Rural Household Multidimensional Poverty in Degu'a Tembien District, South Eastern Zone of Tigray, Ethiopia

***Desawi Kiros*[1*], *Abate Mekuriaw*[2] and *John Cameron*[3]**

Abstract

Poverty is one of the most multifaceted problems, in which a single indictor such as income or consumption is not adequate to show the comprehensive picture of poverty among households. Multidimensional poverty approach helps to show the actual realities of households in rural areas. This study aimed at assessing household multidimensional poverty focusing on a set of household capabilities and functionings in Degu'a Tembien District in Tigray Region, Ethiopia. Cross-sectional data were collected from randomly selected 420 households from six rural Kebeles (villages) of the District to estimate multidimensional poverty. Findings showed that household's incidence of deprivation was generally high and widespread in landholding, livestock ownership, decision making on income, access to electricity, energy use for cooking, and access to sanitation. Results also showed that 60% of households were multidimensional poor while the average intensity of multidimensional deprivation, which showed the share of deprivations each poor household's experiences on average, was 58%. Overall, a Multidimensional Poverty Index of 0.35 was found for the rural households in the study district. This result implies that rural development poverty reduction program should be focused on targeted interventions on the indicators that have higher deprivations.

Keywords: Rural households, multidimensional poverty, Degu'a Tembien, South Eastern Zone of Tigray, Ethiopia

[1] Department of Cooperatives, College of Business and Economics, Wollo University, Ethiopia. [*]Corresponding author.

[2] Assistant Professor (PhD), Center for Rural Development, College of Development Studies, Addis Ababa University, Ethiopia.

[3] International Institute of Social Studies (ISS), Erasmus University Rotterdam, The Netherlands.

1. Introduction

Poverty is widely recognized as one of the most complex economic and social problems of the 21st century in the developing world. Cognizant of this, the United Nations general assembly in 2000 had promised to halve the proportion of people who were suffering from extreme poverty and hunger no later than 2015 (UN 2000). Although the United Nations (UN, 2015) reported the number of people living in extreme poverty globally had declined by more than half, falling from 1.9 billion in 1990 to 836 million in 2015, poverty reduction progress across countries and regions was distributed unequally, particularly in Sub-Saharan Africa and South Asia that remained behind achieving the Millennium Development Goals (MDGs). FAO (2015) also reported that almost half of the population in Sub-Saharan Africa lived in abject poverty.

After fifteen MDG years, the post-2015 Sustainable Development Goals (SDGs) are designed to end absolute poverty in terms of its monetary and non-monetary forms. The non-monetary form of poverty refers to multidimensional poverty described as the multiple deprivations, suffered by many, in education, health, living standard, social isolation, exclusion and powerlessness, and psychological ill-being (Walker 2015; Bici and Cela 2017). Considering income-based measures of poverty, 1.2 billion people of the world live with $1.25 or less a day (Alkire *et al*. 2015a). However, a study by Oxford Poverty and Human Development Initiatives (OPHI, 2015a) in 101 countries indicated that a total of 1.6 billion people were living in multidimensional poverty, of which 31% were found in Sub-Saharan Africa. Nearly half of all multidimensionally poor people (733 million) are destitute. Of 811.5 million people of Sub-Saharan Africa, a total of 496 million are multidimensionally poor (OPHI 2015a).

In spite of such problems, the multidimensionality of poverty is often neglected at policy formulation stage in developing countries (Chowdhury and Mukhopadhaya 2014). Monetary poverty assessment dominates in developing economies (Chen and Ravallion 2010) and plays a significant role in designing national development plans. However, following capability approach which was articulated by Sen (1993) and broadening of

the definition of wellbeing to comprehensive functionings and capabilities (Duclos and Araar 2006; Wagle 2008; Alkire and Deneulin 2009), there has been urgent need to comprehensively understand the principal foundations of poverty. According to Sen (1999), functionings are 'the various things a person may value doing or being', while capabilities are the real freedoms and opportunities to achieve a group of functionings. Arising from this conceptualization, multidimensional poverty measure was constructed to comprise different deprivations of individuals or households to different features of wellbeing, such as economic, social, psychological, and material wellbeing.

Ethiopia is considered as one of the fastest growing economies in the world. At the same time, the country is one of the poorest countries where its poverty continues to deprive the wellbeing of its population. As a result, the government has put in place various poverty reduction policies, strategies and programs such as the Sustainable Development and Poverty Reduction Program (2002/03-2004/05), Plan for Accelerated and Sustained Development to End Poverty (2005/06 to 2009/10), Growth and Transformational Plan I (2010/11 to 2014/15) (MoFED 2010), and Growth and Transformation Plan II (2015/16 to 2019/20) (MoFED 2016). Following these programs and strategies, the country has recorded remarkable progress in different socioeconomic areas such as economy, health and education. The recent World Bank report shows that the country has experienced more than 10% average economic growth per year between 2009 and 2016 (UN 2018). Under five child mortality has declined from 110 to 68 deaths per 1,110 births between 2005 and 2016, while the adjusted net primary school enrolment rate has increased from 40.2% in 2000 to 86% in 2015 (UNICEF 2018). The proportion of women with no schooling has declined from 77% in 2000 to 49% in 2016, while the proportion of men with no schooling has decreased from 62% in 2000 to 35% in 2016 (CSA and ICF 2016). Child mortality has also decreased from 97 deaths per 1,000 live births in 2000 to 48 deaths per 1,000 live births in 2016, which shows about a 50% decline in the past 16 years; while married women contraceptive use has gradually risen from 6% in 2000 to 35% in 2016 (CSA and ICF 2016).

