

**MEASURING MULTIDIMENSIONAL POVERTY IN KENYA;
AN APPLICATION OF ALKIRE-FOSTER METHODOLOGY**

By

OMACHE SARAH BONARERI

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DECLARATION

This research paper is my original work and has not been submitted for award of a degree or examination in any other university or institution.

Signature.....

Date.....

OMACHE SARAH BONARERI

X50/68038/2013

This research paper has been submitted for examination with my approval as the university supervisor.

Signature.....

Date.....

PROF TABITHA KIRITI NG'ANG'A

DEDICATION

I dedicate the work in this research paper to my parents Mr. Zachary Omache and Mrs. Hellen Omache, my six brothers Samuel, Samson, Simon, the late Steve, Sylvester and Seth for the invaluable support they gave me in pursuing my studies.

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LIST OF ABBREVIATIONS AND ACRONYMS

AF	Alkire-Foster
ASDI	Africa Social Development Index
BNA	Basic Needs Approach
CWI	Composite Wealth Indicator
DHS	Demographic Health Survey
FGD	Focus Group Discussion
G-CSPI	Global correlation sensitive poverty index
GDP	Gross Domestic Product
HDI	Human Development Index
HDR	Human Development Report
HH	Household
HPI	Human Poverty Index
KIHBS	Kenya integrated Household Budget survey
KNBS	Kenya National Bureau of Statistics
MICS	Multi indicator Cluster Surveys
MPI	Multidimensional Poverty Index
OPHI	Oxford Poverty and Human Development Initiative
SDGs	Sustainable Development Goals
UNDP	United Nations Development Programme
VIP	Ventilated Improved Pit latrine
WC	Water Closet
WMS	Welfare Monitoring Survey

1.0 CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.1 Background

A multidimensional poverty measure is an approach to measurement of poverty through counting of overlapping deprivations that the poor people suffer on a number of aspects of life that are of vital importance, such as; education, health, standards of living, social security amongst others, as opposed to pegging poverty on lack of income alone.

The Multidimensional Poverty Index (MPI) was introduced by the United Nations Development Programme (UNDP) in 2010. The computation of MPI was through the Alkire-Foster methodology developed by Sabina Alkire and James Foster in 2007. This is a flexible technique that can incorporate several different dimensions of poverty or wellbeing into a deprivation matrix, to create a composite measure of poverty. The product of the methodology was to produce a global MPI using three indicators; education, health and standards of living to report acute poverty in a number of countries. The international measure was named, the global MPI. Notably, the global MPI was computed using the achievements of individuals of three indicators namely; education, health and standards of living. The index is useful in determining the poorest of the poor for effective targeting and also determining the patterns and relationships in deprivation in the above dimensions. However, it is recommended that each country domesticates the methodology using the dimensions, indicators and cut-offs that are most appropriate to compute the National MPI. A national MPI, therefore, is a country-specific poverty measure that borrows from the global MPI albeit with different dimensions measured by locally appropriate indicators.

Other measures of poverty that do not focus on income as the only determinant of poverty, apart from the MPI, include the Human Development Index (HDI), Human Poverty Index (HPI), Africa Social Development Index (ASDI) and the Global correlation sensitive poverty index (G-CSPI).

1.1.1 Money metric/Income measure of poverty

The commonly used Money metric measure or income measure of poverty; a uni-dimensional poverty measure, uses the poverty line to determine if a person is poor or not. From this distinction, the portion of the population that is poor or that lives below the poverty line can be obtained as a percentage of the total population. The poverty line is obtained by coming up with a basket of food items that a person needs so as to attain the minimum calorific requirement to go about normal daily activities. Summing up these items to represent the monthly calorific requirement and costing them obtains the food poverty line. If the basic services such as

healthcare and education are added to the poverty line and the total costing is done for a month, the absolute poverty line can be obtained. In most cases, accurate data on income is impossible to obtain through the household surveys, thus, consumption expenditure is used as a proxy. The current World Bank international income poverty line is \$1.90 per day. The Kenyan Poverty line used in the analysis of Poverty using the 2015/16 Kenya Integrated Household Budget Survey was Ksh. 5995 for Urban and Ksh.3252 for rural as reported in ‘Basic report on well-being in Kenya’ (2018)

One of the uses of the income poverty measure in Kenya, is revenue allocation. The allocation to each county or region or sub-group is proportionate to the poverty incidence of the county or region or sub-group. Consequently, proportionately higher revenue is allocated to the poorer counties while the counties with lower poverty incidence receive proportionately lower revenue allocation. Counties receive the share of the revenue according to their contribution to national poverty as regards to income achievements only. But is poverty manifested only by lack of income?

1.1.2 AF methodology

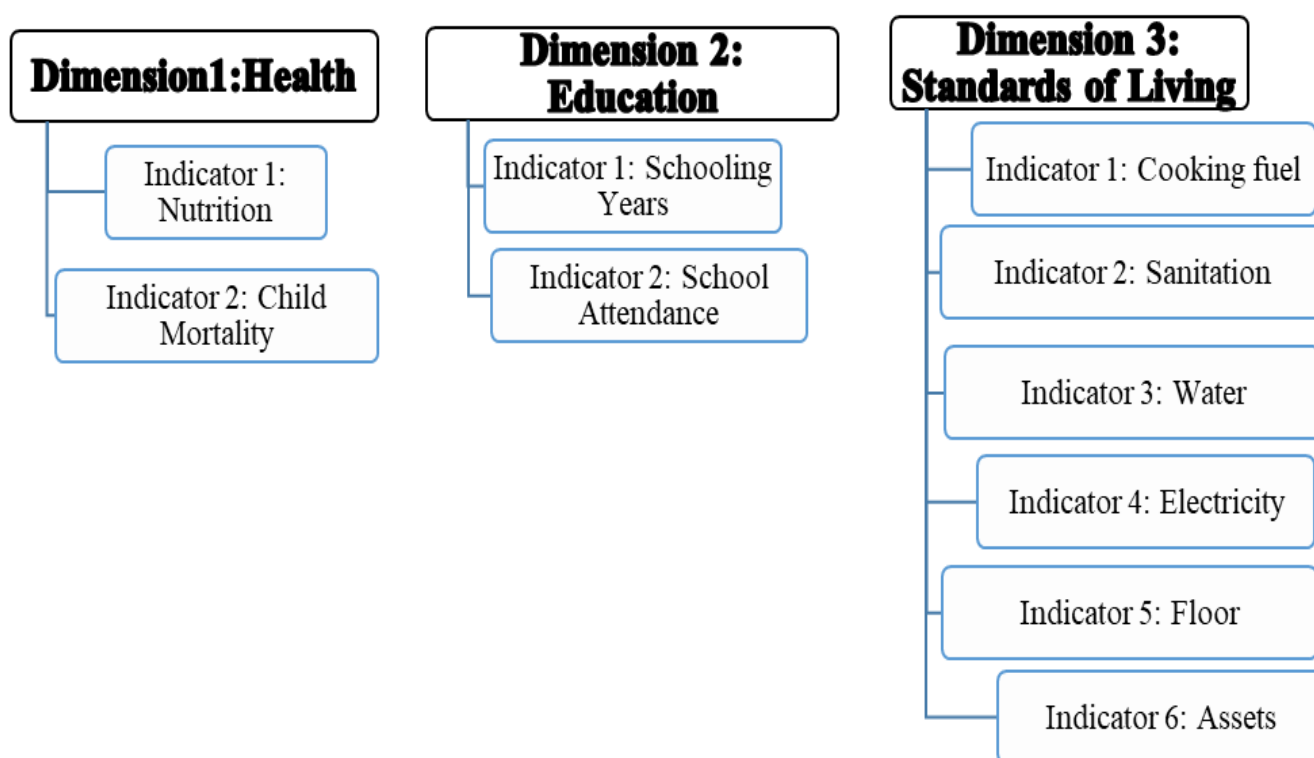
MPI computation using the AF Method utilizes the Headcount Ratio method to obtain the number of MPI poor in a country or region plus the intensity to which these poor people are deprived so as to obtain the MPI. This entails the use of the headcount, plus deprivations or achievements of individuals in other essential aspects such as health, education and standards of living and subjecting it to a cut-off beneath which a person is deemed poor or not. As opposed to the money metric approach, the multidimensional approach does not require costing of consumption items. Conversely, AF methodology uses indicators, deprivations, cut-offs and weights in deciding the level of poverty. Here various indicators are assigned achievements which are weighted and a cutoff is set by policy to determine if individuals are poor or not from their deprivations. The MPI therefore is the product of the headcount of those observed to be poor according to the dimensions and the weighted percentage of indicators, in which the multi-dimensionally poor are on average deprived.

(Ravallion, 2011) suggested that poverty is not only affected by market goods but also by non-market goods such as access to public facilities.

1.1.3 The Global MPI

The global MPI is an index that measure multidimensional poverty of a number of countries using a standard set of indicators and thus enables comparisons amongst these countries. The main aim of the MPI is to identify individuals living in acute poverty in developing countries. Since 2010, the United Nations Development Plan (UNDP) has released the global MPI for more than 100 countries. The dimensions and indicators used in computation of global MPI are uniform across the countries to allow comparability between countries and comparison of their MPIs over time. However, it is recommended that each country constructs a National MPI after policy makers should take a decision on what locally appropriate dimensions and indicators are to be used.

