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**Article**

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DEVELOPMENT ECONOMICS | RESEARCH ARTICLE

# Determinants of wheat value chain in case of North Shewa Zone of Amhara region, Ethiopia

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**Abstract:** The main objective of the study is to identify the determinants of wheat value chain in case of North Shewa Zone of Amhara region, Ethiopia. The researchers used multistage purposive random sampling technique to select representative households in the study area. The ordinary least square output revealed that production of wheat, price of wheat and secondary and tertiary education of the household positively and significantly affect supply of wheat to the market. On the other hand, distance from the market and distance from the main road have negative and significant effect on supply of wheat. Moreover, the multinomial logit regression result showed that household family size and market information have positive and significant effect while distance from the market and ownership of livestock have negative and significant effect on smallholder farmers' market participation. The binary logit model also indicates that land holding, access to market information, total livestock and primary education affected positively and significantly. Therefore, policies aiming at increasing farmer's awareness of producing value added wheat produce to enhance value creations are recommended to strengthen chain development.

**Subjects: Rural Development; Economics and Development; Economics**

**Keywords: Agriculture; market supply; market outlet; value chain; Moretina Jiru; Minjar Shenkora; North Shewa; Ethiopia**

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## ABOUT THE AUTHOR

Eshetu Molla Demeke, the author of this article, is a lecturer at Debre Berhan University, Ethiopia. He earned BA in Agricultural Economics and MA in Development Economics from Haramaya and Hawassa University respectively. His research interest includes commercialization, value addition, market performance, determinates of value chain and market outlet.

## PUBLIC INTEREST

In Ethiopia, agriculture is the main sector of the country's economy. But the sector is dominated by subsistence production and low rate of commercialization. This is due to the fact that the agricultural commercialization is challenged by different constraints. Due to this, agriculture could not cover domestic consumption and the country is now importing substantial agricultural products from different countries mainly wheat. Value chain development plays significant role to improve agricultural commercialization. Thus, this study tried to examine the determinants of wheat value chain in North shewa Zone of Amhara region, Ethiopia. The study found that demographic, socio economic and institutional factors are significantly contributed to low commercialization of the agriculture. Therefore, addressing these constraints can helps to improve wheat value chain in the study area.

## 1. Introduction

Agriculture is the backbone of Ethiopian economy. The sector significantly contributes about 27.5 billion dollars or 34.1% to the GDP, employs about 79% of the population, accounts for 79% of foreign currency earnings, and is the major sources of raw material and capital for investment and market (Diriba, 2020).

In Ethiopia, cereal production and marketing is the means of living for millions of smallholder families and it includes the single largest sub-sector in the economy. Wheat is one of largest cereal crops produced for consumption and marketing purpose in the country. In terms of production, it ranks fourth next to maize, sorghum and teff that constitutes 1.63 million per hectare, the volume produced 3.9 million tons. Moreover, 4.7 million farmers engage in wheat production with an average productivity of 2.4 tons per hectare from total cereal production (CSA (Central Statistical Agency), 2014).

This crop is not only covering the substantial share of the cereal production, but also it is selected as one of the target crops in the strategic goal of achieving national food independence in Ethiopia (Amare et al., 2015). Nonetheless, most of the farmers in Ethiopia are smallholder farmers, producing mostly for own consumption and producing only a little marketed surplus; mostly produced for consumption purpose with a meagre contribution for commercialization (Amentae et al., 2017; Endalew et al., 2020). Even though it has a massive potential in terms of production, only 20% of the total wheat production is traded, whereas 80% of its total production is used for household consumption, seed, in-kind expenditures for labour, and animal feed (Kim et al., 2016).

One of the central challenges that hinder the commercialization activity of wheat production is poor linkage to the market and post-harvest losses. Owing to this, the wheat farm households in the country earn little economic benefit from their wheat produce due to lower rate of wheat commercialization. Therefore, wheat value chain development is vital to harness the untapped commercialization potential of the crop to achieve food security at the national and household level (Amentae et al., 2017; Endalew et al., 2020).

