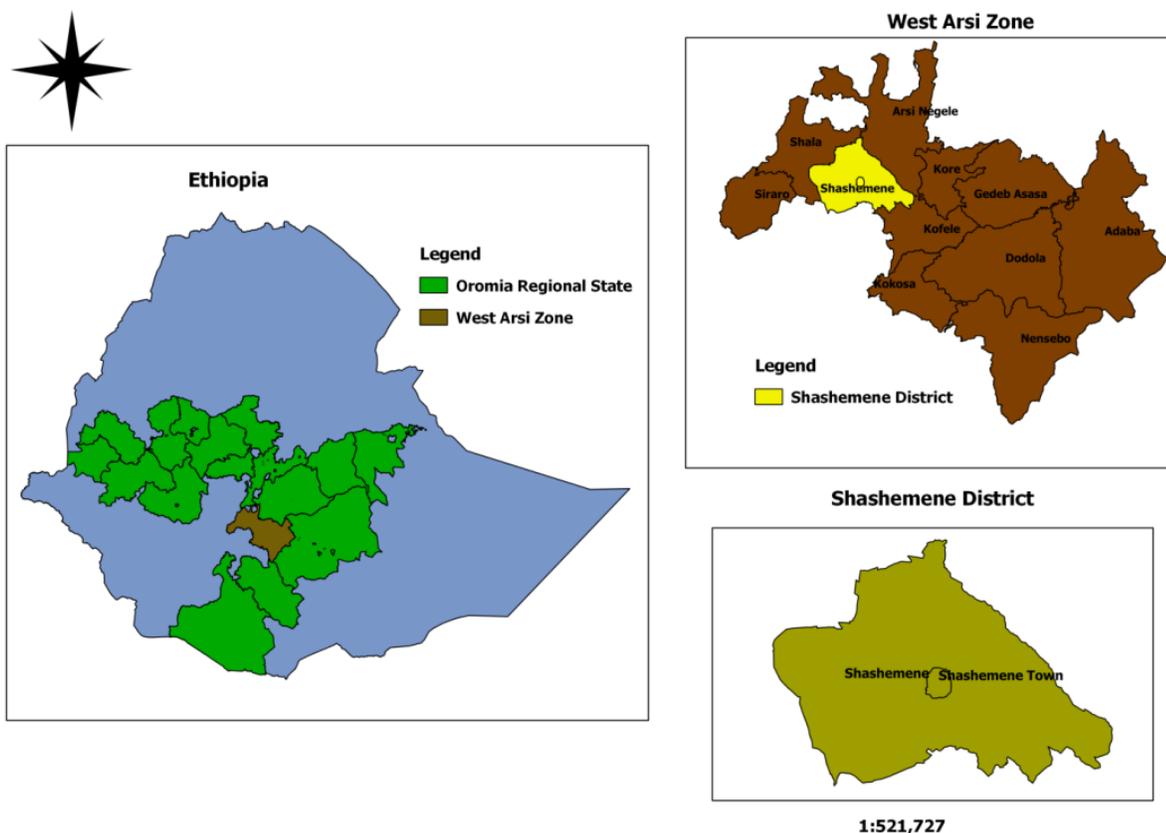


Figure 1: Sketch of study area

2.2. Data types and data sources

Both primary and secondary data was used for this study. Primary data was collected from sample households using a structured questionnaire. Structured questionnaire household survey was employed to collect primary data on the demographic, socioeconomic and institutional characteristics from a representative sample of households. The questionnaire were designed and pre-tested in the field for its validity and content, and to make overall improvement of the same and in line with the objectives of the study. Secondary data for this study was obtained from extension officers, research office, and DOA of the study area. Secondary information from published and unpublished sources such as journal articles and related materials was used to back up the findings from primary sources.

