

Analyzing Poverty Status of Bamboo Producing Smallholders in North-West Ethiopia

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ABSTRACT

Exploring and understanding the multiple purpose of bamboo to enhancing and sustaining the livelihood of smallholders to alleviate multidimensional poverty are crucial. To conduct this study, 486 smallholders have been administering, from both Amhara and Benshangulguze regions. The data was collected through semi-structured questionnaire and analyzed in both descriptive and econometrically via stasoftware.

To examine the multidimensional poverty status of the small holders, multidimensional poverty index developer model was used by employing education, health and living standards as a latent dimension, as the finding shows that, 29.13 percent of the small holder farmers were multidimensional poor.

As a recommendation, organizing bamboo producers in cooperative, providing extension service, proper processing and value chain should have to under taken as a policy, to enhance the wellbeing and to build shock resilience smallholders.

Key words: Bamboo, Multidimensional poverty, Smallholder

1. INTRODUCTION

It is a global fact that rural households have an attachment to natural resources in general and to forest particular for consumption and non-consumption purposes. Among the various resources in the world, bamboo is one of the most important and has taken an attention for its numerous uses and its advancing new applications for the last twenty years on the globe Chirwa and Meliczek (2014). It offers substantial economic, social, and environmental uses, fuel wood, timber and non-timber products, construction materials, medicinal uses, and cultural values for local communities particularly for smallholders (Mohammadi et al., 2010, INBAR, 2010). Around the globe above 600 million people make their income from bamboo, and about 2.5 billion people based their life on bamboo with an estimated value of US \$ 7 billion per year FAO, (2005). To this effect, bamboo has enormous potential for enhancing the environment, resilience to shocks, reducing poverty, UNIDO, (2009). Particularly, the bamboo sector has the potential to end poverty. In addition to this as, INBAR (2015) stated in its report by promoting bamboo planting and cultivation can help the poor provide with a natural resource that they have access to and ownership over and principally resilient to natural and manmade shocks and reduce the severity of poverty.

Among the definition of poverty still no consensus due to its multifaceted nature, spatial, temporal, and personal differences Teshome, (2012). But in this article, it has defined as multidimensional deprivation in education, health, and living standards on bamboo producing smallholders. Currently, the prevalence of poverty in Ethiopia is 0.564MPI, particularly 0.588and0.584MPI in Amhara and Benishangul-Gumuz regional states respectively Alkire, S. and Robles, G. (2016).

However, Ethiopia is one of the countries in the world gifted a huge bamboo resource base Embaye (2000), Kelbessa et al. (2000) and Yemishaw et al. (2009). The country has about one million hectares of woodland bamboo, and from which 7% covers the world total and 86% of the African total Embaye et al. (2003), FAO (2006) and Wang (2006) and particularly in Awizone, Amhara regional state 2380 and 77947 in Assossa, Benshangulgumuze regional state in hectare Ensermu et al., (2000).

It was valued that over 1.2 billion USD can be made each year if the country's bamboo supply is appropriately utilized INBAR (2010). According to Arsema, (2008) finding that the farmers of the Shedem area in the Bale Zone of Ethiopia made 47% of their yearly income from collecting and marketing of bamboo culms. YenesewAssaye et al., (2013) studied the socioeconomic contribution of high land bamboo for household livelihood in Banja, district, northwestern, Ethiopia, and he revealed that the contribution of bamboo to the household's annual income is about 48.7%, and much more power full than other timber product forests. However, regarding its massive and higher potential is limited in income generation due to the existing marketing system of the bamboo sector is informal as such there is no interwoven system between product markets at local level and central markets.

Different researchers examine the contribution of bamboo on income generation and means of rural livelihood in the country, Ethiopia and particularly in north-west Ethiopia. For example, a research conducted in 2006 at bule district, gedee zone, SNNPR by FekaduTarekegn discovered that the support of bamboo to the gross household income was found to be only 5.6% of the total following crop and livestock production, which is one-fourteenth of the income from agriculture. Similarly the study carried on the Bale zone at ShedemKebele revealed that bamboo was collected by 99% of 362 respondent households and it's used as a secondary source of income next to agricultural earnings Tinsley and Bridget (2014). The income generating from bamboo subsidizes more to lower income smallholders, which accounts about 38% and used as a means of alleviating poverty.

