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Factors Affecting Adoption of Improved Chickpea Technologies in West Hararghe Zone of Oromia Region

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Abstract

Chickpea is a cool-season food legume which considered a less labor-intensive crop and serves as a multi-use crop. It can grow on residual moisture and be sown at the end of the rainy season following the harvest of the main crop. For this different improved chickpea varieties with their packages were promoted and disseminated. However, factors that influence adoption decisions and intensity of improved chickpea varieties were not conducted in the study area. Thus, the purposes of this study were to identify factors affecting adoption decisions and adoption intensity of improved chickpea technologies of smallholder farmers in West Hararghe zone, Oromia region. For this study, both primary and secondary data were used. Primary data were collected from 189 households (156 adopters and 33 non-adopters) and supported by secondary data. To address the stated above objectives descriptive statistics and econometric models (Heckman two-step) were employed. The econometric result of Heckman's two-step model indicated that the likelihood of adopting the decision of improved chickpeas was positively and significantly affected by the sex of the household, education level, household size (adult equivalent), and land owned of the household. Where, livestock owned (tlu), land owned, use chemicals for chickpeas, and frequency of extension contacts positively and significantly influenced the intensity of adoption of improved chickpea varieties among farmers. The findings generally suggest the need to increase the frequency of extension contacts and use of chemicals for the existence of disease and pests in chickpea production.

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Keywords

Adopters, Adoption, Improved Chickpea, Non-adopters.

Introduction

Chickpea is a cool-season food legume adapted to deep black soils in the cool semi-arid areas of the tropics, sub-tropics, and temperate areas (FAOSTAT, 2012). It plays a significant role in improving soil fertility, a source of income, protein, fiber, complex carbohydrates, vitamins, and minerals thus can help alleviating malnutrition and improving human health (Seleme *et al.,* 2015). In the world, chickpea is the 3rd most important food legume next to haricot bean and soybean (Namvar and Sharifi, 2011). Ethiopia ranks 1st in Africa from the total chickpea export which accounts for 63.5% of the total chickpea export and holds only 4% market share in world exports (Ojiewo, 2016). In area coverage and volume of production among pulse crops grown, chickpeas ranked 4th preceded by soya beans, haricot beans, and mung beans (CSA, 2021).

In the country, 177,547 hectares were allocated for chickpea production and 4,573,193.7 quintals of total production were obtained from the crop (Ibid). Thus, to

sustain the production and productivity of chickpea, utilizing improved seeds is very essential. The use of improved seeds increases productivity by 50% (ATA, 2011).

In the Oromia region, 302,134 households have participated in production of chickpea on the area of 95,690 hectares. In the region, a total production of 2,448,635.6 quintals of chickpea were produced in Meher production season and the crop was ranked 2nd in volume of production among pulse crops grown in the region followed by horse bean (CSA, 2021).

In the West Hararghe zone, there is land scarce and vulnerability to drought spills. For this chickpea can grow on residual moisture which allows farmers to engage in double cropping, where chickpea is sown at the end of the rainy season following the harvest of the main crop. This allows farmers more intensive and productive use of land in addition of it attributes for the farmers' incomes increases. Chickpea was ranked 2nd in volume of production among pulse crops grown in the zone followed by Haricot beans (CSA, 2021).

Over the last eight years, the package of chickpea technologies consisting of improved varieties (Mestawal, Minjar, Natoli, Teketey, and Habru), seeding rate, fertilizer rate, and spacing were conducted on-farm trials, demonstrations, and popularized at different chickpea producing districts of West Hararghe zone by Mechara Agricultural Research Center to promote technologies and enhance adoption. Besides, different governmental and non-governmental organizations like Harar Catholic Secretariat (HCS), Care, and World Vision Ethiopia also have promoted the technologies in the zone.

However, despite the efforts made so far in technology demonstration, dissemination, and popularization improved chickpea that appear to be beneficial for smallholder farmers were not widely dispersed well with its packages. For this, conducting its adoption status was important.

As part of this study, the primary objectives were threefold: first, to assess the adoption status of improved chickpea technologies among smallholder farmers; second, to determine the key factors influencing both the decision to adopt and the extent (intensity) of adoption of these technologies; and third, to identify and prioritize the major opportunities and constraints associated with chickpea production within the target study area.

