

# **Assessing Levels and Determinants of Child Deprivation in Eastern and Southern Africa**

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## LIST OF ACRONYMS

AFIDEP	African Institute for Development Policy
BCG	Bacille Calmette Guerin
DHS	Demographic and Health Survey
DPT1, 2, 3	Diphtheria Pertussis Tetanus 1, 2, 3
ESAR	Eastern and Sothern Africa Region
FA	Factor Analysis
HAZ	Height-for-Age z-score
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
MDG	Millennium Development Goals
MCA	Multiple Correspondence Analysis
MICS	Multiple Indicator Cluster Surveys
PCA	Principal Component Analysis
SRH	Sexual and Reproductive Health
SSA	Sub-Saharan Africa
WAZ	Weight for Age z-score
WHZ	Weight-for-Height z-score
UNCRC	United Nations Convention on the Rights of the Child
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

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## **EXECUTIVE SUMMARY**

Progress in addressing inequities in child health and wellbeing in Africa has partly been curtailed by lack of proper indicators to measure and monitor progress in reducing the vulnerability of children. Child wellbeing has mostly been identified and measured using uni-dimensional approaches such as household income and consumption. Such approaches overlook the multidimensional nature and severity of child deprivation since they do not incorporate other aspects of child wellbeing such as access to health care, education, and social welfare provisions. The aim of this study is to develop a standardized multi-dimensional measure of child deprivation that can enable identification of vulnerable children in each country and allow cross-country comparison of levels and intensity of deprivation. The study examines levels and determinants of child deprivation in Eastern and Southern Africa Region (ESAR). The study is based on analyses of DHS and MICS data from nine ESAR countries with national level child health and wellbeing data collected between 2007 and 2011.

The study examined child deprivation for three childhood age categories: the very young children aged 0-4 years, the younger school going children aged 5-14 years, and the older school going children aged 15-17 years. Five dimensions of child wellbeing were generated for each age group: basic health, water and sanitation, shelter, nutrition, education, and child protection. Uni-dimensional deprivation indices were computed to show deprivation levels at individual dimension level while multi-dimension deprivation measures were computed to represent pooled deprivation levels from different dimensions. The uni-dimension deprivation indices are presented in percentages while the multi-dimension deprivation measures are presented in head count ratios (H0) and M1 indices that account for the depth or severity of deprivation.

Among children aged 0-4 years, multi-dimensional deprivation results indicate that deprivation levels in six out of nine countries were above 30%. Child deprivation is lowest in Rwanda (10%) and highest in Swaziland (48%). At dimension level, deprivation was generally highest in child protection, followed by health. Nutrition and water/sanitation exhibited relatively low levels of deprivation. The deprivation levels were as low as 6% in Lesotho and as high as 39% in Uganda. At dimension level, deprivation was generally high in child protection and health. Education and water/sanitation dimensions exhibited relatively low levels of deprivation. Deprivation levels ranged from 20% in Rwanda to 51% in Uganda, indicating that at least 20% of children aged 15-17 years in the region are multi-dimensionally deprived. Deprivation was generally high in health dimension. Child protection and education showed moderate deprivation levels while water/sanitation exhibited relatively low levels of deprivation.

Generally, child deprivation increased with an increase in the age of the child. Deprivation levels were highest among children aged 15-17 years followed by children aged 5-14 years while children aged 0-4 years had the lowest deprivation levels. At dimensional levels, deprivation was highest in child protection and health dimensions. Education and nutrition showed moderate deprivation levels while water/sanitation dimensions exhibited relatively low levels of deprivation. Levels of deprivation vary across the nine countries studied but Rwanda and

Malawi have relatively low deprivation levels in while Zimbabwe and Uganda have the highest levels of deprivation in most dimensions and at multi-dimensional level.