Figure 1: The dimensions and indicators in the global MPI



Adapted from Oxford Poverty and Human Development Initiative

All the three dimensions and ten indicators in the structure of the global MPI are important in measuring the welfare of individuals in Kenya. Findings from the 2015/16 KIHBS survey indicate that almost a third of children aged below five years in the rural areas were stunted. Despite stunting being an important aspect in measurement of nutrition status of individuals, it only

applies to children aged 5 years and below. The survey dataset included updated data on weights and heights for all household members of the sample which has however not been analyzed yet to determine the Body Mass Indexes for individuals. This limits the use of the nutrition dimension as part of the matrix to compute MPI in this research paper. In summary, the global MPI is a good approach to measurement of poverty globally but does not take into account the different contexts in different countries and the availability of data in some.

1.1.4 Multidimensional poverty in Kenya

This subject has received a lot of interest but little than expected reaction in Kenya. In poverty measurement and targeting, prudent policy makers recommend a much deeper than income measure of poverty but few concise measures have been initiated. Apart from the MPI constructed by UNDP in 2014 for each County, only one other analysis has been done on Women and Child poverty by Mariara et al (2011). The analysis provided multidimensional poverty profiles for children and women between 1993 and 2003. The Demographic Health Survey (DHS) dataset was utilized in this analysis. The measurement of MPI was done using only two indicators; health and asset ownership and the findings indicated that the highest contributor to multidimensional poverty was the composite indicator. Other interesting findings in this paper was that the understanding of the determinants of poverty can help in making sound policies especially with regard to poverty targeting in Kenya. Particularly, the ability to determine contributors to poverty.

The OPHI report on multidimensional poverty in Kenya by the dimensions and indicators in the global MPI and using the 2009 DHS reported an MPI of 0.229. It was further reported that the proportion of population that are vulnerable to poverty was 27.4 per cent while the proportion reported to be severely poor was 19.8 per cent.

1.2 Statement of problem.

The basic report on well-being in Kenya (2018) published by Kenya National Bureau of Statistics, revealed a poverty head count of 36.1per cent which was a drop in poverty headcount by 10 percentage points over a period of ten years. This drop is however not celebrated by all Kenyans since a good number still suffer several deprivations in basic needs such as education, health, sanitation, access to water among others as revealed in the Basic report (2018) published with findings from the same dataset. As at 2015/16, over 10 per cent of Kenyans aged above 3 years reported that they have never attended school. Use of this indicator to measure the welfare of

individuals as regards education increases accuracy in determining acute poverty. Ten per cent also reported to have completed pre-primary as their highest level of education. Despite devolution of health services and infiltration of health education and provision to the villages, the report shows that 3.8 per cent of Kenyans sought health services from unconventional sources which included shops/kiosks and traditional healers. It was observed that over 30 per cent of Kenyans were obtaining drinking water from unimproved sources while 9.8 per cent used non-conventional toilet facilities such as hanging toilet, bucket or no toilet at all. Only 14.6 per cent of Kenyans were using improved sources of cooking fuel which makes majority of Kenyans especially in the rural areas susceptible to respiratory illness due to indoor pollution during meal preparation. It was further observed that slightly over half had permanent flooring material, while the rest had their housing floor material made up of temporary material. (KIHBS Basic report 2018).

Notably, there are a number of poor people that are not being reached by the poverty alleviation strategies employed by the government and other actors. The most probable reason as to why they cannot be reached is because they have not been identified as deprived or acutely poor so as to be targeted first or differently. MPI seeks to measure the multiple deprivations that poor people suffer and hence give clear guidance to policy makers in targeting. This can only be done using the dimensions and indicators that are domesticated and hence reflect the most appropriate deprivations suffered by Kenyans.

1.3 Research Questions

The main question that this research paper sought to answer was, what is the National multidimensional poverty measure in Kenya? Specifically, the research questions to be raised in this bid are as follows:

1. What is the importance of multidimensional measure of poverty?
2. What dimensions and indicators are best suitable for measurement of multidimensional poverty in Kenya?
3. What strength does the multidimensional poverty measure add to the poverty discourse?
4. What is the multidimensional measure of poverty in Kenya using the chosen indicators?

1.4 Objectives of the Study

The broad objective of this research paper was to compute a national multidimensional poverty measure using the AF methodology. The specific objectives are;

1. To identify the importance of a national multidimensional poverty measure to complement existing poverty measures.
2. To determine the strength of the domesticated indicators in measurement of multidimensional poverty in Kenya.
3. To outline the levels of multidimensional poverty in Kenya using domesticated indicators.

1.5 Justification

Measurement of poverty guides the government in allocation of up-to 18 per cent of revenue as well as inform policy makers in formulation, implementation and monitoring of poverty alleviation strategies. A properly computed poverty measure should inform on who the poor are, how poor they are and where they are so that appropriate intervention measures can be applied. For policy analysis, it is essential to track the multiple and interconnected disadvantages poor people experience so as to attack poverty from all sides. Therefore, it is important for the policy makers to be provided with a measure that accurately justifies the use of resources to fight poverty or improve the welfare of citizens. In order for policy interventions on poverty to yield fruit, accurate targeting has to be done to avoid under-coverage and leakage.

One of the pre-requisites for the construction of a national MPI is availability of data. The Kenya National Bureau of statistics obtained household data through the 2015-16 Kenya integrated Household Budget survey (KIHBS) which was used in updating income poverty estimates. The dataset obtained from KIHBS is comprehensive and can be used to derive a national MPI for Kenya. It would be prudent to have a recommendation of which indicators are best suited for poverty measure as a basis for revenue allocation to be used in the fairly new dataset. The finding from this research will inform further analysis of the data set and form a recommendation for policy makers.

Interestingly, MPI can reflect the development status of a country or region as opposed to growth. Some countries record fast growth in their Gross Domestic Product (GDP) but are still not developed if focus is laid on other aspects apart from availability of income for the households. For instance, infrastructural development and how it positively impacts the households. A well-

constructed national MPI adds information value and can inform policy decisions. Furthermore, it can be used as a basis for monitoring the implementation of the Sustainable Development Goals (SDGs); particularly, goal 1.

1.6 Scope and Limitation of the study

The unit of analysis in this research paper are households or individuals depending on availability of data at either level. Some indicators that are available at household level, and in this case, the achievement of each member of the household/individual will be equivalent to the achievement of the whole household. Such indicators include the housing characteristics and asset ownership. The sample will be the total number of individuals sampled in the 2015/16 KIHBS. This is the most recent dataset publicly available for this analysis. Analysis will be predominantly carried out using STATA statistical package. Notably, in computation of MPI, only one dataset; sourced from one survey, can be used and hence it limits the number and scope of indicators that can be chosen to form basis of poverty measure. However, the Kenya National Bureau of Statistics conducts a continuous Survey that aims at updating the socio-economic data base. It is a rich data source that can be used to provide data for tracking of MPI over time.

1.7 Organization of the study

In addition to this chapter, the research paper is organized four other chapters. Chapter two covers the theoretical and empirical literature review of the study. The third chapter covers the conceptual and theoretical framework of the methodology used in the study. The fourth chapter outlines the data analysis and discussion of the findings. The last chapter outlines the summary, conclusion and policy recommendation from the finding of the research paper.

2.0 CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter contains the empirical and theoretical literature review. The theoretical review focuses on theories that were put forth as regards multidimensional poverty. The empirical review focuses on the works of other researchers on multi-dimensional poverty; the data used in constructing the global MPI and national MPIs, the dimensions chosen and the rationale behind these choices, the methodology, the strengths and limitations, recommendations and the findings will be considered. The lack of data on household consumption or expenditure in the 70's led to the use of the Basic needs approach used in measurement of poverty in Latin America. However, other countries with household survey data have for a long time used the income approach to poverty measurement. The SDGs goal one of eliminating poverty in all its forms however, brought to surface the discourse on multidimensional measure of poverty to shape the strategies used by governments and non-governmental actors in alleviating poverty in the subscribing nations.

2.2 The theories of the multidimensional aspect of poverty

The discourse of the multi-dimensional aspect of poverty measurement was opened by Sen (1976) when he considered the strength of an ordinal or axiomatic approach rather than a cardinal approach to poverty measurement. He pointed out the inability of the cardinal measure of poverty to satisfy the axioms of transfer and monotonicity. In measurement of poverty during that period, most scholars and policy makers had focused on identifying the poor and their proportion in relation to the total population while ignoring the aspect of analyzing the details of poverty. In his chapter, he termed the headcount as 'a very crude index' meaning that it did not show the finer details of the poor people. Sen termed the cardinal approach to poverty as insensitive to the differences in income among those living beneath the poverty threshold and the effects on welfare if income is transferred amongst the poor or with the non-poor. Sen summarized this information in two axioms; monotonicity and transfer axioms. The former means that a drop in the income of a person whose welfare achievement is beneath the poverty line must increase poverty of a group or region. The latter states that a transfer of income from a person whose achievement is beneath the poverty line to a person who is not poor must increase poverty.

Sen (1981) noted that poverty gap which is an income poverty measure satisfies the axiom of monotonicity but not the transfer axiom. Chakravarty (2006) supports Sen's postulates by bring

out the idea that poverty measurement has more facets than just income. Most proponents of multidimensional approach to poverty seem to agree that the multidimensional approach is complimentary to income poverty measurement approach as opposed to a substitute to income poverty. This means that poverty should be measured taking into account both market and non-market goods. Satya (2006) brought in the perspective of an individual or a household having a higher income but not being able to access non-monetary attributes in life. The examples given include poor infrastructure in some regions or natural calamities such as diseases, drought, and floods among others. Satya criticizes the income approach to poverty and recommends it as a second choice where a deprivation counting approach cannot be used.

