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Research Article

DETERMINANTS OF SMALLHOLDER SESAME FARMERS' DECISION TO PARTICIPATE IN NON-FARM ACTIVITIES IN EAST WOLLEGA ZONE, OROMIYA REGION

Mekonin Abera Negeri

Department of Statistics, College of Natural and Computational Science,
Wollega University, Ethiopia

A R T I C L E I N F O

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A B S T R A C T

In regions where agriculture has grown robustly, the rural non-farm economy has typically enjoyed rapid growth. The rural non-farm economy includes a highly heterogeneous collection of trading, agro-processing, manufacturing, commercial and service activities. This study was focused on the investigation of determinants of sesame farmers' participation in non-farm activities. Descriptive result depicted that only 29.96% of the sampled households were engaged in non-farm activities. The non-farm activities are performed as a complement to agriculture on part time or during the agricultural off-seasons and these include handcraft selling, trading and small construction in rural areas. Econometric result from Probit model revealed that sesame farmers' participation in non-farm activities is positively and significantly influenced by age of household head, education of household head, family size, number of oxen, distance to extension service and use of fertilizer while negatively and significantly influenced by distance to the nearest market. The efforts of extension agents and agricultural policy makers are needed to boost awareness of smallholder sesame farmers to diversify the sources of income in addition to farm sector which improve livelihood and wellbeing of the farmers.

INTRODUCTION

Ethiopia is one of the original centers for crop and livestock domestication that started during the Neolithic revolution ten thousand years ago. Since then, Ethiopian farmers have continued to utilize their ancient system of production despite changing ecological and population pressures. Ethiopian agriculture is increasingly failing as farmers work to expand agricultural lands at a great cost to the environment and the delicate ecological system, thereby risking the very fabric of their own livelihood. Systemic obstacles to agricultural and rural transformation in Ethiopia can be summarized as lack of sustained and intergenerational commitments to transformation, constitutional and legal constraints, government crowding out the private sector leadership, lack of mechanization options and constrained input supply system, lack of effective and accountable organizational capacity, lack of agricultural and rural financial and credit facilities and environmental degradation (Getachew, 2020).

The Ethiopian economy is mostly based on agriculture, with industry and services slightly increasing recently. Agriculture accounts for 42 percent of GDP in 2014 and about 85 percent of exports earnings in 2010 and it also employs 83 percent of the active population (MoA, 2011).

Corresponding author:* **Mekonin Abera Negeri
Department of Statistics, College of Natural and Computational Science, Wollega University, Ethiopia

Agriculture is primarily rainfed and thus highly dependent on rainfall. Smallholders dominate the sector and the land holding is increasingly fragmented. In 2015, there were 15.6 million agricultural households with an average farm size of 0.95 ha (CSA, 2015). It however benefits from a liberalized economy since the 1990s. The Ethiopian livestock is also significant with over 50 million cattle, 50 million poultry, 20 million sheep and 20 million goats in 2015.The main agricultural exports are coffee, oil seeds, cereals, cotton, sugarcane, khat, spices, natural gum, incense and cut flowers among others (CSA, 2015).

However, non-farm activities have become an important component of livelihood strategies among rural households in most developing countries including Ethiopia. Agricultural households expand the sources of their income due to pull and push factors. A common pull factor is that a non-agricultural activity generates extra income whereas push factor is to minimize risks and cope with shocks. Both types of income diversification influence the well-being of rural households. Pull factors increase income and improve welfare of the households, while the push factors are expected to reduce poverty levels of the households (Nega *et al*., 2009).

In the context of this current study, non-farm income is defined as income obtained by smallholder farmers from

manufacturing, mining, marketing, construction, handcraft and credit except agriculture, livestock and honey production. This definition holds true regardless of the location (rural or urban) and function classification such as wage activity or self-activity (Barrett *et al*., 2001and Hoggblade *et al*., 1989). Households in many parts of Ethiopia had been traditionally involved in a variety of non-farm activities such as iron melting, tanning hides and skins and weaving clothes all contributing to being crucial for household livelihoods (Pankhurt, 2002). Previous studies on non-farm/off-farm activities in Ethiopia (Amogne *et al*., 2017; Fassil and Elias, 2016; Abdulaziz *et al*., 2017) show that the sector was influenced by so many factors. According to Amogne *et al*. (2017), the major constraints which hindered farmers from undertaking non-farm activities in North central Ethiopia include limited access to adequate capital, poor infrastructure and lack of training.