2.3. Methods of the data collection

This study used household survey data that were collected from Shashemane district during early beginning of November 2016. Both structured and semi structured questionnaires were prepared, pretested and adjusted accordingly. For primary data collection enumerators having better qualification and experience in data collection were trained for one day on the objectives, content of the interview schedule and method of data collection. First, enumerators were given one day classroom training on the objectives, content of the interview schedule and method of data collection. Second, the questionnaire was pre-tested before final use and necessary adjustments was made to make it fit with the real conditions prevailing in the study area. Secondary data regarding potato production, challenges in potato production, and potato producers' *kebeles* that could relevant for this study was gathered from Shashemane district office of agriculture, CSA, and from published and unpublished sources.

2.4. Sampling procedure

A multi-stage sampling procedure was used to identify sample households for data collection. In the first stage, potato producer *kebele* were purposefully identified in collaboration with concerned experts from the district office of agriculture and development agents based on the intensity of potato production. The second stage involved random selection of four potato producing *kebeles* from a list of the potato producer *kebeles* in the district. In the third stage, 120 potato producer households were randomly selected from the total potato producer households in the district.

Table 2: Sampling techniques

Name of sampled kebeles	Total potato producers households (number)	Proportion sampled households (%)	Number of sample household heads (number)
Hursa Simbo	722	37.70	44
Aredano Shifaw	461	24.10	30
Kerara Filicha	250	13.10	16
Ilala Korke	480	25.10	30
Total	1,913	100.00	120

2.5. Methods of data analysis

The collected data from the field was edited, coded, and cleaned to ensure consistency, uniformity, and accuracy. Data were entered into computer software for analysis. STATA version 14 was used to manage and process the data. Descriptive statistics and Likert scale were used for analyzing the data. With regard to the assessments of perceptions, an index which identifies how well certain attributes of potato production risk meet farmers' preference were constructed using five-point likert scale. Sample households were asked to rate six items for both advantages and disadvantages attributes based on five-point likert scale scores (1=very low, 2=low, 3=medium, 4=high and 5=very high) in order to evaluate their general perception regarding to potato varieties. The negative statement response was coded to the reverse of positive statements. In the list of advantages, a value less than three indicates how the farmer perceives the characteristics under evaluation as poor or negative and in the list of disadvantages the reverse is true.

3. RESULTS & DISCUSSION

3.1. Descriptive analysis

The average family size of the sample households was 6.50 persons, which is larger than the national average of 4.6 persons per household (CSA, 2014). The average potato farming experience of the sampled farm households was 15.31 years. The average livestock holdings measured in terms of TLU was found to be 6.02. As study result depicts, of the entire household heads interviewed, 90.83% were male-headed, 85.83% attended formal education, 37.5% participated in non/off-farm activities, 62% have access to market information, 56 have access to input supply, and only 30% had access to credit for potato production. The average area covered with potato during the 2015/16 cropping season was 0.64 hectares which accounts for about 39 of average total cultivated 1.64 hectares.

Table 3: Descriptive statistics of selected variables used in the empirical analyses

Variables (Continues)	Mean	Std. Dev.	
Family size	6.50	3.60	
Potato farm experience	15.31	9.08	
Land cultivated under potato	0.64	0.543	
Number of oxen	1.54	0.435	
Variables (Dummy)	Frequency	%	
Sex of the household head	Male	109	90.83
	Female	11	9.17
Education status of household head	Illiterate	17	14.17
	Literate	103	85.83
Access to input supply	Yes	67	55.83
	No	53	44.17
Access to market information	Yes	74	61.67
	No	46	38.33
Access to credit service	Yes	36	30
	No	84	70
Participation in non/off-farm activities	Yes	45	37.5
	No	75	62.5
Access to extension service	Yes	55	45.83
	No	65	54.17

3.2. Land use pattern in the study area

Five land arrangements systems were practiced by the sample households in the study area namely own land, rented-in land, rented-out land, shared-in land and shared-out land arrangements. *Owned land* refers to a land which exists on a legal land certificate given by land authorities. *Renting-in* is a practice in the local land market whereby land owners give their land in contract basis with the exchange of money from the takers side but it is an opposite for *renting-out*. *Shared-in* or *Shared-out* is a practice of acquiring land for production of crop in which land owners share a proportion of crop produce in exchange of their land from land operators who take the land for a fixed period of time, usually for one cropping season.

