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**ANALYZE DETERMINANTS OF INCOME DIVERSIFICATION AND ITS EFFECT OF  
FOOD SECURITY STATUS ON SMALL HOLDER FARMERS IN THE CASE OF  
ETHIOPIA**

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**ABSTRACT**

*In Ethiopia 83 percent of small-holder farmers participated in farming activities and only 27 percent in non-farm economic enterprises. This paper examines the determinants of income diversification and its effect on food security in Ethiopia. The study used two stages sampling in combination with stratified and simple random sampling procedures to select kebeles and households. Fractional response model were employed to analyze the data collected from a sample of 450 rural households. While the Simpson index of diversity were used to measure the extent of income diversification. Income diversification level has positive and significant effect on food security status of the rural farming households in Ethiopia. The level and type of income diversification depends on the accessibility and availability of different income sources. The mean results of degree of income diversification revealed that Simpson Index of Diversity (SID = 0.24) by rural households in the study area. Based fractional response model educational status, credit utilization, distance from market and access to electric power affect at  $p < 0.01$  percent probability level, sex of the household head affect at  $p < 0.05$  percent probability level and, annual household income, special skill and family size significantly affecting degree of income diversification at  $p < 0.1$  percent probability level. Finally, this thesis indicates the important policy implications suggesting that programs, projects and/or any interventions designed targeting to engage people in other income generating activities would augment their income sources which are made to increase the food security status at household level in Ethiopia. To reduce food insecurity, government policies would better aim at increasing access to non-farm activities for all rural households, particularly for households with little human resources, land and monetary assets (opportunities) and decreasing the constraints those hinders the rural households from participating in non-farm activities.*

**Keywords: Income diversification, food security index, fractional response regression**

## **Introduction**

Agriculture in Ethiopia is the basic economic sector on which the country relies for its social and economic development. Its contribution to the gross domestic product (GDP), employment, and foreign exchange earnings of the country is about 35.8, 72.7 and 90 percent, respectively, makes it the incontestable sector in the country's development prospect (CIA, 2018). Despite its importance, the production and productivity of the sector still remains very low as of the traditional, subsistence and nature dependent nature of its production systems. As a result, Ethiopia fails to feed relatively large proportion of its population from domestic production. And more importantly, the populations do not have the productive capacity to earn ability to commend its additional food requirements through commercial imports. The proportion of population undernourished was 64 percent in 1995 and improved progressively to 40 percent after 15 years in 2010 (FAO, 2013). However, the prevalence of undernourishment still remains as such a high level that effort for future improvement is required.

Due to this fact that in most countries farm households that are highly reliant on non- farm income can have good implications if they are thoroughly considered by agricultural research and extension systems of the country. As they are expected to reinvest their non- farm profit back into their farm production would improve farm productivity and household food security. Agricultural production becomes low due to crop or livestock failures resulting from agro - climatic shocks and/or market failures, farm households utilize non- farm incomes to stabilize aggregate income flows and secure food access. This implies that non-farm income cannot only be used as a mechanism to stabilize the household income but also reduces early harvest consumption or distress selling at early harvest time.

The general objective of the study is to analyze determinants of income diversification and its effect on food security status of small holder farmers in Ethiopia. Specifically to identify the major factors affecting degree of income diversification of smallholder farmers and to analyze the effect of income diversification on food security of rural households

## **Material and Methods**

Due to limited resources of finance, labour and time, it is mandatory to take a sample but need to worry about its representatives of the population under study. A total sample of 450 rural households was chosen randomly from small -holder farmers.

The study used two stages sampling in combination with stratified and simple random sampling procedures to select kebeles and households. Fractional response model were employed to analyze the data collected from a sample of 450 rural households. Fractional response regression probit model was employed to answer the question “what are the factors that determine the level of income diversification among the farm households.” While the Simpson index of diversity were used to measure the extent of income diversification.

## Results and Discussion Determinants of income diversification

Table 1: Fractional response probit model results on income diversification

Predictor variables	dy/dx	Coefficient	Robust std. Err	Z- value	P> z
<b>MALEHEAD</b>	0.0428	0.129**	0.057	2.25	0.024
<b>AGE</b>	0.0001	0.000	0.002	0.15	0.877
<b>FAMSIZ</b>	0.0091	0.027	0.015	1.83	0.068
<b>EDU</b>	0.0875	0.265***	0.075	3.5	0.000
<b>DEPR</b>	- 0.0071	-0.021	0.033	-0.64	0.523
<b>REMITA</b>	0.0325	0.098	0.066	1.48	0.139
<b>SKILL</b>	0.0441	0.132	0.073	1.8	0.072
<b>FARMSIZ</b>	- 0.0091	-0.004	0.015	-0.32	0.747
<b>CREDITU</b>	0.0903	0.274***	0.086	3.16	0.002
<b>LIVESTOCK</b>	-0.0011	-0.003	0.002	-1.51	0.132
<b>DAM</b>	-0.1177	-0.357***	0.046	-7.73	0.000
<b>ACCEP</b>	0.0659	0.199***	0.064	3.09	0.002
<b>Log INCOME</b>	0.0231	0.085**	0.046	1.85	0.065
<b>ATTRA</b>	0.0092	0.028	0.079	0.36	0.722
<b>CONSTANT</b>	-	-1.444	0.515	-2.8	0.005

\*\*\* and \*\* indicates statically significant at 1 and 5 respectively

**Male headed households:** Sex of household head affects diversification sources, including the choice of income-generating activities (both farm and non-farm) due to culturally defined roles, social mobility limitations and differential ownership of/access to assets. From the result male headship has a positive and significant effect on income diversification at 5 percent probability level. Thus, keeping other thing remain constant; the level of diversification increase by 4.28 percent when the household head is male (male headed households).

