

Multidimensional Poverty Index for Urban Households in Ethiopia

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Abstract

The research has been undertaken with adherence to the basic themes of constructing a multidimensional poverty index. To that end, methodological setups concerning research design, sample technique & size, data source, data collection tools, and procedures deployed and data analysis were administered. The finding of the study shows acute deprivation of the households in living standard indicators, education, and health dimensions respectively. The incidence of the households that are multidimensionally poor and the intensity of the deprivations experienced were attested to be uncorrelated. In other words, the higher MPI incidence does not necessarily correlate with higher average intensity. Based on the data drawn from the households, the multidimensional poverty index is 0.1938. Dimensional and indicator contribution to the MPI reveals the dominance of living standard dimension's deprivation of the households. The study, therefore, concludes that the surveyed households are multidimensionally poor wherein living standard has the lion's share of contribution relative to education and health indicators. The researcher thereon recommended that targeting poverty reduction must consider and rigorously identify the incidence and intensity features of the households' deprivation. This is because these poverty facets require different approaches to reduce poverty.

Keywords: Multidimensional poverty, Deprivation, Cutoff, incidence, intensity

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1. Introduction

1.1. Background of the Study

“Don't ask me what poverty is because you have met it outside my house. Look at the house and count the number of holes. Look at the utensils and the clothes I am wearing. Look at everything and write what you see. What you see is poverty”. Poor man from Kenya in 1997 (Nayaran et al., 2000)

As stated by the United Nations Food and Agriculture Organization (UNFAO), (2006), poverty is being short of or the failure to achieve, a socially acceptable standard of livelihood. It is where individuals are deficient in command over economic possessions, face potential failure to participate in society, and are destitute of very basic (food, shelter... etc.) necessities for living. Poverty also covers multifaceted alienations; choices, self-esteem, and social insertion. Poverty become a global worry and a hard test for world development. The United Nations Food and Agriculture Organization's projection for three years (2014-2016) revealed that about 795 million people out of the 7.3 billion people in the world or one in nine will anguish from unceasing undernourishment. Nevertheless, the history and the statistics of the burden of poverty were proved by all actors in the field as is unequally spread amongst the areas of the world, among nations, and the regions and groups of the people.

Townsend (2013), a prominent researcher on poverty in focus stated in his article “... a growing number of people in developing countries in broad and their urban cores in particular face many socio-economic challenges and multi-form of deprivation or magnitudes of poverty”. Specifically, he stated Africa, compared to other continents, in both absolute and relative poverty is severe and increased significantly five times more than the number for Latin America, and twofold that for southeast Asia. Urban Africans are less prospective to live in multidimensional poverty than rural Africans but are more likely to be vulnerable to poverty.

The African Development Bank Group's (ADB) report for the years 2014/15 shows Sub-Saharan Africa was the zone with the largest number of starving people in the continent. The African Urban Research Initiative (AURI) (2014), outlined the urban population's status in its report stating that “in Ethiopia, though the mainstream of the population lives in rural areas; even then, with natural population growth, high rural-urban migration, and numerous other reasons, urbanization is taking place at a higher rate than ever before”. Urban poverty has, thus, been intensified by the increase in population that is beyond what the urban economy can support. Of the estimated total urban population of about 16 million, virtually 5.96 million live in a state of poverty.

However, the level of poverty varies throughout urban centers in Ethiopia as is true for other countries subject to diverse factors behind. The exact level, intensity, severity, and other aspects of poverty in the cities can only be determined by deploying measures that can be expressed either in qualitative or quantitative terms (Schmidt, 2009). But the task of doing so is more than complex because urban poverty is multidimensional, thus

understanding it presents several challenges. Alkire (2010), in his monograph on the multidimensional poverty index (MPI), stated that understanding urban poverty presents a set of issues distinct from the general poverty analysis. It involves different reasons to be carefully measured which present a panacea if handled properly and otherwise led to misinformation if a shred of mistakes is committed.

Therefore, how we measure poverty can significantly impact how we come to recognize, scrutinize and create strategies to influence it. For this reason, measurement methodologies can be of tremendous practical importance. Poverty can be measured either in unidimensional poverty or multidimensional poverty style (James, 2011). James continues to explain that unidimensional procedures can be pragmatic when a well-defined single-dimensional resource variable, such as income, has been nominated as the basis for poverty evaluation. The multidimensional poverty approach on the other hand is an extensive concept that reflects the overlapping deprivations that an individual or a household experiences. In a manner that addresses the multidimensional aspects of poverty Alkire & Santos (2010) constructed a new multidimensional poverty index that is currently being used at the national and worldwide levels as a poverty measurement tool.

According to Alkire and Santos (2010), the multidimensional poverty index is a measure of multidimensional poverty. It reflects deprivations in education through health outcomes to the living standards of the people. The MPI reveals a different pattern of poverty than unidimensional poverty measures, as it brightens deprivations directly. Hence, Alkire and Santos developed MPI have three magnitudes: health, education, and standard of living. These are measured using 10 indicators. Education includes two indicators; years of schooling and child enrolment. Health constitutes two indicators; child mortality and maternal death. Standard of living takes account of six indicators such as electricity, drinking water, sanitation, flooring, cooking fuel, and assets.

Mekelle City as a city residing in Ethiopia, a Sub-Saharan African country by no means could be strange to the anomalies of poverty. Hence, the study has come through the analysis of the poverty status of the households in Mekelle city, taking the multidimensional poverty index approach developed by Alkire & Santos (2010) as a guiding methodology. As previously stated, this methodology paves the way to study analyze, and measure poverty from the three dimensions; health, education, and living standard. Each dimension has constituent indicators. It follows that in this paper, the dimensions were thoroughly analyzed with their respective indicators, the incidence and intensity of the poverty were examined, a multidimensional poverty index was determined and the poverty dimension to which the study area is quite susceptible has been identified through the determination of the percentage contribution of each dimension and its respective indicators to the overall MPI.

1.2. Statement of the Problem

Understanding the position of the poor is an important research issue. It helps to identify the disadvantaged from the better off, which in turn allows a meaningful intervention to curb poverty (Theophile, 2014). Poverty is characterized by scantiness or lack of productive means to fulfill basic needs such as water, housing, schooling, clothing, health, and food (Asmamaw, 2013). The character of poverty in Ethiopia could be attributed to many facets, such as low living standards, poor health, and human development (Schmidt, 2009). By any standard, the bulk of both rural and urban people in Ethiopia are among the poorest in the world (Ayalneh, 2008). Though rates of urbanization in Ethiopia are quite low paralleled to other countries; urbanization is taking place, and as Ethiopia urbanizes, poverty converts more urban (Schmidt, 2009).

Urban poverty is multidimensional and embraces deficits from different dimensions such as living standards, health, and education (Ibid). According to Elasa (2011), two-thirds of the urban population in Ethiopia agonizes from some form of non-monetary deprivation related to their living conditions. The 2015/16 data of Tigray regional state's data about urban places indicate that poverty has prevailed amid the infrastructure improvements. It has been stated that due to the poverty cycle children in urban centers were inept to gain access to schooling, and large numbers of those who have had the opportunity face drop out before getting the basic skills. Moreover, health status in urban spaces is poor, though it has been said physical coverage of health centers improved. The data remarkably pointed out that Mekelle city is where residents anguish from different facilities to urban livelihood.