Cultivated farmland was calculated as a sum of own, rented-in and shared-in farm lands minus shared-out farm land (Ermias, 2013). Cultivated farmland is an effective farm land amount used by sample households to undertake agricultural production. The average cultivated land holding size of the sample households was 1.64 hectares, which is larger than national average 1.17 hectares (CSA, 2014c), perhaps due to the availability of more arable farmland in the area. As the survey results depicts that, of total cultivated average land holding size (1.64 ha), 1.10 ha (67.07%) was own land holding. This implies that more cultivated land was from own land in the study area. An independent sample t-test comparison showed that, adopters are superior to non-adopters in terms of cultivated land holding at 5% probability level (Table 4). This finding is in line with the results of Ermias (2013).

The average area covered with potato during the 2015/16 cropping season was 0.64 hectares which accounts for about 39 and 58% of average total cultivated and own land size respectively. This indicates that potato cropping system is dominant in the study areas. Adopters were tending to allocate higher amount of land as compared to the non-adopter farmers for potato production which is highly statistically significant at less than 1% probability level (Table 4).

Table 4: Land use pattern in the study area

Variables	Min	Max	Mean	Std. Dev.
Own land/ ha	0	4	1.10	0.675
Rented-in land (ha)	0	2.5	0.31	0.518
Rented-out land (ha)	0	0.25	0.004	0.032
Shared-in land (ha)	0	3	0.24	0.480
Shared-out land (ha)	0	0.75	0.01	0.082
Total cultivated land (ha)	0.25	8	1.64	1.151
Area under potato (ha)	0.13	4	0.64	0.543

Source: Own survey computed data, 2016.

3.3. Psychological factors

3.3.1. Farmers' perception about potato production attributes:

Perception on high productivity, early maturity, quality grain/fruit, disease resistance, pest resistance and profitability are related attributes assessed to get farmers' view on relative advantages of improved potato varieties whereas, perception on low storability, labor demanding, high seed cost, unavailability of quality seed, low local consumption demand and low market demand are related attributes assessed to get farmers' view on relative disadvantages of improved potato varieties in this study .

Based on the survey result shown in Table 5, improved potato varieties were supported by farmers for all attributes such as, high productivity, early maturity, quality grain/fruit, disease resistance, pest resistance and profitability were found to be taking the average score of 4.5, 3.28, 4.27, 4.21, 4.18 and 4.52, respectively. However, labor demanding, high seed cost and unavailability of quality seeds at the right time were some of the disadvantages associated with the improved potato varieties having an average scores of 3.31, 4.08 and 3.93 respectively. Meanwhile, the others attributes such as low storability, low consumption demand and low market demand are not supported by the society are not a problem and their score are below the average (2.32, 2.41 and 2.15 respectively). So, improved varieties of potato are incompatible to the financial capacity of the farmers due to high cost of purchased seed. Hence, it can be concluded that the local varieties of potato were perceived to be suitable for low cost of seed purchase, low labor demanding and available at the right time by the society.

The average mean score of perceived relative advantage by sample respondents were found to be 4.16, implying highly positive perception towards improved potato varieties. On the other hand, average mean score of perceived relative disadvantage were found to be 3.03 which is slightly greater than the mean score, implying that respondents have negative perception regarding disadvantages of improved potato varieties (Table 5).

