Innovations

The Nexus between Non-Farm Employments and Multidimensional Poverty in Rural Ethiopia: Micro-Panel Data Analysis

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Abstract

The major objective of this study is to analyze the linkage between non-farm employment and multidimensional poverty in rural Ethiopia using balanced panel data from ESS2013/14 and 2015/16. The study employed Alkire and Foster poverty model and probit regression model. Ten indicators of multidimensional poverty are categorized in three dimensions of multidimensional poverty. Results reveal that the incidence of multidimensional poverty among the rural households of Ethiopia is reducing from 94.9percent in 2013/14 to 92.5% in 2015/16,and average deprivations of indicators and the adjusted multidimensional poverty reduced from 50.2% and 49.5%in 2013/14 to 49.7% and 47.4% in 2015/16 respectively. From the three dimensions, standard of living was the highest contributor to the multidimensional poverty index of rural Ethiopia with share of 43.8 percent followed by health dimension at 34.2 percent. On the other hand, the percentage of rural households' that engaged In non-farm employment increase from 28.9% in 2013/14 to 31.3% in 2015/16. The result of the probit regression shows that non-farm employment has a significant effect on multidimensional poverty status. Non-farm employment activities reduce the likelihood of the rural household being multidimensional poor on average by 0.032.It is recommended that the government should implement policies that promote non-farm employment, and increase credit access for rural households.

Key words: *1.Non-farm employment, 2.Multidimensional poverty, 3.Probit model, 4.Rural Ethiopia*

Introduction

Half of the world's 736 million extremely poor people lived in just 5 countries in India, Nigeria, Democratic Republic of Congo, Ethiopia, and Bangladesh. 1.5 billion People are multi-dimensionally poor in 91 developing countries, and, in total, 2.2 billion people are estimated to live in multidimensional poverty or near-poverty. Sankof et al., (2005) shows that 85% of the world's poor live in South Asia and Sub-Saharan Africa. Church (2001) 1.2 billion people have an income of $1.25 or less a day.

According to the recent household consumption expenditure survey report, between 2010/11 and 2015/16 about 5.3 million people are lifted out of poverty in Ethiopia. Poverty gap and poverty severity indices have respectively declined from 10.1 percent and 3.9 percent in 2000 to 3.7 percent and 1.4 percent in 2016 respectively. Nonetheless, poverty is still a challenge in Ethiopia as over 22 million people are living below the national poverty line. Poverty is predominantly rural phenomenon in Ethiopia. While urban headcount poverty declined from 36.9 percent in 2000 to 14.8 percent in 2016, rural poverty only declined from 45.4 percent to 25.6 percent in the same period(UNDP Ethiopia, 2018).

Poverty is still challenging in Ethiopia, over 22 million people are living below the national poverty line. The 2015/16 HICE survey shows that the poverty head count index, which measures the proportion of population below the poverty line in Ethiopia, is estimated to be 23.5% in 2015/16, with marked differences between urban (14.8%) and rural (25.6%) of the country. Multidimensional poverty is high in Ethiopia. Over 86% of Ethiopian households are multi-dimensionally poor (PDC, 2018; UNDP Ethiopia, 2018; World Bank Group, 2015)

Therefore this needs a query for means to escape from poverty. Engagement on rural non-farm activity could reduce poverty in rural Ethiopia. According to(Wan et al., 2016).Today, nonfarm activities become an essential part of the livelihood strategies of rural households, especially in developing countries(Iravani et al., 2019).Rural non-farm economic activities are getting wide spread recognition in most of the developing countries (Parveen & Cheema, 2018). Non-farm income contributes to higher food production and farm income by easing capital constraints, thus improving household welfare in multiple ways(Adewuy et al., 2014; O. et al., 2019). So, greater non-farm income helps to improving food consumption patterns and dietary diversity(Rahman & Mishra, 2020). It is the most important income source of middle income farms (Haggblade, 2010; Buchenriede,(2011; Iqbal, 2018, and Escobar, 2002). The other argues that without non-farm employment, rural poverty would be much higher and deeper. Participation in non-farm activities has a positive spillover effect on household farm production (Janvry, 2005).