The bulk of the empirical evidence available for the analysis of bamboo potential focused only the annual income earning from their resource and they did. Exploring the potential of bamboo in alleviatingmulti-dimensional poverty of smallholders didn't yet done. Consequently, this study was employed multidimensional poverty index model to analyze multidimensional poverty In line with this, this study used as a bench mark of literature review for further study and it contribute its own role in academic arena.

The specific objectives of the paper are; Analyses the multidimensional poverty status of bamboo producing smallholders.

By addressing these inquire; this paper has its own significant role in creating a chance for those smallholders to be diversifying their agricultural systems, for researchers show how to measure multidimensional poverty. More over this paper has a crucial role in providing full information for policy makers to incorporate bamboo resources as a policy option to mitigate multidimensional poverty of smallholders.

2. Research Methodology

Study areas, data sources and Sampling methods

This study is based on primary and secondary data from North-west Ethiopia of both high land and lowland bamboo species potential areas, particularly Amhara and Benshangulguuze regional states in 2018/2019. The survey was implemented two zones in Amhara and one zone from Benshangulegumuze. In both regions multistage sampling procedure was employed to select respondents. In Amhara a sample consists a total of 344 and from Benshangulguuze 142 respondents were considered.

2.1 ANALYZING MULTIDIMENSIONAL POVERTY STATUS OF BAMBOO PRODUCING SMALLHOLDERS

Poverty has been traditionally measured in unidimensional. Among the unidimensional measures Sen's Capability approach has taken a lion share and widely applied. This method comprises non-income constituents such as life expectancy, literacy and infant mortality to measure poverty. Sen (1985) focused on the superiority of life and underlined on the eradicating of problems so that people could have more freedom to function. He elucidated basic capability as the freedom to do basic activities essentially to eliminate poverty.

The capabilities approach (Sen, 1979, 1983, 1985, 1997) criticizes poverty measurements based solely on possessions because resource accessibility says not anything about what people do or may well do with those possessions. Abilities thus designate people's possibilities or degrees of freedom to satisfy certain functions, such as being well fed, obtaining employment and education. In this motivation, poverty is viewed as powerlessness to achieve certain basic functions.

In line with these various studies revealed that in both developing and developed country's estimation of poverty using unidimensional poverty measurements fail to adequately capture the proportion of the poor within the overall populace. This is because among other motives it fails to consider the multi-dimensional nature of poverty (Sen 2000; Alkire and Santos 2010). According to Sen (2000), human lives are maltreated and reduced in all classes of different ways, and the principal task is to recognize that deprivations of very different categories have to be accommodated within a general all-embracing framework. Thus, the view that poverty is composite and multi-dimensional renders the income and expenditure measurement approach inadequate.

Therefore, nowadays to analyze the multidimensional deprivation, multidimensional poverty indices (MPI) have been employed as preferred measurements of poverty due to their own advantages over unidimensional measurements. This is because of MPIs multifaceted advantages over other poverty measurement methods such as unidimensional poverty measures in income do not assurance an enhancement in other dimensions like health, education and living standard. From the perspective of the capability approach, poverty is not the only dispossession of income reasonably it is lack of other social indices, i.e. Health, education and other capabilities, Multidimensional poverty does not oscillate due to inflation Alkire and Santos (2010). MPI also has an advantage over HDI (Human Development Index) such as HDI is a macro miracle which measures welfare at the country level. It uses country means to reflect collective dispossessions in health, education, and standard of living. Although it can be disaggregated at micro group or regions such as district level or state level but the central problem is that it depends on macro data. These are combined in a way such that the data directly are not used to calculate the index. It could not pinpoint specific individuals, households or larger groups of people as equally deprived. But the MPI uses household as the unit of analysis, which is then summed up to country level. The MPI addresses the poverty circumstances by picking up how many people experience overlying dispossessions (prevalence) and exactly how many dispossessions they face meanly (intensity). By the way it is constructed, accessible information can be used proficiently and loss of information is diminished.

The MPI can be classified by the indicator to illustrate how the components of multidimensional poverty fluctuations for different regions, ethnic groups with useful implications for policy. Moreover, MPI has miracle welfares such as monitor the standard and components of poverty, target the poorest more efficiently, pinpoint poverty traps and chronic poverty, and relate the composition of deprivations in different areas or for different ethnic groups, and kinds of household, sabinaalkire (2009).