Alkire et al (2015) analysed the trends in reduction of poverty in Sub-Saharan African countries. In the analysis, it was noted that reduction of MPI is more effective across the poor and regions as opposed to targeting using the income approach in which case, while the poorest people benefit, the poorer people are left unchanged. This reinforces Sen (1976) ideas on the two axioms of monotonicity and transferability which can only be satisfied by a multidimensional poverty measure. According to Alkire et al (2015) analysis, if the deprivations that the poor people suffer are reduced, the overall MPI is reduced. This simplifies the information needed by policy makers in devising poverty alleviation strategies.

2.2.1 Approaches to multidimensional poverty

The capability approach

This approach was brought forth by Sen (1979) with considerations that individuals could be having the same resources but their ability to convert these resources into satisfaction of needs differs, or, some people might have a lack of items that they have instilled into their day to day life such that provision of these items makes no difference in their satisfaction. Further, Sen considered that among options provided to individuals for satisfaction of their needs, if no option is valuable to the individual, then it is as good as no option at all. All these considerations are Sen's contribution to the criticism of the utilitarianism approach to poverty.

The basic needs approach

The Basic Needs Approach (BNA) approach used in the measurement of poverty in the Latin American countries in the 1970s is one of the earliest attempts to have a composite poverty measure using a number of indicators. The approach was first used in 1975 in Chile to map out individuals living in acute poverty. The indicators used in this approach were selected based on their direct association with income poverty, they could reflect a level of deficiency in

satisfaction of basic needs, they were comparable across the country and there was available data on the indicators. These same considerations are made when constructing a national MPI. The dimensions eventually used in the BNA were housing, sanitation basic education and economic capacity in the households. Individuals were identified as poor if they were deprived in at least one of the dimensions. The data source used for the analysis of BNA was census data which made it possible to obtain highly disaggregated poverty. The approach however was limited in measurement of the level of deprivation suffered by poor people and hence could not bring out the severity of poverty.

Intergrated approach

This approach to poverty measurement entailed the use of both the deprivations in basic needs as well as the lack of income poverty in determining who is poor. This method was pioneered in the Latin American countries upon availability of household information. The method allowed further break down of poverty findings into the poor by basic needs deprivations, the poor by lack of income and the poor by both aspects. The approach was however criticised by Boltvinik (1991) and even after revision, the approach lost popularity.

2.3 Empirical Literature on Multidimensional poverty measure.

2.3.1 The inception of the global MPI.

In the Human Development Report (2010) UNDP and OPHI released the findings of analysis of multidimensional poverty for 78 per cent of the World population living in 104 developing countries. In the analysis, the AF methodology was used to aggregate the dimensions of Health, Education and standards of living which form the structure of the global MPI. The AF methodology builds on Sen's capability approach. The poverty measure has been used by various policy makers in revenue allocation, targeting in cash transfers and monitoring the effectiveness of programmes. The structure of the global MPI has also been domesticated by some countries to compute the National MPIs.

The Global MPI has 3 dimensions and 10 indicators as illustrated in Figure 1. A person is identified as multi-dimensionally poor if they are deprived in at least one third of the identified dimensions. The MPI is calculated by multiplying the incidence of poverty (the percentage of people identified as MPI poor) by the average intensity of poverty across the poor. So it reflects both the share of people living in multidimensional poverty and the degree to which they are deprived. The MPI can be disaggregated to obtain results for regions and sub-groups.

The Global MPI report by OPHI (2019) reported that 23.1 per cent of the population in 101 countries were multidimensionally poor. The report revealed significant drop in deprivations in Ethiopia, India and Peru in the three dimensions of the global MPI after employment of different strategies to reduce poverty. Interestingly, MPI in South Africa was over eight times lower than the income poverty headcount. Over half of the population in South Africa could be living below the income poverty line but only 6.3 per cent are deprived in the ten indicators of the global MPI. In all the east African countries, the MPI headcount was higher than the national income poverty headcount.

2.3.2 National MPIs

Based on the global MPI, a number of developing countries have constructed their National MPIs to inform their policies in allocation of resources in order to reduce poverty. The dimensions, indicators, weights and cut-offs are tailor made for each country's context. The weight of the dimensions and indicators can never be uniform across countries, regions or groups hence the different normative choices. This is also an open ground for researchers to compute the MPI indexes using different dimensions to determine the optimum sets for different situations and subject to availability of data.

The Columbian government domesticated the global MPI and computed its 2016 national MPI using 5 equally weighted dimensions; education conditions, childhood/youth, labour, health and household utilities. The indicators of these dimensions were 15 and the unit for analysis is the households. Mexico also constructed its national MPI using the dimensions of educational gap, access to healthcare, access to social security, basic services at home, quality of living spaces, access to food, the current income per capita and the degree of social cohesion. The composite index used the multidimensional approach in complimentary with the income approach and an individual was considered poor if their income was less than could afford them the basic goods and services and still were deprived in at least one of the six indicators in the Mexican national MPI structure. (OPHI 2015)

Outcomes of computation of the National MPI are unique to countries, regions or groups. For instance, in 2013, in South Africa, poverty measured using the World Bank's \$ 1.90dollar per day poverty line was 11%, the MPI poor were also found to be 11%. However, only 3 % of the population were found to be poor by both measures. This implies that, some individuals could be lacking income, but they are not deprived of many attributes that contribute to their wellbeing.

2.3.3 Review of multidimensional Poverty measurement in Kenya.

In 2014, UNDP and OPHI used the Demographic and Health Survey dataset to compute the global MPI for Kenya using the global MPI. From the findings the MPI headcount was 47.8 per cent while the intensity of poverty was 48 per cent leading to an MPI of 0.229. The analysis was disaggregated by county and Mandera had the highest MPI of 0.23 while Nairobi had the least MPI of 0.02. The indicators that were the highest contributors to multidimensional poverty were child mortality and nutrition at 15 per cent each. The least contributor to poverty was school attendance at 6 per cent. When the MPI was compared with the MPI computed from the 2003 DHS data, there was a drop in head count of the poor and deprived in each indicator. However the marginal decrease was least in nutrition which was also one of the highest contributor to multidimensional poverty. (OPHI 2011). In 2007, the global MPI for Kenya was estimated at 0.187 in the OPHI country briefing 2017. Both the MPI head count and intensity of deprivation in the global MPI indicators had reduced to 39.9 per cent and 47 per cent respectively compared to the MPI measures in 2014. Child mortality and nutrition were the highest contributors to multidimensional poverty in 2017 at 17.9 and 15.1 per cent respectively. (OPHI 2017)

The computation of the global MPI in Kenya in 2019 using the 2014 DHS dataset showed an MPI of 0.178. The MPI head count and the intensity of deprivations were 38.7 per cent and 46 respectively. Interestingly, the contribution of child mortality to multidimensional poverty dropped drastically as compared to the situation in 2017. The highest contributors to multidimensional poverty in 2019 were nutrition and housing.

J. Mariara et al (2011) analyzed the 1993, 1998 and 2003 DHS data to compute child and women multidimensional poverty using the Alkire Foster methodology. The deprivation matrix was composed of two dimension; Wealth and Child health and four indicators. The indicator used to measure wealth was a composite indicator- Composite Wealth Indicator (CWI). The other three indicators were used to measure the dimension of child health; child height for age, child weight for age and the standardized height for weight. From the analysis 41.2 and 44 per cent of children and women respectively were identified as multidimensionally poor if the cut-off was set at deprivation in more than one indicator. The indicator that was identified as the highest contributor to poverty was the CWI.

2.4 Summary of the Literature review

From the literature review, it is evident support for a multifaceted approach to poverty given that income alone, or market goods cannot be solely used to describe the well-being of an individual. There is glaring evidence in South Africa in 2016 where multidimensional head count and the income poverty based on \$ 1.90 per day poverty line were equal but the headcount that were identified as poor in both were only 3 per cent. The global MPI headcount and national poverty in Kenya has been comparable for 2014, 2017 and 2019. However, this does not translate to the same individuals that are income poor being the same that are multidimensionally poor. For targeting in this case, the cutoff for the multidimensionally poor has to be reviewed to identify the individuals living in acute poverty.

There is also emphasis of the use of the multidimensional approach as a compliment to income approach to poverty measurement as used in Mexico and other Latin America countries and as incorporated in the Mariara et al (2011) in the CWI indicator whilst measuring the women and child poverty.

On tracking the Kenyan Global MPI between 2014 and 2017, child mortality and nutrition were the leading contributors to Multidimensional poverty. However, in 2019, the highest contributors were nutrition and housing. The policy intervention to improve nutrition are seemingly less effective as compare to interventions in child mortality that yielded a decline in contribution of the latter to multidimensional poverty. However, exploring the dataset exposes data gaps that lead to under estimation of the nutrition achievements especially for adults. This necessitates the review of the structure as recommended by OPHI to suit the country's context.