In North Shewa Zone, wheat production is one of the most widely produced cereal crops. According to the Agricultural Office of North Shewa Zone (2020), cereal crop production particularly wheat production in the zone is highly constrained by inadequate transportation network, limited numbers of traders and market outlets, inadequacy of credit access, weak bargaining power of producers, lack of flour industries, price instability, lack of storage facilities, poor-quality mechanism and weak market information. Despite this fact there are scant studies conducted to empirically scrutinize this issue using the appropriate empirical technique. With the purpose of improving the ultimate impact of wheat to the producer and to the economic growth of the country, it is essential to investigate the market performances and options to minimize post-harvest losses across the supply and marketing chains. Thus, the main objective of this study is to examine the determinants of value chain of wheat production in the study area.

## 2. Review of related literature

Value-added agriculture has involved substantial attention in recent years as a means to increase and stabilize farm incomes and to revitalize primary agriculture and the rural economy. The move to value-added agriculture is basically market-driven. Value-added activities are born from the necessity to adapt to the wide-ranging changes affecting the agriculture and agro-food industry (Tura et al., 2016). However, smallholder farmers' decision to select appropriate market outlets can be affected by various factors such as demographic, institutional factors, socioeconomic factors and access of market outlets. There are different studies in different parts of the country that

explored the major determinants of value chain development of cereal crops. For example: Endalew et al. (2020) studied the determinants of wheat commercialization among smallholder farmers in Debre Elias Woreda, Ethiopia. The result of the study showed that 23.4%, 51.9%, and 24.7% of smallholder farmers were subsistence, semi commercialized and commercialized, respectively. The result indicated that the majority of smallholder farmers are semi commercial wheat producers. Moreover, the beta regression result indicated that educational status, number of oxen, land size allocated to wheat production, farming experience in wheat production, extension service, and market distance are major factors for smallholder farmer's wheat commercialization.

Abate et al. (2021) analysed the determinants of market participation of smallholder wheat farmers and measured its commercialization level in Northern Ethiopia. The descriptive result revealed that the average commercialization level of the sample wheat farmers was 10.26%. The model result showed that the age, educational level, current selling price, wheat market experience, access to market/information, off/none farm income, family size, market orientation, distance to all weather roads and land size allocated for wheat significantly affected the smallholder wheat farmers' market participation.

Dessie et al. (2018) investigated the factors that influence market channel choices among wheat producers in North western Ethiopia. The study identified four major wheat market channel choices such as retailers, assemblers, consumers and wholesalers as alternatives to wheat producers to sell majority of their products. Thus, retailers who accounted for 40.49% of total sold assemblers (39.2%), consumers (37.5%) and wholesalers (23.93%). The results of a multivariate probit model indicated that age of household, education status of the household, credit access, livestock number, off-farm income and total land-holding size of farmers significantly affected the market channel choice decisions in one or another way.

Amentae et al. (2017) analysed wheat value chain focusing on market performance, post-harvest loss, and supply chain management in Arsi zone of Oromia region, Ethiopia. The study identified producers and their cooperatives, collectors, wholesalers, retailers, and processors as primary actors. At these stages of the wheat chain, post-harvest losses reported were 21%, 3%, 4%, 6% and 5%, respectively. With the highest loss happening at producers' stage, this stage was identified as loss-hot-spot point. The assessed wheat value chain was characterized by unfair share of benefit among the chain actors. The producers who were in a position of adding the highest portion of value to the wheat received only 16% of the profit margin. The traders jointly and processors shared 33% and 51% of the profit margin, respectively. The assessment on the degree of clearness noted that for 54% of the chain actors, it was very difficult to get reliable information about the whole wheat market along the chain. Licensing procedure, capital, and competitions were reported as barriers to wheat market entry.

However, many of the aforementioned researches show the determinants of wheat value chain (e.g. Endalew et al., 2020). Abate et al. (2021, 2018), Amentae et al. (2017) and other several studies have been used single analysis like determinants of market outlet choice and used beta analysis. But this study used three models including OLS, multinomial logistic regression (MLR) and logistic regression. Therefore, this study contributes to the existing literature by examining the determinants of wheat value chain using MLR, linear regression and logistic regression. To assess factors of wheat supply, determinants of value addition and determinants of market outlet choice of producers of wheat three models egression model. Whether including OLS, Multivariate logistic regression and logistic regression. Thus, this study analysed whether wheat value chain constrained by different factors or not.