Materials and Methods

Description of the Study Area

The study was conducted in Habro, Oda Bultum and Tulo districts of West Hararghe Zone among the major chickpea production potential. Habro district is located 404 km to East of Addis Ababa and 75 km to South of Chiro, zonal town. The altitude of the district ranges from 1600 to 2400 masl.

The annual average rainfall in the district was 1010 mm & the mean temperature ranges between 16 and 32°C. Oda Bultum is located 37 km in the South of Chiro town, the capital town of a Zone. The minimum and the maximum temperature of the district was 22 and 28 ^{0}C, respectively.

Its average rainfall is 900 mm-1200 mm and the main rainy season is from April to September. Tulo district is also located 368 km East of Addis Ababa and 42 km from Chiro. The district is found from 1631 to 2800 meters above sea level. The district received a mean yearly temperature of 26 ◦C, whereas mean annual rainfalls of 1700 mm (TAO, 2021; Meskerem *et al.,* 2023).

Sampling techniques

A combination of purposive and random sampling techniques was employed. Firstly, three districts were selected purposively based on chickpea production potential and improved chickpea technology. Secondly, two *kebeles* from each district were selected randomly out of the potential *kebeles* using the improved chickpea technology.

Thirdly, the chickpea producers were stratified into adopters and non-adopters of improved chickpea varieties. Finally, sample respondents were selected in a simple random sampling method from each group (adopter and non-adopter) by considering probability proportional to population size.

The sample size was determined according to Cochran (1977) at 94% confidence level and 6% level of precision as described below.

$$n_0 = \frac{Z^2 pq}{e^2} = \frac{(1.88)^2(0.26)(0.74)}{(0.06)^2} = 188.89 \approx 189 \quad \text{-----(1)}$$

Where n_0 is the sample size, Z is the standard cumulative distribution, p is the estimated proportion of an attribute, q = 1- p that is 0.74 and e is the desired level of precision.

Data types, sources and method of data collection

A study utilized cross-sectional data from both primary and secondary data sources focused on qualitative and quantitative data. The primary data was collected from sample households using prier prepared semi-structured questionnaire. For this study, an interview schedule was used to collect primary data from sample respondents. Secondary data were also collected from published and unpublished for rational conclusion.

Method of Data Analysis

The collected data were analyzed using STATA software version 17 statistical tools. Both descriptive statistics and econometric model were employed for analyzing the collected data.

Descriptive and Inference

Descriptive statistics such as mean, standard deviation and percent were used to describe the result. While, inferential statistics: t-test and chi-square test were used. Adoption index was also used to realize the adoption status of farm households in improved chickpea technologies packages. Garret ranking technique was also used to rank constraints of improved chickpea production and marketing in the study area.

Estimation of the adoption index

The adoption index was employed to measure the extent/ level of adoption of improved chickpea production technologies. It was used in the case of the study of multiple practices at the time of the survey.

The adoption index was calculated by the adoption index formula indicated in other adoption study (Negussie *et al.,* 2021) by adding up and dividing the adoption of each practice and number of adopting practices for each household head, respectively. Accordingly, the adoption index was calculated using the following formula:

$$AI_i = \Sigma\left[\frac{AC_i}{TA_i} + \frac{SRA_i}{RSR_i} + \frac{ARF_i}{RRF_i} + \frac{NWA}{RWA} + \frac{RP}{RrP}\right] / NP \quad \text{----(2)}$$

Where, AI_i = adoption index of the i^{th} farmer; AC_i = area under an improved variety of chickpea of the i^{th} farmer; TA_i = total area allocated for chickpea production of the i^{th} farmer; SRA_i = seeding rate applied per hectare of i^{th} farmer; RSR= recommended seeding rate per hectare; ARF= applied rate of fertilizer for chickpea; RPF= recommended rate of fertilizer; NWA = a number of weeding; RWA = Recommended number of weeding; RP = Row planting; RrP = Recommended planting & NP= number of practices.

Thus, farmers were categorized depending on their technology adoption level as per the criteria given above. According to Dhondhiyal (1991), the extents of technology adoption categories were low adopter = 0 - 0.25, medium adopter = 0.25 - 0.50, high adopter = 0.50 - 0.75 and very high adopter = 0.75 - 1.00.

Econometrics model

According to Rogers and Shoemaker (1971) defined adoption, it is a decision to continually use and apply an innovation. In several adoption studies, adoption decisions have been viewed in dichotomous terms (adopter and non-adopter). Various studies have used the Tobit model to approximate relationships with few dependent variables, whereas others have used the double-hurdle model.