Non-farm employment provides additional income that enables farmers to spend more on their basic needs include: food, education, closing and health care (Ana Damena, 2017). And it exert positive effects on household food consumption and nutrition (Seng, 2015). It contributes to higher food production and farm income by easing capital constraints, thus improving household welfare in multiple ways (Qaim, 2010). So, greater non-farm income helps to improving food consumption patterns and dietary diversity (Mishra, 2017). If the household participate in non-farm employment the prevalence of child stunting, underweight, and wasting is lower, and it can open an opportunity to provide for enhanced child's long-term nutritional status. Similarly Samuel and et.al (2018) emphasizes that households that participate in non-farm economic activity earns higher income and expend more on health care. On the other hand, non- farm employment affect multidimensional poverty by affecting expenditure on education and standard of living. RNFE affect the standard of living through the total income and purchased goods hat improve housing quality.

(Bezabihet.al.,2010;Woinishet,2010;Zerihun,2016;Berhane,2015;Kassieet.al.,2017;Mekore,2018 & Kowalski,2016).

Previous Studies regarding the effect of RNFE on poverty focused on the uni dimensional approach. And the result shows that rural non-farm has a positive spillover effect on household farm production, a potential pathway out of poverty for rural poor households, positive effects of non-farm employment on rural livelihood and supports poverty reduction(Devkota & Upadhyay, 2013; Iqbal et al., 2018; Obama, 2008; Ousseini et al., 2014; Peter, 2007; Rizzo, 2011). Even though there are different studies that show the effects of non-farm employment on the reduction of poverty in money measures, there is no studies conducted that show the effects of non-farm employment on multidimensional poverty in rural Ethiopia. Monetary and multidimensional poverty are distinct constructs that are linked, but cannot serve as a proxy for one another. Even if almost all the above studies show that non-farm employments have negative effect on the monetary measure of poverty, it does not mean that non-farm employments also affect multidimensional poverty negatively. So the current study was tried to fill the gap by examining the linkage of non-farm employments on multidimensional poverty in rural Ethiopia.

Therefore,this study analyzed the linkage of non-farm employment and multidimensional poverty by using 2013/14 and 2015/16 Ethiopian socio-economic survey data and micropanel data was applied.

Material and methods

Data type and sources

This study employed dataset from CSA-World Bank-Ethiopian rural Socioeconomic Survey (ERSS-2013/14 and 2015/16).The Ethiopia Rural Socioeconomic Survey (ERSS) is being implemented by the Central Statistical Agency (CSA) and the World Bank Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA).

ESS data is a panel data which began as ERSS (Ethiopia Rural Socioeconomic Survey) in 2011/12. ESS1 will refer to the first wave of the ESS carried out in 2011/122; ESS2 will refer to the second wave of the ESS carried out in 2013/14 and ESS3 will refer to the third wave of the ESS carried out in 2015/2016. ESS1, ESS2, and ESS3 together create a panel data set of households from rural and small town areas (i.e. the same households that were interviewed in ESS1 were tracked and re-interviewed in ESS2 and ESS3).

Accordingly, the number of enumeration areas (EAs) covered by the survey increased from 333 (or 3,776 households) to 433 (or 5,262 households). ESS2 and ESS3 together represent a panel of households and individuals for rural and all urban areas. ESS2 and ESS3 covered all regional states including the capital, Addis Ababa. The majority of the sample comprises rural areas as it was carried over from ESS1.The ESS2 and ESS3 were implemented in 433 enumeration areas (EAs) out of which, 290 were rural, 43 were small town EAs from ESS1, and 100 were EAs from major urban areas. Hence the research focused on the effect of non-farm employment on multidimensional poverty in rural Ethiopia, the rural data from the household questionnaire were used.

Multidimensional Measures of Poverty

Income or consumption expenditure is traditionally uni-dimensional measure of poverty. In the uni-dimensional analysis, a basket of goods and services considered the minimum requirement to live a non-impoverished life is valued at the current prices. People who do not have an income sufficient to cover that basket are deemed poor. So multi-dimensional measure of poverty is uniquely able to capture the multiple aspects that contribute to poverty(Santos, 2011)

According to UNDP (2019), the multidimensional poverty index (MPI) identifies multiple deprivations at the household and individual level in the tree dimension of poverty. These dimensions include: health, education and standard of living. The MPI have ten indicators which have the same weight in the same dimension. Education dimension have two indicators: those are school attendance and years of schooling. Health dimension have two indicators those are nutrition and child mortality. And standards of living have six indicators: these are cooking fuel, toilet (sanitation), floor, drinking water, electric and asset.