## 3. Methodology

### *3.1. Description of the study area*

North Shewa is one of the 10 zones in the Ethiopian Amhara Region. North Shewa takes its name from the kingdom or former province of Shewa. The zone is bordered on the south and the west by South Wollo, on the north east by the Oromia Zone, and on the east by the Afar Region. It covers a total area of 15,936 $km^2$. Its largest town is Debre Birhan. Based on the 2007 census conducted by the Central Statistical Agency of Ethiopia (CSA), this zone has a total population of 1,837,490 of whom 928,694 are men and 908,796 women; with a population density of 115.30. Specifically the study areas; Moret and Jiru district has an estimated total population of 101,447 and the other study area, Minjar Shenkora has a total population of 140,639 in 2012 E.C.; 12,237 or 9.49% are urban inhabitants (North Shewa Zone Administration Office, 2019).

### *3.2. Data collection method*

Cross-sectional data from primary and secondary sources were collected as well as structured and pre-tested questionnaire was applied to collect primary data. Before data collection, pretesting of the questionnaire have been carried out, and then depending on the results, there were some adjustments that would be made to the final version of the questionnaire. Secondary data were gathered from documented and published sources including books, journals, government reports, articles, reports from North Shewa urban municipality Development Bureaus and other publications.

### *3.3. Sampling method and size*

For this particular research, multistage purposive random sampling procedure was used to select representative households in the study area. In the first stage, the two districts namely Minjar Shenkora and Moretn and Jiru were selected purposely as they have the largest area under wheat production in the study zone. In second stage, out of 40 kebeles of the two districts, four Kebeles were selected randomly as all kebeles are producers of wheat and in the district.

#### *3.3.1. Sample size determination*

A list of wheat producers along with area allocated under wheat was prepared by the researchers. Finally, appropriate numbers of sample farmers from four kebeles were selected in proportional to population size using Yemane (1967) formula. Accordingly, the required sample size at 95% confidence level with level of precision equal to 5% are recommended to obtain a sample size required that represent a true population of farmers.

$$n = \frac{N}{1 + N(e^2)} = \frac{242,086}{1 + 242,086(0.05)^2} = \mathbf{399.8} \approx \mathbf{400}$$

Where, $n$ = sample size, $N$ = Population size and $e$ = level of precision assumed 5%. Using the above formula, totally 400 farm household heads, was selected from the two Districts' farmer household heads of 242,086. But due to incomplete information five respondents was rejected. So the final sample size is 395 households.

### *3.4. Econometric model specification*

#### *3.4.1. Factors affecting market supply*

For studying factors affecting wheat market supply in the study area, Ordinary Least Squares model was used since all sample respondents interviewed has been participated in supplying wheat to the market in 2019/20 production year. This model is also selected for its simplicity

and practical applicability (Greene, 2000). Econometric model specification of supply function for wheat in matrix notation is given as below.

$Y = X'\beta + U$

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.

Then the econometric model specification is described as follows:

$$\begin{aligned} Y = {} & \beta_0 + \beta_1 \mathrm{Pr}odW + \beta_2 LandZ \\ & + \beta_3 priceW + \beta_4 mkt\,\mathrm{inf}\,o \\ & + \beta_5 HFS + \beta_6 Sex + \beta_7 Age \\ & + \beta_8 EXS + \beta_9 AGREX \\ & + \beta_{10} TLU + \beta_{11} EDUC \end{aligned}$$

*3.4.2. Factors affecting market outlet choices*

To estimate factors of market outlet choice of respondents, multinomial linear regression model has been used. MLR model is an extension of binary logistic regression since it is effective where we have more than one categorical dependent variable. In a MLR model, the estimates of parameters can be identified and compared to a baseline category of the dependent variable. The baseline-category logit model with a predictor is specified as follow:

$$\log\frac{\pi j}{\pi j} = \alpha j + \beta j x,\ j = \ 1,\ 2\ \ldots\ J-1 \tag{1}$$

Let $p_{ij}$ = the probability a farmer can have $j^{th}$ market out let choice, where i = 1, 2... 395 and *j*= 1, 2, 3, then the two multinomial logit are specify as follow:

$$\log\frac{P(yi=\frac{1}{xj}=seXi+\ldots STB}{P(yi=\frac{1}{xj}=seXi+\ldots STB} = \beta 0 + \beta 1 xiSEXSTB \tag{2}$$

$$\log\frac{P(yi=\frac{1}{xj}=seXi+\ldots STB}{P(yi=\frac{1}{xj}=seXi+\ldots STB} = \beta 0 + \beta 1 xiSEXSTB \tag{3}$$