However, in the case of expected selection bias in the sample, it is conceivable to use (Heckman, 1979, 2013) two-step procedure. For this study, a Heckman two-step model was used to estimate factors affecting the adoption and level of adoption of improved chickpea varieties in the study area.

The specifications of the empirical model used to identify these factors the Heckman two steps model widely discussed in different adoption studies (Jima *et al.,* 2021; Elsheikh *et al.,* 2018 and others).

The specification of the two-equation model for a farmer can be written as:

$$y_1 = \sum_i \begin{matrix} 1 \; if \; Y^* > 0 \\ 0 \; if \; Y^* < 0 \end{matrix} \quad \text{(Decision to adopt)} \quad \text{----(3)}$$

$$y_2 = \begin{matrix} y^* \text{ if } y_1^* > 0 \\ 0 \; if \; y_1^* < 0 \end{matrix} \quad \text{(Intensity of adoption) ----(4)}$$

Where, y_1^* is adoption decision; y_2^* was intensity of adoption and $y_1^* \neq y_2^*$.

Before running the specified model, the explanatory variables were checked for the existence of severe multicollinearity and heteroscedasticity problems using the Variance Inflation Factor (VIF) (Mean vif =1.20) and Breusch-Pagan test, respectively.

Besides, the appropriateness of Heckman two stages was checked through the significance of inverse mills ratio (IMR) (Lamda = 0.4645 $p>|z|$ = 0.001) at a 5% significance level.

Results and Discussion

The Results of Descriptive Analysis

A survey results indicate that more than two-thirds of the respondents were adopters of improved chickpea varieties while their improved chickpea technologies adoption rate varies. That means more than two-thirds of chickpea producers cultivated at least one improved chickpea variety in 2022/23 production season. While less than one-third were not cultivating improved chickpeas as a reason of lack of capital (42.42%), expensiveness of improved seed (21.21%), perceiving local chickpea as more productive (18.18%), fear of risk (9.09%), perceiving improved inappropriate for intercrop (6.06%) and land shortage (3.03%).

According to Table (3) below, the education level of the respondents was one of among significantly affecting variables of the chickpea adoption decision. The average education level of the respondents was around grade four (4) years of schooling. The average land owned among the sample respondents was 4.19 timad per household. At a 1% level of significance, there was a significant difference in the average land owned by the household head between the adopters and the non-adopter households (Table 3). Land holding size in study area is lower than the regional average of land holding of household's which is 1.10 hectares (i.e. 8.8 timad) per household (CSA, 2021).

The interviewed households arrived FTC (farmers training center) on average 13.80 minutes. Moreover, the results showed that there was a significant mean difference between adopters and non-adopters in terms of minutes that takes a household to walk a distance from his/her home to FTC. Livestock is a crucial income source for farmers and indicates their wealth; also providing funds for production inputs which statistically significant differences at the 1% probability level. On average, sample families own 2.20 tlu.

The average number of land fragmentation was 1.85. There is a significant mean difference between adopters and non-adopters in numbers of land fragmentation. Out of the 189 chickpea producer farmers, on average they had 1.25 frequent contacts with agricultural extension agents in 2022/23 fiscal year. According to the t-test result, there was a substantial difference between adopter and non-adopter households in frequency of extension contacts.

Two third of the sampled respondents (67.20%) obtained access to market information from neighbors (55.12%), traders (33.07%), DA (6.30%) and others like radio (5.52%). This shows there is not much market information inaccessibility in the area. The chi-square value showed that systematic association between access to market information and the adoption categories (Table 4). Out of the total sample size of 189 households, 58.73% were found to members of the agricultural cooperatives while 41.27% were not members for cooperatives. The chi^2 value showed that there was a significant difference in membership for cooperative among the two groups (adopters and non-adopters).

In the study area, almost all chickpea producers (96.3%) observed disease on their chickpea farms. That means disease was a very common problem in chickpea production in the study area. It forces farmers to use chemicals to reduce production loss. Three-fourth (75.13%) of the sampled respondents chickpea producers in the study area used chemicals in the production of chickpeas implying that only one forth (less of the respondents) did not utilize chemicals for their chickpea productions (Table 4).