3.0 CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter explains in detail the application of the AF methodology to compute the National MPI for Kenya. It presents the theoretical and conceptual framework of the model, the pre-requisites and the data sources used in this study. As indicated in Chapter 1, this research paper will domesticate the global MPI model to obtain a National MPI for Kenya using the 2015/16 KIHBS dataset. The next section explains the conceptual framework of the AF methodology

3.2 Theoretical framework

In order to compute an MPI, there are some pre-requisite considerations that are made as regards to the purpose, dimensions, indicators, weights and cut-offs. All these choices are informed by the context of the measure and are subject to the availability of data. The process of making these choices involves one or many sittings with the stakeholders to discuss, agree on and justify the dimensions and indicators that are best suited to measure poverty in the country. Alkire (2015) recommends that the choice of particular dimensions and indicators be accompanied by a write-up explaining why the indicators were included and their contribution to the model as well as why other indicators were not included. The requirements for construction of a national MPI are as follows;

3.2.1 Data from a single source

For the purpose of constructing a National MPI, just like in the global MPI, there is need to have data from one survey or census from which all indicators in the structure are drawn from. Common sources of data for construction of MPI include Household Budget Surveys, Demographic Health Surveys (DHS), Multi indicator Cluster Surveys (MICS), Welfare Monitoring Survey (WMS) and the population and housing censuses. The data source chosen should be rich enough to satisfy the demand of information to be used in the matrix. For instance, if we want to define the dimension of education using school attendance as an indicator of poverty, then the survey in question should be able to provide information on school attendance for appropriate ages. As already noted in Chapter one, one limitation in construction of MPI, is that, it is not possible to obtain information on one dimension or indicator from one survey and supplement with information from another survey since the samples are different.

3.2.2 Unit of analysis

Analysis can be done at individual or household level. In the Global MPI, a person is deemed as deprived or not based on the achievement of the household in which they belong; the analysis of the global MPI is therefore based on household achievements which is assigned to the individuals belonging to the households. This assumes the principle of shared negative effects or externalities within the households. This is due to the fact that data on some indicators is not available on individuals and hence is imputed from data at household level. In Kenya, the 2105/16 KIHBS dataset, which will be used in this analysis presents data at individual level for health, education and economic engagement. So deprivations for individuals in as far as these dimensions are concerned will be obtained based on individual achievement. However, in measuring the standards of living, the household achievements will be used since the individuals within the household are within the same standards of living as described by the kind of house they live in, the kind of assets they own, sanitation and access to water.

3.2.3 Pre-construction Normative Choices

In construction of MPI, prior choices have to be made on several aspects. These normative choices to be made are; the purpose, space, unit of identification and analysis, the dimensions, the indicators, the deprivation cut-offs, weights and poverty cut-offs.

Purpose of the MPI: In construction of the MPI, the purpose of the measure should be clear. Different users have different purposes for the MPI. For instance, OPHI and UNDP use the global MPI to measure acute poverty in over 100 developed countries in the spirit of leaving no one behind. The measure is also used as an indicator in monitoring goal 1 and target 1.2 of the SDGs. A number of countries have also constructed their national MPIs with different purposes. Armenia, Chile, El Salvador and Mozambique compute their national MPI to use it to compliment the national income poverty measure. Other countries such as Bhutan and Philippines use it to inform poverty targeting and alleviation programmes. Nigeria constructs the national MPI to identify the dimension that contributes most to multidimensional poverty. UNDP, OPHI (2019)

Dimensions: These are conceptual categories of indicators of poverty. They summarize the aspects of poverty for the user of the information. In construction of the Global MPI three dimensions; Education, health and standards of living are used. Sabina Alkire (2008) recommends a write up on justification of the choice of dimensions in MPI reports and papers to ensure the reader gets a clear picture.

The common considerations in choosing dimensions are the purpose of the poverty measure, the existing data, result of deliberations and consensus with interested parties. This is usually an intensive thought process for the policy makers since the index is mostly used to inform major planning decisions. In justification of the dimensions used in construction of the National MPI there is need to explain why each dimension is claimed to be of value to people, a description and defense of how the dimensions were obtained, list the dimensions and pointing out why some indicators were not feasible.

Indicators: These are variables that define a particular dimension of poverty. They are the aspects that describe a dimension and enable the setting of thresholds to define who is deprived or not.

In MPI, the choice of dimensions and indicators to be used has been termed as a complex step due to the involvement of many stakeholders and other preconstruction requirements. Alkire (2008) points out that there are no standard dimensions that can be used to compute national MPI nor is there a particular formulae to guide the selection of dimensions and indicators. A number of studies have been conducted and no explanation has been made as to why particular dimensions or indicators were used. This creates lack of trust in the reader or user of the information.

The global MPI uses the following dimensions and indicators in obtaining the MPI.

Education

In education, the years of schooling and school attendance are the two indicators used to determine whether a person is derived or not.

Health

In health, level child mortality and nutrition are used to determine whether an individual is poor or not.

Standards of living

Under the standards of living, various household characteristics are used to measure poverty. These are; the house flooring material, asset ownership, the source of drinking water for use in the household, availability of electricity, sanitation and the source of cooking fuel.

Weights and cut-offs

Cut-offs: In the AF methodology, there are two cut-offs to be set. The first is the deprivation cut-off which as defined as the minimum level of achievement of an individual or household in a

particular indicator that indicate that the individual is not deprived in that indicator. The other cut-off is the poverty cut-off. This is the threshold total sum of deprivations beneath which an individual is deemed poor. In the AF methodology, the deprivations have to be weighted before they are totaled to obtain the poverty cut-off.

Weights: When a number of dimensions and indicators are chosen for computing the MPI it is given that they will have different weights as far as their contribution to welfare or poverty is concerned. This will also depend on the contexts; regions or groups. Therefore, there is need to weight the achievements in each indicator by assigning weights for each dimension and subsequently each indicator to the achievements. The weights of the indicators add up to 1 that should be replicated in the dimensions.

Weighted deprivation; This is simply the achievement in an indicator after considering its weight i.e. the achievement multiplied by the weight of that particular indicator. OPHI provides the term deprivation score for the sum of these weighted deprivations for an individual.

The global MPI matrix is made up of three dimensions with ten indicators. Each of the 3 dimension is given equal weight (1/3 each). For education, the two indicators have a weight of 1/6; $1/3 \times 1/2$. This also applies to the health dimension. The standards of living indicators however have a weight of 1/18 each since they are 6 in number ($1/3 \times 1/6$). The summary of the Dimensions, indicators and weight of the global MPI is presented in Table 1.

Table 1 the indicators and weights in the global MPI

Dimensions	Wight	Indicators	Weight
Health	1/3	Child Mortality	1/6
		Nutrition	1/6
Education	1/3	Years of schooling	1/6
		School attendance	1/6
Standards of living	1/3	Cooking fuel	1/18
		Sanitation	1/18
		Source of drinking water	1/18
		Electricity	1/18
		House floor material	1/18
		Assets Ownership	1/18
Total	1		1

Adapted from the Global MPI

The cutoffs set for each indicator in the global MPI are as follows:

Years of schooling; If any member of the household has less than five years of schooling then the household is deprived in education

School attendance; If there is a child of school going age who is not attending school then the household is deprived in education.

Child mortality; If any child below the age of 5 years had died in the family then the household is deprived of child mortality.

Nutrition; If any member of the family reports malnutrition then the household is deprived of nutrition

Cooking fuel; the household is deprived if the members use wood, charcoal or dung as a source of cooking fuel

Sanitation; the household is deprived if the members do not have access to toilet facilities or the facility to number of people ratio is too high.

Electricity; the household is deprived if there is no access to electricity

Asset ownership; the household is deprived if it does not own more than one of these items; television, radio, bicycle, telephone, motorcycle or refrigerator and does not own a car or tractor.

House flooring material; the household is deprived if the house floor material is dirt, dung or sand.

Source of drinking water; the household is deprived if the members do not have access of clean drinking water or the source of clean drinking water is more than 30 minutes away.

The global MPI dimensions can easily be applied and are comparable universally. However, not all the indicators can be obtained from the available datasets in various countries. Some of the dimensions or indicators may also be deficient in measuring poverty in some contexts. Consequently, a number of countries have constructed national MPIs and used them for policy decisions

3.2.4 National MPIs in Africa and Latin America

In 2014, Chile designed a national MPI to include four dimensions; Health, education, employment and social security, and housing with a total of twelve indicators. In the design, an

individual was deemed poor if they were deprived in an equivalent of one whole dimension. The structure was revised in 2016 and an additional indicator on networks and social cohesion was included. Furthermore the housing dimension was expanded to include the local environmental conditions totaling the number of indicators to 15.

In 2014, South Africa computed the national MPI using four dimensions namely; Education, health, living standards and economic activity with a purpose of complimenting the income poverty measure.

3.3 Conceptual Framework

In this study, the purpose of constructing the national MPI is to determine the level of multidimensional poverty using an indicator matrix that is appropriate for the Kenyan context, to determine how multidimensional poverty compares with national income poverty and to form recommendations on how the measure can be used for policy decisions such as revenue allocation and targeting in cash transfer programmes. The findings of this research paper are from the analysis of secondary data provided by the 2015/16 Kenya Integrated Household Survey. The data provides information on the indicators at both individual and household level and hence the unit of analysis will be both at individual and household levels as applicable.

The structure of the National MPI in this study is drawn using information drawn from a focus group discussion with five economists to determine which indicators are best suited for measurement of multidimensional poverty in Kenya. The information from the Focus Group Discussion (FGD) was complimented with rationale drawn from analysis of the raw headcounts on each indicator from the 2015/16 KIHBS. The structure is made up of the 3 Global MPI dimension plus one unique dimension; income potential of households, which is measured using economic engagement and transfers from sources outside the household. In addition, the dimension of health will be measured using the child mortality, nutrition and access to conventional health service provision, a slight departure from the global MPI that uses nutrition and child mortality. In total, the deprivation matrix includes a total of 13 indicators, three of them being uniquely introduced in this study. The inclusion of the income potential dimension is informed by the small marginal decline in the dependency ratio especially in rural areas. Furthermore, the dependency ratio increased in some North Eastern Counties and Nairobi. (Labour Force Basic report-2018). The access to conventional health service provision is included as an indicator to measure the health dimension given that 3.8 per cent of the population sought

health care services from unconventional sources. (Basic Report 2018). Table 2 shows the structure of the national MPI used in this research paper.