The Equations (2) and (3) give the odds ratios of farmers choosing of processors market out let from others, Equations (4), (5) and (6) are Pi having the chance of choosing trader market out let

$$\frac{e\beta 1 xi}{1+\sum^{\sum_{j=1}^{3} e\beta j xi}} \tag{4}$$

*pi* having the chance of choosing processor market out let

$$\frac{e\beta 2 xi}{1+\sum^{\sum_{j=1}^{3} e\beta j xi}} \tag{5}$$

*pi* having the chance of choosing cooperative market out let

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$$\frac{e\beta 3xi}{1+\sum^{\sum_{j=1}^{3} e\beta jxi}} \tag{6}$$

The explanatory variables include sex of household head, age of household head, household family size, farming experience, membership of cooperatives, participation in off-farm income, own price of the product, market information, distance from the market, credit access, extension service, total livestock and education level of the respondent. Simple random samples of 395 respondents were selected from the two Districts '(Moretina Jiru and Minjar shenkora weredas) of the North Showa zone.

### *3.4.3. Factors affecting wheat value addition*

**The logistic regression model is mathematically formulated as follows**:

$$(pi)^n = \frac{(e)^{zi}}{1+e^{zi}} \tag{1}$$

Where, *pi* is the probability of participation in the value addition,

$$Zi = \beta o + \sum \beta ixi + ui \tag{2}$$

Where, *i* = 1, 2, 3,—–*n*, *Zi* is the dependent variable that is value addition and equals 1 if household participated in value addition other wise 0. *βo* = intercept; *βi* = regression coefficients to be estimated

*u* = a disturbance term, and *xi* = pre-intervention characteristics.

### *3. 4. 4. Descriptions of variable and its measurement (Table 1)*

## *4. Results and discussion*

### *4.1. Descriptive statistics*

The study used descriptive statistics tools such as means, frequencies, percentages and standard deviations to analyse the results. The software used for descriptive and econometric analysis was STATA Software Version 13.

As shown in the above Table 2, 92.15.3% or (*n* = 364) of employees participated in the study are male and 7.85% or (*n* = 31) are female. This shows that the male respondents formed majority of the target population.

**Availability of market information**: Getting market information is important to know about price of product, price of inputs and so on. Majority of respondents were accessed market information 364(92.15%) and the remaining 31(7.85%) did not accessed market information.

**Access to Extension service**: Majority of respondents get support from extension workers which covered 360(91.14%) and the remaining 35(8.86%) did not access this extension services. Extension support is important for farmers to adopt new technology and other important farm implements. On the other hand, from the total respondents, 168 household were participated in off farm activities the remaining 227 household were not participated in off farm activities. When we see market outlet choices of farmers majority of the respondents were chooses whole sale market (273) followed by cooperative market outlet (112).

**Table 1. Variable discerption**

| Variables | Variable discretion | Measurement | Expected sign |
|---|---|---|---|
| Sex | Sex of household | 1 = male<br>0 = female | – |
| Participation<br>Off farm income | Participation of respondents on off farm income | 1 = participant<br>0 = non participant | – |
| Market information | Availability of market information | 1 = available<br>0 = non available | + |
| Market outlet | Alternative market outlet | 1 = Trader<br>2 = cooperative<br>3 = proposer | + |
| credit access | Availability of credit service to farmers | 1 = access<br>2 = did not access | + |
| EXS | Access to extension services | 1 = access<br>2 = Did not access | + |
| DFMR | Distance from main road | Measured in km | – |
| Age | Age of respondents | Life span (year) | – |
| HFS | Household family size | Number | + |
| AGRIEX | Agricultural experience of respondents | Number of year | + |
| Landw | Land available for wheat crop cultivation | hectare | + |
| Soldw | Amount of wheat produced for sale | kg | + |
| Pricew | Average price of wheat | Birr | + |
| DFM | Distance from market | km | |
| TLU | Number of livestock | Tropical livestock unit | |
| EDUC | Education level of respondents | Schooling year | |

**Age of HH** as indicated in table 2 above age of household head has been taken as major socio demographic variable in the study. This is assumed to influence the decision of household members participated in the value addition activities. The average age of household head is 43.66 at standard deviation (11.6).