Therefore, a person may feel pain from deprivation of indicators of health, education, and living standard either separately or simultaneously. And so, emphasizing one factor alone, such as income or another, is not enough to capture the true authenticity of poverty. Rather Multidimensional poverty measures and analysis need to be used to create a more complete picture. The MP measure exposes who is poor and in what way they are poor; the range of different disadvantages they experience as well as provides a headline measure of poverty (Alkire and Santos, 2010).

Mekelle, Capital City of Tigray Regional State, ordinarily dubbed Northern Star City upon receiving its share from the recent achievement of Ethiopia's pleasing economic growth is rallying towards improvement at its level. The basic infrastructures, such as roads, water, electricity, transport... etc. are all improving in relative terms at an unprecedented pace. Nevertheless, Poverty remains a common malaise of the urban society in different dimensions; education, health, and living standard. The 2015/16 annual education reports of the city

revealed as many students drop out before finishing school. For instance, the Grade 1-8 dropout report of the city in that particular year indicated a total of 481 students left out their education (both from private and public schools). These could be attributed to different reasons, which may include the difficulty of getting to school and the cost of schooling. Health problems are also evident in the city as reports of the year 2015/16 revealed a total of 311 adults and 38 children were found stunted while relatively lower child mortality (31) was observed. Utility services in liaison with water supply, housing, and electricity sectors are all below the bar. The present daily water production capacity of the boreholes for instance is 24000m³, while the estimated daily demand as reported by the city water supply service office is 43000m³.

The consolidation of the poverty states into such a comprehensive dimensional base in Mekelle has not been performed. Rather usually, poverty measures in monetary terms (inadequacy of consumption or income) were taken as a poverty clarification. Even most academic researchers lean to such approaches of welfare measurements, consumption, expenditures, income, and others to delineate poverty. Research addressing the question of who is poor? How deep and severe is poverty? What are the basic and immediate (proximate) determinants of poverty? What do the welfare, and inequality of the inhabitants look like? were previously been undertaken in Mekelle city. Dawit (2012) has done a poverty analysis research in the city; come through the analysis of the poverty in the city in connection with the monthly consumption expenditure. Ataklit (2014) was another researcher who studied determinants of poverty in the city concerning gender-differentiated households which again connoted with finance at the center. The researcher reasons here that, they both have not considered the multidimensionality nature of the hell; poverty in that only lonely income, welfare or consumption measurements and contracted reference of analysis were applied.

Nevertheless, at this juncture, the researcher remained keen on the statement that “Money lacks the oomph to precisely exhibit the gloom of this destitution; poverty”. And so, has deployed multidimensional poverty examination and measure towards the poverty status of the sampled households. This study, therefore, has determinedly positioned multidimensional poverty analysis and measurements to delineate the actual manifestation and the level of poverty in the study area, Mekelle city. The multidimensional aspect of poverty has been measured and analyzed using Alkire and Santos's (2010) methodology of the multidimensional poverty index. The methodology developed by Alkire and Santos was introduced in 2010 as the new measurement of the global multidimensional poverty index. The methodology is currently in use by international organizations like World Bank to measure the poverty of world countries on an annual base. It is this current methodology that has been cascaded to study the multidimensional poverty of the study area.

1.3. Research Questions

The research questions section sets in bold the basic questions that are addressed in the study within the predetermined objectives and delimitations. Therefore, the study has addressed the following general and particular questions that are addressed in this paper.

1.3.1. General Question

- How do the three dimensions of poverty; education, health, and living standard appear in Mekelle City given the notion of multidimensional non-monetary poverty measurement?

1.3.2. Specific Questions

- At what level do the prevalence and the strength of multidimensional poverty in the study area exist?
- How much is the multidimensional poverty index of the study area?
- What is the proportion of the households vulnerable to poverty?
- What is the proportion of households in severe poverty?
- How much does each dimension contribute to the overall multidimensional poverty index of the city?
- Which dimensions have a whopping contribution to the MPI?
- How much each indicator has contributed to the overall MPI?
- Which indicators across the dimensions considered have immensely contributed to the overall MPI?
- To which dimension and indicator do the study is highly disposed?

1.4. Research Objectives

In the above sections, the background of the study, problem statement, and research questions are established. The objectives hereunder provide an accurate description of the specific actions taken to reach the aims held in the first place; multidimensional poverty analysis.

1.4.1. General Research Objective

- The main objective of the study is to analyze and measure the multidimensional poverty levels of urban

households in Mekelle city.

1.4.1. Specific Research Objectives

- To determine the incidence and intensity of multidimensional poverty.
- To determine the multidimensional poverty index.
- To determine the proportion of the poverty-vulnerable and severely impoverished households.
- To determine the contribution of each dimension and corresponding indicators to the overall MPI.

2. Review of Related Literature

2.1. Concept of Poverty

The meaning of poverty is widely debated and no single universally accepted definition abides. There is a continuum of definitions of poverty put forward by scholars in the field of development economics, the political economy of development, and related. There are scholars delineating poverty in terms of material deprivation. It follows that people are impoverished when they lack the material resources to fulfill their needs. Food, clothing, housing, and other resources are categorized under this perspective. Poverty's coincidence with material resources is put as "poverty consists of a core of necessities as well as a list of other necessities that change over time and place" (George cited in Specker, 1998), thus poverty lies in the lack of basic material needs. Poverty is also understood in terms of economic circumstances. The most notable economic indicator of poverty is income. Social scientists describe poverty as low income. Individuals or households are identified as poor in terms of income "if their income is below a particular threshold" (ILO, 1995).

There are scholars and international agencies that define poverty as multidimensional deprivations. For instance, the UN has defined poverty as:

a situation characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education, and information. It depends not only on income but also on access to services. (UN, 1995).

World bank's (2000) poverty definition:

Poverty is an unacceptable deprivation of human well-being that can comprise both physiological and social deprivation. Physiological deprivation involves the non-fulfillment of basic material or biological needs, including inadequate nutrition, health, education, and shelter. Social deprivation widens the concept of deprivation to include risk, vulnerability, lack of autonomy, powerlessness, and lack of self-respect.

Poverty can be viewed in absolute and relative terms, objective or subjective perspectives, and physiological and sociological deprivations.

The notable definition of relative poverty was given by Townsend (1979) as:

Individuals, families, and groups in the population can be said to be in poverty when they lack the resources to obtain the type of diet, participate in the activities, and have the living conditions and amenities that are customary, or at least widely encouraged, or approved, in the societies to which they belong.

Amartya Sen (1983), however, opposes relative poverty, rather defines poverty as absolute. His definition can be put as:

a failure to achieve certain minimum capabilities and, according to him, the lack of capabilities is absolute. However, capabilities are not fixed over time or in societies. 'Absolute' in Sen's definition means that there is a threshold in capabilities after which functioning within the society is no longer possible.

Poverty is highly associated with inequality. Inequality concerns an "even distribution of wellbeing" (Haughton and Khandker, 2009) whereas poverty emphasizes just the "lower end of the distribution" (McKay, 2002).