The MPI reflects both the incidence of multidimensional deprivation (a headcount of those in multidimensional poverty) and its intensity (the average deprivation score experienced by poor people). The MPI offers a valuable complement to income-based poverty measures (Alkire S. , 2016).

The MPI has the mathematical structure of one member of a family of multidimensional poverty measures proposed by Alkire and Foster (2007, 2009). This member of that family is called M0 or Adjusted Headcount Ratio. M0 is the appropriate measure to be used whenever one or more of the dimensions to be considered are of ordinal nature, meaning that their values have no cardinal meaning.M0 measures poverty in d dimensions across a population of n individuals.

M_0 Measure poverty in D dimensions across a population of individuals. Let $y = \lfloor yij \rfloor$ denote NxD matrix of achievements for i person across j dimension . The typical achievement $[yij \geq o]$ represents individual i achievement in dimensionj. Each row vector $y_i = (y_{i1}, y_{i2}, y_{i3 \ldots\ldots y_{iD}})$ gives individual i's achievements in the different dimensions, whereas each column vector.

$y_j = (y_{1j}, y_{2j}, y_{3j, \ldots\ldots y_{Nj}})$, Gives the distribution of achievements in dimension j across individuals. M_0Allow weighting each dimension differently. In fact, this is the procedure followed by the MPI, which has 'nested weights'. The element $W_j$represents the weight that is applied to dimension j. Note that$\sum_{j=1}^{D} w_j = D$, that is the dimensional weights sum to the total number of dimensions. In the case of the MPI, D =10 (Alkire S. , 2010/11).

Poverty Identification and Aggregation

$$C_i = W_1 I_1 + W_2 I_2 + W_3 i_3 \ldots\ldots + W_d I_d \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where$I_i = 1$, if the household is deprived in indicator i and $I_i = 0$ otherwise, andW_i is the weight attached to indicator $i$with $\sum_{i=1}^{d} W_i = 1$

$$H = \frac{q}{N} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$A = \frac{\sum_{i=1}^{N} C_i(k)}{q} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$MPI = H * A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where q is the number of people who are multi-dimensional poor, N is the entire population, $C_i(k)$ is the censored deprivation scores of household i.

Dimensions, indicators, deprivation cut-off and weight of MPI

Three dimensions and ten indicators of multidimensional poverty are used.We assign equal weights to each of the three dimension (education, health and living standards) which sums up to 1, implying one-third (0.33) for each and also equal weighting across indicators in a dimension(Alkire S., 2014; UNDP, 2019, & Damilola, 2019). The dimension, weight, indicators and the deprivation cutoff descused in tabel 2 bellow.

Table 1. The Dimension, Indicators and Weight of MP

Dimension	Indicator	Household deprivation cut-off	Weight
Education(1/3)	Years of schooling	No one has completed five years of education in the household; the household is deprived by years of schooling.	16.7%
	Child school attendance	At least one school-age child 7-15 years old in the household is not currently attending in school the house hold is deprived.	16.7%
Health(1/3)	Nutrition	At least one member of the household's body mass index is less than 18.5 and greater than 25 the household is deprived by nutrition.	16.7%
	Mortality	One or more of children of age under 5 have died in the last 5 years in the household the household is deprived.	16.7%
Standard of living(1/3)	Electricity	If the household have not used electricity light the household is deprived by electricity.	5.6%
	Water	If the household's safe drinking water source are not piped water, protected water source, using rainwater, or clean water source is more than 30 minutes' walk from home (roundtrip) the households deprived by clean drinking water.	5.6%
	Sanitation	If the household lack of adequate sanitation or their toilet is shared, the household is deprived by sanitation.	5.6%
	Floor	If the household's house has dirt, sand or dung floor, the household is deprived.	5.6%
	Cooking fuel	If the household use 'dirty' cooking fuel (dung, firewood or charcoal), the household is deprived by cooking fuel.	5.6%

Asset	The household does not own more than one of: radio, bed/table, kerosene lamp, kitchen utensils, jewelry, or ox cart/bicycle, or do not own all farm tools (hoe, plough, sickle or shovel/spade). refrigerator, telephone or television, the household	5.6%

Source: Alkire& Santos (2011)

The Probit Regression Model

Multi-dimensional poverty status is dummy variable, that the household is multidimensional poor if the weighted deprivation is greater than 0.33, while non- poor if the weighted deprivation of the household is less than 0.33. So, the probit model was used to estimate the effect of non-farm employment, on multi-dimensional poverty.