**Family size**: The average family size of the sample households is nearly 5 which are lower than the regional average of 6 persons (CSA, 2014). Family size might has positive and negative effect of value addition. First when family size increase household consumption increased surplus product become decreased, on the other hand, size of family size might contributed for value addition activities.

**AGRIEX** based on their agricultural experience; at average they do have 24 years' experience with standard deviation 12 years. Farmers with more agricultural experience might help to increase their output and participated in value addition activities it is consistence with Endalew et al. (2020).

L**and for wheat** at average 0.91 hectare land was cultivated wheat from their total land. It indicated that at average 29 quintal wheat was produced per hectare. And average price per kg was 15 birr.

**Table 2. Result of descriptive statistics**

| Discrete variable | | | | Continuous variable | | | |
|---|---|---|---|---|---|---|---|
| **Variable** | **Categories** | **Freq.** | **Present** | **Variable** | **Observation** | **Mean** | **Standard dv.** |
| Sex | Female | 31 | 7.85 | DFMR | 95 | 2.40841 | 4.22109 |
| | Male | 364 | 92.15 | Age | 95 | 43.6683 | 11.5863 |
| | Total | 395 | 100 | HFS | 95 | 4.86075 | 2.12749 |
| Participation Off farm income | Yes | 168 | 42.53 | particofff~m | 95 | .574683 | |
| | No | 227 | 57.47 | AGRIEX | 94 | .495017 | 24.4543 |
| | Total | 395 | 100 | Landw | 95 | .913670 | 2.49162 |
| Market information | No | 31 | 7.85 | Produced wheat | 95 | 29.3272 | 25.7317 |
| | Yes | 364 | 92.15 | Soldw | 94 | 13.9961 | 14.4422 |
| | Total | 395 | 100 | Pricew | 95 | 14.9974 | 5.23508 |
| Market outlet | Coop | 112 | 28.35 | | | | |
| | Whole | 273 | 69.11 | | | | |
| | Retail | 10 | 2.35 | | | | |
| | Total | 395 | 100 | | | | |
| redit access | Yes | 351 | 88.86 | | | | |
| | No | 44 | 11.14 | | | | |
| | Total -+ | 0395 | 100 | | | | |
| EXS | No | 35 | 8.86 | | | | |
| | Yes | 360 | 91.14 | | | | |
| | | 395 | 100 | | | | |

Source: Own data analysis, 2020

**Table 3. Determinants of market supply of wheat**

| Variables | Coefficients | Standard error |
|---|---|---|
| DFMR | −0.29376** | 0.142454 |
| SX | 0.449722 | 1.888435 |
| Age | −0.07082 | 0.077082 |
| HFS | 0.429083 | 0.276618 |
| AGRIEX | 0.069457 | 0.069558 |
| Land for wheat | −0.03063 | 0.226257 |
| Product of wheat | 0.350983*** | 0.019943 |
| Price of wheat | 0.21077*** | 0.067981 |
| Accessing market info | 0.939843 | 1.92538 |
| DFM | −0.30711*** | 0.094306 |
| ACCRE | 1.64847 | 1.659654 |
| EXS | −0.74665 | 1.805834 |
| TLU | −0.07604 | 0.141955 |
| EDUC_02 | 1.725156 | 1.208475 |
| EDUC_03 | 3.168131* | 1.772271 |

*N = 395, $R^2$ = 0.52, ***,** and * refers significant level at 1%, 5% and 10%, respectively.*

Source own data analysis result, 2020.

**Distance from market**: As it indicated in Table 2, the average distance from respondent's house to the nearest market is about 5.4 km with standard deviation 6 km. table 2 also shows the average number of livestock per household was 5.46 TLU with standard deviation 3.78.

**Access to credit: credit access also assessed in Table 2 and the descriptive result showed that** 88.86 percent of the respondents accessed to credit for their agricultural practice.

*4.2. Econometrics model result*

In this section, factors affecting volume of wheat supplied to market, factors affecting value chain analysis and market outlet choices of producers are presented and discussed.

### *4.2.1. Determinants of market supply of wheat*

As we have seen from Table 3, five variables are statistically significant from fourteen explanatory variables. These are distance from main road (DFMR), amount of wheat produced (ProdW), price of wheat per kg (pricew), distance from market (DFM) and education (EDU).