Table 2: The domesticated structure of the National MPI

Dimensions	Wight	Indicators	Weight
Health	0.25	Child Mortality	0.08
		Nutrition	0.08
		Health service providers	0.08
Education	0.25	Years of schooling	0.13
		School attendance	0.13
Household Income Potential	0.25	Economic engagement	0.13
		Transfers from outside the household	0.13
Standards of living	0.25	Cooking fuel	0.04
		Sanitation	0.04
		Source of drinking water	0.04
		Electricity	0.04
		House floor material	0.04
		Assets Ownership	0.04
Total	1		1.00

Adapted from the Global MPI.

3.3.1 Domesticated thresholds for the national MPI

For the purpose of this research paper, the cut-offs set to determine the levels of deprivation of individuals on the 13 indicators were obtained from the feedback of a focus discussion group. The cut-off can be represented as z ; just like the poverty line. If an individual i has an achievement x_i in an indicator x and $x_i < z$, then person i is deprived in indicator x . Table 3 shows the cut-offs and weights that are used to determine in each indicator.

Table 3: The domesticated cut-offs and weights for the national MPI

Dimensions	Indicators	Weight	Cut-off
Health	Child Mortality	0.08	If there has been death of a child below the age of 5 in the household.
	Nutrition	0.08	If any child in the household suffers stunting or is malnourished or if the BMI of any adult is below 18 then the individual is deprived in this indicator.
	Health service providers	0.08	If there are no health service providers visited by the members of the household when they are ill or if the providers visited are non-conventional due to lack of money then the household is deprived.
Education	Years of schooling	0.13	If any member of the household of school going age, is not attending school and reports less than 8 years cumulative years of schooling then they are deprived in this indicator.
	School attendance	0.13	If any individual above the age of 18 is not attending school and has less than 10 years of schooling they are deprived.
Household Income Potential	Economic engagement	0.13	A household is deprived in this indicator if no member of the household has an economic activity or if the total estimated income from the engaged household members is less than Ksh.200 and Ksh.110 per day for urban and rural households respectively.

	Transfers from outside the household	0.13	A household if no member in the household has an economic activity and no member has received any transfer over the last 1 year.
Standards of living	Cooking fuel	0.04	If the household members uses firewood, grass, dung or charcoal for cooking, the household is deprived.
	Sanitation	0.04	If the household does not have a VIP pit latrine, WC toilet or the ratio of shared facility is more than 10 then the household is deprived.
	Source of drinking water	0.04	If the household does not have electricity connection then it is deprived
	Electricity	0.04	If the household does not have more than one of the following; radio, television, mobile phone, bicycle/ motorcycle or refrigerator and does not own a vehicle then the household is deprived.
	House floor material	0.04	If the floor material of the house inhabited by household members is predominantly dirt, dung, mud or sand then the household is deprived.
	Assets Ownership	0.04	If the source of drinking water for the household is unsafe e.g unprotected spring or the nearest source of safe drinking water is more than one hour away then the household is deprived.
	Total		1.00

Adapted from the global MPI structure.

3.3.2 Individual weights and poverty cut-offs

After building the framework, a deprivation score for each indicator and for each individual has to be calculated. This can be explained mathematically in a very small sample. However, practically the sample sizes are very big and analysis is done by use of STATA statistical package.

Mathematically, if an individual belongs to a household with a deprivation or has a deprivation in any of the indicators, 1 is assigned to that individual. The deprivation score for that individual in the indicator question we multiply one with the weight of that indicator. If there are 10 indicators and an individual is deprived of all indicators, then they have a deprivation score of 1. If the individual is deprived of none of the indicators, then their deprivation score is 0.

The deprivation score can be summarized in the equation below:

$$D_s = w_1 d_1 + w_2 d_2 + \dots + w_n d_n$$

Where

D is the deprivation score/ weighted deprivation

w₁ is the weight of the first indicator

d₁ is the deprivation in the first indicator which is represented by 1 if the person is deprived in the first indicator or 0 if they are not.

w₂ is the weight of the second indicator

d₂ is the deprivation in the second indicator which is represented by 1 if the person is deprived in the first indicator or 0 if they are not.

n is the number of indicators

Once the deprivation scores or weighted deprivations are obtained for all individuals, there is need to set a cut-off for the weighted deprivation. This is likened to the poverty line in income poverty measurement. If an individual has a score higher than the weighted deprivation cut-off they are deemed multi-dimensionally poor. If the weighted deprivation score is at z and person i has a weighted deprivation of x_i , person i is deemed poor if $x_i > z$.

In the global MPI the weighted deprivation cut-off is $1/3$ or 0.33 . All individuals with weighted deprivation above or equal to 0.33 i.e. $D_s \geq 0.33$ are deemed multi-dimensionally poor. The rest of the individuals with the deprivation score below 0.33 i.e. $D_s < 0.33$ are non-poor.

In this research paper, the poverty cut-off will be set at 0.25. Individuals deprived in more than one dimension or are deprived in indicators with a weight of more than a quarter are considered to be multidimensionally poor. However, different cut-offs can be used for comparisons to measure the severity of poverty or for particular use in policy implementation.

3.3 Computation of the MPI

MPI is the product of the headcount ratio of the multidimensionally poor and the weighted average deprivation (The number of deprivations that the poor people suffer on average).

MPI Head count

The head count is the ratio of the number of MPI poor individuals and the total population i.e.

$$H = q/n$$

Where q is the number of people deemed multi-dimensionally poor and n is the total population.

Intensity

Once the number of multi-dimensionally poor individual's q is determined using the poverty cut-off, the average weighted deprivation can be obtained. This can be expressed as:

$$A = \sum_{i=1}^n D_s / q$$

This is the sum of all weighted deprivations of the multi-dimensionally poor divided by the number of the multi-dimensionally poor individuals.

MPI is eventually obtained by multiplying the Headcount with the Intensity i.e.

$$MPI = H * A$$

Table 4 illustrates mathematically how the MPI is obtained using a sample with 4 households with a total of 18 individuals and a deprivation cut off set at $k=0.33$. An individual is deemed poor if they are deprived in more than 0.33 of the indicators in the structure.

Table 4 Mathematical illustration of the computation of MPI

DIMENSION	INDICATOR	CUT-OFFS	HH 1	HH 2	HH 3	HH 4	Weights
		No. of members in household	5	2	8	3	
Education	Schooling years	If the individual has less than 10 years of schooling	0	0	1	1	0.13

		they are deprived.					
	School attendance	If a child in the household is of school going age and is not attending school.	0	0	0	1	0.13
Health	Child Mortality	If there has been death of a child below the age of 5 in the household.	1	0	0	0	0.08
	Nutrition	If any child in the household suffers stunting or is malnourished or if the BMI of any adult is below 18 then the individual is deprived in this indicator.	0	1	0	0	0.08
	Health service providers	If there are no health service providers visited by the members of the household when they are ill or if the providers visited are non-conventional due to lack of money then the household is deprived.	1	1	0	0	0.08
Income Potential	Economic engagement	If no member of the household has an economic activity then the household is deprived	0	1	0	1	0.13
	Transfers	If the household has received no transfer over the last 1 year	0	1	0	1	0.13
Standards of living	Cooking fuel	If the household members uses firewood, grass, dung or charcoal for cooking, the household is deprived.	1	0	1	0	0.04
	Sanitation	If the household does not have a VIP pit latrine, WC toilet or the ratio of shared facility is more than 10 then the household is deprived.	1	0	0	0	0.04
	Electricity	If the household does not have electricity connection then it is deprived	1	0	0	0	0.04
	Asset ownership	If the household does not have more than one of the following; radio, television, mobile phone, bicycle/ motorcycle or refrigerator and does not own a vehicle then the	1	0	0	0	0.04

		household is deprived.					
	House floor material	If the floor material of the house inhabited by household members is predominantly dirt, dung, mud or sand then the household is deprived.	0	0	0	0	0.04
	Source of drinking water	If the source of drinking water for the household is unsafe e.g unprotected spring or the nearest source of safe drinking water is more than one hour away then the household is deprived.	1	1	0	0	0.04

Author's formulation of example

From the information provided, HH1 is deprived in child mortality, health service providers, cooking fuel, electricity, asset ownership and source of drinking water. The achievement of that household is the sum of the weighted deprivations.

The achievement for the households is derived as follows:

HH1

The household is deprived in 7 indicators; Child mortality, access to conventional health services, cooking fuel, sanitation, electricity and asset ownership.

$$D_s = (0.04) + (0.04) + (0.04) + (0.04) + (0.04) + (0.08) + (0.08)$$

$$= 0.36$$

$0.36 > 0.33$, Therefore, all the 5 individuals in HH1 is MPI poor.

HH2

HH2 is deprived in nutrition, health service providers, economic engagement, house wall material, house roof material and drinking water.

The achievement of the household is as follows;

$$D_s = (0.08) + (0.08) + (0.13) + (0.13) + (0.04)$$

$$= 0.46$$

0.46 > 0.33 and therefore all the 2 individuals in HH 2 are also MPI poor.

HH3

The deprivations of HH3 are in schooling years, cooking fuel. The achievement is;

$$D_s = (0.13) + 0.04)$$

$$= 0.17$$

$$0.17 < 0.33$$

All the 8 members in HH3 are not MPI poor since their deprivation score is below the threshold.