The probit model is expressed as:

$P(Y = {}^{1}/_{X}) = \Phi(X\beta + \varepsilon)$…… (5)

Where Y = multidimensional poverty status, and X is factors that affect multidimensional poverty.

Results and Discussions

This section contains both the descriptive and inferential statistics analysis. In the descriptive section, the incidence and intensity of multidimensional poverty and the relationship of non-farm employment with overall multidimensional poverty and its indicators in rural Ethiopia are described. cross tabulation of multidimensionally poor rural household and quintile of aggregate consumption as weill as decompositions of multidimensional poverty index of rural Ethiopia by sub-group were discrived.

Descriptive Statistics

Table 2 presents the descriptive statistics of selected variables at rural household level. 23.6% and 23.2% of the rural household head were female in 2013/14 and in 2015/16 respectively. This implies that female headed reduce by 0.4% from 2013/14 to 2015/16.Non-farm employments increase overtime from 28.9% in 2013/14 to 31.3% in 2015/16.

From the access to basic services the average distance from the nearest asphalt road was reduced from 39.194 km in 2013/14 to 34.905km in 2013/14. This implies that the linkages between rural areas with the urban areas were improved. Similarly the average distance from the nearest CBE reduced from 24.052 km in 2013/14 to22.069 km in 2015/16.

Table 2.Summery of Descriptive Statistics

	Year 2013/14 N=2821		Year 2015/16 N=2821	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Non-farm employment	.289	.453	.313	.464
Age of household head	46.009	15.043	48.139	15.166
Head-married	.766	.423	.767	.423
Orthodox	.436	.496	.435	.496
Muslim	.329	.47	.329	.47
Head-female	.236	.425	.232	.422
Numbers of adult worker	2.301	1.046	2.392	1.097
Dependency ratio	1.145	.97	1.098	.948
Education levels of head	2.7	8.624	2.616	6.973
shock drought	.104	.305	.327	.469
shock flood	.022	.148	.011	.106
shock landslide	.003	.053	.005	.07
shock heavy rain	.015	.123	.028	.166
shock other cop damage	.044	.206	.086	.281
shock livestock death	.039	.194	.083	.276
credit access	.046	.209	.278	.448
Distance from nearest asphalt road	39.194	47.907	34.905	44.539
Distance from nearest woreda Town	22.653	25.143	21.991	20.453
Distance from nearest market	14.597	11.781	14.133	15.052
Distance from nearest primary school	.957	5.494	.799	3.582
Distance from nearest hospital	18.14	23.32	13.671	14.473
Distance from nearest CBE	24.052	22.977	22.069	21.713
Distance from nearest MFI	20.491	20.385	21.227	20.873
Household size	5.007	2.305	5.093	2.326

Source: Own computation from 2013/14 and 2015/16 ESS data

Percentage of Individuals Indicator *Values is below the Threshold.*

Table 3 shows the deprivation of each indicator in multidimensional poverty. 99.746% of the rural households of Ethiopia is deprived by nutrition 2013/14 and it reduced to 99.687%. This implies that almost all of the rural households of Ethiopia using firewood, dung, charcoal, and crop residuals. 97.235 % and 96.065% of the households are deprived by floor in 2013/14 survey years and 2015/16 survey years respectively. Similarly 83.5165% and 69.692% of the rural households are deprived by of the rural households are deprived by electric city. This reduction is due to the adoption of solar light.

Table3.Percentage of Individuals Indicator Values is below the Threshold.

Indicators	2013/14	2015/16
Floor deprivation	97.235%	96.065%
Cooking deprivation	99.866%	98.114%
Toilet deprivation	44.594%	38.958%
Electric deprivation	83.516%	69.692%
Water deprivation	57.32%	53.633%
Asset deprivation	23.928%	20.206%
Years of schooling deprivation	52.570%	49.167%
School attendance deprivation	13.577%	12.230%
Nutritional deprivation	99.746%	99.687%
Child mortality	2.026%	6.026%

Source: Own computation from 2013/14 and 2015/16 ESS data

The Multidimensional Poverty Index

Table 4 shows that the incidence, intensity and adjusted MPI in the two wave years. The poor household's average deprivations of indicators and the adjusted MPI reduced from 50.2% and 49.5% in 2013/14to 49.7% and 47.4% in 2015/16respectively. For the overall censored head count ratio of the panel year 2013/14contributes 50.9% to the indices and year 2015/16contributes 49.1%. On average 93.5% of the rural households were multidimensional poor in the panel year, the adjusted multidimensional poverty index of the rural Ethiopia is .484 for the panel years.