2.2. Approaches to Poverty Analysis

The very purpose of analyzing poverty is to determine who is poor and non-poor. Commonly, poverty is analyzed based on welfare and non-welfare parameters. The former is more related to "microeconomic concepts" while the latter confers "being more social in character than welfare approach" (Boccanfuso, 2004). The welfare approach relies on the individual's or household's real income and consumption expenditure to analyze poverty. This approach is advocated by World Bank, the IMF, and other agencies in the world development arena. On the other hand, the non-welfare approach is "more sociological in nature" (Oyekale, 2011). In a relative speech, the non-welfare approach is of more multidimensional aspects than the welfare approach. The non-welfare approach has its roots in two schools of thought. The First is the basic need approach views poverty as "unacceptable social inequality" (Kanbur, 2002). It hence analyses poverty from a social inequality perspective. The Second is the school of capabilities. Sen (1986) has explained the capability approach as follows:

An individual's ability to enjoy the available choices and get the real capability to realize the choice he/she has made. In this respect, poverty is regarded as the deprivation of choices available

for an individual to live life. It also indicates the deprivation of an individual's capabilities to realize that choice. Hence, poverty is no longer limited to the issue of income and/or education.

2.3. Measuring Poverty

There are several forms of poverty measurement. The commonly used poverty measurement among researchers is the Foster-Greer-Thorbecke Index (FGT, 1984) approach. This method takes into account the food and non-food consumption expenditures of the households. Ultimately, it deploys real consumption per capita to classify households as poor and non-poor. However, a variety of empirical evidence criticizes that measuring poverty based on income or expenditures involves errors and fails to make the distinction between "structural and transient poverty" (Kafle, K., McGee, K., Ambel, A. and Seff, I., 2014, Carter & Barrett, 2006a; Carter & May 2001). Sen (1983) has defined poverty as a "lack of capability, where capability is defined as being able to live longer, to be well-nourished, healthy, and literate". It is these historical remarks by Sen that have created fertile ground to evaluate poverty from various dimensions' perspectives. The notable poverty measurement approaches developed following Sen's works are the "asset-based approach and multidimensional poverty index" (Baulch and Hoddinott, 2000). The asset-based approach "takes into account household assets as a measure of wealth and employs both consumption and asset-based measures to analyze the dynamics of wellbeing" (FAO, 2011). There are two ways by which this approach makes multidimensional assets form a single wealth measure. On one hand, researchers "convert assets into monetary values and compute the aggregated wealth measure" (Liverpool-Tasie & Winter-Nelson, 2011). On the other hand, "others combine assets to create a weighted index using principal component analysis" (Booyesen, van der Berg, Burger, Maltitz, & Rand, 2008; Filmer & Scott, 2008; Moser & Felton, 2007; Sahn & Stifel, 2000). The critics of these approaches are that "no matter how they use assets, they still miss the true poverty dynamics as they lack longitudinal data at the household level and are forced to rely on cross-sectional or pooled cross-sectional data instead" (Dang & Lanjouw, 2013). As a solution, the multidimensional poverty index was forged by Alkire and Santos (2010).

The Multidimensional Poverty Index (MPI) considers several individuals' and households' deprivations across education, living standard, and health dimensions (Alkire and Santos, 2010). The development of the index is based on a household survey. An individual is identified as poor or non-poor based on the deprivations' weight of his/her household. The weights of the deprivation are then used to compose a measure of poverty. The MPI manifests the incidence and intensity of poverty. Poverty incidence indicates a "headcount ratio" while "intensity" indicates average deprivation by the poorest section (Alkire, Sabina, and Foster, 2011a).

MPI therefore can be used to form a comprehensive picture of people living in poverty. Then it makes it easy "to compare poverty across regions, countries and different urban or rural zones of a country" (Alkire, Sabina, and Foster, 2011b). The MPI provides a valuable substitute for income-based poverty measurements.

Multidimensional Poverty Index explained

Methodology for the Construction of Multidimensional Poverty Index

Table 2.1 The Dimensions, Indicators, Deprivation Thresholds, and Weights of MPI

Cutoff level in each dimension: We denote each deprivation cutoff of indicators in all dimensions, D by X . The deprivation cutoffs of indicators of each dimension, d are summarized by vector z such that

$$z = \sum_{i=1}^d X_i$$

The weight of X for the cutoff of each indicator in education and health is 0.165 while for the cutoff of each living standard indicator z equals 0.055 while z for each dimension must equal 0.33.

To get the overall weight of the multidimensional poverty index; the deprivation value of all dimensions, D , is then summed up, such that:

$$D = \sum \sum_{i=1}^d X_i \quad \text{Or} \quad D = \sum_{i=1}^d z_i$$

The deprivation index of each household is calculated by taking a weighted sum of the number of deprivations so that the overall deprivation index of each household in all dimensions lies between 0 and 1. A household, which is not deprived in any indicator, receives a score equal to 0.

The above equation could be breakdown as follows:

$$D = \sum X_1 + \sum X_2 + \sum X_3$$

Where $\sum X_1$ represents the summation of weight for indicators of education dimensions

$\sum X_2$ stands for the summation of the weight of indicators of health dimensions and $\sum X_3$ stands for the summation of the weight of indicators of living standard dimensions respectively. According to the values attached to each dimension d in the above table, each of them counts for 0.33 which yields a value of 1 for D . The computation of multidimensional poverty for a household i thus is represented as:

$$D = \sum_{i=1}^d z_i = 1$$

Thus

$$D = 0.33 + 0.33 + 0.33 = 1$$

Poverty cutoff: The poverty cutoff is the share of (weighted) deprivations a household needs to have to be identified as multidimensionally poor. We will denote it by k . A household i is identified as poor if it has an overall deprivation score, D higher than or equal to $\frac{1}{3}$ and non-poor otherwise.

Thus $D \geq k$

Where $D \in (0, 1]$ and might comprise deprivation cut off from more than one dimension; for instance, a household might be deprived, if a child died and no household member has completed eight years of schooling; cutoffs for health and education indicators respectively. Therefore, since indicators of health and education have a cutoff weight of **0.165**, each summed up together equals **0.33** which is the minimum weight to be considered multidimensionally poor. It could also be greater than **0.33** depending upon the indicators in which the household is deprived.

For concreteness, a household is said multidimensionally poor if it is deprived of three living standard indicators and when there is a school-aged child not attending school. Each indicator of living standard weighs **0.055**, thus three indicators contribute **0.165** which then added to **0.165** weights of not-school attending child and yield **0.33**; enough to be considered multidimensionally poor.

Censoring: For those households whose deprivation score is below the minimum poverty cutoff, $\frac{1}{3}$ even if it is non-zero, this is replaced by “zero”; this is what we call censoring in poverty measurement.

To differentiate between the original deprivation scores from the censored ones we use the censored deprivation score the notation (k) . Hence, if $D \geq k$, then, $D(k) = D$, but if

$D < k$ then $(k) = 0$. Thus, $D(k)$ represents the censored deprivation score of the poor and reflects only the deprived poor household.

Before censoring the poverty score yield of the households is only the raw poverty data that simply reveal voluntary and involuntary deprivations of the households. Censoring comes into play thus to identify the probable voluntary deprivation and the probably obliged deprivations that poor households are those who are caught in the trap of deprivations equal to or surpassing the poverty cutoff. The probably voluntary deprivations will be given a “0” score to avoid them being included in the computation of the multidimensional poverty index. Once the raw poverty was generated and described, then attention was directed to the censor-filtered poverty data that only included the deprivation scores of the righteously poor deemed households based on poverty cutoffs.