HH4

HH4 is deprived of schooling years, school attendance and the entire dimension of economic engagement.

$$D_s = (0.13) + (0.13) + (0.13) + (0.13)$$

$$= 0.52$$

$$0.52 > 0.33$$

All the 3 members in HH4 are also MPI poor.

a) MPI Head count

Out of the four households three are MPI poor. To compute the head count, H, we need to find the ratio of the MPI poor to the total individuals in all the four households.

$$H = (5+2+3) / (5+2+8+3)$$

$$= 10/18$$

$$= 0.55$$

Therefore, 55% of the sampled individuals are MPI poor. The MPI poverty headcount for the entire population can be obtained if the appropriate weights are provided. The computation is usually less complicated when using the STATA statistical package.

b) Intensity

In the calculation of the percentage of deprivations the MPI poor individuals suffer on average, the non-poor individuals are not counted because they do not contribute to deprivation. Intensity A, will be obtained by summing up the achievements with respect to the number of members in each household as a ratio of the sample size. It is the weighted average number of deprivations the people experience.

$$A = \{(0.36*5) + (0.46*2) + (0.52*3)\}/10$$

$$= (1.8+0.92+1.56) / (5+2+3)$$

$$= 5.28/10$$

$$= 0.53$$

$$\text{MPI} = A * H$$

$$= 0.55 * 0.53$$

$$= 0.291$$

Therefore the Multidimensional Poverty Index for the 4 households is 0.291. From this illustration, over half of the sampled people are multidimensionally poor. These poor people on average are deprived in over half of the indicators. Their multidimensional poverty index is therefore 0.291.

Table 5: MPI changes with adjustment of cut-offs

Deprivation cut-off	MPI Headcount	Intensity	MPI
k=0.25	0.55	0.53	0.291
k=33.3	0.55	0.53	0.291
k=0.50	0.22	0.52	0.114

In chapter four, the actual national multidimensional poverty measure are computed using the 2015/16 KIHBS dataset and the STATA statistical package.

4.0 CHAPTER FOUR: DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Multidimensional Poverty in Kenya

Results of the analysis in this research paper show that the multidimensional poverty index for Kenya according to the 2015/16 Kenya Integrated Household Survey (KIHBS) dataset is 0.19 using the cut-off $k=33.3\%$ as specified in the national MPI structure used in this research paper. Based on this cut-off, almost one third of Kenyans are multidimensionally poor. From this research we can infer that over 17 million Kenyans are multidimensionally poor. These poor Kenyans on average suffer deprivation in half of the indicators specified in the deprivation matrix.

$$\begin{aligned} \text{MPI} &= H * A \\ &= 0.39 * 0.49 \\ &= 0.19 \end{aligned}$$

The MPI headcount is 51% and 13% if the deprivation cut-off is set at 0.25 and 0.5 respectively. Table 6 shows the MPI measure at three different cut-offs. The use of different cut-off allows for identification of those living in acute poverty and even deprived in almost all the indicators.

Table 6: The National MPI with different cut-offs

Deprivation cut-off	MPI Headcount	Intensity	MPI
k=0.25	0.51	0.82	0.418
k=33.3	0.39	0.49	0.191
k=0.50	0.13	0.48	0.062

Further analysis by area of residence revealed that the MPI head count was notably lower in the urban area (26%) than in the rural areas (43%). This is replicated in the intensity of deprivation which was lower in the urban areas as compared to rural areas. Figure 2 represents the MPI Headcount for National, rural and urban areas.

Figure 2 MPI by area of residence

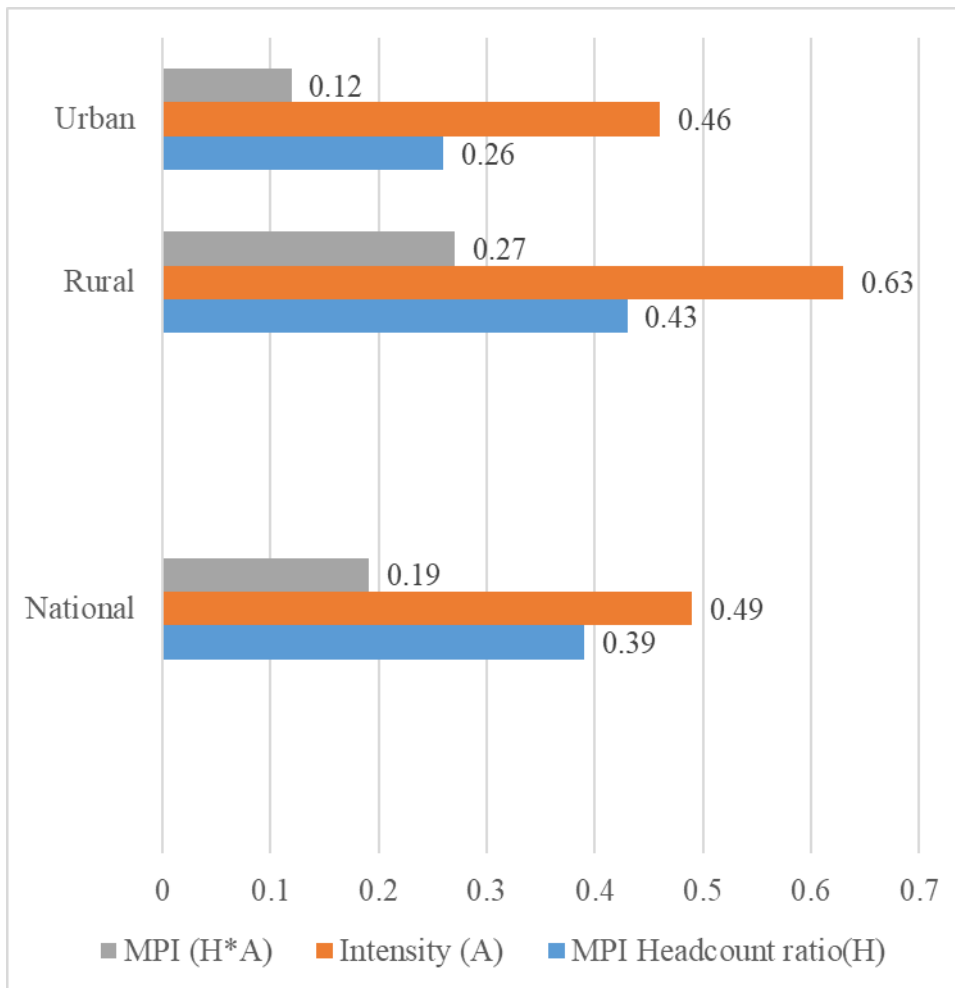


Table 7 shows the results of analysis of Multidimensional poverty for each County.

Table 7: The measure of Multidimensional poverty by County at k=33.3%

Residence /County	MPI Headcount ratio (H)	Intensity (A)	MPI (H*A)
Baringo	0.49	0.51	0.25
Bomet	0.41	0.34	0.13
Bungoma	0.47	0.42	0.14
Busia	0.30	0.71	0.21
Elgeyo Marakwet	0.42	0.51	0.21
Embu	0.35	0.45	0.15
Garissa	0.55	0.61	0.33
Homa Bay	0.49	0.48	0.15

Isiolo	0.59	0.60	0.36
Kajiado	0.31	0.48	0.15
Kakamega	0.42	0.41	0.17
Kericho	0.36	0.40	0.14
Kiambu	0.29	0.36	0.10
Kilifi	0.42	0.55	0.23
Kirinyaga	0.30	0.38	0.11
Kisii	0.45	0.41	0.18
Kisumu	0.36	0.40	0.14
Kitui	0.55	0.50	0.27
Kwale	0.56	0.60	0.33
Laikipia	0.41	0.34	0.95
Lamu	0.53	0.60	0.32
Machakos	0.38	0.35	0.13
Makueni	0.48	0.51	0.12
Mandera	0.58	0.45	0.26
Marsabit	0.57	0.40	0.23
Meru	0.46	0.39	0.18
Migori	0.52	0.49	0.25
Mombasa	0.46	0.41	0.19
Murang'a	0.35	0.34	0.12
Nairobi	0.26	0.34	0.09
Nakuru	0.26	0.36	0.09
Nandi	0.46	0.51	0.23
Narok	0.45	0.41	0.18
Nyamira	0.47	0.55	0.26
Nyandarua	0.36	0.38	0.14
Nyeri	0.36	0.34	0.13
Samburu	0.54	0.63	0.34
Siaya	0.43	0.45	0.19
Taita Taveta	0.55	0.60	0.33
Tana River	0.37	0.50	0.33
Tharaka Nithi	0.41	0.50	0.21
Trans Nzoia	0.39	0.40	0.16
Turkana	0.59	0.51	0.30
Uasin Gishu	0.34	0.38	0.13
Vihiga	0.48	0.45	0.22
Wajir	0.58	0.61	0.35
West Pokot	0.58	0.65	0.38

Source: Author's own computation using STATA. Do-file adopted from OPHI.

From the findings, the Counties with the highest MPI and Headcount ratios are West Pokot, Wajir and Samburu while the Counties with the lowest headcount ratios are Nairobi, Nakuru and

Kiambu. This is notably different with the finding of poverty calculation using the money-metric poverty line where the Counties with the highest poverty headcounts were Turkana, Mandera and Samburu. It can be noted that while individuals in Samburu are both MPI and income poor, individuals in the other two counties might lack income, but have access to the amenities necessary for day to day functioning. This could be explained by the regular targeting of these counties by government and non-governmental organizations.