Regardless of such progress, Ethiopia remained one of the poorest countries in the world (UNDP 2015; OPHI 2015b). Human Development Index (HDI) value for 2018 showed that Ethiopia fell within the low Human Development category in the world, ranking 173th out of 189 countries (UNDP 2019). OPHI (2015b) study indicated that 56.4% of the total Ethiopian population was multidimensionally poor, while the rural population live in multidimensional poverty accounted for 64%. Using a unidimensional (monetary) measure of poverty, the 2010/11 Household Income, Consumption and Expenditure Survey showed that 29.6% of the total population was living below the national poverty line, and higher poverty was observed in rural areas (30.4%) than urban areas (25.7%) (MoFED 2012). These figures reveal that poverty in Ethiopia is persistent, deep-rooted and complex, which requires thorough investigation and policy intervention.

Official methods of poverty measurement in Ethiopia were historically dependent on monetary approach. Because of this, anti-poverty policies and strategies had focused on enhancing monetary attributes of the poor. This approach fails to show the comprehensive picture of socioeconomic problems, capabilities and functionings. Other potential dimensions of poverty have been neglected due to the fact that the majority of preceding studies in Ethiopia have followed unidimensional strategy, which overlooked the multifaceted nature of people's wellbeing. Such poverty approach leads to partial understanding of the problem and has incomplete ability to explain the nature of poverty effectively and comprehensively. Furthermore, the diverse disparities in geographic and socioeconomic characteristics of Ethiopia have been problematic issues which require specific information to address the poor and design special targeting system.

Some studies such as Gebretsadik (2013), Bruck and Sindu (2013), Tassew (2014), Alemayehu *et al*. (2015), and Mekonnen and Almas (2016) looked at multidimensional poverty and related issues in Ethiopia. Majority of the studies on multidimensional poverty made use of secondary data on education, health, living standard and durable asset dimensions of poverty in their analysis. However, the current study incorporated indicators such as land and livestock ownership which are significant indicators of wellbeing

for Ethiopian rural households. Cooperative membership and decision making on income were also added as empowerment dimensions of poverty in the analysis. These indicators, according to Alkire (2007a), are the missing dimensions of poverty in the global MPI (Multidimensional Poverty Index), which complement the Human Development Report, and are not included in previous estimates of multidimensional poverty in the Alkire and Foster (2007, 2011) (AF) methodology.

The use of appropriate indicators in measuring poverty is of paramount importance in poverty reduction efforts as it might help to effectively target the poor. For this reason, it is argued that multidimensional poverty assessment, which focuses on household's capability and functioning evaluation space, would have strong justification for measuring poverty status of households. This study assessed multidimensional poverty of rural households based on Sen's capability framework (Sen 1992; Sen1993). Sen's capability approach provides better conceptualization of poverty and helps to investigate multiple dimensions and indicators of multidimensional poverty, and the approach is considered to have extensive significance for the conceptualization of wellbeing and multidimensional poverty (Jenkins and Miclewright 2007; Anand and Sen 2008).

The overall objective of this study was, therefore, to assess the multidimensional poverty status of rural households in Degu'a Tembien District of Tigray, Ethiopia. Specifically, the paper attempted to analyze the incidence and intensity of multidimensional poverty; investigated the dimensions and indicators, which contributed more to household multidimensional deprivation; and assessed the major characteristics of households with multidimensional poverty.

2. Methods

2.1 Study Area Description

The study was conducted in the Degu'a Tembien District, South Eastern Zone of Tigray, Ethiopia. Geographically, it is situated 39º10' East longitudes and 13º38' North latitudes covering an area of approximately 1,125 sq km (Ayenew *et al*. 2011). The district is located at an elevation of

1500 to 2750 meters above sea level (DTWOPF 2017). Hagereselam is the capital of the District, located 50 km from the regional capital, Mekelle (Ayenew *et al*. 2011). The District's climatic zones are classified as lowland, temperate and highland with a proportion of 18.75%, 37.5% and 43.75% of the District's area, respectively. The annual rainfall ranges from 600–800 mm while the annual average temperature ranges from 8ºC to 24ºC (DTWOPF 2017). The district has erratic type of rainfall with high variation between and within years, and receives rainfall once a year. The district is highly vulnerable to rainfall induced soil erosion due to its mountainous terrain. The major soil types of the district are mainly clay (50%), sandy loam (40%) and sandy (10%) (Nyssen *et al*. 2005). Agriculture, as the dominant source of livelihood for the majority of the population, is small scale in its nature with mixed crop-livestock farming. The major crops grown and cultivated in the district include cereals such as barley, wheat and Teff. Livestock production is an important economic activity in the mixed farming system of the District. Cattle, sheep, goats, donkeys and mules are the major livestock reared by households in the study area (Nyssen *et al*. 2008).