Incidence and Intensity: After censoring it mean the righteously poorest households are known and this underlies the central subject of the study. Given the true multidimensional poor household number, next is to compute the multidimensional poverty index for them. Before doing so the components of the multidimensional poverty index calculation should be determined. These components are the incidence of the multidimensional poor in the considered population and the corresponding average proportion of deprivations from the total considered deprivations for the poor. Below is a further explanation:-

The proportion of or the incidence of households (within given total households) that experiences multiple deprivations. Thus, is the proportion of poor households, according to the *MPI* (those deprived in at least one-third of the weighted indicators).

The intensity of their deprivations, the average proportion of (weighted) deprivations they experience. This is the average number of deprivations poor households experience at the same time. Properly, the first component is called a multidimensional headcount ratio (H)

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

Here, q is the number of households that are multidimensional poor after censoring and N is the total households (including multidimensional poor and probably voluntarily deprived poor as well as none deprived households).

The second component is called the intensity (or breadth) of poverty (A)

$$A = \frac{\sum D(k)}{q}$$

Here (k) is the censored deprivation (all the deprivation scores equal or above 0.33) score of the MP household iq is the total number of people who are multidimensional poor after censoring.

The point here is the gross value of the censored deprivation score of each multidimensional poor household is summed up and divided by the total number of households that are multidimensional poor after censoring.

Multidimensional Poverty Index: The multidimensional poverty index would therefore be the product of both (H) and (A). Thus:

$$MPI = A \times H$$

It is also called adjusted incidence Ratio (M_o)

Indicators and Dimensions Contribution to the Overall MPI

Once the MPI is computed, the next is to determine the contribution of each dimension to the overall MPI. This would help to identify the dimension to which the study area is more susceptible. The steps are; first, the contribution of all indicators in each dimension is computed followed by a summation of each dimension's indicators contribution to yield dimensional contribution. The formulae are as follows

$$\text{Contribution of an indicator to MPI} = \frac{\frac{h}{H} C(K)}{MPI \text{ of Sub City}} \times 100$$

Where h is the number of poor in that indicator

H is the total number of households considered in the survey place. (K) is the censored weight for the indicator in question. MPI Stands for the overall weight of the multidimensional poverty index for the study unity (city or sub-city); the deprivation value of all dimensions; D .

Contribution of dimension d to MPI = $\sum_{i=1}^d z_i$ Where, as expressed above $\sum_{i=1}^d z_i$

stands for the summation of the deprivation cutoffs of all indicators of each dimension, and MPI stands for the overall weight of the multidimensional poverty index of the study place (city or sub-city in our case); the deprivation value of all dimensions, D .

Interpretation of MPI and its Components

The multidimensional incidence ratio (H) represents people who are multidimensional poor from the society under consideration. They are disadvantaged at least either in all the indicators of a distinct dimension or a mix across dimensions such as a dead child in the household, poor source of drinking water, a dirty floor, and unimproved sanitation.

According to the MPI, this means that they are in severe poverty. Crisply put H represents the share of the multidimensionally poor households.

The intensity of poverty (A) represents the percentage of the weighted indicators in which on average people are multidimensionally poor. Thus, it is the average deprivation score of the multidimensional poor people.

The MPI represents the share of the households that are multidimensional poor adjusted by the intensity of the deprivation suffered. This adjustment is necessary because if we only look at H

we merely know that a given percentage of the population is poor. But are they all equally poor? Are they deprived in 100 percent of all the considered deprivations? Most likely they would not. The average poor household rather would be deprived of some weighted indicators; this is intensity. These are called "weighted" indicators because to create the deprivation score for all dimensions, D each deprivation indicator is entered according to its relative weight (see the weights as described in the table above).

The proportion of the poor is "adjusted" by the intensity of poverty, and that is why **Alkire and Foster (2007, 2011)** called MPI , the Adjusted incidence Ratio. For instance, if there was a society with 75 percent poor households, and all of them were deprived in **all** the indicators, then A would be "1", and thus the MPI would equal H . Alternatively, if there was a society where 100 percent of people were poor, then MPI would be equal to A .

Vulnerability and Severity

By considering the deprivation score of the households, the proportion of households vulnerable (at risk) to poverty and the proportion of households in severe poverty can be determined. According to multidimensional poverty breakdown analysis, households that recorded deprivation scores ranging from 20% to 32.9% are dubbed as poverty vulnerable households. While those households that recorded deprivation scores equal to or greater than 50% are classified as in-sever poverty households. The exact proportion of either vulnerable or severe households the number of households with the specified deprivation score is to be divided by the total number of the households considered. Specifically:-

Poverty vulnerable HH = $\frac{h}{H} \times 100$ Where h denotes the number of households with deprivation scores ranging from 20% to 32.9% and H denotes total households considered and

In – sever Poverty HH = $\frac{h}{H} \times 100$ where h is the number of households with a deprivation score greater than or equals to 50% and H denotes the total households considered.

2.4. Conceptual Framework

The study was undertaken per the conceptual map sketched in figure 2.1. The very objective was to adopt the multidimensional poverty analysis and measurement based on the household data through a survey. Once the pool of data was obtained through a survey from the households, a setting poverty cutoff assessment was employed. A deprivation matrix has been developed from which the calculation of the components of the MPI was computed. MP incidence and intensity have been determined which are then used to yield MPI by multiplication. From the deprivation matrix, the vulnerability and severity were also calculated. Last but not certainly the least is that the contribution of dimensions and indicators of the poverty examined also were computed.

Figure 2.1 Conceptual Framework

3. Methodology

3.1. Research Approach

The study has adopted a mix of both qualitative and quantitative approaches. The quantification of the deprivation value weights was applied to produce an index of the multidimensional poverty in the study. It was based on the qualitative data obtained through a survey. This was made possible with the application of the carefully worked out quantitative formulae developed by Alkire and Santos (2010). The use of the mix of these research approaches has been justified by the recognition of the fact that every method in each approach has its limitations and that the use of both methods could be complementary to each other.

3.2. Research Design

The study has used a descriptive research design to obtain information concerning the current status of poverty and to describe "what exists" concerning dimensions and indicators of poverty considered in the study. This design has been used as a pre-cursor to the construction of the multidimensional poverty index to make an analytical overview; giving valuable pointers as to what the indicators and dimensions are worth from deprivation and non-deprivation perspective setting in percentage statistics. Down the line, the survey has been administered to draw cross-sectional data regarding poverty from the sampled households.

3.3. Data Types and Sources

Qualitative data was collected and used given the milieu of the study. Quantitative data salvaged from the qualitative data was used in an accompanying fashion; in the analytical part to describe the full picture of the poverty of households. Both primary and secondary data sources were deployed in the study. The primary sources of the study were the sampled households from Mekelle city across sub-cities and ketenas. A variety of secondary data sources were used for the study. These include internet sources, books, past research, published journals, and various documents of the Mekelle city administration.

3.4. Target Population and Sampling

Target Population

The study shed light on the poverty status of the Mekelle City wherein households in the city made the population composition.

Sample Size

With the citywide coverage of the study; constituting all households of the Mekelle city for data collection proved practically not possible; time-consuming and expensive. Only part of the household has been used to draw inferences about the households.