Adoption status of Chickpea packages of technologies

In the study area around 82.54% of chickpea producers cultivated at least one improved chickpea variety in 2022/23 production year. While the remaining 17.46% of farmers' cultivated local varieties. In the case of weeding frequency, 72.49% of the farmer had weeded their chickpea two to three times. While only 22.75% used the row planting sowing method in the study area (Table 5).

Types of improved chickpea varieties

As described in Figure (3) below, Mestawel, Arerti and Minjar chickpea varieties were those dominantly

cultivated by farmers in the study area. Mestawel and Minjar varieties are firstly delivered by Mechara Agricultural Research Center; while the Arerti variety is provided by zonal and respective districts' agricultural offices.

However, currently, both (the research center and agricultural office) proceeded in the supply of improved chickpea by farmers to farmers' seed dissemination through purchase.

There are five levels of adoption categories of improved chickpea packages in the study area (Table 6). This indicated that large proportions of chickpea producers found in medium and high adopters' adoption categories have the opportunity to boost chickpea production in the study area.

Econometric Results

The sex of the household head had a significant and positive effect on the decision to adopt an improved chickpea variety at a 5% significance level. This may be because farmers who are male have more access to improved technology and the opportunity to attend field days and demonstrations.

The value of the marginal effect indicated that the probability of adopting improved chickpea varieties was 23.08% greater for male farmers than female farmers keeping other variables constant. Similarly, a study conducted by Tabe-Ojong and Mausch (2017) found a positive relationship between gender and the decision to produce chickpea.

Household size had a positively and significantly affect decision to adopt an improved chickpea variety at a 1% significance level. The value of the marginal effect indicated that an increase in 1 unit of adult equivalent increases the probability of adopting an improved chickpea variety by 6.33%.

Among chickpea producers, only 4.8% did not observe insects on their chickpea farms. Those insects: armyworms, leaf miners and aphids are those majorly observed. The finding of the results indicated that the use of chemicals for chickpea production affected the intensity of adoption of improved chickpea technology positively at the 1% significance level.

It indicated that the intensity of adopting improved chickpea packages was 108.69% greater for those farmers who used chemicals for chickpea production than those farmers do not use chemicals keeping other variables constant.

Frequency of extension contacts affected the intensity of adoption of improved chickpea technology of the smallholder farmers positively at the 10% significance level. It indicated that a 1 unit increase in frequency of extension contact will increase the intensity of adoption of chickpea production package by 19.33%, controlling the other variables constant. The results of the study agree with those of Asegie *et al.,* (2023), who revealed that farmers who had more interactions with DAs are more inclined to choose improved chickpea varieties.

Land ownership had a significant and positive effect on the decision to adopt an improved chickpea variety at 1% significance level. The value of the marginal effect indicated that an increase in 1 timad of land increases the probability of adopting an improved chickpea variety by 3.26% and the intensity use of chickpea production package by 16.93% keeping others constant. This finding is consistent with the findings of Asegie *et al.,* (2023) who have reported expanding the size of land for households helps them to diversify the risks linked with utilizing improved chickpea varieties.

The finding of the study indicated that livestock owned (tlu) affected the intensity of adoption of improved chickpea technology of the smallholder farmers positively at the 5% significance level. It indicated that a 1 tropical livestock unit increase of livestock owned will increase the intensity adoption of chickpea production package by 26.29%, controlling the other variables constant. A similar result had been documented by Mesfin *et al.,* (2023) who indicated that livestock generate additional income for a household which capacitates to purchase improved chickpea varieties.

Different factors constrained the production of chickpea in the study area. Among diseases and pests was a major and first-ranked constraint by farmers. It is followed by high costs of inputs, untimely availability of input, and lack of improved chickpea varieties that resistant / tolerant for the highly occurring disease and pests and land shortage, respectively.