2.2 Sample Size Determination and Sampling

Three stage sampling technique was employed to select sample respondents. First, the Woreda Kebeles were stratified by agro-ecology into three groups as highland, midland and lowland, considering the traditional agro-ecological zonation of Ethiopia. Second, excluding the main town of the Woreda, a total of six Kebeles; two Kebeles from each agro-ecology, were selected randomly using a lottery method. In the last stage, sample households were selected proportionately from each of the sample Kebeles by using simple random sampling technique. Sample size of the study was determined using Yamane (1967) simplified formula [i.e, $n=N/1+N(e^2)$, where, n is the sample size; N denotes the population size and e refers to precision level]. An analysis was, thus, made for a total of 420 rural households. A household survey questionnaire was constructed with questions relating to socioeconomic characteristics. A set of multidimensional poverty indicators, linked to the characteristics of the study District, were administered to collect data from studying households.

2.3 Data Analysis

2.3.1 Selection of Poverty Dimensions, Indicators and Cutoff Points

The choice of functionings and capabilities to measure poverty is highly dependent on intuitive decisions (Sen, 2008). Therefore, dimensions that were believed to be highly relevant for the studied population were identified on the basis of both normative assumptions and empirical evidence (Table 1). The selected variables were supported by the newly designed Sustainable Development Goals (SDGs) that provided strong grounds for their incorporation. This study followed Alkire and Santos (2010) equal weighting structure across dimensions and equal weights within dimension indicators to construct the district MPI. Table 1 presents the dimensions, indicators and deprivation cutoff points identified for the analysis of household's multidimensional poverty in the study area.

Table 1. Selected dimensions, indicators and deprivation cutoff values

Wellbeing Dimensions(Weight)	Deprivation Indicators(Weight)	Deprivation Cutoffs
Education (1/5)	Years of schooling (1/10)	1= if no household member has completed five years of schooling; and 0 otherwise
	Child school enrollment (1/10)	1= if any school-aged child* in the household is not attending school; and 0 otherwise
Health (1/5)	Health care access (1/15)	1= if a household does not have access to health care services in their village and 0 otherwise
	Health functioning (1/15)	1= if any member is unable to pursue household main activities due to serious disease for at least three months; and 0 otherwise
	Child mortality (1/15)	1= if any child had died in the household in the past five years prior to this survey; and 0 otherwise
Standard of Living (1/5)	Access to safe drinking water(1/20)	1= if households use unimproved drinking water sources** ; and 0 otherwise
	Access to improved sanitation (1/20)	1= if the household's sanitation facility is not improved** ; and 0 otherwise

Wellbeing Dimensions(Weight)	Deprivation Indicators(Weight)	Deprivation Cutoffs
	Energy for cooking (1/20)	1= if the household cooks with dung, wood, or charcoal; and 0 otherwise
	Electricity (1/20)	1= if the household has no electricity; and 0 otherwise
Wealth (1/5)	Land ownership (1/10)	1 = if the household does not own more than local average (i.e., 0.66 ha. of land); and 0 otherwise
	Livestock ownership in tropical livestock unit (TLU) (1/10)	1 = if the household does not own TLU more than local average (4); and 0 otherwise
Empowerment (1/5)	Decision making (1/10)	1 = if household decision making on the use of income is not participatory; and 0 otherwise
	Cooperative membership (1/10)	1= if any member of the household is not member of cooperatives; and 0 otherwise

* According to MOE (2009), the compulsory school age for children in Ethiopia is 6-14 years

** According to WHO and UNICEF (2006) and WHO (2014), improved water sources include piped water close to plot or yard, protected spring, bottled water, hand pump, public standpipe, protected well, and piped water into dwelling while unimproved water sources comprise unprotected well, cart with small tank, unprotected spring, tanker, and surface water. WHO and UNICEF (2006) and WHO (2014) guideline for improved sanitation facility includes flush to piped sewer system, flush to pit, bucket, pit latrine, and composting toilet. Unimproved sanitation facilities include open defecation (bush/field).

2.3.2 Measuring Households Multidimensional Poverty

This study used Alkire and Foster (2011) 'dual cutoff' identification methodology to assess the multidimensional poverty status of households. After the deprived and non-deprived households were identified using single indicator deprivation cutoffs, multidimensional poor households were distinguished using the second cutoff across all indicators/dimensions. Once individual poor households were identified through the above counting methodology, a set of poverty measures were generated by bringing together the data on all surveyed households into an aggregate indicator of poverty (Alkire and Foster 2011).

The headcount ratio which measures the proportion of households that are identified as multidimensionally poor was calculated as $H=q/n$, where, H denotes the head count ratio, q is the number of households who are identified as poor according to the thresholds vector z and the cutoff k, and n represents the total population. The intensity of multidimensional poverty measures the average share of weighted indicators in which poor households are deprived. This was computed as $A = \sum_i^n = 1\ c_i(k)/q$, where, A stands for intensity of multidimensional poverty and $c_i(k)$ denotes the censored deprivation score of household i. Therefore, the Multidimensional Poverty Index (MPI) was calculated as $MPI = H*A$. The MPI summarizes information on the multiple deprivations into a single number.

Following the technique employed by Alkire-Foster methodology (Alkire *et al*. 2015b), the MPI was decomposed across population subgroups, dimensions and indicators to identify who is poor and explore the contribution of each dimension and indicators to the overall MPI of households. In so doing, an intermediate poverty cutoff (k) that lies somewhere between the union criterion (deprivation in any one indicator) and intersection criterion (deprivation in all indicators) was used. Intermediate criterion minimizes the overestimation of the poor by union criterion and underestimation by intersection criterion (Batana 2008; Alkire *et al*. 2015b). Robust and internationally accepted value of k was selected to identify the contribution of each dimension and indicator to MPI, and sensitivity analysis was done to observe the change in poverty measures across different multidimensional poverty cutoffs (k).