The regression analysis results show that household wealth and education level of the household head were the two factors highly and consistently associated with child deprivation in all the countries and age-groups. Children born in poor households and to less educated household heads had the highest chances of deprivation. Results from most countries show no association between child deprivation and place of residence. Findings on the relationship between sex of the child and deprivation levels varied; boys were more deprived among children aged below 15 years, but girls were more deprived among children in the older age-group (15-17 years). Results from most countries showed no association between the sex of the household head and child deprivation. An increase in the age of the household head had a positive and significant effect in reducing child deprivation in almost half of the countries. The age of a child was a more important determinant of child deprivation among children aged 5-14 years and 15-17 years than among those aged 0-4 years. Other factors that had some association with child deprivation in several countries include region/province, orphan-hood, religion and the number of household members.

Despite the ongoing efforts to improve the welfare of children in the region, significant gaps still exist, particularly in the child protection and health dimensions, as well as the education dimension for the older group. A key factor that distinguishes the countries that have relatively low levels and intensity of deprivation is consistency in good performance across the age groups, dimensions of deprivation, and various socioeconomic sub-groups. Malawi, Rwanda, and Lesotho (and to some extent Tanzania and Kenya) have stood out in this analysis as countries that have low levels of child deprivation, and this pattern corresponds to the findings on the assessments of MDGs 4 and 2 where these countries are making good progress. The results also confirm that the overall level of child deprivation varies widely across various socioeconomic groups within the study countries. In general, countries with lower levels of overall deprivation also have relatively low levels of inequities in deprivation across the socioeconomic factors examined in this study. This suggests that part of the driving force behind the reduction of overall levels of child deprivation centers on the reduction of inequities in child wellbeing. The clear lesson from this pattern is that countries need to adopt a comprehensive approach that tackles the different dimensions of child wellbeing simultaneously. Countries in the region should reinforce their efforts to close service and opportunity gaps between the poor and the rich, the less educated and more educated, and those living in rural and urban areas. The positive results from Malawi and Rwanda are in line with the re-orientation of their health service delivery system towards more community outreach over the last decade.

## CHAPTER 1: INTRODUCTION

### 1.1 Background

UNICEF is the agency of the United Nations mandated to advocate for the protection of children's rights, to meet their basic needs, and to expand their opportunities of reaching their full potential. Guided by the Convention on the Rights of the Child, UNICEF strives to establish children's rights as international standards of behavior towards children. UNICEF mobilizes political will and material resources and provides technical assistance to help countries prioritize and address children's needs. Reaching the most deprived and vulnerable children with basic health, nutrition, education and child protection services is central to UNICEF's mission. In this regard, UNICEF has recently adopted a more equity-focused approach in order to address the persistent inequalities in children's access to basic social services. The equity-based strategy is consistent with the human rights approach to programming and is critical for improving child wellbeing in general, and in particular, the Millennium Development Goal (MDG) 4 focused on improving child health.

Over the last decade or so, some countries in the Eastern and Southern African Region (ESAR) like Malawi and Rwanda have recorded relatively impressive progress towards achieving MDG 4. Amidst this progress however, there are persistent and unacceptably high levels of inequities in child health and wellbeing outcomes between the rich and poor, the educated and non-educated, urban and rural residents, different ethnic groups, and geographical regions both within and across countries. In order to galvanize action to address these inequities, UNICEF's Eastern and Southern Regional Office (UNICEF-ESARO) has promoted prioritization of equity-focused policies and intervention programmes in its support to countries. In specific terms, this includes:

- Strengthening application of an equity lens in situation analysis;
- Better definition, identification and targeting of deprived and vulnerable individuals, groups and communities in program design and implementation of programs;
- Promoting the development, testing and scaling up of equity oriented strategies, and
- Strengthening equity oriented monitoring and evaluations of programs.

Progress in addressing inequities in child health and wellbeing in the region and beyond has partly been curtailed by lack of proper indicators to identify children who are deprived of multiple needs and rights. Most analyses of health equity are based on specific diseases and health outcomes. Yet, children are vulnerable to multiple diseases and health conditions, which are affected by service oriented factors, as well as household and community circumstances.