Table.1 Number of sampled households in each district

Kebeles	Agricultural Households	Sample taken	
		Frequency	Percent
Habro	30,761	60	31.75
Oda Bultum	43,470	63	33.33
Tulo	32,672	66	34.92
Total 106,903		**189**	**100**

Source: Own computation, 2024

Table.2 Summary of variables and hypotheses

Variables	Type	Measurement	Expected sign
Dependent variable			
Adoption decision	Dummy	1= Adopter , 0 = non-adopter	
Adoption level of improved chickpea	Continuous	Proportion of land of improved chickpea	
Explanatory variables			
Education level of household head	Continuous	Complete schooling years	+
Sex of household head	Dummy	1 = Male, female = 0	+/-
Household size	Continuous	Adult equivalent	+
Livestock (TLU)	Continuous	Tropical livestock unit	+
Frequency of extension contacts	Continuous	Number	+
Access to training	Dummy	1 = Yes and 0 = No	+
Land owned	Continuous	Measured in *timad*	-
Participation on demonstration/ field day	Dummy	1 = Yes and 0 = No	+
Access to credit	Continuous	Number	+
Distance from FTC	Continuous	Number	-
Membership for cooperatives	Dummy	1 = Yes and 0 = No	+
Access to market information	Dummy	1 = Yes and 0 = No	+
Use chemicals	Dummy	1 = Yes and 0 = No	+
Land fragmentations	Continuous	Number	-
Participation in non/off farm	Continuous	1 = Yes and 0 = No	+

Sources: Empirical studies reviewed, 2022

Table.3 Descriptive statistics of continuous variables within adoption categories

Continuous variables	Adopters (N=156)		Non-adopters (N=33)		Overall (N=189)		T-value
	Mean	St. Dv	Mean	St. Dv	Mean	St. Dv	
Education level (Grade)	3.92	3.58	2.55	3.46	3.68	3.59	2.011**
Household size (Adult equiv)	3.44	1.55	3.47	1.69	3.44	1.57	.096
Livestock (TLU)	2.40	1.63	1.29	1.11	2.20	1.61	3.723***
Land owned (*timad*)	4.54	3.34	2.55	1.46	4.19	3.18	3.349***
Distance from FTC (minute)	12.73	13.44	18.85	11.81	13.80	13.34	2.423**
Land fragmentation	1.85	.90	1.42	.50	1.77	.85	2.617***
Frequency of extension contact	1.37	1.59	.73	1.44	1.25	1.58	2.126**

Note: ***, ** and * are significant at 1%; 5% and 10% respectively.
Source: Survey result, 2024

Table.4 Descriptive statistics of categorical variables within adoption categories

Variables		Adopter (%)	Non-adopter (%)	Overall (%)	Ch^2
Sex of respondent	Male	87.18	84.85	86.77	.129
	Female	12.82	15.15	13.23	
Participation on non/off farm activities	Yes	23.08	24.24	23.28	.021
	No	76.92	75.76	76.72	
Access to credit	Yes	44.87	48.48	45.50	.143
	No	55.13	51.52	54.50	
Participation on training	Yes	17.95	12.12	16.93	.658
	No	82.05	87.88	83.07	
Access to market information	Yes	69.87	54.55	67.20	2.903*
	No	30.13	45.45	32.80	
Participation in field day or demonstrations	Yes	12.18	6.06	11.11	1.033
	No	87.82	93.94	88.89	
Membership for cooperative	Yes	44.87	24.24	58.73	4.783**
	No	55.13	75.76	41.27	
Use chemicals for chickpea	Yes	83.33	36.36	75.13	32.163***
	No	16.67	63.64	24.87	

Note: ***, ** and * are significant at 1%; 5% and 10% respectively.
Source: survey result, 2024

Table.5 Categories of adopter farmers in chickpea technologies packages

Technologies	Category (Yes)	
	Frequency	Percent
Using an improved chickpea variety	156	82.54
Weeding frequency (2-3 times)	137	72.49
Recommended seed rate used (60-100kg/ha)	73	38.62
Fertilizer application	52	27.51
Sowing method (row planting)	43	22.75

Source: Survey result, 2024

Table.6 Adoption categories of chickpea-producing farmers in the study area

Adoption categories	Index score categories	Frequency	Percent
Non-adopters	0	33	17.46
Low adopter	0.01 - 0.25	26	13.76
Medium adopter	0.251 - 0.50	55	29.10
High adopter	0.50 - 0.75	67	35.45
Very high adopter	0.75 – 1	8	4.23

Source: Survey result, 2024

Table.7 Results of Heckman-two-step estimation model of adoption decision and level of adoption of improved chickpea technologies