Fassil and Elias (2016) investigated factors influencing off-farm activities and they concluded that age, education, access to infrastructure, livestock ownerships, credits uses, and farmincome are the main determinants of households' participation in off farm activities in Southern Ethiopia (GamoGofa zone). Their finding further examined that off-farm participation rate was 76% while off farm income accounts for 51% of the total household income in GamoGofa zone. Abdulaziz *et al*. (2017) examined that the determinants of rural non-agricultural activities include lack of access to agricultural land, low/volatile earnings and social/economic independence. Majorly, lack of market opportunities, limited access to credit, poor access to road and lack of education were most prominent.

Although Ethiopian households are widely practicing in non-farm income generating activities, the majority of earlier studies were conducted based on household surveys with limited coverage that hardly represent the whole country. Furthermore, the importance of non-agricultural activities in Ethiopia is not properly recognized and is rarely supported by the government. Evidence based policy intervention for promoting non-agricultural activities in Ethiopia requires studying the existing features and prospective of the sector. Due to the foregoing, this study was carried out to investigate the factors influencing participation in non-farmwork among small-scale sesame farmers in East Wollega zone. The findings of the study are expected to guide policymakers onmeasures to improve rural households' incomes and livelihood security.

MATERIALS AND METHODS

The study area, sampling and variables of the study

The study was carried out in East Wollega zone of Oromiya National Regional State. This zone comprises of 17 districts where the agriculture is the basis of livelihood of smallholder farmers. East Wollega zone is characterized by three major agro ecologies include highland, midland and lowland. The study used primary data source and respondents were selected by multistage random sampling procedure where at the first stage, three wored as were randomly selected. At the second state, two kebeles from each selected wored as were again randomly selected. At the third stage, sesame farmers were selected by simple random sampling from each kebeles.

Sample size determination formula for proportions proposed by Cochran (1977) was used and adopted as follows:

$$n_0 = \frac{pq(Z\alpha_{/2})^2}{d^2} = \frac{(0.50*0.50)(1.96)^2}{(0.06)^2} = 266.7 \approx 267 \quad 1$$

Based on the principle of geometric growth model, the projected total households of the selected kebeles was sum to 8,317 households. Hence, it can be seen that $\frac{n_0}{N}$, that is $\frac{267}{8317} = 0.032$ is less than 5 percent. So the calculated sample size is satisfactory approximation of n. In this regard, $p$is set proxy to proportion of households engaged in non-farm activities, $q = 1 - p, Z_{\frac{\alpha}{2}}$ is the value of standard normal distribution, $d$is margin of error, $n$is the required sample size and $N = 8{,}317$.

The data collected included household, farm, and socioeconomic, demographic and institutional factorsand those variables are defined in Table 1. Information on income from both farm and non-farm activities was collected.

Table 1 Definition of selected variables of the study

Dependent variables	**Definition**
Decision to Participate in non-farm activities	A dummy variable coded as 1 = yes and 0 = no
Explanatory Variables	**Definition**
Sex of household head (X_1)	A dummy variable coded as 1 if male and 0 if not
Age of household head(X_2)	A continuous variable measured in years
Education status of household head(X_3)	A continuous variable representing year of schooling
Household size(X_4)	A continuous variable measured in number
Land size of household head(X_5)	A continuous variable measured in hectare
Number of Oxen(X_6)	A continuous variable measured in number
Access to credit(X_7)	A dummy variable coded as 1 = yes and = no
Access to extension service(X_8)	A dummy variable coded as 1 = yes and 0 = no
Distance from extension service(X_9)	A continuous variable measured in minute
Distance from the nearest market(X_{10})	A continuous variable measured in minute
Access to market information(X_{11})	A dummy variable coded as 1 = yes and 0 = no
Sesame yield per hectare(X_{12})	A continuous variable measured in hectare
Using fertilizer(X_{13})	A dummy variable coded as 1 = yes and 0 = no