The urban poverty headcount index of $0.257 = P$, computed in 2011, MoFED, (2012) was taken.

For different reasons non-response rate, r of 10% is considered in the sample.

The margin of error, \in assumed here is 5%.

Having all those inputs above the sample size was determined using the minimum sample size formulae of Fowler (2001) cited in Gebriel etal (2012). Accordingly, the calculated sample size yields 322 as follows:

$$\frac{Z^2 [P * (1 - P)]}{\epsilon^2 + n(r)}$$

$$\frac{1.96^2 [0.257 * (1 - 0.257)]}{0.05^2 + n()}$$

$$= 293 + 293(10\%)$$

$$n = \underline{\underline{322}}$$

Area Sampling

Non-Probability and probability sampling technique was employed to draw representative precincts of the city from which samples have been selected for the study. At the first step, all seven administrative sub-cities (Adi-haki, Hawelti, Semen, Kedemay weyane, Aider, Hadnet and Quiha) were taken indeed with intent. At the second step, as the sub-cities were further categorized into Ketenas; from the total ketenas within each sub-city, three ketenas were selected randomly. To that end, each ketena was assigned a unique number. The numbers were thoroughly mixed and placed in a vessel and waggged. Then, blindly, the researcher has selected three Ketenas from the total available for each sub-city.

Sample distribution

The total number of the samples, 322, as determined above in formulae, was purposely divided equally to each sub-city. Accordingly, 46 households were taken from each sub-city as participants of the study. In each sub-city, it was only from the randomly selected ketenas that the sub-city allocated 46 households were drawn. Two ketenas from each sub-city were accorded 15 households, while one ketena was accorded 16 households; a total of 46. To this end, the house number of the resident households in each ketena was taken from their administrative unit. Using the house number, systematic random sampling has been adopted to draw the study participant households from each ketena.

3.5. Data Collection Tools and Procedures

To collect the data from the household a standardized and structured survey questionnaire was used as a principal tool. Provided the structured survey questions interview has been conducted face-to-face with the respondents at the place of residence. The questions were prepared in a closed-end form so that responses were easily filtered which has assisted in the interpretation of data.

Data collectors were recruited to collect the data; considering their educational level (at least high school completion) and local language proficiency to comprehend English-prepared questions. They were passionately trained on how to approach the respondents and collect the data. The questionnaire was pretested to learn both the performance of the already trained enumerators and the appropriateness of the questions.

3.6. Data Processing and Methods of Analysis

Manual data processing was used and the data collected was edited, coded, and classified. Both field and in-house editing were applied. Field editing involved examining the data collected in questionnaires/schedules to detect errors and omissions and ensure that they are corrected. In-house editing was used that once the whole data collection was completed; a final and a thorough checkup was made.

Once editing was finalized the data was sorted and arranged for all the dimensions and indicators of the poverty considered. This was accompanied by assigning codes to data collected for each dimension and indicator. Then the data were made-ready for entry and subsequently entered into a computer system for analysis. To that end, SPSS (Statistical Package for the Social Science), version 20 was used.

The analysis and presentation of the study have established both qualitative and quantitative aspects. For multidimensional poverty index computation, a quantitative analysis of its level has been adopted using the Alkire and Santos (2010) method of measuring multidimensional poverty.

4. Results and Discussions

4.1. Demographic Characteristics of Households

4.1.1. Household Population by Age, Sex, and Sub Cities of Residence

Table 3.1 Household Population by Age, Sex, and Sub Cities of Residence

4.1.2. Households' Characteristics of Employment, Size, Marital Status, and Headship

Table 3.2 Household Characteristics of Employment, Size, Marital Status, and Headship

4.2. Construction of Multidimensional Poverty Index

In this section, the computation of the multidimensional poverty index and related calculations are delineated in detail.

4.2.1. Demonstrated MPI Computation: Quiha Sub City

This section provides the calculation of poverty measurements; incidence, intensity, MPI, the proportion of vulnerable households, and in-sever poverty households. Subsequently, the percentage contribution of each indicator and dimension to the overall MPI is determined. The detail calculation is computed just for one sub-city data only to exemplify the process. The whole city and the rest of sub city's calculations have been done the same way from the data. Therefore, the calculation is done for Quiha as follows from the data in the deprivation matrix developed for the city.

Poverty Incidence (H)

As it has been mentioned that poverty incidence refers to the proportion of households that are multidimensional poor (MP) from the total households surveyed. In other words, it is a proportion or the incidence of households (within given total households) that experience multiple deprivations. According to the *MPI* multidimensional poor households are those recorded deprivation scores equal to or greater than 0.33; at least one-third of the weighted indicators. From the deprivation matrix below, thus it is 24 households recorded deprivation scores of greater than or equal to 0.33 from the total 46 households surveyed in the sub-city. By applying the formula:

$(H) = \frac{q}{N}$ Here q is the number of households that are multidimensional poor after censoring and N is the total households (including multidimensional poor and probably voluntarily deprived poor as well as none deprived households).

We can now determine the poverty incidence in the sub-city

$(H) = \frac{24}{46} = 0.5217$ or 52.17% in other words, it means from the total 46 households examined 52.17% are MP.

Poverty Intensity (A): The intensity of deprivations is the average proportion of (weighted) deprivations they experience. It is the average number of deprivations poor households experience at the same time. The 24 multidimensional poor households have recorded a respective score in all weighted indicators. Therefore, these deprivation scores are to be summed up and divided by the MP households to yield the intensity. By applying the formula:

$$A = \frac{\sum D(k)}{q}$$

Here $D(k)$ is the censored deprivation (all the deprivation scores equal to or above 0.33) score of the MP household i

q is the total number of people who are multidimensional poor after censoring.

Now we can determine the poverty intensity in the sub-city:-

$$A = \frac{0.99 + 0.495 + 3(0.44) + 2(0.385) + 17(0.33)}{24} = \frac{9.185}{24}$$

$A = \underline{0.3827}$

In other words, the average proportion of (weighted) deprivations the MP households experience is 0.3827.

Multidimensional Poverty Index

The multidimensional poverty index would therefore be the product of both (H) and (A). Thus:

$MPI = A \times H$ It is also called adjusted incidence Ratio (Mo)

$$MPI = 0.3827 \times 0.5217$$

$$MPI = \underline{0.1997}$$

Poverty Vulnerable households

According to multidimensional poverty analysis interpretation, households those recorded deprivation scores ranging from 20% to 32.9% are dubbed as poverty vulnerable households. So, from the deprivation matrix below, there is no household with a deprivation score in the mentioned interval of the percentage. To yield the formula is

$Poverty\ vulnerable\ HH = \frac{h}{H} \times 100$ Where h denotes the number of households with deprivation scores ranging from 20% to 32.9% and H denotes total households considered.

By applying this vulnerability computation formula that is the exact number of households with the specified deprivation score divided by the total number of the households considered we can determine vulnerability.

$Poverty\ vulnerable\ HH = \frac{0}{46} = 0$ In other words, there is no household vulnerable to poverty among the 46 households examined from the Quiha sub-city.