As a result of these multiple functions, Multidimensional Poverty Index (MPI) is considered to measure critical poverty (Alkire& Santos, 2010) and multidimensional poverty indices are used as a guide intended to measure critical poverty. Critical poverty denotes that multiple deprivations in terms of education, health, and living standards within their observable indicators such as if one doesn't accomplish five years of schooling in the household, does one school- age child joined in school, does one member from the household is malnourished, from the household does one or above children under 5 years have died, does the household at least accessible to electric, households does not access to solar energy, if households does not access to clean drinking water, if households does not accessible to adequate sanitation, if households does uses traditional energy for cooking (dung, fire wood, Charcoal),and if households house floor construct with mud, sand, dung Human development report (2015).

To analyze multifaceted poverty status of bamboo producing smallholders, the multidimensional poverty index employed for analysis using the software package of Stata version thirteen. Clearly, it presents as;

Multidimensional Poverty Index measurement latent variables and indices

Dimensions	Indicators of dimensions	measurements
Education	No one has completed five years of schooling in the household	1=no hh member complete five year schooling 0=otherwise
	At least one school- age child not enrolled in school	1=if school age chilled doesn't enrolled in school 0=otherwise

Health	At least one member is malnourished with in the 12months	1=if malnourished in kcal. 0=otherwise
	One or more children under 5 years have died within 12 months	1=if under five age child died 0=otherwise
Living standards	No access to electric	1=no access 0=otherwise
	No access to solar energy	1=no access 0=otherwise
	No access to clean drinking water	1=no access within 30minut walking 0=otherwise
	No access to adequate sanitation	1=no access 0=otherwise
	Household uses dirty cooking fuel (dung, fire wood, Charcoal)	1=no access to electric cooking fuel 0=otherwise
	Household has construct his house floor with dung, sand, mud	1=no accessible 0=otherwise

Based on this information the head count ratio, intensity of poverty MPI value and contribution of dimensions for deprivation were done as the following;

The headcount ratio (H) is the percentage of the multidimensionality poor in the populace:

$$H = \frac{q}{n}$$

Where, q is the number of people who are multidimensionality poor and

n is the overall populace.

The intensity of poverty (A) represents the proportion of the weighted constituent indicators in which, meanly deprived

$$A = \frac{\sum_i^q c_i}{q}$$

Where, c_i is the deprivation score that the i th deprived individual involvements.

The **MPI value** is the result of two measures: the multifaceted poverty headcount ratio and the intensity of poverty.

$$MPI = H * A$$

The **contribution of dimension j** to multidimensional poverty can be stated as

$$contrib\ j = \frac{\sum_1^q c_{ij}}{MPI}$$

3. Empirical Results

3.1 The role of bamboo on poverty alleviation

Bamboo has a huge potential for economic development and improving the living standards of smallholders in North-West Ethiopia. Bamboo provides a meaningful advantage to smallholder farmers with little access to diversified livelihoods. The incomes generated by households add more to the agricultural economy in general and act as poverty alleviates for smallholders through the producing, processing and sale of bamboo products. This finding is similar to the finding of FAO, 2005, a thematic study prepared in the framework of the Global Forest Resource Assessment 2005.

In the study area, bamboo is mainly used for constructing houses, building fences, sources of fuel-wood, fodder for animals, handicrafts, and particularly in Benshangul-gumuz region, for human food. Generally, the multiple purposes of bamboo are limited to traditional uses. This study agrees well with the finding of Fekadu Tarekegn, (2010). The contributions of highland bamboo (*Yushania alpina*) to rural livelihoods and status of its domestication at bule district, geddo zone, SNNPR.

The present study also indicated that, agriculture alone could not sustain the overall proportion of the households in the studied district and that support from other activities should complement household livelihoods.

To this end, the role and importance of bamboo were found to be crucial in filling income gaps and supplying the needs of households for additional income to fulfill basic needs, child educational expenses, health care, and means of surviving and resilient to different shocks.

Generally, the monthly mean incomes of 297 bamboo producers were 2965.5 while the 189 non-user mean is 1559.57 which is significant at α 0.05%. This finding disagrees with the finding of FekaduTarekegn, (2010) that indicates the contribution of high land bamboo to rural livelihoods at Blue district was insignificant.