**Distance from the main road (DFMR)**: This refers to the distance between household resident and main road which is accessible for transportation. It is significantly and negatively affects the amount of wheat supply to the market. When distance increased by one kilometer, the supply of wheat to the market decreased by 0.29 quintals. This indicates that distance from main road from the household resident is negatively affect value chain of wheat crop in the study area because of difficulty of transporting the product using traditional transportation system. Therefore, fulfilling infrastructure is very important to facilitate value addition of wheat.

**Amount of wheat produced (ProdW)**: The amount of wheat produced by the household is significant and positively affect the amount of wheat supplied to the market at 1%. When the

amount of wheat produced increased by one quintal, the supply of wheat to the market increased by 0.35 quintals. This indicates that when household produced more, the surplus from the home consumption increased and that will be supplied to the market. As result, market supply of wheat also increased. As result increasing wheat product and productivity helps to improve value chain development in the study area.

**Price of wheat (Pricew)**: The price of wheat is significantly and positively affects the supply of wheat to the market at 1% significant level. When the price increased by one birr, the supply of wheat will increased by 0.21 quintals. That means when price increased producers will supply more wheat to the market by decreasing their storage and consumption. This result is similar with the finding of Abate et al. (2021); current price increases the market supply of wheat in northern Ethiopia.

**Distance from the market (DFM)**: Distances from the market to the household resident significantly and negatively affects the supply of wheat at 1% significant level. As it indicated in Table 3, when the resident of the household far away from the market by one kilo meter, the amount of wheat supply to the market decreased by 0.3 quintals. This shows that when the farmer is far away from market, transporting the product become difficult and costly. So producers will reduce their supply of wheat to the market. It is consistence with Endalew et al. (2020). The study has similar finding with the study of Endalew et al. (2020) in which market distance has a negative effect on market supply of wheat.

**Education level of household head (EDU)**: Education level of the household head is significantly and positively affects the supply of wheat at 10% significant level. That means when the education level increased by one grade the supply of wheat to the market increased by 3.16 quintals. For this study, education level is classified in to three categories. The first category is from illiterate,

**Table 4. Binomial logit regression result for factors influencing value addition of wheat**

| Variable | *dy/dx* | Std. Err. |
|---|---|---|
| SX | .0490207 | .09961 |
| Age | .0001763 | .00405 |
| HFS | 0271429* | .01462 |
| AGRIEX -. | 0028252 | .00369 |
| LandW. | 0403435 | .05576 |
| ProdW | .0012014 | .00136 |
| PriceW | .0024106 | .00545 |
| mktinfo | .175591* | .0932 |
| DFM | −.0181777*** | .00579 |
| ACCRE | −.0974712 | .09231 |
| EXS | −.0075576 | .09387 |
| TLU | −.0154798** | .00753 |
| EDUC_02 | .0845881 | .05775 |
| EDUC_03 | −.0253786 | .0649 |

*Number of observations = 395, Pseudo $R^2$ = 0.35, LR chi$^2$ (13) = 28.85, Log likelihood = −257.31083*

**** ** and * are statistically significant at 1%, 5% and 10%, respectively.*

**Source: Survey analysis result, 2020.**

the second category is primary education (from grade 1 to grade 8) and the third category secondary and tertiary education (grade 9 and above). The result shows that when household head secondary and tertiary educational level (from grade nine and above) increase by one year, he/she could be market oriented and supplies their product to the market as compared to the illiterate household head. This result is consistent with the study of Weldeyohanis et al. (2017), Dessie et al. (2018), Endalew et al. (2020) and Abate et al. (2021) and where educational status of the household head has a positive and significant effect on market supply of wheat.

### 4.2.2. Factors affecting decision of participation in wheat value addition

Among the explanatory variables significantly affect value addition are household family size (HFS), accessing market information, Distance from market to household, ownership of livestock. These explanatory variables are significant at 5% and 10% significance levels. Other independent variables were found insignificant and not considered in this study.

**Household family size (HFS)**: Family size of the household positively affects participation of household in value addition activities. The marginal effect shows that when the household's family size increased by one,individual (in adult equivalent), the probability of household participating in value addition increases by 2.7% (table 4). This is due to the nature of agricultural practice mainly done by human labour in the study area. This result is consistent with the finding of Abate et al. (2021) that household family size significantly affected the smallholder wheat farmers' market participation.