Table 4.The Multidimensional Poverty Index

Poverty status	2013/14	2015/16	Total
H	0.949	0.925	0.935
MO	0.495	0.474	0.484
A	0.503	0.497	1.000

Source: 2013/14 and 2015/16 ESS data of Ethiop

Decomposition of Multidimensional Poverty Index by Dimension

Looking at the censored headcount ratios in table 5 the deprivations of all the three dimensions were reduced from 2013/14 to 2015/16. Standard of living, education and health were 44.7%, 22.5 and 35.8% in 2013/14 respectively, but reduced to 42.8%, 21.5 and 32.6 in 2015/16 respectively. Standard of living is the highest component of MPI, it cover 43.8% of the total which is followed by health dimension that share 34.2% of the aggregate multidimensional poverty index. The least share of education dimension(22%) is because of the second goals of millennium development. According to the MDG (2014) report, the net enrolment rate in primary education is 93 percent in 2014, and net enrolment in primary education grew by about 18 per cent per annum. Also the forecast show that it will reach 100 per cent in 2015.

Similarly the share of the health dimension is less than share of standard of living dimension. MDG (2014) report shows that health service coverage significantly improved and primary health service coverage reached 93.4 per cent of the population in 2012/13 and 94.0 percent in2013/14.One of the reasons behind the observed success in reducing child mortality has been the expansion of the coverage of health service. From this we can understand that the reduction of child mortality leads to the MPI share of health dimension is less than standard of living dimension.

Table 5. Decomposition of Multidimensional Poverty by Dimension

Dimension	2013/14	2015/16	Total
Standard of living	0.447	0.428	0.438
Education	0.225	0.215	0.220
Health	0.358	0.326	0.342
Total	1.000	1.000	1.000

Source: 2013/14 and 2015/16 ESS data of Ethiop

Decompositions of Multidimensional Poverty by Indicators

Table 6 show that more than half of the multidimensional poverty indicators deprivations shares to MPI were reduced in 2015/16 relative to in 2013/14. This reduction due increase in access to clean water and improved sanitation, numbers of health posts, The primary net attendance rate for 7-14 year old children, numbers of health center, immunization coverage, access to solar light, modern contraceptive use, and decrease in infant mortality, and under-five mortality. These changes are the result of millennium development goals which lead to decline the deprivations of multidimensional poverty indicators.

Table 6.Decomposition of Multidimensional Poverty Index by Indicators

Indicators	2013/14 survey year	2015/16 survey year
Floor deprivation	0.108	0.106
Cooking deprivation	0.110	0.107
Toilet deprivation	0.050	0.046
Electric deprivation	0.094	0.082
Water deprivation	0.65	0.063
Asset deprivation	0.027	0.024
Years of schooling deprivation	0.178	0.0174
School attendance deprivation	0.046	0.043
Nutritional deprivation	0.37	0.328
Child mortality	0.007	0.021

Source: 2013/14 and 2015/16 ESS data of Ethiop

Decomposition of MPI by: Sex of the Household Head (2013/14-2015/16)

Figure 1 shows that decomposition of MPI by sex of the household head. From the female head almost all (94%) are multi-dimensionally poor. Similarly from the male headed of the household 93.4% are multi-dimensionally poor. On the other hand male headed are deprived by 73.9% of the indicators, while female headed are deprived by only 26.1% of the indicators. Female headed contributed the largest share (73.8%) of the censored head count ratio of the rural Ethiopia. This result is in line with the finding of Diran et al. (2010) that was sex of the household heads was positively related to the likelihood of poverty. This implies that female-headed households are likely to be poorer than male-headed households. Women's may have lower education due to discriminatory access as children, and their access to productive resources as well as decision making tend to occur through the mediation of men. Womentypically face a narrower range of labor markets than men and lower wage rates.