3.3 Econometric analysis of multidimensional poverty status of smallholders

Based on international **conciseness** of the former MDG's and nowadays sustainable development goals (SDG's), this paper employed ten indices by customizing and belonging to three dimensions education, health, and living standards. These indices compose the multidimensional poverty index two of them for education, two for health and the rest of six indices for living standards.

The weight given to the dimensions was allocated equally, thus each dimension received one third or 33.3 percent. Each index within the dimensions also allocated equal weight, so that the indices in education and health received one-sixth or 16.7 percent and indices in living standards was received one eighteenth or 5.55 percent. In line with this, the analysis revealed that, the incidence of multidimensional poverty is 57.82 percent and 57.82 percent of the people live in multidimensional poor households. In addition to this, the intensity of multidimensional poverty is 50.38 percent and 281 smallholder farmers were deprived in 50.38 percent of the weighted indices. Onwards, 29.13 percent of smallholders were multidimensional poor.

Regarding multidimensional deprived smallholders, 162 (33.3 percent) bamboo producers were multidimensional poor while 189 (38.8 percent) were non-bamboo producers. This result revealed that, from 189 non-bamboo producer smallholders, 109 (57.67 percent) were multidimensional deprived and bamboo has its own role on alleviating multidimensional poverty through filling the income gap of the household to fulfill the educational, health and day to day living expenditure relatively than non-producers.

3.4 THE SHARE AND CONTRIBUTION OF EACH DIMENSIONS AND INDICES TO MULTIDIMENSIONAL POVERTY

After multidimensional poverty has been computed, decomposition of multidimensional poverty in to its dimension and indices were necessary to reveal how the households were multidimensional poor.

3.4.1 Education

Among the respondents, 96 of smallholders were deprived in school age children school enrolment indicator. In this indicator, 19.75 percent of the peoples were live in poor households and the average poor persons are deprived in 16.7 percent by school age children enrolment weighted indicator. The contributions of school age children school enrolment indicator to multidimensional poverty were 11.32percent.Regarding the household members 5 years of schooling, 253 of smallholders were deprived in household members 5 years of schooling indicator. In this indicator, 52.02 percent of the peoples were live in poor households and the average poor persons are deprived in 16.7 percent by household members 5 years of schooling weighted indicator. The contributions of household members 5 years of schooling indicator to multidimensional poverty were 29.84 percent.

Overall, 59 of smallholders were deprived in education dimension. In this dimension, 12.13 percent of the peoples were live in poor households and the average poor persons are deprived in 98.6 percent educational weighted dimension. The contributions of educational dimension to multidimensional poverty were 41.09 percent.

Education latent dimension and its contribution to MPI

Dimension and indices	Number of multiple deprived households (q)	Incidence of multidimensional poverty in% (H)	Intensity of multidimensional poverty in% (A)	Contribution to MPI
Education	59	12.13	98.6	41.09
school age children school enrolment indices	96	19.75	16.7	11.32
household members 5 years of schooling	253	52.05	16.7	29.84

Source: Own computation in stata version thirteen, 2019

3.4.2 Health

Among the respondents, 78 of smallholders were deprived in child death under 5 year's indicator. In this indicator, 0.16 percent of the peoples were live in poor households and the average poor persons are deprived in 16.7 percent by child death under 5 year's weighted indicator. The contributions of child death under 5 year's indicator to multidimensional poverty were 9.19 percent. Regarding the malnourishment, 200 of smallholders were deprived in malnourishment indicator. In this indicator, 0.41 percent of the peoples were live in poor households and the average poor persons are deprived in 18.37 percent by malnourishment weighted indicator. The contributions of malnourishment indicator to multidimensional poverty were 23.59 percent.

Overall, 31 of smallholders were deprived in health dimension. In this dimension, 0.06 percent of the peoples were live in poor households and the average poor persons are deprived in 16.02 percent health weighted dimension. The contributions of health dimension to multidimensional poverty were 35.08 percent.