**Access to market information**: Access to market information affects value addition participation positively and significantly at 10% significant level. The result of marginal effect shows that when the household get market information frequently, the probability of household participating in value addition activities increased by 17.5%. This is due to the fact that market information makes the farmers informed about the price difference between value-added and non-value added products in price per kg. This study has a similar result with the finding of Abate et al. (2021) in which accessibility of market information increases wheat producers' market participation.

**Distance from the market (DFM)**: The likelihood of value addition participation was affected by the distance between household and market negatively and significantly at 1% significant level. That means distance from market increased by 1 km, the probability of household participating in the value addition activities decreased by 1.8% (mfx). This is due to the difficulty of transporting the product and the high cost of transportation in the study area. The result is in line with the finding of Endalew et al. (2020); that market distance is the major factor for smallholder farmer's market participation.

**Ownership of livestock (TLU)**: This variable affects participating in the value addition of household negatively at 5% significant level. The marginal effect result shows that when the number of livestock owned by household increased by one unit, the probability of household in wheat value addition practice decreased by 1.5%. This is due to the fact the household increased their grazing land and decreased the amount of land allocated for wheat production and then participation in wheat value addition decreased. This result is consistent with the study of Dessie et al. (2018) livestock production significantly affected the market channel choice decisions of the smallholder farmers.

### 4.2.3. Factors affecting wheat market outlet choices

As shown in table 4 below MLR was used to analyse factors affecting choice of wheat market outlets with three alternative categories. If there are a finite number of choices (greater than two),

**Table 5. Results of Multinomial Logit for choice of wheat market outlets**

| Market outlet | *dx/dy* | Coef. | Std. Err. |
|---|---|---|---|
| **Wholesalers** | | | |
| SX | −.0474233 | −.4956214 | .486781 |
| Age | .0049541 | .0288059 | .019647 |
| HFS | .0119551 | .0109221 | .0688222 |
| AGRIEX | −.0042715 | −.0172167 | .017498 |
| COPMEMB | −.0047976 | .0236454 | .5116688 |
| OFFINC | .0585525* | .4985277 | .2621156 |
| PriceW | .0045813 | .030555 | .0265342 |
| Mktinfo | .1550616* | . 9,922,196 | .5458552 |
| DFM | −.0115599** | −.0572538 | .0259902 |
| ACCRE | .1212397 | . 5,720,494 | .4311735 |
| EXS | −.1445579 | −.2913975 | .4071306 |
| TLU | −.0130578** | −.0825446 | .035925 |
| EDUC_02 | .0037868 | −.2690458 | .2742255 |
| EDUC_03 | .022622 | .017299 | .2846985 |
| Processor | | | (Base outcome) |
| **Cooperatives** | | | |
| SX | −.0474233 | −.6702398 | .4934875 |
| Age | .0049541 | .0178779 | .0214925 |
| HFS | .0119551 | −.1194398 | .0765254 |
| AGRIEX | −.0042715 | .0057301 | .0195555 |
| COPMEMB | −.0047976 | .125707 | .5348288 |
| OFFINC | .0585525** | .6595433 | .2888774 |
| Price | .0045813 | .0274017 | .0284192 |
| Market info | .1550616 | .5975288 | .5545469 |
| DFM | −.0115599 | −.0140744 | .0218402 |
| ACCRE | .1212397 | .0687342 | .4716596 |
| EXS | .1445579* | 1.25212 | .6643136 |
| TLU | −.0130578* | −.0654903 | .0383619 |
| EDUC_02 | .0037868** | −.7503227 | .2996477 |
| EDUC_03 | .022622 | −.2353566 | .3697329 |

**Source own data analysis 2020.**

multinomial logit estimation is appropriate to analyse the effect of exogenous variables on choices.

Producers choose their marketing plans and assess outside options that are available before participating in any market outlet. The producer's choice of a market outlet is based on utility maximization among the existing alternatives. After identifying choices of market outlets, they choose where and for who to sell based on comparative advantage in bargaining and accessibility of outlets for farm products.

The alternative "processor" was used as a base category. This implies that the discussion of a results focuses on the impact of the explanatory variables on a use of cooperatives and trader

and processors category relative to use of processors (the base category). The result of MNL and its marginal effect is explained in Table 5.

**Participation of off farm income**: This variable positively and significantly affected accessing wholesaler market outlet choices as compared with processors market outlet choices at 10% probability level. The marginal effect result shows that the likelihood of accessing wholesaler/trader market outlet choice is increased by 5.85% as compared to processor market outlet choices for a one birr increased of off farm income from their previous income earned. Whereas the same time this variable affect positively and significantly accessing cooperatives at 5% significant level it is consistence with Abate et al. (2021).