Probit Model of Determinants of participation in Non-Farm Activities

The leading step in the implementation of this model relates to the decision or willingness to participate in non-farm activities. This binary decision can be modeled as an index function using a probit model as follows:

$$Z_i^* = \omega_i^{'}\alpha + \varepsilon_i, \text{ where, } Z_i = \begin{cases} 1, & if Z^* > 0 \\ 0, & if Z^* \leq 0 \end{cases} 2$$

Where,Z_i^* is a continuous real-valued index variable for observation i, that is unobserved (latent), $Z_i$is a dichotomous variable which takes a value of 1 if the household is participating in non-farm activities and 0 elsewhere, $\omega$is a vector of explanatory variables, αdenotes a vector of parameters and $\varepsilon$is the error term. The empirical model for sesame farmers' decision to participate in non-farm activity is specified for this study as follows:

$$Z_i = \alpha + \alpha_1 X_1 + \alpha_2 X_2 + \cdots + \alpha_{13} X_{13} + \varepsilon_i 3$$

Where, $Z_i$measure the choices of the i^{th}sesame farmers to participate in non-farm activities, $\alpha_i's(\alpha_1 + \alpha_2 + \alpha_3 + \cdots +$

α_{13}) are parameters to be estimated by maximum likelihood method, $X_i's(X_1 + X_2 + X_3 + \cdots + X_{13})$ are explanatory variables defined in Table 1 above and $\varepsilon_i$is the error term.

In the functional form of the Probit model, we assume the model takes the form$Pr\left(Y = \frac{1}{X}\right) = \Phi(X_i'\alpha)$, Φis the cumulative distribution function (CDF) of standard normal distribution.

The parameters $\alpha's$are typically estimated by the maximum likelihood technique which for the current study adopted as:

$L(\alpha) = \prod_{i=1}^{n}[\Phi(x_i'\alpha)]^{y_i}[1 - \Phi(x_i'\alpha)]^{1-y_i}4$

The log likelihood is obtained by taking the log of both sides of Equation 4.

$ln\, L(\alpha) = \sum_{i=1}^{n}\{y_i \ln[\Phi(x_i'\alpha)] + (1 - y_i)\ln\,[1 - \Phi(x_i'\alpha)]\}5$

Because of the symmetry of the normal density, $1 - \Phi(x_i'\alpha)$can be expressed ad $\Phi(-x_i'\alpha)$. Hence, the log likelihood function will have the form:

$ln\, L(\alpha) = \sum_{i=1}^{n}\{y_i \ln[\Phi(x_i'\alpha)] + (1 - y_i)\ln\,[\Phi(-x_i'\alpha)]\}6$

This log-likelihood function is globally concave in β and standard numerical algorithms for optimization will converge to the unique maximum.

In the Probit model, the magnitude cannot be interpreted using the coefficient because different models have different scales of coefficients. Hence, the marginal effect is used instead to interpret the model and defined as:

$\frac{\partial Pr\,(y=1)}{\partial x_j} = \Phi(x'\alpha)\alpha_j 7$

The marginal effects reflect the change in the probability of $y = 1$ given a unit change in an independent variable, keeping other covariates fixed. Coefficients and marginal effects of the Probit model have the same sign.

RESULTS AND DISCUSSION

Descriptive results

General Characteristics of Sesame farmers

The descriptive result showed that 187 (70.04%) of the sampled respondents were not engaged in non-farm income generating activities while the remaining 80 (29.96%) involved in the sector. The summary statistics given in Table 2 show that majority of the respondents were male headed households (224 or 83.90%) and the remaining were female headed households. Even though education is the basic tool to improve one's livelihood, large proportion (130 or 48.69%) of the sampled respondents had no formal education while 112 (41.95%) attended primary education. Financial access such as access to credit is not well experienced as 164 (61.42%) of them did not have this financial access. The mean age of the respondents was found to be 40 years with average family size of 6 members. The average farm land holding per household was 1.6 hectare while on average an individual household owned three Oxen. Other information of the respondents could be seen from Table 2 given below and interpreted in the same manner.