In-sever poverty Households

According to multidimensional poverty breakdown analysis, households with those recorded deprivation scores equal to or greater than 50% are classified as in-sever poverty households. So, from the deprivation matrix, there is 1 (one) household with a deprivation score in the mentioned interval of the percentage. To yield the formula is

$In - sever Poverty HH = \frac{h}{H} \times 100$ Where h denotes the number of households with a deprivation score greater than or equals to 50% and H denotes total households considered.

By applying this severity computation formula which is the exact number of households with the specified deprivation score divided by the total number of the households considered we can determine the severity.

$in - sever Poverty HH = \frac{1}{46} = 0.021774$ In other words 2.17% of households are in severe poverty from the 46 households examined in the Quiha sub-city.

4.2.2. Contribution to MPI by Indicators and dimensions: Quiha SubCity

Once the MPI is computed, the next is to determine the contribution of each indicator and dimension to the overall MPI. This would help to identify the dimension to which the study area is more susceptible. The overall weight of the MPI of the sub-city under consideration, Quiha, as it is yielded in the above calculation is **0.1997**. Next is to determine how much each indicator and dimension has contributed to this MPI, 0.1997 for the sub-city. Don't forget it is the data in the deprivation matrix that still governs our steps. It is figured as follows:

Indicators' Contribution to MPI

$$\begin{aligned} \text{Contribution of indicator Child school attendance to MPI} &= \frac{\frac{h}{H}C(K)}{MPI \text{ of Sub City}} \times 100 \\ &= \frac{\frac{1}{46} * 0.165}{0.1997} \times 100 \\ &= \underline{1.8\%} \end{aligned}$$

$$\begin{aligned} \text{Contribution of indicator Adult year of schooling to MPI} &= \frac{\frac{h}{H}C(K)}{MPI \text{ of Sub City}} \times 100 \\ &= \frac{\frac{24}{46} * 0.165}{0.1997} \times 100 \\ &= \underline{43.1\%} \end{aligned}$$

$$\begin{aligned} \text{Contribution of indicator child death to MPI} &= \frac{\frac{h}{H}C(K)}{MPI \text{ of Sub City}} \times 100 \\ &= \frac{\frac{1}{46} * 0.165}{0.1997} \times 100 \\ &= \underline{1.8\%} \end{aligned}$$

$$\begin{aligned} \text{Contribution of indicator maternal death to MPI} &= \frac{\frac{h}{H}C(K)}{MPI \text{ of Sub City}} \times 100 \\ &= \frac{\frac{1}{46} * 0.165}{0.1997} \times 100 \\ &= \underline{1.8\%} \end{aligned}$$

$$\begin{aligned} \text{Contribution of indicator access to electricity to MPI} &= \frac{\frac{h}{H}C(K)}{MPI \text{ of Sub City}} \times 100 \\ &= \frac{\frac{24}{46} * 0.055}{0.1997} \times 100 \\ &= \underline{14.37\%} \end{aligned}$$

$$\text{Contribution of indicator sanitation to MPI} = \frac{\frac{h}{H}C(K)}{MPI \text{ of Sub City}} \times 100$$

$$= \frac{\frac{5}{46} * 0.055}{0.1997} \times 100$$

$$= \underline{3\%}$$

Contribution of indicator **source of drinking water** to MPI = $\frac{\frac{h}{H}C(K)}{MPI \text{ of Sub City}} \times 100$

$$= \frac{\frac{2}{46} * 0.055}{0.1997} \times 100$$

$$= \underline{1.2\%}$$

Contribution of indicator **flooring** to MPI = $\frac{\frac{h}{H}C(K)}{MPI \text{ of Sub City}} \times 100$

$$= \frac{\frac{24}{46} * 0.055}{0.1997} \times 100$$

$$= \underline{14.37\%}$$

Contribution of indicator **cooking fuel** to MPI = $\frac{\frac{h}{H}C(K)}{MPI \text{ of Sub City}} \times 100$

$$= \frac{\frac{24}{46} * 0.055}{0.1997} \times 100$$

$$= \underline{14.37\%}$$

Contribution of indicator **asset possession** to MPI = $\frac{\frac{h}{H}C(K)}{MPI \text{ of Sub City}} \times 100$

$$= \frac{\frac{7}{46} * 0.055}{0.1997} \times 100$$

$$= \underline{4.19\%}$$

The contribution of each indicator to the overall MPI, 0.1997 for Quiha sub-city is as calculated above, and in generic rule, the total contribution of all indicators must sum to 100% which is true in our case.

Dimensional contribution

Now, it is an easy task in that the calculated indicator contribution is to be categorized in their respective dimension; education, health, and living standard. Subsequently recorded contribution of indicators in each dimension is to be summed to yield each dimension's percentage contribution to the overall MPI. Accordingly:

The Contribution of education dimension d to MPI = $\sum_{i=1}^d z_i$

$$= \mathbf{1.8\% + 43.1\% = 44.9\%}$$

The Contribution of health dimension d to MPI = $\sum_{i=1}^d z_i$

$$= \mathbf{1.8\% + 1.8\% = 3.6\%}$$

The Contribution of living standard dimension d to MPI = $\sum_{i=1}^d z_i$

$$= \mathbf{14.37\% + 3\% + 1.2\% + 14.37\% + 4.19\% = 51.5\%}$$

Therefore, the above calculation procedures manifest the steps taken to compute the poverty incidence, intensity, MPI, the proportion of vulnerable households, and in-sever poverty households as well as the percentage contribution of each indicator and dimension to the overall MPI. Since the above calculation is just for the single sub-city; Quiha the calculation for the rest sub-cities and the whole city has been done the same way from their respective deprivation matrix.

The comprehensive result of the poverty incidence, intensity, MPI, the proportion of vulnerable households and in-sever poverty households across sub-cities and Mekelle as well as the percentage contribution of each indicator and dimension to the overall MPI is presented in the subsequent section in tables.

4.2.3. MPI and its Components: Whole Mekelle City and its Sub Cities

As noted earlier, the MPI is the product of two components; the proportion of the households who are MP (incidence) and the average proportion of weighted indicators in which the MP households are deprived (intensity) (Alkire and Santos, 2010). The table below presents the MPI for the whole Mekelle City and 7 (seven)

sub-cities and the MPI components. Based on MPI and its components, other calculations such as the proportion of the households vulnerable (or at risk) to poverty (including severe poverty), the number of MP households, and the overall ranking of sub-cities of Mekelle city are computed in the following table.

It is presented in the table below that from the considered 322 households across sub-cities in Mekelle city the proportion of multidimensional poor was attested to 162 (50.31%) households. Specifically, it is 162 households recorded a deprivation score of 0.33 across dimensions and indicators considered. From the multidimensional poor households, the rate of deprivation score is different across households, thus leading to “severe poverty” for some households depending on their deprivation score. According to multidimensional poverty index interpretations, the household that recorded a deprivation score greater or equal to 50% is said in severe poverty household. Hence, it is 2.2% of households from the total consideration that lies in severe poverty in Mekelle City.

The rest 160 (49.69) households are not multidimensional poor because their score record appeared below the minimum value threshold to be dubbed multidimensional poorer, thus, less than 0.33. This does not mean that these 162 households are non-poor. Rather, in relative discourse, they are in a good position in their deprivation records. According to the multidimensional poverty index delineation if a household didn’t qualify to be called multidimensional poor it could be in a vulnerable position of poverty. It has been clearly stated in Alkire and Fostre, 2011 multidimensional poverty index directives that a household is said vulnerable to poverty when it has recorded a 20%-32.9% deprivation score. Because of that, 8.8% of households are vulnerable to poverty, though they recorded a deprivation score less than the MP minimum threshold, 0.33% deprivation score.