3. Results and Discussion

3.1 Uncensored Headcount Ratios

Looking at the general characteristics of households' deprivation, findings indicated very low (i.e. <10%) incidence of deprivation for the whole sample (Figure 1.) The incidence of deprivation was generally moderate (i.e., 25 - 55%) in years of schooling, child school enrollment, health care access, access to safe drinking water, landholding, livestock ownership, health functioning, child mortality and cooperative membership. Largest percentage of deprivation (>70%) were observed in households' decision

making on income, access to electricity and energy for cooking, which suggested higher general levels of deprivation.

Specifically, the level of deprivation in terms of years of schooling was found to be relatively lower as only 26% of households did not have at least one household member who had completed five years of schooling. This implied that majority of households benefitted from the literacy level of, at least, one household member in their daily household interactions. Regarding child school enrolment, majority of households (70%) were found non-deprived and their school aged children were exposed to schooling, while 30% of households had children who were deprived of school enrolment seeing that they had, at least, one school-age child not currently attending school. These two education indicators are "… good proxy of functionings that require education: literacy, numeracy, and understanding of information" (Alkire and Santos 2010:14), but do not show the quality of education and skills derived from schooling.

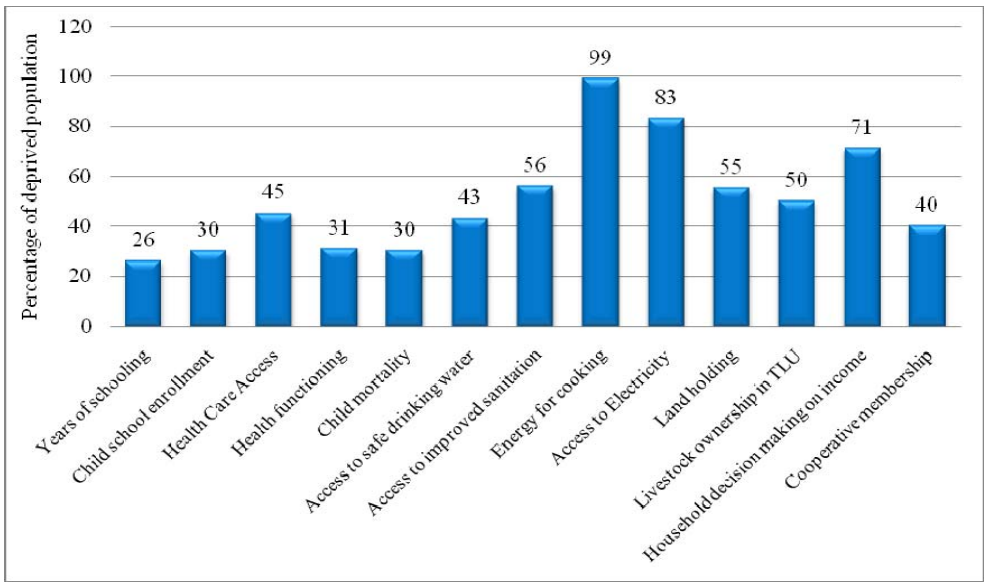

Figure 1. Percentage of households deprived in each poverty indicators

About 55% of households had access to healthcare facilities while 31% of households were deprived of health functioning in that they had experienced health problem in the past three months (from the time of interview) which

limited the ability of household members to participate in household daily activities. With regard to child mortality in the past five years, 70% of the households did not experience (not deprived of child mortality), while 30% reported they had experienced it.

Unimproved water sources can create the risk of health problems. Safe drinking water is important for better health and livelihood development. In this regard, household's access to safe and improved drinking water facility were found to be unsatisfactory as only 57% of households had access to improved drinking water. Households used unimproved water sources for drinking, preparing food, personal hygiene and for other domestic purposes, which could lead to various water borne diseases. Household sanitation facilities are very important factors in healthcare as they reduce the risk of illness. However, results showed that 56% of the study households were without access to improved toilet facility in their home. These households practiced open defecation, which could cause the contamination of drinking water sources, and the spread of diseases such as diarrhea and cholera (WHO 2014).

Large deprivation was observed in cooking fuel as almost all households (99%) were relying on inefficient or traditional cooking energy sources such as animal dung, charcoal, firewood and straw which demanded a lot of time to gather. These cooking sources, as causes of household (indoor) air pollution, would have damaging health effects (IEA 2014). In line with this, WHO (2018) indicated that 3.8 million deaths globally in 2016 can be attributed to household air pollution. This is also a serious concern to the study area where about 83% of households did not have access to electricity sources. Not only health wise, lack of access to electricity also prevented household members from performing a wide range of activities such as studying, refrigeration and communication. The operation of other modern appliance like television was also limited due to lack of access to electricity.

Land is the major and critical asset of the rural people which determined the wellbeing of households in the study area. Although land is fundamental means of realizing food security, employment and income generation in agriculture dominated economy, 55% of households were deprived in

possession of cultivated land as they had land below 0.66 hectare (local average). Livestock ownership is another indicator of household wealth as livestock are crucial means of storing wealth and provide a kind of insurance against future shocks, while also fulfilling part of household's consumption and production requirements. However, half of the studied households owned livestock below the local average of four TLU (Tropical Livestock Unit).