Table 2 Characteristics of respondents

Variable	Item	Freq.	Percent
Decision to participate in non-farm activities	Yes	80	29.96
	No	187	70.04
Sex of household head	Male	224	83.90
	Female	43	16.10
Education of household head	No formal education	130	48.69
	Primary	112	41.95
	Secondary and above	25	9.36
Access to credit	Yes	103	38.58
	No	164	61.42
Access to extension service	Yes	171	64.04
	No	96	35.96
Access to information	Yes	246	92.13
	No	21	7.87
Use of fertilizer	Yes	168	62.92
	No	99	37.08

Variables	N	Mean	Std. dev.	Min	Max
Age of household head (Year)	267	40.30	9.92	19	80
Family size	267	5.53	2.20	1	14
Land holding size (Hectare)	267	1.60	0.86	0.25	4.5
Number of Oxen	267	2.90	1.46	0	6
Distance from extension service (Minute)	267	55.10	30.41	5	120
Distance from nearest market (Minute)	267	52.73	32.62	10	130
Yield of sesame per hectare (Quintal)	267	5.20	1.77	3	10

Source: Author computation (2020)

Econometric result

Determinats of decision to participate in non-farm activities

As discussed in the methodology part, probit model was applied to detect basic determianants of decision to participate in non-farm income generating activities. This model uses maximum likelihood estimation techniquue for parameter estimation. The marginal effect which quantifies the effect of a unit change in the explanatory variable on the dependent variable is computed by the STATA13 command *'mfx'*. The model is well fitted and has strong explanatory power as indicated by $(LR\chi^2(13) = 129.25;\ Prob > \chi^2 = 0.000)$. Thirteen variables are entered as explanatory variables in the econometric model and six of them were found to be statistically significant. The coefficients and marginal effects of the Probit model are given in Table 3 and possible discussion and interpretations of these variables are as follows.

Age of household head positively and significantly influenced households' decision to participate in non-farm income generating activities. The result of the marginal effect shows that, other variables being constant, the probability of participating in non-farm activity increases by 0.90% as the age of household increases by one year. The older the head, the higher is the possibility to participate in non-agricultural activities. The implication of this result could be due to the fact that older people have more experience in searching of non-farm income generating work as they cannot be committed to stay in farming during retirement and are more enthusiastic to engage in non-agricultural activities. On the other hand younger heads of households usually possess more effort compared to the older household heads and desire to stay in farming. This result is contradictory with Abdulaziz (2019) who justified negative influence of age on the participation of households in non-agricultural activities in Ethiopia.

Education of household head positively and significantly influenced households' decision to engage in non-farm income

generating activities. The result of the marginal effect shows that, other variables being constant, the probability of engaging in non-farm activity increases by 12.6% for literate households over that of illiterate households. The implication of this result is that literate households appreciate the importance of non-farm activity to increase household income and are more likely to engage in different non-farm activities than illiterate households. This result is in line with the result by Raphael and Matin (2009) who examined that households who are disadvantaged in terms of education are constrained in their ability to participate in more lucrative off-farm activities.

Family size positively and significantly influenced households' decision to involve in non-farm income generating activities. Marginal effect of this variable further depicted that as family size of household increases by one person, the probability of involving in non-farm activities increases by 4.6% other variables being constant. This result is consistent with Musa and Kumilachew (2018) who justified that large family size increases the households' participation in off-farm works since a larger family size requires relatively higher marginal income. Hence, households with large family size would have abundant labor and send some of the family members to off-farm activities.