The spillover effect of the above two components, incidence and intensity make up MPI for the city in general. It is the product of these two components that yield the MPI of the city. As a result, the whole city's multidimensional poverty index was calculated to be 0.1938. In other words, when the incidence of poverty is adjusted for intensity in the city, the adjusted poverty incidence proved 0.1938.

Per the MPI as it is presented in the table below, Adi Haki Sub City has the least MPI score of 0.1124, far below the City average of 0.1938. The sub-city also has the least MPI incidence of 26.09, which is also lower than the city's MPI incidence of 50.31%. However, a closer observation of the average proportion of the proportion of weighted indicators in which the MPI-poor persons in the Adi Haki sub-city are deprived (intensity) of 43.08% is not significantly different from other sub-cities which have a highest MPI poverty incidence. Rather, with exception of the Kedamay Weyane sub-city the rest sub-cities and even the whole of Mekelle city's poverty intensity is below that of the Adi Haki sub-city. Therefore, in terms of intensity, it is the most impoverished sub-city while based on the MPI it has been identified as the most developed sub-city.

Table 3.3 MPI for the city and the sub-cities

Not arbitrarily, the two sub-cities; Hadnet (56.52%) and Quiha (52.17%) have the highest MPI poverty incidence, higher than city record. MPI incidence is also high to some extent Ayder and Semen, both recorded 41.30% and limited in Kedamay Weyane (28.26%) and Hawlti (36.96%).

Interestingly, while the MPI poverty incidence appears to be extremely high for both Hadnet and Quiha sub-cities, the average intensity of deprivations between these sub-cities and the rest of the sub-cities in Mekelle is a marginal or not significant (see table above). In other words, the higher MPI incidence does not necessarily relate to the higher average intensity. For instance, in the table while sub-cities such as Adi Haki, Kedamya Weyane, and Hawlti, tend to have relatively the lowest MPI incidence, the average intensity of deprivation tends to be high. Moreover, for sub-city, Semen, a few percentage points separate the MPI incidence and the average intensity of deprivation.

The absence of association between the MPI poverty incidence and the average intensity of the deprivation raises questions regarding poverty intervention and targeting. This suggests that there may be different pathways to approach poverty reduction in Mekelle city. For sub-cities such as Adi Haki and Kedamay Weyane with a relatively low incidence of poverty and but higher levels of deprivation, interventions may not need to focus on reducing the number of the poor but rather on the average deprivation. In this direction, the intervention may require focusing on specific dimensions of deprivation. The opposite approach may be required in Hadnet, Quiha, and to some extent in Ayder, Semen and Hawlti where the incidence of poverty is higher. In these sub-cities, the highest level of incidence of poverty requires a comprehensive effort toward reducing the higher proportion of the total poor population.

Based on the MPI the sub-cities in the city were ranked wherein Hadneti, Quiha, Semen, Hawlti, Ayder, Kedamay Weyane, and Adi Haki are the ascending order of the ranks. Therefore, this rank shows the adjusted incidence for the intensity record of each sub-city.

4.2.4. Indicator and Dimension Percentage Contribution to Overall MPI

The table below demonstrates the contribution of the three dimensions of the MP (education, health and living standard) and the selected ten indicators to the overall city MPI, which is 0.1938.

This is very useful for understanding the major foundations of poverty in Mekelle City, and across sub-cities. The table reveals that across Mekelle the largest contributors to poverty are dimensions of education and living standards. Health plays a very minor role as its contribution is less than 2% of the total contribution to overall poverty. In generic terms, for all sub-cities and the city itself, the living standard appears to be the largest contributor, accounting for over 50% except for Hawlti where it has contributed below 50%.

The table also provides information on the specific contribution of each of the ten indicators to the overall poverty both citywide and across sub-cities. Thus, taking individually deprivation of each indicator across dimensions, no adult household member not completing 8 years of schooling is the single largest contributor to overall poverty. Citywide it is 42.83%, but remarkably higher in the two sub-cities, Ayder (45.5%) and Quiha (43.1%), more than the city average. It is a little trail behind the city-wide average in Hadnet (42.62), Semen (40.72%), and Hawlti (40%) sub-cities.

Table 3.4. Percentage contribution of dimensions and indicators to overall MPI

In addition to the indicator of no adult household member not completing 8 years of schooling, three indicators under living standards such as access to electricity, cooking fuel, and flooring contribute moderately to overall city poverty (see table above). Regarding the level of contribution of these indicators, there is not much difference in terms of the contribution to the overall poverty across the sub-cities.

5. Conclusion and Recommendations

5.1. Conclusion

The study has applied non-monetary poverty measurement, namely, the multidimensional poverty index (MPI). Using ten indicators drawn from three dimensions (education, health, and living standards) to analyze poverty. The findings are concluded as follows:

- ❖ The prevalence of multidimensional poverty and the average deprivation were found at 50.31% and 38.53% respectively. It has been checked that there is no association between the poverty incidence and the intensity of poverty across the sub-cities in the city. In other words, the higher MPI incidence does not necessarily relate to higher average intensity.

- ❖ Based on the poverty incidence and intensity figures the multidimensional poverty index was calculated to be **0.1938**. The ceiling of the index is 1 which represents absolute deprivation of households in all indicators and/or dimensions while the bottom surface of the index is 0 which represents the non-deprivation status of the households in all indicators and/or dimensions. It can therefore be deciphered that the MP index record of Mekelle city, 0.1938 represents moderate deprivation of the households examined across indicators and/or dimensions. This can be witnessed by visualizing the propinquity of 0.1938 to 0 (represents non-deprivation) than to 1 (that represents deprivation).

- ❖ Among the multidimensional poor the rate of impoverishment defers across households. Accordingly, the global multidimensional poverty measure dictates that those households with multidimensional deprivations rate of equal to or greater than 50% are dubbed “in-severe poverty”. Hence, it is 2.2% of households from the total households considered that lie in severe poverty in Mekelle City. Those households that don’t qualify to be called multidimensional poor could qualify for poverty vulnerability, and households recorded deprivation scores ranging from 20% to 32.9%; i.e., 8.8% of households are vulnerable to poverty, though they recorded deprivation scores less than MP minimum threshold, 0.33% deprivation score.

- ❖ From the point of view of contribution to MPI, the five indicators of the living standard dimension altogether contributed 53.47% to the MPI. The education dimension stood second in that perspective with a contribution record of 44.68%, while the health dimension’s impact has been demonstrated as insignificant, with only a 1.85% contribution rate. When it is seen on indicator bases distinctively, it is the years of schooling indicator in the education dimension that is leading the level of contribution to the overall MPI, with a contribution proportion of 42.83%. In the second rank, it is the three living standard indicators (improved dwelling floor, improved cooking fuel, and access to electricity) have contributed a lot, 14.37% each. The rest six indicators combined have brought only a contribution of 14.06% to the overall MPI. Thus, the city is exposed to the living standard poverty dimension and indicators based on the adult illiteracy in the education dimension.