This study used decision making and cooperative membership as two indicators of household's empowerment. Understanding who usually makes decisions in the household is important. Participatory decision making empowers all household members to make decisions on significant issues in the household. Household's decision-making process on income was considered as one important aspect of empowering equality. Results indicated that the majority (71%) of household members were deprived in decision making on income as decisions were made by only the head of the household. This implied that most household members were suffering from powerlessness in deciding on income related decisions aspects of the household. For subsistence-oriented and agrarian societies like Ethiopia, cooperative organizations can play an important role in the acquisition and distribution of improved agricultural technologies and inputs like fertilizers, pesticides and modern farm equipment, and assist in sales of agricultural produce. Such institutional innovations help farmers to solve market failures (Hazell *et al*. 2010), raise agricultural incomes and reduce rural poverty (Alemayehu and Bernard, 2012) through inclusive development of rural households' livelihoods. In this regard, results indicated that although all households had access to cooperatives, 40% of households were deprived in cooperative membership. This implied that these households were not benefitting from the joint socioeconomic empowerment obtained from working together. Collectively, cooperatives empower their members through providing sustainable rural employment opportunities, credit and saving services, input supply, training and education.

In most of the above indicators, the study area is better off as compared to the national derivation calculated based on the uncensored headcount ratio (the percentage of households who are deprived in each indicator) using the

2016 DHS data for Ethiopia. In this DHS data, Alkire and Kanagaratnam (2018) found out that the percentage of households deprived in years of schooling, child school attendance, child mortality, improved sanitation, drinking water, and asset ownership were 43.9%, 33.7%, 31.6%, 93.4%, 63.7%, and 70.6%, respectively.

3.2 Incidence, Intensity and Multidimensional Poverty Index

As indicated by Alkire (2007b), the value of multidimensional poverty measures decreased as the poverty cutoff (k) increased (Table 3). It also displayed the variation in the percentage of households who were identified as poor (H) and its average deprivation (A) given the value of k. Looking at the percentage distribution of household deprivations, all households suffered in, at least, one deprivation, 99% from two, 91% from three and 73% from four deprivations. Only 7% and 1% of households suffered from deprivations in seven and eight indicators, respectively. The proportion of households identified as MPI poor declined at an increasing rate as the number of multidimensional poverty cutoffs (k) increased to eight. And at k equals 9 to 13, no deprived and poor households were observed. The value of MPI decreased as the percentage of deprived households' declined while the average intensity of poverty increased among the households still labeled as deprived with increasing values of k (Table 3).

Table 3 also indicated that the percentage of poor households (H) and the value of MPI decreased as k increased from one to thirteen. Results revealed that with equal weighting system and given poverty cutoff (k) equal to 2, 98% of households were identified as deprived with an average of 49% of the possible indicators, so that household MPI was 0.48. When we take deprivation in 4 indicators as poverty line (k=4), the level of poverty is still high. At this point, 71% households were identified as poor and the average deprivation score of households was 56% of all the indicators. As a result, the MPI became about 0.40 and falls slightly from the values for k=2 and k=3 suggesting the significant fall in proportion of deprived households as k increases is heavily offset by increase in average number of deprived factors.

Table 3. Change in multidimensional poverty indices at different poverty cutoffs

Aggregate poverty Cutoff Point (k)	No. of MPI poor households	% of MPI poor households	Incidence of Poverty (H)	Average Intensity of Poverty (A)	Multidimensional Poverty Index (MPI) = H*A
1*	420	100	1	0.482	0.482
2	415	98.81	0.981	0.488	0.479
3	381	90.71	0.888	0.514	0.457
4	307	73.10	0.712	0.557	0.396
5	207	49.29	0.498	0.609	0.303
6	103	24.52	0.252	0.675	0.170
7	31	7.38	0.057	0.771	0.044
8	4	0.95	0.017	0.833	0.014
9,10,11,12,13**	0	0	0	0	0

Note: *refers to value of cutoff k=1 (Union approach) and ** refers to 13 (Intersection approach)

Source: Own computation, 2018

One remarkable finding observed from Table 3 is that the value of multidimensional poverty varies across poverty cutoffs suggesting that MPI value is highly sensitive to the choice of cutoffs. As k increases above 4, the MPI score decreases dramatically.

The AF methodology in the global MPI used k=33.3% of indicators as a poverty line which means if a household has above 33.3% of indicators showing deprivation then it is stated to be multidimensionally poor (Alkire and Santos 2010). This means households are considered as multidimensionally poor if they are deprived in at least one-third of the selected indicators. Therefore, following this globally accepted standard, we choose k=4 as a poverty score for k to categorize households as multidimensionally poor and non-poor. Accordingly, the overall multidimensional poverty status of households is presented in Table 4.