**Availability of Market information**: It is discrete variable, which was, the accessing market information via different channels or not. This variable positively and significantly affects the likelihood of household accessing wholesalers/traders markets at 10% significant level. The marginal effect result shows that the likelihood of accessing wholesaler's market outlet choice increased by 15.5% as compared to processor market outlet choices for increasing access of market information but it has insignificant effect on cooperative market outlet. It is consistence with Amentae et al. (2017).

**Distance from market place**: Distance from the closest market place negatively and significantly affected accessing traders (wholesaler and retailer) market outlet at 5% significant level as compared with accessing processors market outlet. The marginal effect indicates that probability of choosing traders' increased by 1.16% as compared with accessing processors market outlet for a unit decrease in kilometer, consistent with Tadesse (2017).

**Number of livestock owned by Household**: It influences negatively and significantly traders' market outlet and also cooperatives market outlet at 5% and 10% significant level respectively as compared to processors wheat market outlet. Likelihood of accessing trader's market outlet and cooperative market outlet decreased by 1.3% for one unit increased in number of livestock as compared with accessing processors. Accessing both market decreased by 1.3% since they used their land for both crop production and livestock rearing their crop production decreased when their number of livestock increased.

**Extension service**: Frequency of extension contact positively and significantly affected accessing cooperatives market outlet choices as compared with processors market outlet choices at 10% probability level. The marginal effect result shows that the likelihood of accessing cooperatives market outlet choice increases by 14.4% as compared to processors market outlet choices for a unit contact of extension services. This is consistent with Tadesse (2017).

**Education**: Education level positively and significantly affects accessing cooperative market outlet at 5% significant level. When education levels increased by1 grade, accessing cooperative market outlet increased by 0.4% until grade eight. But above grad eight it is not significant for accessing traders' market outlet.it is consistence with Abate et al. (2021).

## *5. Conclusions and recomendation*

This study was conducted in Moretina Jiru and Minjar Shenkora districts of North Shewa zone in Amhara region. The main focus of this study was analyzing wheat market value chain, identifying the factors affecting wheat market supply and identifying marketing channels of wheat and factors affecting market outlet choice decision of wheat producers.

Primary data were collected from 395 sample wheat farmers taken from four kebeles in the two districts. Secondary data were collected from woreda agriculture office, bureau of development and trade and from published and unpublished materials. The data were analyzed using econometrics and descriptive statistics tools by employing STATA software packages.

To identify factors affecting the market supply of wheat prodcution, multiple regression model was used and the regression result indicated that amount of wheat produced by farmers in quntals, price of wheat per kilogram and teritiary education positively and significantly influnces market supply of wheat to the market. While distance from the main road and distance from the market negatively and significantly afffect market supply of wheat to the market.Wheat producers of the study area supply their product to different market outlets. Farmers supply their products to wholesalers, cooperatives and processors market outlets. To analyse factors affecting producers choice of the three market outlets, MLR model was used.

While the likelihood to choose wholesalers market outlet was significantly influenced by participation of off- farm activities, market information, distance from the market and total livestock production as compared to accessing processors wheat market outlet. On the other hand, the likelihood of accessing cooperative wheat market outlet was significantly influenced by participation of off-farm income, extenstion service, total live stock production and primary education as compared to accessing processors market outlet.

On the other hand, decision to engage in wheat value addition was influenced by total livestock production and distance from the nearest market place negatively and significantly. Access to market information and household family size positively and significantly affected decision to be engaged in wheat value addition

Based on the result, to improve the production and productivity of wheat in the study area resolving the prevailing production problems seems a necessary condition. Among these increasing farmers' awareness on the importance of integrated crop management packages for increased productivity and sustainable production is one of them. In order to strengthen farmer's production potential, making available credit to farmers for input purchase also needs attention.

The result of econometric analysis indicates that volume of wheat supplied to the market jointly influenced positively and significantly by quantity produced and own price of the commodity. Therefore, in order to enhance volume of wheat supplied to the 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. And the farmers should charge higher price for their market supplied products. The agriculture development agencies should expand cultivated farming land size and farmers should aquire long farming experience for a better prodcution of wheat.

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