Variables	Probability of adoption			Variables	Adoption intensity	
	Coef.	St.Err.	Dy/dx		Coef.	St.Err.
Access to credit	.0904	.0722	.0904	Sex of household head	-.3591	.3818
Sex of household head	.2308**	.1042	.2308	Household size (adult equivalent)	-.1036	.0863
Participation in non/off farm	.0713	.0812	.0713	Livestock owned (tlu)	.2629**	.1141
Education level	.0176*	.0094	.0176	Land owned	.1693*	.0946
Household size (adult equivalent)	.0633***	.0234	.0633	Access to credit	.0834	.2697
Livestock owned (tlu)	.0248	.0271	.0248	Access to market information	.0711	.2810
Frequency of extension contacts	.0323	.0253	.0323	Use chemicals	1.0869***	.2768
Participation on demonstration	.0021	.1209	.0021	Land fragmentations	.1793	.2500
Land owned	.0326***	.0109	.0326	Frequency of extension contacts	.1933*	.1067
Distance from FTC	.0028	.0024	.0028	Access to training	-.0916	.4342
Membership for cooperatives	.0816	.0747	.0816	Participation on demonstration	.1437	.5120
Access to training	-.0132	.1078	.0132	Membership for cooperatives	.4767	.2913
Lamda	.4645***	.1460		Constant	-.8801	.5880
Obs = 189 Selected = 156 Non-selected = 33						

*, ** & *** represents significance at 10%, 5% and 1% respectively.
Source: Survey result, 2024

Table.8 Constraints of chickpea production & marketing in study area using Garrett ranking

Constraints	Rank given by respondents							Total score	Ave	Rank
	R_1	R_2	R_3	R_4	R_5	R_6	R_7			
Lack of resistant chickpea varieties for disease	1,312	2730	1197	464	260	48	0	6011	31.80	4
Untimely availability of input	328	2380	2457	870	104	48	0	6187	32.74	3
Disease and pests	12628	1540	378	116	0	0	42	14704	77.80	1
High costs of inputs	656	1120	2142	986	988	480	42	6414	33.94	2
Flood	0	420	63	58	156	48	84	829	4.39	8
Land shortage	164	840	515	464	884	816	84	3767	19.93	5
Lodging	82	280	126	116	0	0	0	604	3.20	9
Lacking of capital	164	210	378	0	52	48	0	852	4.51	7
Low product price	0	840	0	58	0	0	0	898	4.75	6
Unfair traders' weighting	0	0	63	0	0	0	0	63	0.33	10

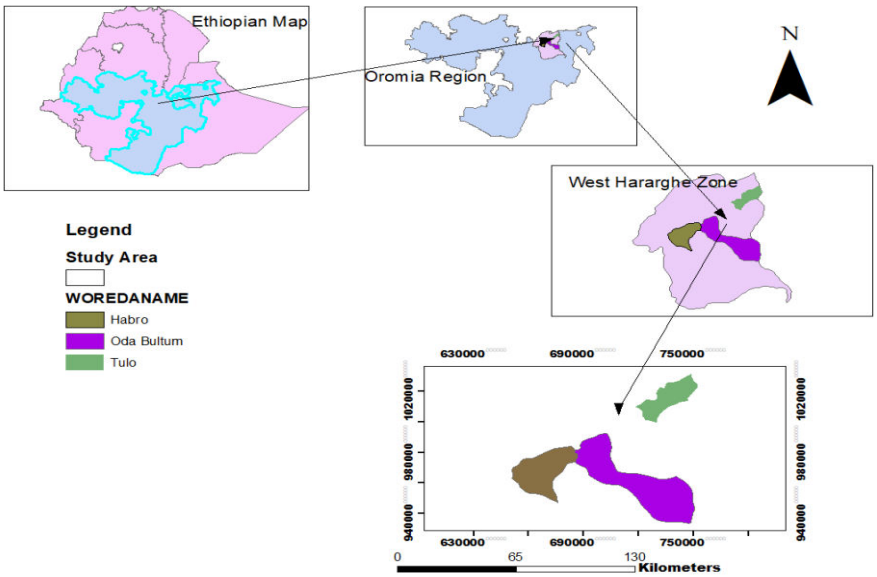
Source: Survey result, 2024

Table.9 Existing opportunities for chickpea production in study area using Garrett ranking

Opportunities	Rank given by respondents					Total score	Ave	Rank
	R_1	R_2	R_3	R_4	R_5			
Existence of improved varieties	0	66	627	1300	44	2037	14.24	5
Suitability of soil and climate	3555	2244	2394	250	0	8443	59.04	2
Market availability	1501	3498	2337	150	0	7486	52.35	3
Existence of farmers interest	6715	3036	741	100	0	10592	74.07	1
Existence of irrigation access	158	66	0	0	0	224	1.57	6
Producing twice a year	1659	594	399	200	0	2852	19.94	4
Labor availability	0	0	57	0	0	57	0.40	7