Number of Oxen owned is another important positive and significant determinant of households' participation in non-farm activities and accordingly the marginal effect of this variable conveyed that as number of Oxen owned by the household increase by one, the probability of households' decision to participate in non-farm income generating activities increases by 12.4% keeping the effect other variables constant. This result is contradictory to the result by Getachew (2012) who found that income share of rural non-farm sector is higher for households owning less number of Oxen. This is because Ox is an important factor of cropproduction and is sometimes considered as 'capital' together with its plough complements.

Distance to extension service is found to be positive and significant determinant of households' decision to participate in non-farm income generating activities. The marginal effect of this factor depicted that as distance from extension service increases by one minute, the probability of households' decision to engage in non-farm activities increases by 0.6% being other variables constant. The focus of extension agents is usually on the mechanization of farm activities rather than non-farm involvement. Therefore, if the distance from this service increases, households are less likely to contact extension agents which in turn decrease the influence of those agents on households to engage in farming activities. Households can freely involve in non-farm income generating activities if there is no external influence to give more attention to agricultural farm.

Distance to the nearest market negatively and significantly affected households' decision to engage in non-farm income generating activities. Distance to the market center is integrated in the model by considering the walking time spent to arrive at the nearest major market center that is calculated in minutes. It is incorporated to capture the impact of access to market for non-farm activities. The marginal effect of this variable further showed that as the distance from the nearest market increase by one minute, the probability of households' decision to engage in non-farm income generating activities decrease by 0.5% keeping the effect of other variables constant. This outcome is consistent with Abdulaziz *et al*. (2019) who examine the negative effect of distance to major market on the participation of non-agricultural activities.

Use of fertilizer positively and significantly influenced households' decision to participate in non-farm income generating activities. The result of marginal effect further revealed that the probability of households' decision to participate in non-farm activities increases by 16.3% for the household who uses fertilizer for the production than that of the household who do not use fertilizer. Nowadays, agricultural farm lands become infertility in many areas due to natural and man-made factors and farmers are forced to apply fertilizers on farm land. Also there is difficulty of purchasing fertilizers because of seasonal economic fluctuations especially during crop season. If the use of fertilizer is the only option in such circumstances, households are more likely to engage in non-farm income generating activities as a source of their livelihood.

Table 3 Coefficients and marginal effects of probit mpdel

Variables	Coef.	Std. Err	Z	P	dydx
Sex of household head (1 = Male)	0.19	0.27	0.69	0.489	0.073
Age of household head (Year)	0.02	0.01	1.89	0.059	0.009
Education of household head (1 = literate)	0.33	0.13	2.44	0.015	0.126
Fanily size	0.12	0.07	1.65	0.099	0.046
Land holding size (Hectare)	-0.04	0.05	-0.86	0.392	-0.016
Number of Oxen owned	0.32	0.08	3.78	0.000	0.124
Access to credit (1 = Yes)	-0.19	0.22	-0.87	0.382	-0.075
Access to extension service (1 = Yes)	-0.21	0.21	-0.97	0.330	-0.081
Distance to extension service (Minute)	0.02	0.01	4.23	0.000	0.006
Distance to the nearest market (Minute)	-0.01	0.01	-4.41	0.000	-0.005
Access to information (1 = Yes)	-0.21	0.40	-0.53	0.598	-0.083
Use of fertilizer (1 = Yes)	0.42	0.21	2.01	0.044	0.163
Yield of sesame per hectare (Quintal)	-0.09	0.06	-1.62	0.105	-0.036
Constant	-0.83	1.06	-0.79	0.431	
N = 267, LR $\chi^2(13) = 129.25, P > \chi^2 = 0.000$, Psedu R^2 =..3511 Log Likelihood = -119.45 Significance levels: 1, 5 and 10%					

Source: Author computation (2020)