Table 4. Poverty incidence, intensity and MPI (at k=4)

Poverty Cutoff (k)	Poverty Indices	Value	Std.Err	Confidence Interval (95%)	
k=4	Multidimensional Poverty Index (MPI) = H*A	0.351	0.014	0.323	0.380
	Incidence of Poverty (H)	0.602	0.024	0.556	0.649
	Average Intensity of Poverty (A)	0.583	0.006	0.572	0.595

Source: Own computation, 2018

As indicated in the above table, at poverty cutoff (k=4), the value of H (incidence of poverty) is 0.60 which means about 60% of studied rural households are poor when deprivation in any four indicators are required to declare a household is poor. Households' average intensity (A) of multidimensional deprivation, which shows the share of deprivation each poor household experience on average, is 58%. Given that MPI is both the product of A and H, it gives an index value of 0.351. This means the poor households in the study district experience 35% of the total deprivations that would be experienced if all households were poor and deprived in all selected indicators of poverty. Although this finding reveals a severe poverty in the study District, it is largely lower than the MPI reported by

OPHI (2018) which showed 55% of Ethiopian rural and 45% the study region (Tigray) population being multidimensionally poor in 2016. Similarly, the national headcount ratio (92.2%) and an average share of the deprivations of the weighted indicators poor households experienced at the same time (59.6%) is also higher than the study district estimates (OPHI 2018).

3.3 Censored Headcount Ratio

The uncensored headcount ratio does not reflect the complex deprivations of poor households. Hence, the censored deprivation headcount ratio is computed to obtain additional information about the proportion of households who are poor and deprived in each indicator. As shown in Figure 2, the overall censored headcount ratio of households was extremely high implying that household's multidimensional poverty was acute. The figure revealed that deprivation in energy for cooking exhibits the highest deprivation level among the surveyed households as 60% of them are multidimensionally poor and are also deprived in cooking energy. Second largest censored headcount ratio is observed in electricity as about 55% of the population is multidimensionally poor without access to electricity. Lack of access to electricity for lighting, production, communication and cooking reduces economic growth and welfare.

Households are building block of a society where various livelihood decisions are made. Hence participation in household's decision-making processes on income is very important for empowering members as it reflects the actual use of household member's capacity to plan livelihood activities. However, 51% of the population live in multidimensional poor households and suffer from lack of control and participation in household decision-making on income generated from different sources such as crops, livestock and non-farm activities as decisions are made by the household head. This shows that half of the population are poor and have high incidence of gender disparity in household's decision making which stifled household member's autonomy, and compromises the concept of equality, thereby portraying disempowerment of women and other household members.

Livestock production is an integral part of agricultural system in the study district as more than 85% of households kept livestock though the multidimensional poor who are deprived in terms of TLU make up 40% of the total households. Another discouraging headcount ratio result was obtained in landholding. About 39% of the population lives in a household that has been identified as poor and deprived as they have cultivated size of land below the local average. This aggravates rural poverty because land as productive asset is the basis for food, income and employment security in particular and livelihood/socioeconomic development in general for rural people. Note that lowest levels of deprivation were observed in years of schooling and child mortality (Fig. 2).

Poverty indicators with higher censored headcount ratio are higher drivers of multidimensional poverty and these results provide insights to the focus areas for intervention in reducing multidimensional poverty in the study district. Although the overall censored headcount ratio observed in each multidimensional poverty indicator were high, our finding for the majority of indicators was significantly lower than the censored headcount ratio of these deprivation indicators observed in 2011 and 2016, which shows poverty in Ethiopia is severe which affect a very large population (Alkire and Santos 2011; Alkire and Kanagaratnam 2018).

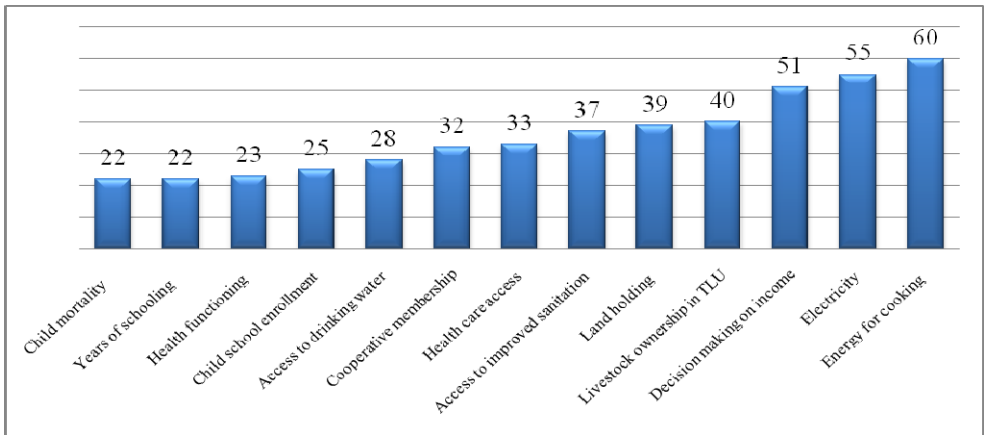

Figure 2. Censored headcount ratios for k=4 poor households

Source: Own computation, 2018

3.4 Dimensions and Indicators Contribution to Overall Adjusted Headcount Ratio

The highest contributor to MPI was standard of living that contributed 26% of overall multidimensional poverty (figure 3). This showed that the selected living standard indicators, namely access to safe drinking water sources, access to improved sanitation, fuel used for cooking, and access to electricity were quite relevant for the overall multidimensional poverty and the result of deprivation in this wellbeing dimension made the life of the rural households difficult. The larger share of the standard of living dimension to overall MPI in the study district showed that households lacked the basic infrastructural services that supported welfare. The weight given for living standard indicators was lower than other wellbeing indicators as the dimension value (1/5) was equally divided to its four indicators. However, this dimension exhibited relatively higher percentage of poverty and deprivation contributions. This was followed by the empowerment and wealth dimensions of multidimensional poverty (Fig. 3).