Table 5. Advantages and disadvantages rating of IPV by household heads

Advantage Attributes	Obs	Distribution of HHH per perception category (%)					average score	
		Very low	Low	Medium	High	Very high	Mean	SD
High productivity	120	0.83	0	4.17	38.33	56.67	4.5	0.661
Early maturity	120	6.67	14.17	35	32.50	11.67	3.28	1.063
Quality grain/fruit	120	0.83	0.83	11.67	44.17	42.50	4.27	0.764
Disease resistance	120	1.67	4.17	8.33	43.33	42.50	4.21	0.888
Insect/pest resistance	120	1.67	3.33	9.17	47.50	38.33	4.18	0.857
Profitability	120	0.83	0.83	6.67	29.17	62.50	4.52	0.733
Disadvantage Attributes	Obs	Distribution of HHH per perception category (%)					average score	
		Very low	Low	Medium	High	Very high	Mean	SD
Low storability	120	34.17	26.67	18.33	15.00	5.83	2.32	1.250
Labour demanding	120	8.33	8.33	36.67	37.50	9.17	3.31	1.035
High seed cost	120	5.83	2.50	5.83	50	35.83	4.08	1.022
Seed unavailability	120	7.5	10	10	27.50	45	3.93	1.278
Low cons. demand	120	40.83	17.50	11.67	20	10	2.41	1.441
Low market demand	120	46.67	24.17	5.83	14.17	9.17	2.15	1.382

Source: Own survey computed data, 2016; HHH indicates household heads.

3.3.2. Total perception score on the advantages and disadvantage of improved potato seed

In order to summarize the discussion on perception of sample households and examine its influence on adoption of improved potato varieties, it was important to calculate the total perception score of the improved varieties with regard to the relative advantages and relative disadvantages.

Total score of perception by respondents regarding advantages and disadvantages of improved potato varieties were 24.95 and 18.18, respectively. Adopters mean perception scores on the advantage and disadvantage attributes of improved potato varieties were 25.24 and 17.94, respectively while, non-adopters mean perception scores on the advantage and disadvantage attributes were 24.58 and 18.49, respectively. An independent sample t-test result shows absence of significant mean difference between adopters and non-adopters in terms of perceived relative advantages and disadvantages of improved potato varieties. This might indicate that all respondents have relatively similar awareness level and perception regarding the positive and negative attributes of the improved potato varieties.

Table 6. Total perception score on the advantages and disadvantages of improved potato seed

Variables	Adopters (n=67)		Non-adopters (n=53)		Total Sample (n=120)		t-value
	Mean	Std. Dev	Mean	Std. Dev.	Mean	Std. Dev	
Advantages score	25.24	3.09	24.58	4.082	24.95	3.562	-0.999(NS)
Disadvantages score	17.94	4.37	18.49	4.626	18.18	4.475	0.667(NS)

Source: Own survey computed data, 2016; NS=Not-significant.

3.3.3. Household head compatibility perception of improved potato varieties:

Sample households socio-economic compatibility perception of improved potato varieties was asked using five-point likert scale (1=not compatible, 2=less compatible, 3=undecided, 4= compatible and 5=highly compatible). The mean value less than three indicates how the farmer perceives the compatibility of improved potato varieties regarding to socio-economic circumstances was under evaluation as poor or negative. As displayed in Table 7, the average compatibility perception score was 4.32 which is greater than the mean score 3, indicating improved varieties of potato is compatible to the socio-economic circumstances of the farmers in the study area. An independent sample t-test result shows a significant mean score difference between adopters and non-adopters with respect to perceived socio-economic

compatibility scores of improved potato varieties at 10% probability level, suggesting adopter farmers perceives better than non-adopter farmers regarding to compatibility of improved potato varieties with respect to socio-economic circumstances of the study area.

Table 7. Socio-economic compatibility perception of improved potato varieties

Variable	Adopters (n=67)		Non-adopters (n=53)		Total Sample (n=120)		t-value
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	
Compatibility score	4.42	0.58	4.12	0.810	4.32	0.698	-1.804*

Source: Own survey computed data, 2016; *, statistically significant at 10% level.