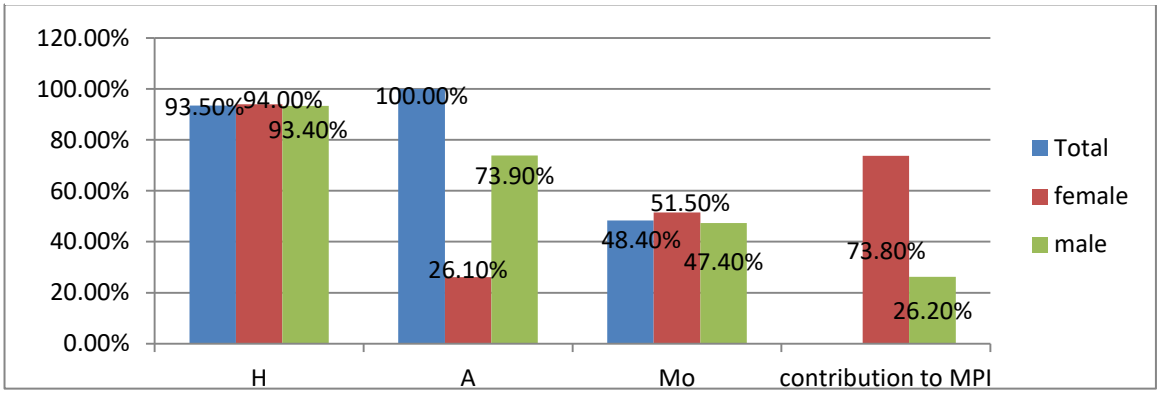

Figure 1. Decomposition of MPI by: household head sex (2013/14-2015/16)

Source: Own computation from 2013/14 and 2015/6 ESS data of Ethiopia

Note: H= censored head count ratio, Mo = adjusted multidimensional poverty rate and A=intensity

Decomposition MPI by Marital status

Table 7 shows that 94.2% of non-married rural household heads of Ethiopia are multi-dimensionally poor. Also 93.3% of married head are multi-dimensionally poor. So married headed of the rural household contribute the largest to MPI in rural Ethiopia with the share of 74.4%. On the other hand non-married headed of rural Ethiopia contribute only 25.6% for the MPI of rural Ethiopia. Similarly the share of married headed rural household is greater than that of non-married headed for the adjusted MPI of rural Ethiopia.

Table 7. Decomposition of MPI by: marital status of household head

	Head not married	Head married	Total
H	0.942	0.933	0.935
Mo	0.522	0.472	0.484
A	0.254	0.746	1.000

Source ESS 2013/14 and ESS 2015/6 data

Non-Farm Employment and Multidimensional Poverty

Table 8show that contributions of non-farm employment for each dimension deprivation. The deprivations of all dimensions were less in 2013/14relative to 2015/16 survey year. Households that are not engaged in non-farm employment are more deprived by each dimension than the household that are engaged in non-farm employment for both survey years. Households that are not engaged in non-farm employment on average deprived about 45.4% in standard of living,22.1% in education and 32.4% in health dimension in 2013/14. But, the deprivation of standard of living and education reduced to 43.8%, 22.00% respectively for the households that are not engaged in non-farm employment in 2015/16. The rural households that are not engaged in non-farm employment are more deprived than that engaged in non-farm employment in both survey years. Deprivations of standard of living for the household that engaged in non-farm employment reduced from 43.6% in 2013/14 to 42.1% in 2015/16.

Table 8.The Contribution of Non-farm Employment on the Deprivation of each Dimension (2013/14-2015/16)

Dimensions of Multidimensional poverty	Non-farm employment status 2013/14 survey year		Non-farm employment status 2015/16 survey year	
	Not engaged in non-farm employment	Engaged in non-farm employment	Not engaged in non-farm employment	Engaged in non-farm employment
Standard of living	45.4%	43.6%	43.8%	42.1%
Education	22.1%	23.0%	22.6%	21.6%
Health	32.4%	33.4%	35.8%	34.5%
Total	100%	100%	83.95%	16.05%

Source: 2013/14and 2015/16 ESS data of Ethiopia

Table 9 shows that the cross tabulation of multidimensional poor household and non-farm employment. On the table more of the household who is not engaged in non-farm employment are multidimensional poor in both survey years. Multi dimensional poverty is less in 2015/16 relative to in 2013/14 for both households that are engaged in non-farm employment or not.67.81% and 62.15% of the samples that are not engaged in non-farm employment are multidimensional poor in 2013/14 and 2015/16 respectively. But, only 26.80% and 8.98% of the rural household that engaged in non-farm employments are multidimensional poor in 2013/14 and 2015/16 survey year respectively. This shows that reduction of multidimensional poverty due to increasing non-farm employment participation.