Health latent dimension and its contribution to MPI

Dimension and indices	Number of multiple deprived households (q)	Incidence of multidimensional poverty in% (H)	Intensity of multidimensional poverty in% (A)	Contribution to MPI
Health	32	0.06	16.02	35.08
child death under 5 year's indicator	78	0.16	16.7	9.19
malnourishment	200	0.41	16.7	23.59

Source: Own computation in stata version thirteen, 2019

3.4.3 Living standards

Access to electric is one of the indices in living standards latent dimension and 456 of smallholders were deprived in access to electric indicator. In this indicator, 93.82 percent of the peoples were live in poor households and the average poor persons are deprived in 36.51 percent by access to electric weighted indicator. The contributions of access to electric indicator to multidimensional poverty were 17.87 percent. Beside to this, access to solar energy is the second indicator and 385 of smallholders were deprived in access to solar energy indicator. In this indicator, 79.21 percent of the peoples were live in poor households and the average poor persons are deprived in 14.5 percent by access to solar energy weighted indicator. The contributions of access to solar energy to multidimensional poverty were 15.09 percent.

Access to clean drinking water is the third indices and 148 of smallholders were deprived in access to clean drinking water indicator. In this indicator, 30.45 percent of the peoples were live in poor households and the average poor persons are deprived in 94.35 percent by access to clean drinking water weighted indicator. The contributions of access to clean drinking water indicator to multidimensional poverty were 65.73 percent. Regarding household using dirty cooking material like dung and wood 478 of smallholders were deprived in access to clean drinking water indicator. In this indicator, 98.35 percent of the peoples were live in poor households and the average poor persons are deprived in 5.55

percent by access to clean drinking water weighted indicator. The contributions of access to clean drinking water indicator to multidimensional poverty were 18.73 percent.

Households' access to improved sanitation employed as a one indicator to estimate living standards. As shown in the table, 166 of smallholders were deprived in access to improved sanitation indicator. In this indicator, 34.15 percent of the peoples were live in poor households and the average poor persons are deprived in 10.69 percent by access to improved sanitation weighted indicator. The contributions of access to improved sanitation indicator to multidimensional poverty were 6.5 percent. Regarding smallholders' house floor construction from dung, mud and sand, 463 of smallholders were deprived in house floor construction from dung, mud and sand indicator. In this indicator, 95.27 percent of the peoples were live in poor households and the average poor persons are deprived in 5.55 percent by house floor construction from dung, mud and sand indicator. The contributions of house floor construction from dung, mud and sand to multidimensional poverty were 18.15 percent.

Overall, 485 of smallholders were deprived in health dimension. In this dimension, 99.79 percent of the peoples were live in poor households and the average poor persons are deprived in 18.07 percent health weighted dimension. The contributions of health dimension to multidimensional poverty were 61.90 percent.

Living standards dimension and its contribution to MPI

Dimension and indices	Number of multiple deprived households (q)	Incidence of multidimensional poverty in% (H)	Intensity of multidimensional poverty in% (A)	Contribution to MPI
Living standards	485	99.79	18.07	61.90
Access to electricity	456	93.82	36.51	17.87
Access to solar energy	385	79.21	14.5	15.09
Access to clean drinking water	148	30.45	94.35	65.73
household using dirty cooking material like dung and wood	478	98.35	5.55	18.73
access to improved sanitation	166	34.15	10.69	6.5
house floor construction from dung, mud and sand	463	95.27	5.55	18.15

Source: Own computation in stata version thirteen, 2019

4. CONCLUSIONS AND POLICY IMPLICATIONS

Internationally, there is a consensus on post-2015 sustainable development goals. Among 17 development goals ending poverty is the first issue. Before and in 2015, government has performed different activity to reduce poverty targeted it as the first MDG's goals.

However, it was not enough and cannot be lift out smallholders from multiple deprivation.

As a result of this, poverty of smallholders in North-West Ethiopia among the indicators. To overcome such types of problems, bamboo is one of the means of living strategies and has a crucial importance as coping mechanisms to fill the income gap of smallholders' expenditure to sustain their livelihood. In addition to this, the purpose of bamboo appreciated above all due to its domestically multiple purpose. However, the systems of bamboo utilization were limited to traditional use and obsolete technology.

As a result of this, government should have to look towards these problems to solve and ensure the multiple purposes of bamboo up to its maximum potential. In line with this, to scale up the current production and to provide demand for bamboo production, setting bamboo production and utilization policy and strategies nationally is the optional way to improve and sustain bamboo livelihood of smallholders' in Ethiopian.

To utilize the current bamboo potential efficiently, to scale up bamboo production in the future for sustainable utilization, organizing farmers in bamboo cooperative, providing extension service on bamboo, providing technical training how to use bamboo in different way, proper processing of bamboo, value chain, replacing obsolete technology by modern technology should have to governmental policy and strategies intervention areas.

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