In analyses that go beyond health indicators, child wellbeing has mostly been measured using uni-dimensional monetary approaches such as household income and consumption. However, such approaches do not fully capture the multidimensional nature of child deprivation since they do not reflect what proportion of household monetary resources are actually used for key child wellbeing issues such as access to health care, education, and child protection provisions (Minujin et al, 2005).

Furthermore, most analyses of health equity and wellbeing do not provide real time indicators of vulnerability that intervention programs can use for proper targeting.

This study fills some of these evidence gaps by developing a multidimensional index to identify deprived children based on nationally representative data from selected countries in East and Southern Africa.

## **1.2 Study Objectives**

The primary aim of the study is to develop and operationalize a standardized multi-dimensional measure of child deprivation that can enable identification of the most vulnerable children in each country, and allow cross-country comparisons of levels and intensity of deprivation over time. The study examines the levels and determinants of child deprivation in nine ESAR countries that have the required nationally representative datasets collected between 2007 and 2011. This analysis will be valuable in identifying which countries have made good progress in improving child wellbeing and the key areas where countries that are not doing well are falling behind.

## **1.3 Human Rights and Child Wellbeing**

The conceptual framework underlying this study considers child deprivation in the light of the stipulations in the United Nations Convention on the Rights of the Child (UNCRC), other human rights instruments, and recent advances in child poverty measurement. The study builds on the deprivation of basic needs approach, which defines children's human rights from the perspective of their access to a set of basic needs and services such as: adequate and nutritious food; clean water and sanitation services; healthcare; shelter; education; and protection from various forms of discrimination, exploitation and harm (Gordon et al. 2003; UNICEF 2005). These dimensions of child wellbeing are so interrelated and interdependent that deprivation in one aspect is likely to compound deprivation in other dimensions (Fernandes, 2006). For instance, deprivation in nutrition and health care during early childhood may affect physical and cognitive growth and undermine chances of acquiring education and skills needed to reach full potential during later childhood and adulthood. Therefore, according to the basic needs approach, programmes seeking to improve child wellbeing must address deprivations in these multifaceted basic needs in a comprehensive manner.

UNICEF holds that child poverty, and estimates of its extent, should be constructed on the basis of access to a number of specific economic and social rights and the 'freedom from material and social deprivation including premature death, hunger, malnutrition, and lack of access to clean water, sanitation, education, health care and information' (UNICEF, 2004). This human rights-based approach highlights the need to examine child wellbeing and design child development policies and programmes from a multidimensional perspective.

## CHAPTER 2: METHODOLOGY

### 2.1 Conceptual framework and analysis

As noted above, the most commonly used methods to measure child wellbeing and deprivation are based on health indicators, income, consumption levels, or household assets and amenities. Such measures offer narrow perspectives of child wellbeing and limit the extent to which they can guide policies and programmes to improve the general status of children. In this study, we use the basic needs framework to guide the analysis and pool information from various indicators and generate the multidimensional index of child deprivation using the methodology developed by Alkire and Foster (2008). A conceptual framework for the multi-dimensional measure is presented in Appendix 1. The study measures and compares levels of child deprivation, differentials, and its determinants for each of the nine countries.

The Alkire and Foster method follows the twelve-step computational process outlined below, which can be divided into two broad stages. In the first six steps (which constitute the first stage), information is pooled from variables within each dimension and a within-dimension composite measure of deprivation is computed. This results in the computation of deprivation within each dimension. The last six steps (which constitute the second stage) are followed for the computation of the inter-dimension index of child deprivation.