**Educational status of household head:** As expected, the level of education is significant at 1 percent probability level, and has a positive relationship with the level of income diversification index. This implies as the level of education (years of schooling) of the household increases by one year, the level of income diversification index increases by 8.75 percent, ceteris paribus.

**Credit utilization:** Access to credit affect the level of income diversification of household's positively and significant at 1 percent level of significance. This means credit utilization by household would increase income diversification level by 9.03 percent.

**Distance from market:** As hypothesized, distance from the market was significantly and negatively related to level of income diversification index into the combination non-farm and farm income generating activities at 1 percent probability level. This implies that farther the household from market centre lower the degree of income diversification. If the other factors remain constant, the marginal effect of farm household's level of income diversification decreases by 11.8 percent as household's residence increase from *woreda* weather market centres by one hour.

**Access to electric power supply (Access to EPs):** access to electric power supply has a positive significant at 1 percent probability level influence on Simpson diversification index. The marginal effect of electric power access was found to be 0.0659. This implies, *ceteris paribus*, if household have electric power supply access Simpson diversity index is increased by 6.5 percent.

**Annual household income:** This variable was found to have positive and significant influence on the level of income diversification into non- farm activities at 5 percent probability level. From the model result, other things being constant, marginal effect reveals that if the household income is increase by one percent level of income diversification increased by 2.3 percent.

### **Effect of income diversification on food security status**

The results presented there is significant relationship between level of income diversification and food security status of the households. This variable affects food security status positively and significantly at 5 percent probability level. The odds ratio obtained for the diversification index was 1.2324. The positive sign of the coefficient indicates that when diversification index increase by one unit, the probability of a household to become food secure, *ceteris paribus*, increase by a factor of 1.2324. This implied that as income diversification increases, food security status of the respondents also increases. Income diversification has been reported to cause a significant increase in total household income, which would, in turn, increase household food security status.

This implies that that additional non-farm employment has a significant role in maintaining household food security. This result is similar to that of Agboola *et al.* (2008) who found that food security among farming households was influenced by income diversification strategies.

This is because 61% of individuals that derived their livelihood from a combination of crop production and off farm activities were food secured.

The result of the study implied that diversification index has a role which is significant in maintaining household food security. This result is similar to Fassil Eshetu and Elias Mekonnen (2016) the regression result showed that, participation in off farm activities (livelihood diversification) diminishes the probability of being poor of rural farm households. Most of rural households depend on agricultural production which is heavily affected by vagaries of nature and this motivates rural farm households to diversify their livelihood strategies and manage any risk associated with low agricultural production. The coefficient of off-farm participation showed that the probability of being poor of households participating in off farm activities is lower than that of households with no off farm activities by 7.5% and this is also statically significant. Similarly, Degefa Tolossa (2005); Bereket Zerai and Zenebe Gebreegziabher (2011); Bassie Yizengaw (2014). As a result they conclude that participation in to non -farm activities has apposite effect to improve the food security status of small holder farmers. Based on the findings of this study, the hypothesis which states that level of income diversification has positive effect on food security status of the farmers is satisfy because income diversification has positive effect on food security status of the farmers is accepted.

## **Conclusions and Outlook**

Agricultural production has been declining from time to time due to frequent land fragmentation, uncontrolled population growth and recurrent drought, and this has forced people to look for alternative income options other than agriculture. A number of rural households engage in diverse income generating activities away from purely crop and livestock production. Agricultural sector alone cannot be relied upon as the main activity for rural households as a means of improving livelihood, achieving food security and reducing poverty in Ethiopia. This study attempts to investigate the determinants of income diversification and its effect on food security status using the survey data collected from 450 randomly selected households from Ethiopia.

## **Recommendation**

- ✓ To increasing the extent of income diversification, government should continue its efforts to generate income earning opportunities in the rural areas and support the farmers to

enhance agricultural productivity through supportive policies including input utilization and creating market for their product.

- ✓ To reduce food insecurity, government policies would better aim at increasing access to non-farm activities for all rural households, particularly for households with little human resources, land and monetary assets (opportunities) and decreasing the constraints those hinders the rural households from participating in non- farm activities.
- ✓ Government and other responsible bodies design necessary strategies so as to create awareness among the community to participate women equally with man in all development activities.
- ✓ Government policy should pay more attention on infrastructure to reduce the entry barriers and facilitate easier access to non-farm activities.
- ✓ The concerned body has to work more to increase the access to education in the study area in order to explore the existing opportunity of income diversification via non-farm activities.
- ✓ The international NGOs, local organizations, private sector and government should continue to work together on strengthening the livelihoods, rural market structures and providing the climate resilience services that improve the ability of poor households to cope with shocks.

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