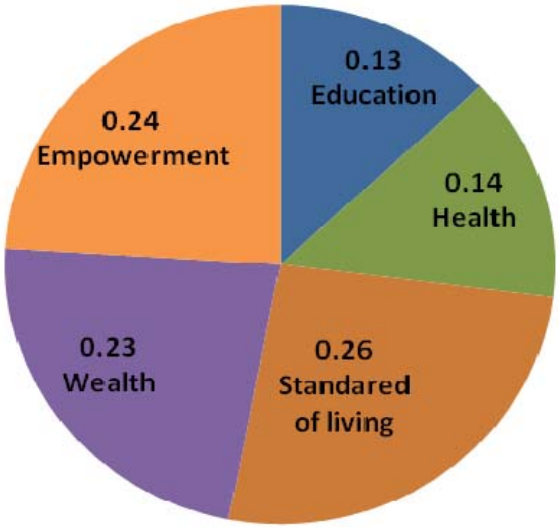

Figure 3. Dimensional contributions to MPI

Deprivation in households' decision making on income, which accounted for 15% of the total MPI, was found to be the largest contributor and deprivation in health functioning, child mortality and access to safe drinking water were found to be the least contributors to the overall value of multidimensional poverty. All other deprivations ranged between 5% and 11% (Figure 4). The percentage contribution of each deprivation in education, health and standards of living were found to be lower than the estimates of Alkire and Kanagaratnam (2018).

Generally, Alkire and Santos (2011) indicated that if the contribution of each wellbeing indicator to the overall multidimensional poverty became above their weight, it reflected that the households were highly deprived in these indicators. In light of this, deprivation in decision making on income, livestock ownership, cultivated size of farm land, energy for cooking and access to sanitation services contribute more to multidimensional poverty above their weight.

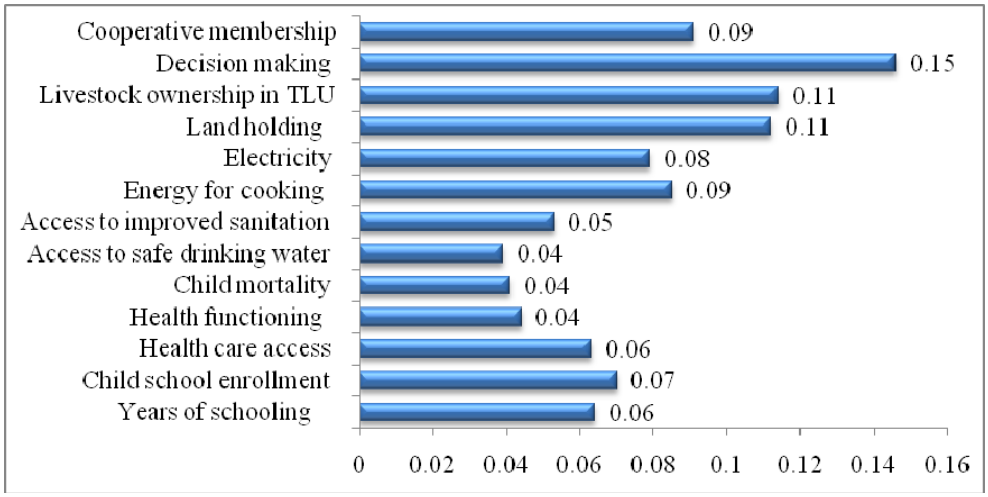

Figure 4: Indicators contributions to overall MPI
Source: Own computation, 2018

3.5 Decomposition of Household Multidimensional Poverty Status

Poverty decomposition by kebele has been made to identify which location is affected by high incidence of deprivation. The analysis shows that the proportion and incidence of multidimensional poverty varies significantly across all study kebeles at 1 percent level of significance and poverty indices were not evenly distributed across the kebeles. The highest prevalence of multidimensional poverty value was observed in Walta Kebele (47%) followed by Selam Kebele (45%) and Simret Kebele (37%). These Kebeles were also comprised of higher proportion of poor (H) with above MPI of the study district (0.35). The reason for the high MPI value in Walta and Selam is probably due to a very small plot of land possessed by the higher proportion of households compared to the other study Kebeles. Particularly, Walta is an isolated area and found at far distant from the district center (24.3km from Hagereselam) which has limited access to different economic resources and infrastructural facilities such as education, health and market. Arebay Kebele contributed relatively less MPI (18%) and low population share as compared to other study kebeles (Table 5).