Source: Survey result, 2024

Figure.1 Map of the study area



Source: Own design from ArcGIS data, 2024

Figure.2 Adoption status of improved chickpea varieties of farmers in the study area

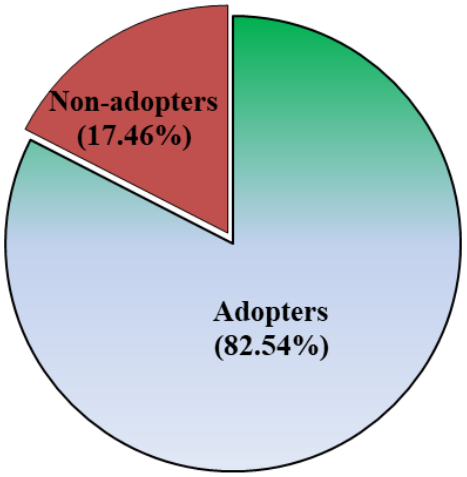
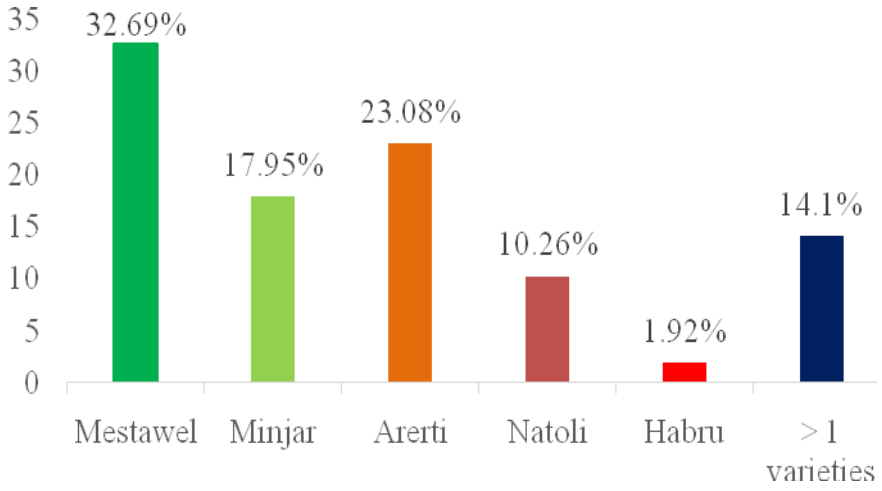


Figure.3 Types of improved chickpea varieties farmers were sown in the study area



Conclusions and Recommendations

Chickpea is a legume crop that serves as a multi-use crop improving soil fertility, a source of cash, protein, fiber, complex carbohydrates, vitamins, and minerals. The study tried to investigate the status of adoption and factors influencing farmers' decisions and intensity of adoption. In this study adoption index was used to assess adoption status; while Heckman two-step model was applied.

More than two-thirds of the respondents adopted improved chickpea varieties. The estimates of the selection model result indicated that the decision of households to adopt improved chickpea variety was found to be influenced by the sex of the household, education level, household size and land owned. While, livestock owned, land owned, use of chemicals and frequency of extension contacts were variables that significantly influenced farmers' adoption intensity of improved chickpea. Chickpea production was majorly challenged by disease and pests, high costs and untimely availability of inputs and land shortage in the study area.

However, there are also opportunities for chickpea production and marketing in the study area which include high farmers' interest on a crop, suitability of soil and climate, market availability and existence of improved varieties. As conclusion, the adoption of improved chickpea was very important for home consumption and income generation in the absence of competent crops at the time of sowing in the study area.

Given the above conclusion, this study makes the following recommendations to increase chickpea adoption and production:

- ✓ Strengthening & increasing frequency of extension contact with chickpea-producing farmers on the use of chemicals for the disease and pests.
- ✓ It is ought to be an effort to help farmers improve their education level to help them get a better return from utilizing the existing area potentiality in crop and existing improved chickpea varieties.
- ✓ Regarding bodies that participate in an input provision/ supply for chickpea-producing farmers have to deliver inputs in a timely with a balanced price.

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