Table9. The Relationship between Non- Farm Employment and Rural Household Multidimensional Poverty

Multidimensional poverty status	Non-farm employment status 2013/14 survey year		Non-farm employment status 2015/16 survey year	
	Not engaged in non-farm employment	Engaged in non-farm employment	Not engaged in non-farm employment	Engaged in non-farm employment
Non-poor	3.3%	2.09%	21.80%	7.06%
Poor	67.81%	26.80%	62.15%	8.98%
Total	71.28.89%	28.89%	83.95%	16.05%

Source: 2013/14 and 2015/16 ESS data of Ethiopia

The Probit Regression Result

Table 10 shows the marginal effect of probit regression performed to estimate the effects of non-farm employment on multidimensional poverty.

Non-farm employment

Holding all other factors constant the regression result shows that engaging in non-farm employment reduces the likelihood rural households of Ethiopia being multi-dimensionally poor on average marginally by 0.032 at 1%level of significant. This implies that engaging in non-farm employment improve farmers spending on basic needs i.e. food, education, closing, health care and improve asset accumulation. Which, confirming the hypothesis that engaging in non-farm employment has a negative effect on multidimensional poverty. The result is in line with Damilola et al. (2019) who conclude the non-farm wage income and non-farm self-employment has negative association with multidimensional poverty. Similarly the result support the findings of different literature that conclude engaging in non – farm employment reduce the one-dimensional level, depth and severity of poverty, and it is an effective way to out of poverty for rural households in developing countries (Alain et .al 2005, Hadijah; 2011, Steven; 2011, Katsushi et al; 2012, Trung; 2014, Muhamed et.al; 2018, Sagarika; 2018&Shakila; 2019).

Table 10. The marginal effects after probit regression

variable	dy/dx	Std.Err.
Non-farm employment	-0.031***	0.009
age_head	0.005***	0.001
Head-married	0.004	0.013
Orthodox	-0.010	0.012
Muslim	-0.012	0.014
Head-female	-0.016	0.014
Numbers of adult workers	-0.019**	0.008
Dependency ratio	0.013*	0.007
Educ-head	-0.005***	0.001
shock drought	0.023*	0.013
shock_flood	0.011	0.021
shock_landslide	-0.054	0.048
shock_heavyrain	0.052***	0.017
shock_othercrop damaged	0.002	0.013
shock_livestockdeath	0.025**	0.012
shock_natural	-0.014	0.013
Credit access	-0.018**	0.008
Distance from nearest asphalt road	0.000	0.000
Distance from nearest woreda town	0.0004**	0.000
Distance from nearest market	0.00005	0.000
Distance from nearest primary school	0.000	0.000
Distance from nearest hosp hospital	-0.000	0.000
Distance from nearest CBE	0.000	0.000
Distance from nearest MFI	-0.000	0.000
Household size	0.003	0.004
Amahara	0.042***	0.016
Tigray	0.010	0.021
Oromia	0.047***	0.014
SNNP4	0.017	0.017

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Note that: CBE is Commercial Bank of Ethiopia, and MFI isMicro Finance

Access to credit

Similarly, the marginal effects of access to credit were significant at 5% level of significant and negatively affected the likelihood of rural households of Ethiopia being multi-dimensionally poor. Holding all other factors constant if the household get credit, the likelihood of rural households of Ethiopia being multi-dimensionally poor was on average marginally reduced by0.018.The result is in line with Damilola.et.al(2019) concluded that having access to formal credit by rural farm households reduces the likelihood to be multi-dimensionally poor, by revealing the role of credit in promoting rural livelihoods and poverty alleviation in Nigeria, and Bruk & Kebed (2013) finding households with access to loans and membership in an informal saving association are less likely to be consumption and multidimensional poor in rural Ethiopia. This implies that the access to credit reduce capital constraints, and increase expenditures on basic needs like food, close, health care, education and construction of housing.