Table 5. Decomposition of poverty indices by kebele

Indices by Kebele (absolute) at pop. share (%)			
Kebele	**MPI**	**H**	**Pop. Share**
Simret	0.37	0.63	0.22
Selam	0.45	0.76	0.14
Arebay	0.18	0.35	0.12
Walta	0.47	0.76	0.19
Michael Abiy	0.30	0.55	0.18
Mizane Birhan	0.29	0.49	0.15
Total	0.35	0.60	1.00
ANOVA P-value = 11.85***			

Note: *** Significant at 1%

Source: Own computation, 2018

Poverty indices decomposition by various demographic and socioeconomic indicators is highly important to identify the characteristics of the poor and show who the poor are. This trait is extremely important for targeting purposes, as the information obtained from breaking the adjusted headcount ratio is useful to know which population group has a higher proportion of overall poverty and help development planners to direct public budget and efforts among the different Kebeles. It also shows the extent to which the various groups of households are affected by multidimensional poverty. There is statistically significant gender disparity ($p<0.1$) in the decomposed poverty indices (Table 6). About 80% of the studied population comprised male headed households. In this case, the incidence of poverty (H) was higher (69%) for female-headed households than for male-headed households (58%). Additionally, decomposition of poverty by gender of household heads showed that 42% of the population lived in female-headed households and were multidimensional poor (MPI) while only 33% of male-headed households were multidimensional poor. This shows that female-headed households were significantly more likely to be MPI poorer than their male counterparts. This result contradicted with the study made by Mekonnen and Almas (2016) which found higher incidence of multidimensional poverty for male household heads in Ethiopia. When multidimensional poverty measure was disaggregated by age, household heads with age below the mean (50 years) had a higher proportion of

poverty (H) (65%) than those who had age above the mean. This was also reflected in the value of multidimensional poverty, as 38% of household heads whose age was below the mean were found to be significantly MPI poorer ($p<0.1$). Table 6. Decomposition of poverty indices by socioeconomic characteristics

Characteristics	Category	H	MPI	Pop. Share	P-value
Head gender	Male	0.58	0.33	0.80	8.54***
	Female	0.69	0.42	0.21	
Heads age	Below average	0.65	0.38	0.54	3.32 *
	Above average	0.55	0.32	0.46	
Head education	No formal education	0.61	0.36	0.50	0.9
	Primary	0.60	0.35	0.43	
	Secondary	0.57	0.31	0.07	
	Tertiary	0.00	0.00	0.01	
Household size	Small	0.71	0.43	0.20	5.44***
	Medium	0.58	0.34	0.72	
	Big	0.49	0.27	0.08	
Head health	Poor	0.45	0.26	0.05	3.77 **
	Medium	0.65	0.39	0.34	
	Good	0.59	0.34	0.61	
Training	Yes	0.58	0.34	0.69	2.98 *
	No	0.65	0.38	0.31	
Size of land	< local ave. (0.66 ha)	0.72	0.43	0.55	54.66***
	≥ local average	0.46	0.26	0.46	
TLU	≥ local average (4)	0.40	0.22	0.51	114.11***
	< local average	0.81	0.48	0.50	
Credit utilization	Yes	0.62	0.36	0.58	1.18
	No	0.57	0.34	0.42	
Improved seed	Yes	0.55	0.32	0.52	11.60 ***
	No	0.66	0.39	0.48	
Market access	Yes	0.56	0.32	0.70	23.13***
	No	0.71	0.43	0.31	

Note: ***significant at 1%, **significant at 5%, and *significant at 10%
Source: Own computation, 2018

ANOVA test on gender, household size, land size, TLU, and access to improved seed and market showed a statistically significant difference ($p<0.1$) between the different groups in multidimensional poverty indices. Households with medium (≥ 5 to ≤8) and larger family size (>8) had proportionately low poverty status as compared to the larger households,

with small sized households being the most better off. Larger multidimensional poverty (43%) and proportion of poor (71%) were exhibited among households with fewer members (≤4) although the population share was small (20%) among these households. The reason for high poverty among these households was, probably, lack of economically active labor in the households which could pursue economic activities. This finding is consistent with a study made by Andualem (2015), who reported that households having small, medium and big family size were associated with high, medium and low MPI for the year 2009, respectively.

Similarly, households with average cultivated land size and TLU below the study district averages had a higher incidence of poverty and multidimensional poverty as compared to those who possess above or equal to local average. Likewise, households who did not use improved seeds in the last cropping season and households with no market access had a large proportion of poor (H) and MPI. These results show that poverty seems to be closely associated with asset endowment.

4. Conclusion and Implications

Poverty is one of the most multifaceted problems, in which income or consumption approach is not adequate to show the comprehensive picture of poverty among households. The use of multidimensional poverty approach is important to clearly identify on what indicators households are poor and based on that design proper strategies to address the problem. In light of this, the paper constructed indices of multidimensional poverty measures using non-monetary dimensions, which have been identified as important indicators of real poverty. Accordingly, with an overall multidimensional poverty level of 35%, households exhibited higher levels of poverty and deprivation in cooking fuel, access to electricity, decision making on income, livestock ownership, land ownership and access to improved sanitation. The percentage of poor and deprived households in each of these indicators, which ranges from 37% to 60%, is much higher than the overall (35%) deprivations and, on average; the poor were deprived in 58% of all the indicators.

This finding shows that multidimensional poverty in the study area is high and chronic. Thus, rural development or poverty reduction programs should focus on targeted interventions on the indicators that have higher deprivations. In other words, the government should spend substantial resources and exert its effort for the improvement of the living standards, asset possession and empowerment of households. Targeting would avoid the problem of resource misallocation. Targeted poverty reduction interventions would generate higher net benefits in terms of the overall multidimensional poverty reduction as they help policy makers to identify the poorest sections of households so that they can distribute the existing budget according to priority guided by higher deprivation sectors.

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