Comparison of the uni-dimensional poverty measures with multidimensional poverty measures

Table 8 shows the MPI headcount as compared to the national income poverty headcount. The multidimensional poverty head count in all domains is higher than the income poverty headcount. This is a clear demonstration of how multidimensional poverty measure captures deprivation of individuals in a number of indicators. The residual is usually small but coincisely captures the most severely deprived individuals. This is the strength of MPI in informing poverty targeting.

Table 8: Income poverty and Global and National MPI poverty Headcounts

Domain	Income Poverty Headcount (%)	National MPI headcount (%)	Global MPI (2019) Headcount (%)
National	0.36	0.24	38.7
Rural	0.40	0.31	
Core-Urban	29.40	0.19	

From the findings in Table 4.2 we can infer that an individual may have a high income but still be poor if they cannot convert the income into satisfaction of basic needs and amenities. In some countries, measurement of non-monetary poverty or MPI analysis includes intangible basic needs of the population such as; security, access to justice, happiness which cannot be quantified in income terms.

The MPI poorest counties

Table 9 shows the comparison between the MPI headcount of the 5 MPI poorest Counties in Kenya with their corresponding income poverty headcounts reported in KNBS Basic report on well-being in Kenya (2018).

Table 9: Counties with the Highest MPI poor headcount

County	Head count Ratio		Intensity of poverty
	MPI Headcount	Income Poverty Headcount	
West Pokot	0.38	0.57	0.65
Tana River	0.37	0.62	0.63
Garissa	0.35	0.66	0.71
Homa Bay	0.35	0.34	0.6
Samburu	0.34	0.76	0.5

Notably, the MPI and income poverty headcounts for Homa Bay are almost equal. However, the MPI poor people in Homa Bay on average suffer deprivation in 60 per cent of the 14 indicators. If a policy to eliminate income poverty was to be employed, perhaps part of the deprivations would go unnoticed. But if the specific indicators in which the MPI poor are deprived are targeted, the effectiveness of the poverty alleviation programmes is likely to be felt.

MPI by sex

More females (53.5%) are multidimensionally poor as compared to their male counterparts. The findings further show that MPI among females is 0.194 with 37.7 per cent of females being MPI poor and deprived in over half of the national MPI indicators. The 35.7 per cent of their male counterparts were MPI poor and deprived on average in 45 per cent of the indicators. Figure 4.3 shows the MPI headcount by sex.

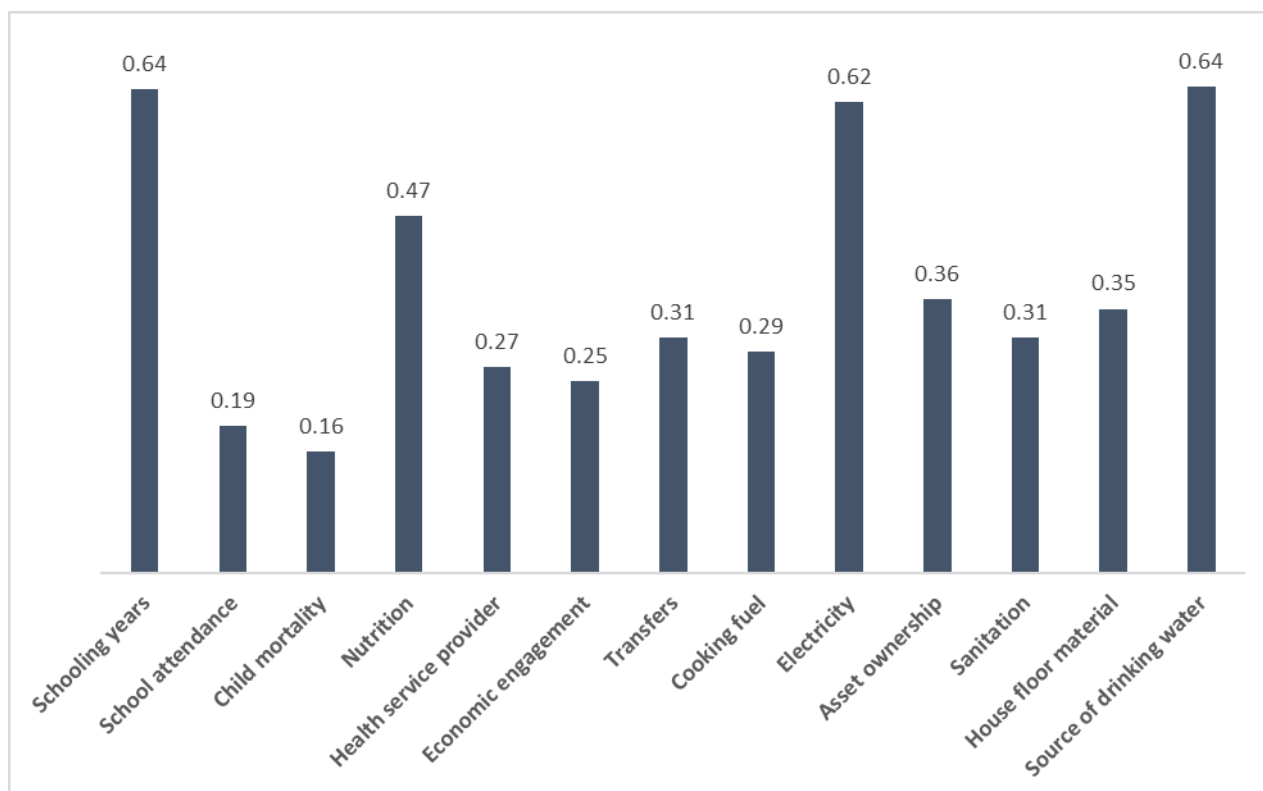
Sources of deprivation

Deprivation in the access to electricity by the MPI poor stands out in the findings of this research paper. Three quarters of the population that is MPI poor are deprived in access to electricity. Two thirds of the MPI poor population are deprived in the source of drinking water. The other indicator in which most of the MPI poor are deprived is schooling years with 64 per cent of the MPI poor being deprived in terms of the number of schooling years they have. Child mortality and School attendance are the two indicators in which the lowest percentage of the MPI poor reported deprivation. This is probably due to free universal primary education and focus on child and maternal health by the government and other non-governmental organizations over the years. The

information on the sources of deprivation can guide policy makers on which areas to target when devising poverty alleviation strategies.

Figure 3 shows the headcount of Kenyans who are poor and deprived in the various indicators as per the deprivation cut-offs set in Chapter 3 for each indicator.

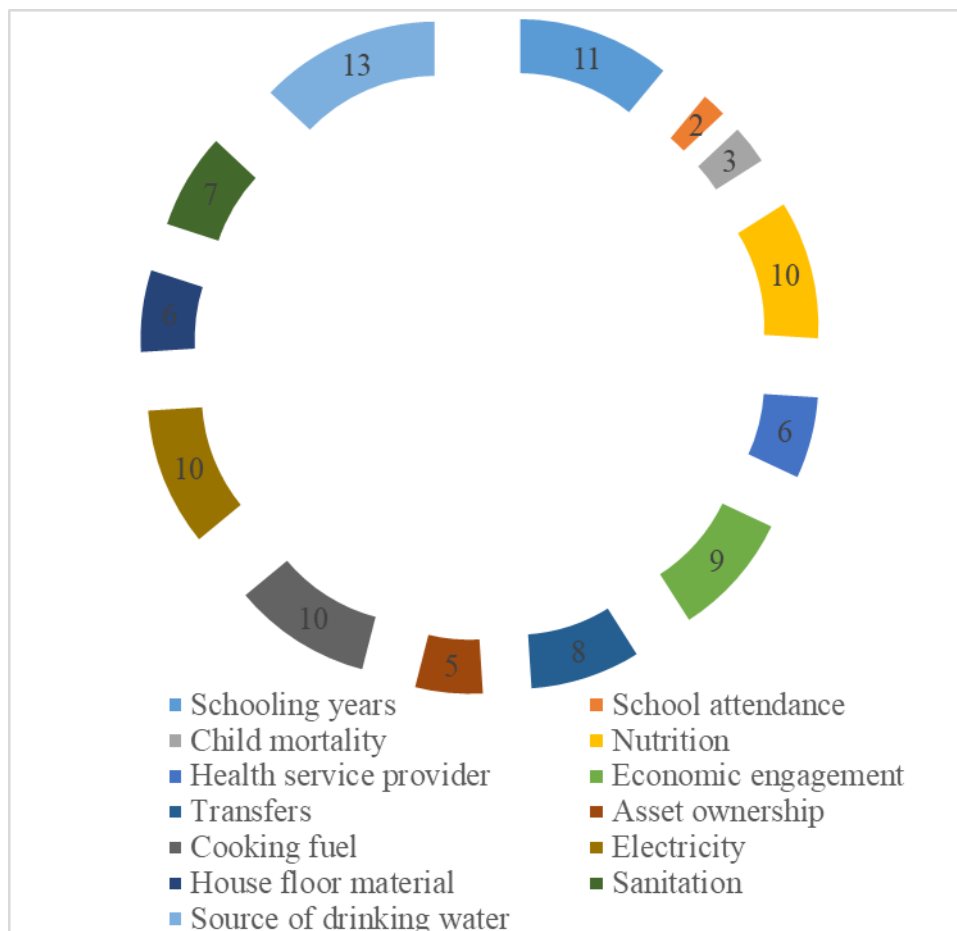
Figure 3 Sources of deprivation



Contribution to MPI by the indicators

Figure 4 presents the contribution of each indicator to national multidimensional poverty. Deprivation in access to safe drinking water and schooling years are the highest contributors to national multidimensional poverty at 13% and 11% respectively. The lowest contributor to national multidimensional poverty is deprivation in school attendance at 2%. In the global MPI in 2014, 2017 and 2019, nutrition has been the highest contributor to multidimensional poverty. However, findings of this paper show nutrition as a third contributor (10%) to multidimensional poverty.