3.3.4. Household head attitude towards improved potato varieties

Attitude towards improved potato varieties determines the intensive use of technology and innovation in any given social setting. Individual's attitude is the major factor in the adoption and intensity of adoption decision of agricultural technologies and innovations. Attitude of farmers towards improved potato varieties were measured using five-point likert scale. Sample households were asked to rate six items based on five-point likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree) in order to assess their general attitude regarding to improved potato varieties. The negative statement response was coded to the reverse of positive statements.

Reliability analysis were undertaken for all six statements (helps to improve the yield, consumes a lot of labor, demands intensive management practices, requires high overhead cost per farmer, ecological adaptability and only small number of farmers benefit from it) to see the degree of scale reliability of each attitude statements and to determine potential items, which influences respondents' attitude towards improved potato varieties. All of the statements used to analyze respondents' attitude towards improved potato varieties were found reliable, due to this fact none of them were dropped. As Table 8 depicts, the average attitude score for sample respondents was found to be 11.2. Mean attitude score comparison using sample an independent t-test shows insignificant mean difference between adopters and non-adopters regarding their attitude scores towards improved potato varieties (Table 8).

Table 8. Attitude towards improved potato varieties

Variable	Adopters (n=67)		Non-adopters (n=53)		Total Sample (n=120)		t-value
	Mean	Std. Dev	Mean	Std. Dev.	Mean	Std. Dev	
Attitude score	11.01	2.750	11.4	2.863	11.2	2.794	0.668(NS)

Source: Own survey computed data, 2016; NS=Not-significant.

3.3.5 Access to quality potato seeds

Low yield results from the accumulation of seed-borne diseases, especially bacterial, fungal and viral diseases which have been associated with severe degeneration in seed quality globally (Julius *et al.*, 2016; Thomas *et al.*, 2016). Difference in access to quality of improved potato seeds is the major reason that influences adoption decision and level of adoption in the study area. From total households interviewed, only 31.67% have access to quality of improved potato seeds with varying proportion being 38.81% and 22.64% for adopters and non-adopters respectively. The chi-square test result shows that adopters have more access to quality improved potato seeds than non-adopters at 10% significance level indicating a systematic difference between adopters and non-adopters of improved potato varieties in access to quality potato seeds. This finding was in line with Hirpha *et al.* (2010); Ume and Uloh (2011) and Wen-Chi Huang *et al.* (2015). Therefore, there should be different mechanism from government and NGO to increase supply of quality of improved potato seeds to increase adoption and level of adoption of improved potato varieties in the study area.

3.3.6 Perception of the households about timely availability of improved potato seeds

As evidence of this study revealed that perception of household heads about timeliness availability of improved potato seeds affect their adoption decision as follows; very high, high, somewhat effect and less effect which are 33.33%, 34.17%, 22.5% and 8.33% respectively in the study area. From total sample respondents interviewed, only 18.33% perceive improved potato seeds are available on time with varying proportion being 23.88% and 11.32% for adopters and non- adopters respectively. A chi-square analysis also shows a systematic difference between adopters and non-adopters of improved potato varieties and perception of household heads about timely availability of improved potato seeds at 10% significant probability level. This finding was consistent with the finding of Ume and Uloh (2011) and Ume and Ochiaka (2016). Therefore, supply of improved potato seeds should be available for producers at the right time to increase likelihood of adoption of improved potato varieties in the study area.