Shock

As hypothesized shock has positive effect on being multi-dimensionally poor, the probit regression result shows that holding all other factors constant heavy rain increases the likelihood of multi-dimensionally poor on average marginally by0.052 at 1%level of significant, which agrees the finding of Kebed(2013) that show occurrence of many shocks simultaneously affects deprivations in morbidity, access to safe drinking water, and housing quality significantly. This implies that simultaneous shocks affect the structural character of welfare. On the other hand livestock death also increases the likelihood of being multidimensional poor by 0.025 at 10% level of significant. Since, it reduces the wealth of the rural household. The other shock that significantly affect the likelihood of multi-dimensionally poor was drought. Which, different from the finding of Bruk & Kebede (2013) that conclued drought has an insignificant effect on multidimensionl poverty. But for this study the occerance of drought had apositive effect to the likelihood of multidimensionally poor and it increase the likelihood by 2.3%,but only at marginally significant level.

Dependency ratio

Dependency ratio also significantly increases the likelihood of being multidimensional poor, and theresult in line with WorldBank (2020)concluded that dependency ratio strongly correlated with poverty, and dependency ratio positively affects the likelihood of the household beingunidimensionally poor (Daniel, 2018; Diran et al.; 2010). The regression result shows that if dependant persone on adult worker increase by one persone, the liklhood of the household being multidimensionally poor increase by .0013 at 1%blevel of segnificant.

Distance from the nearest Woreda Town

Region Dummy

The likelihood of be being multi-dimensionally poor is greater for the household that live in Amhara and Oromia region than the household live in other region. The likelihood of multi-dimensionally poor for the household that live in Amhara region is greater by 4.5% than the household live in other region at 5% level of significant. Similarly the likelihood of multi-dimensionally poor for the household live in Oromia region is greater by 5.1% than the household live in other region at 1% level of significant.

Conclusions and policy implications

Conclusion

Multidimensional poverty was reduced from 94.9% in 2013/14 survey year to 92.5% in 2015/16 survey year it is still a challenging phenomenon for the rural households of Ethiopia. Since engaging in non-farm

employment one way of escape multidimensional poverty, participations of rural households of Ethiopia in non-farm employment increase from 28.9% in 2013/14 survey year to 31.3% in 2015/16 survey year.

The deprivations of all the three dimensions are less in 2013/14 relative to in 2015/16. Standard of living, education and health were 44.7%, 22.5 and 35.8% in 2013/14 respectively, but reduced to 42.8%, 21.5 and 32.6% in 2015/16 survey respectively, also the censored head count ratio in rural Ethiopia is reduced from 94.9% in 2013/14 to 92.5% in 2015/16. On the other hand that poor household's average deprivations of indicators and the adjusted MPI reduced from 50.2% and 49.5% in 2013/14 to 49.7% and 47.4% in 2015/16 respectively.

The probit regression result shows that non-farm employment, access to credit, numbers of adult workers and education level of the household head have significantly negative effect to the likelihood of being multidimensional poor. While distance from the nearest woreda town, heavy rain, livestock death and dependency ratio have a significant positive effect on the likelihood of being multidimensional poor.

Engaging in non-farm employment reduce the likelihood of rural households of Ethiopia being multidimensional poor on average marginally by 0.032 at 1% level of significant. Also access to credit is statistically significant, and the access to credit reduces the likelihood of the rural households of Ethiopia being multidimensional poor on average marginally by 0.018.Heavyrainis the other significant variable that increases the likelihood of being multidimensional poor on average marginally by 0.052 at 1% level of significant. On the other hand livestock death also increases the likelihood being multidimensional poor on average marginally by 0.025 at 10% level of significant.

Policy Implications

Since multidimensional poverty is challenging for rural households of Ethiopia, policy makers need to give attention for poverty coping programs and strategies. Also the government should implement policies that promote non-farm employment, such as small business and self-employment, as well as the creation and support of businesses that absorb the extra labor from the farm. Non- farm employment can smooth consumption and increase expenditures on education,

Since standard of living contributes the highest shares of multidimensional poverty in both survey years, the government needs to design practical and effective policies for raising living standards byformulating a comprehensive social development strategy that covers the immediate needs, as well as the medium and long-term needs. This responsibility does not rest on the Ministry of Social Affairs alone, or with any specific group of ministries. It is rather a collective responsibility of all parties involved in the development process, with a special role for the government, including the entities concerned with the formulation of overall economic and social policies. In light of such a strategy, it is possible to identify the specific responsibilities to be entrusted to the various ministries, and the complementarities of their work, as well as the responsibilities that are the domain of the private and civil sectors

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