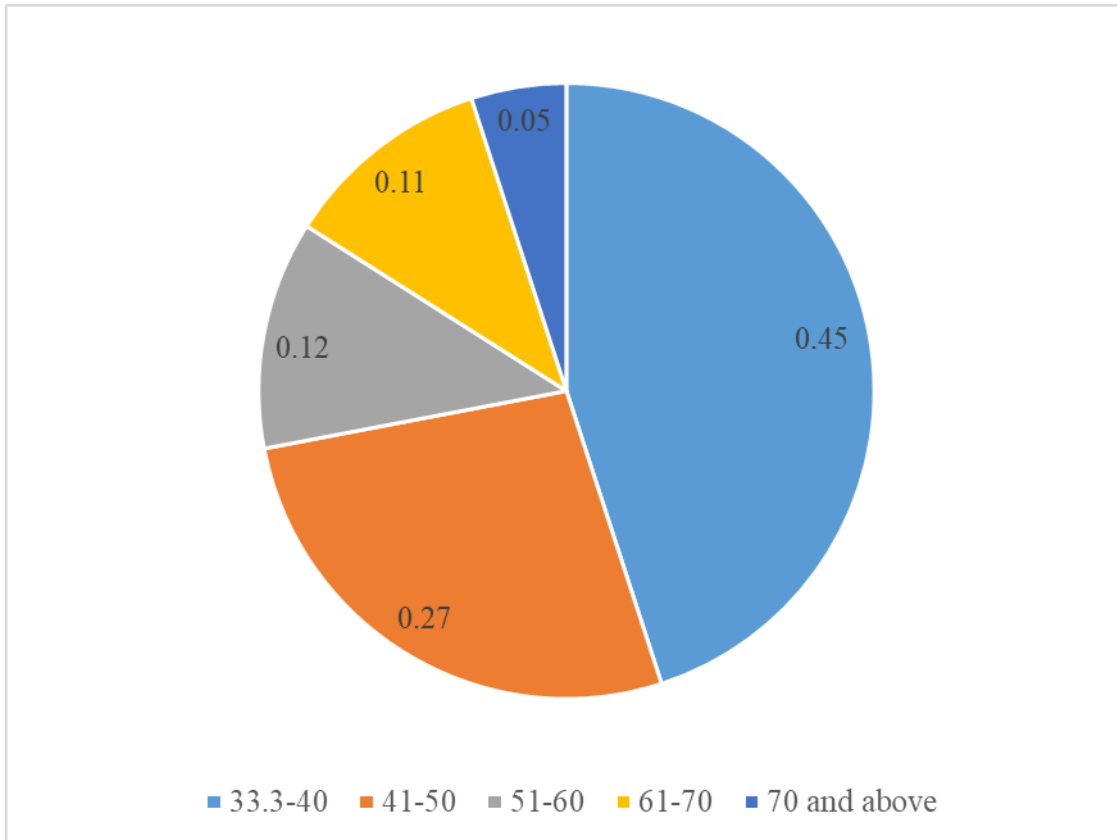
Figure 4 Contribution of indicators to multidimensional poverty



Analysis of poverty intensity

Intensity measures the average proportion of deprivations that poor individuals suffer. This measure is used for further analysis to determine how poor the poor are; in how many indicators they are deprived as a ratio of all indicators in the analysis. A cut-off of the intensity of poverty is used to determine who is multidimensionally poor or not as earlier discussed in chapter 3. Intensity allows comparison between countries and comparison within the country among the regions. For instance, the findings in table 4.1, show that Marsabit, Elgeyo Marakwet and Migori have equal MPI headcounts. However, their intensities of deprivations are different. Using only the headcount will not allow specific intervention in poverty targeting measures. But with additional information on different deprivations will allow proper targeting. For instance, one would use more resources for poverty alleviation in Marsabit because the poor in the County on average suffer deprivations on more indicators than the poor in both Elgeyo Marakwet and Migori. Figure 5 illustrates the head count of the MPI poor individuals by thr ranges of deprivation.

Figure 5 Headcounts of the MPI poor by ranges of deprivation



The majority of the MPI poor have a deprivation on average in a third to two thirds of the indicators in the national MPI. The proportion of the MPI poor that were deprived in more than half of the indicators is 0.28.

5.0 CHAPTER 5: SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Summary

This purpose of this research paper was to calculate the national multidimensional poverty for Kenya using the Alkire foster methodology and the 2015/16 KIHBS data. The unit used in this analysis was individuals and households. The structure of the national MPI was made up of four dimensions with a total of 13 indicators. Individuals were considered MPI poor if they were deprived in more than a third of the weighted indicators. The aggregation was done using STATA version 14 with the do-file adapted from OPHI. The findings of the analysis were presented at national, rural and urban domains, by County, and by sex. Further analysis was done on decomposition of multidimensional to determine the contribution to poverty by each indicator and the analysis of poverty intensity of deprivation.

5.2 Conclusion

From this analysis, we can infer that 39% of Kenyans are multidimensionally poor and deprived in half of the dimensions of health, education, income potential and standards of living. Comparison of MPI headcount with the national poverty headcount reveals that multidimensional poverty measures capture the multiple deprivations suffered by the population that are not revealed by the income poverty measure which uses only income (Proxied by consumption expenditure) to determine who is poor and who is not. MPI measure also provides information for effective targeting, because it identifies those living in acute poverty at different thresholds. Hence, the headcount identified as multidimensionally poor can be further analyzed to identify individuals living in acute poverty for prioritization in poverty targeting. The intensity of poverty also allows the identification of the number of indicators in which the poor are deprived. This important piece of information can be used by policy makers in intervention on specific indicators.

The contribution of each indicator to multidimensional poverty can also inform decisions on the sector where intervention is required. For instance, the results also show that electricity is the indicator in which most of the poor are deprived in. Other indicators in which the poor are deprived in are drinking water and years of school attendance and

nutrition. These indicators can be targeted during plan, implementation of development programmes.

Over the last 5 years, the global MPI findings have shown nutrition as the highest contributor to multidimensional poverty. The findings of this research paper back this up and hence recommendations to relevant policy makers to focus on the indicator so as to improve welfare of Kenyans as regards this indicator.

The dimensions and indicators used in this research paper greatly depart from the ones used in the calculation of the global MPI. They are domesticated to fit the Kenyan case as recommended by OPHI. From the results, the chosen indicators have great strength as observed on the raw and censored headcounts. The use of the global MPI dimensions and indicators provide useful information albeit for planning and comparison beyond the country. Otherwise the three dimensions and 10 indicators are somewhat deficient in determination of deprivation suffered by the poor in Kenya.

5.3 Policy recommendations

Notably, the MPI discussion is a multi-sectoral approach that needs round table discussion of all the stakeholders. In Kenya, all the relevant, ministries and government agencies and the County governments are the key stakeholders to determine the dimensions and indicators that can best measure deprivation of Kenyans. Furthermore, the need for tracking of MPI over time necessitates continuous update of the socioeconomic database to ensure the data set used for computation of MPI is always available and up to date.

Findings in this research paper show that a number of counties have the same multidimensional headcount but they have different intensities and hence the MPI ranks them differently. This is also important information for policy makers for use in prioritization of areas in resource allocation where the MPI, intensity and headcount are similar for different domains.

It is worth noting that the computation of the National MPI is an invaluable contributor to monitoring of the Sustainable Development Goals. The indicators used in the global MPI and in this research paper touch on a number of goals. Mainly, Goal one and target 1.2

which relate to elimination of poverty in all its forms and MPI has been a hot topic towards this end.

MPI is not aimed at replacing the income approach to poverty measurement but rather, it is aimed at complementing it. Therefore, further research on both approaches is highly recommended to determine the strengths of each, independently, as well as the strength of a composite measure derived from both approaches.

Poverty being one of the major indices used as a basis for revenue allocation in Kenya, has to be accurately presented for each administrative or geopolitical area so as to employ effective poverty alleviation measures. The 2015/16 Kenya integrated Household budget survey dataset is the most recent official data publicly available to provide national poverty estimates. From this dataset, the money metric poverty index by county was computed and is in use as a basis for revenue allocation and other poverty targeting measures. However, as noted earlier, a single indicator cannot be used to measure poverty especially in a developing country. The people suffer from many deprivation or disadvantages that may not be reflected solely by lack of income. Multidimensional poverty is made up of several factors that constitute poor people's experience of unmet needs – such as poor health, lack of education, poor living standards, poor working conditions and insecurity. The measure enables estimation of poverty deeper beyond the income dimension into the overlapping disadvantages experienced by the people even those identified as income non-poor. If the measure can be used in revenue allocation and in targeting of cash transfer programmes, equitable distribution will be enhanced.

A multidimensional poverty measure can act as a focal point for integrated policy; multi-sectorial approach because it is flexible and can be easily disaggregated by regions and sub-groups and it can be used as a fast implementation and monitoring tool.

From the idea of poverty being multi-faceted, more topics for discussion arise, such as changes in multidimensional poverty over time, poverty differences in sub-groups, comparisons in rural and urban poverty, and inequality among the poor. Other similar indexes are also been developed such as the Africa Social Development Index (ASDI), Child, youth and women poverty indexes and the happiness index.

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