Table 9. Perception about timely availability and access to quality potato seed

Variables	Adopters (n=67)		Non-adopters (n=53)		Total Sample (n=120)		χ^2 -value
	Obs.	%	Obs.	%	Obs.	%	
Perception of households about timely availability of improved potato seeds							
Yes	16	23.88	6	11.32	22	18.33	3.118*
No	51	76.12	46	86.79	98	81.67	
Total	67	100	53	100	120	100	
Access to quality potato seeds							
Yes	26	38.81	12	22.64	38	31.67	3.573*
No	41	61.19	41	73.36	82	68.33	
Total	67	100	53	100	120	100	

Source: Own sample survey, 2016; * represents 10 % significance level

4. CONCLUSION AND RECOMMENDATION

For the study, Multi-stage sampling technique was used to select 120 sample households from four sample kebeles. Primary data collected through structured questionnaire and secondary data sources were used. A Likert scale, based on farmers' perception, was used to rank the various sources of potato production by using improved seed varieties. The mean scores results, derived based on Likert scales, indicated that attributes such as, high productivity, early maturity, quality grain/fruit, disease resistance, pest resistance and profitability were positive perception/advantage of utilization improved potato seed for potato production which take the average score of 4.5, 3.28, 4.27, 4.21, 4.18 and 4.52, respectively While, labor demanding, high seed cost and unavailability of quality seeds at the right time were some of the disadvantages.

Accesses to improved potato a seed variety on time was also have positive and significant impact on the household's adoption decision. Lack of improved potato seed variety on time/timeliness availability of improved potato variety seed was also another critical problem in study area. Therefore, effort should be made to deliver proper and adequate quality of potato variety through strengthening supply delivery network and also link farmers market, cooperatives/groups with proper sources of seed supply to enhance potato farmer regular/timely access to seed supply on market dynamics. On the other hand, improving the capacity of those farmers to get access to the currently unaffordable and inaccessible improved potato seed through better access to asset building mechanisms, such as livestock, access to favorable credit and promotion of local seed producers may be essential. Therefore, efforts aimed at increasing the capacity of making agricultural productivity enhancing quality seed access available on time through policies that promote the development of farm inputs supplying institutions or accessible input sales/distribution points

is necessary for meaningful adoption of improved potato varieties. Therefore, strengthening of seed availability on time control mechanisms should be given due attention both in the areas of policy and development intervention.

In general the following policy implication was recommended to increase adoption and extent/level of adoption of improved potato varieties in Shashemane area

- a. Improve farmers access to improved quality potato variety
- b. Improve farmers access to improved potato seed variety on time
- c. Strengthening social network of farmers
- d. Development of human capital

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7. APPENDICES

Appendix Table 1. Choice/ selection traits for improved potato varieties

Order of traits	Order of traits for improved potato variety selection							
	Yield	Color	Taste	D/D res.	Maturity	Establish	Store	Market
First traits (%)	76.92	0	0	17.95	0.85	1.71	2.56	0
Second traits (%)	17.24	0.86	0.86	38.79	6.90	3.45	6.03	25.86
Third traits (%)	4.39	4.39	4.39	21.05	14.04	3.51	21.05	27.19

Source: Own survey computed data, 2016.

Appendix Table 2. Producers' knowledge on improved potato varieties

Do you know	Yield of		Di/tolerance of		Dr/tolerance of		Maturity day of		M/intensity of	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Jalane?	57.5	42.5	57.5	42.5	57.5	42.5	57.5	42.5	57.5	42.5
Gudane?	84.17	15.83	85	15	85	15	84.17	15.83	84.17	15.83

Source: Own survey computed data, 2016.

Appendix Table 3. Respondents input cost perception in relation to profit gained

Input parameters	Obs	Distribution of respondents/perception category (%)					average score	
		V/Exp	Exp	Moderate	Less Exp	Not Expen	Mean	SD
Improved varieties	95	31.58	51.58	15.79	1.05	0	4.14	0.709
Local varieties	115	7.83	24.35	48.70	17.39	1.74	3.18	0.876
Fertilizer cost	118	48.31	48.31	3.39	0	0	4.42	0.564
Chemical cost	118	33.90	55.93	9.32	0.85	0	4.23	0.645
Labor cost	100	15	46	32	5	2	3.67	0.865

Source: Own survey computed data, 2016.

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