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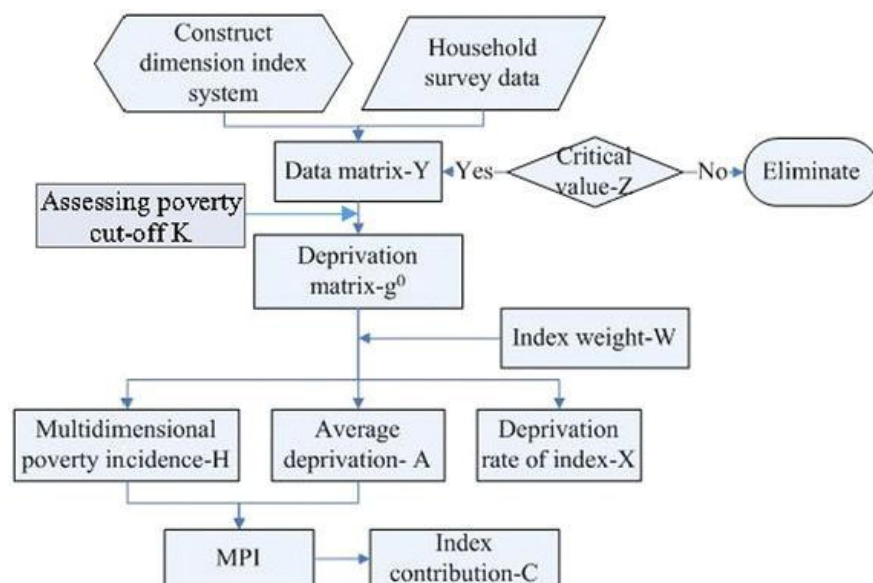


Figure 2.2 Conceptual Framework
 Source: Alkire and Fostre, 2010

Table 2.1 The Dimensions, Indicators, Deprivation Thresholds and Weights of MPI

Dimensions	Indicators	Deprivation Cutoffs (Deprived if...)	Weights
Education	Years of schooling	No household member completed eight years of schooling	1/6
	Child school attendance	Any school-aged child is not attending school	1/6
Health	Maternal Death	Death of female household member during pregnancy, during delivery and after delivery within the specified time period, the past 12 months	1/6
	Child death	Any child has died in the household	1/6
Living Standard	Electricity	The household has no own electricity wire direct from the city/18 grid	1/18
	Improved sanitation	The household has no sanitation facility; toilet	1/18
	Safe source drinking water	The household's source of drinking water is not safe; other than piped water, public taps, bore hole or pump, protected well, protected spring or rain water	1/18
	Flooring	The household has a dirty earth, sand or dung floor	1/18
	Cook fuel	The household cooks with dung, wood or charcoal	1/18
Assets	The household does not own more than one radio, TV, telephone, motorbike, or bicycle, similar vehicle	1/18	

Source: Alkire and Fostre, 2010

Table 3.1 Household Population by Age, Sex, and Sub Cities of Residence

Age Ranges			Gender Composition of the Households			Household Residence					
			Freq	%ge	Male	Frequency	%ge	Sub City	Frequency	%ge	
0-6	189	11.87	Female	834	52.39	Adi Haki	46	14.286			
7-14	267	16.77					758	47.61	K/Weyane	46	14.286
15-18	165	10.36							Hawlti	46	14.286
19-26	279	17.53							Quiha	46	14.286
27-40	381	23.93							Ayeder	46	14.286
41-65	213	13.38							Semen	46	14.286
>65	98	6.16							Hadnet	46	14.286
Total	1592	100									
*Dependency Ratio	≈ 9:7			1592	100				32	2	100

Source: Own Survey, 2017

Table 3.2 Household Characteristics of Employment, Size, Marital Status and Headship

Employment	Household Size					Marital Status			Headship		
	Freq	(%)	Size	Freq	(%)		Freq	(%)	Male	Freq	(%)
Employed	761	47.8	2	40	12.42	Married	707	44.41		258	80.12
Formal public	209	27.47	3	52	16.15	Single	801	50.31	Female	64	19.88
Self employed	193	25.36	4	63	19.57	Widowed	40	2.51			
Informal sector	198	26.01	5	44	13.66	Divorced	44	2.77			
Working unpaid	101	13.27	6	39	12.11						
Domestic skills	60	7.89	8	39	12.11						
Total	761	100									
Unemployed	831	52.2	>=8	45	13.98						
Total	1592	100		322	100		1592	100		322	100
Em. To Uem. R.	7.61:8.31		Source: Own Survey, 2017 Em. To Uem. R: Employed to unemployed ratio								

Source: Own Survey, 2017

Table 3.3 MPI for the City and each Sub City

City and Sub cities	Multidimensional Poverty			Households				
	Incidence: Households in multidimensional poverty (H) % households	Intensity of deprivation among poor (A)-Average % of weighted deprivation	MPI Range 0 to 1	Households vulnerable (or at risk) to poverty (intensity between 20%-32.9%)	Households in severe poverty (intensity higher than 50%)	Household(HH)	Number of HH MP	MPI Rank
Mekelle	50.31	38.53	0.1938	8.8	2.2	322	162	-
Adi Haki	26.09	43.08	0.1124	17.39	2.17	46	12	7
Kedamay Weyane	28.26	46.54	0.1315	28.26	4.35	46	13	6
Hawlti	36.96	41.41	0.1516	21.74	6.52	46	17	4
Quiha	52.17	38.27	0.1997	0	21.74	46	24	2
Ayder	41.30	36.18	0.1494	23.91	0	46	19	5
Semen	41.30	40.53	0.1674	21.74	0	46	19	3
Hadnet	56.52	38.71	0.2188	0	4.35	46	26	1

Source: own Survey, 2017

Table 3.4 Percentage Contribution of Dimensions and Indicators to overall City MPI

City and Sub City	MPI	Percentage contribution of deprivation of each dimension to MPI			Percentage contribution of each indicator to MPI									
					Education		Health		Living standards					
		Education	Health	Living Standard	Years of Schooling	Child school attendance	Child death	Maternal death	Electricity	Sanitation	Source of drinking water	Flooring	Cooking	>1 Asset
		%	%	%	%	%	%	%	%	%	%	%	%	%
Mekelle	0.1938	44.68	1.85	53.47	42.83	1.85	1.32	0.53	14.27	3.88	1.85	14.27	14.27	4.93
A Haki	0.1124	39.28	9.58	51.14	38.29	0	6.38	3.2	12.77	1.13	3.2	12.77	12.77	8.5
K Weyane	0.1315	39	0	61	36	3	0	0	12	10	3	12	12	12
Hawlti	0.1516	47	4.7	48.3	40	7	4.7	0	13.23	7	1.6	13.23	13.23	0
Quiha	0.1997	44.9	3.6	51.5	43.1	1.8	1.8	1.8	14.37	3	1.2	14.37	14.37	4.19
Ayder	0.1494	45.6	0	54.4	45.5	0	0	0	15.2	1.6	2.4	15.2	15.2	4.8
Semen	0.1674	40.72	0	59.28	40.72	0	0	0	13.57	7.4	3.57	13.57	13.57	7.86
Hadnet	0.2188	45.9	0	54.1	42.62	3.2	0	0	14.21	5.46	1.64	14.21	14.21	4.37

Source: own Survey, 2017