Conclusion and Recommendation

CONCLUSION

The core objective of this study was to assess determinants of households' decision to participate in non-farm income generating activities based on the information collected from smallholder sesame farmers. The result revealed that only 29.96% of the sampled households were engaged in non-farm activities. The non-farm activities are performed as a complement to agriculture on part time or during the agricultural off-seasons and they include handcraft selling, trading and small construction in rural areas. Rural households engage in non-farm activities due to lack of agricultural land, low earnings and for obtaining additional income to invest in agriculture. The econometric result revealed that aged people have more experience in searching of non-farm income generating work as they cannot be committed to stay in farming during retirement and are more enthusiastic to engage in non-agricultural activities. Literate households are more likely to participate in non-farm activities than their illiterate counterpart. Households with large family size would have abundant labor and send some of the family members to off-farm activities as they relatively need more marginal income. As distance from extension service increases, the participation

of households in non-farm activities also increases while the increase in the nearest market decrease households' participation in non-farm activities. Household who use fertilizer are more likely to involve in non-farm activities than those households who do not use fertilizer for sesame production due to difficulty in purchasing power.

Recommendations

Based on the findings of this study three policy recommendations were drawn:

Firstly, farm income alone might not fulfill all basic livelihoods of sesame farmers. Hence, households should be able to diversify the source of their income by giving attention to non-farm income generating activities.

Secondly, extension agents should increase the awareness of sesame farmers by scheduling necessary training inclusively in rural settings how they can deal with generating non-farm income during agricultural off-season.

Thirdly, Agricultural policy makers and experts should give priority to significant variables identified by this study and take necessary action to diversify source of income which improve livelihood and wellbeing of those farmers.

References

AbdulazizMosa, Khalid Siddig and HaraldGrethe.2019. Opportunities and determinants of rural non-agricultural activities in Ethiopia. *Journal of Development and Agricultural Economics,* 11(11), pp. 265-271

AmogneAsfaw, Belay Simane, Ali Hassen & AmareBantider. 2017. Determinants of non-farm livelihood diversification: evidence from rainfed-dependent small holderfarmers in northcentral Ethiopia (*Woleka* sub-basin), Development Studies Research, 4:1, 22-36.

Barrett CB, Reardon T, and Webb P. 2001. Nonfarm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics and Policy Implications. Food Policy 26(4):315-331.

CSA [Central Statistical Agency].2015.*Key findings of the 2014/2015 (2007 E.C.) Agricultural sample surveys*. Central Statistical Agency. Addis Ababa

FassilEshetu and Elias Mekonnen. 2016. Determinants of off farm income diversification and itseffect on rural household poverty in Gamo Gofa Zone, Southern Ethiopia. *Journal of Development and Agricultural Economics*, 8(10), pp. 215-227

GetachewDiriba. 2020. Agricultural and Rural Transformation in Ethiopia Policy Working Paper 01/2020, Addis Ababa, Ethiopia.

GetachewYirga. 2012. Rural nonfarm sector and poverty: evidence from some villages of amhara region, ethiopia. *Ethiopian Journal of Economics, Vol XXI No 2.*

Haggblade S, Hazell P, Brown J. 1989. Farm-Nonfarm Linkages in Rural Sub-Saharan Africa. World Development 17(8):1173-1201.

MoA [Ministry of Agriculture]. 2011. *Small-scale irrigation situation analysis and capacity needs assessment.* Ministry of Agriculture.

Musa Hasen Ahmed and Kumilachew Alamerie Melesse. 2018. Impact of off-farm activities on technical efficiency: evidence from maize producers of eastern Ethiopia. *Agricultural and Food Economics, 6:3*

Nega F, Marysse S, Tollens E, Mathijs E. 2009. Diversification, Income Inequality and Social Capital in Northern Ethiopia, Paper Delivered at the „Taking Action for the World‟s Poor and Hungry People‟‟‟ Conference.‟ Beijing.

Pankhurst A. 2002. Indigenous Knowledge Systems in Craftwork: The Case of Iron Smelting, Tanning and Weaving in Ethiopia, Paper Presented at Indigenous Knowledge Systems in Ethiopia National Workshop. Addis Ababa.

Raphael O. Babatunde, and Matin Qaim. 2009. The role of off-farm income diversification in rural Nigeria: Driving forces and household access.

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