1. Choice of unit of analysis (household, or individual child level)
2. Choice of dimensions
3. Choice of indicators within a dimension
4. Set poverty lines (define the deprivation cut-off line within dimension levels)
5. Apply poverty lines to determine deprivation
6. Count the number of deprivation for each person
7. Set the second cut off
8. Apply cutoff  $k$  to obtain the set of poor persons and censor all non-poor person data
9. Calculate head count,  $H$
10. Calculate the average poverty gap,  $A$
11. Calculate the adjusted head count,  $M0$
12. Set weights and compute  $M1$  and  $M2$  depth indices

### 2.2 Data

The study uses recent national data collected through the Demographic Health Survey (DHS) and UNICEF's Multiple Indicator Cluster Survey (MICS) systems. We consider countries whose latest national data sets were collected in the last five years, and which have all the variables needed to develop the multi-dimensional index. Restricting the analysis to countries with all required variables is critical to ensure that the index is comparable across countries and over time if trends are to be considered. The following nine ESAR countries met these criteria and were included in the study: Kenya, Lesotho, Malawi, Rwanda, Swaziland, Tanzania, Uganda,

Zambia and Zimbabwe. The table in Appendix 2 shows a list of all countries in ESAR, their data sources, and brief notes on why the other countries were excluded from the analysis.

### **2.3 Dimensions of Child Deprivation**

This study integrates the following five core components of the basic needs framework to generate a multi-dimensional index of child deprivation:

1. Basic health
2. Water and sanitation
3. Nutrition
4. Education
5. Child protection

Our measure of child deprivation uses the child as a unit of analysis. Out of the five dimensions used in the analysis, basic health, nutrition, and education are based on the child's personal situation or experiences. The two dimensions that are measured at household level (water and sanitation and child protection) reflect household conditions that have a direct bearing on the health and general wellbeing of children. The child-focused measures preclude the need for assumptions about the distribution of resources within the household, which is required when income-based measures of wellbeing are used (White et al. 2002). The importance of a child-centered analysis with respect to poverty is also emphasized within the deprivation approach (Gordon et al. 2003a, 2003b). We excluded household assets from the computation of the multi-dimensional deprivation indices because assets are also a proxy measure of general wellbeing and they are not directly amenable to interventions in the health and social sectors.

### **2.4 Categories of Children**

The study adopts the 0-18 age definition of children used by UNICEF and examines multidimensional deprivation separately for the following age groups: 0-4, 5-14 and 15-17 years. Among children aged 0-4 years, the multidimensional index includes health status (including vulnerability to various morbidities, access to preventive health services such as immunization), water and sanitation, food and nutrition, and child protection. For the school-going age groups (ages 5-14 years and 15-17 years), the index includes health, education, water and sanitation, and child protection dimensions. The health dimension for the oldest children includes sexual and reproductive health behaviors and services.

### **2.5 Within and inter-Dimension Deprivation**

Standardized and comparable variables that we use to measure various aspects of each of the five dimensions are outlined in Table 2.1. The table shows the list of variables in each dimension, the age groups to which the variable applies, a brief description of how the variable is measured, and the cut-off values determining whether the child is deprived or not at dimension level.

Various methods can be used to generate the within dimension deprivation index. Some of the most common methods used to pull information from different variables include: simple summation of indices; use of statistical methods like Principal Component Analysis (PCA), Factor Analysis (FA) or Multiple Correspondence Analysis (MCA). In this study, the construction of within dimension deprivation index is based on a simple summation method. We did not use MCA, PCA, and FA because these statistical methods give a specific child's deprivation status relative to other children in a given country, thereby precluding comparisons of levels over time and across countries. For example, using MCA, two people with similar possessions and other measures of deprivation can be classified in very different classes of poverty just because they belong to countries with different levels of poverty<sup>1</sup>. The simple summation method adopted in this study allows us to standardize the deprivation measure that is comparable across countries and over time.

## **2.6 Inter-dimension Deprivation**

The inter dimension deprivation index was constructed by pooling the within-dimension deprivation indices. Alkire and Foster (2008)'s method was used to pool information from different deprivation dimensions to generate a multi-deprivation measure. As noted above, steps 7-12 outlined by Alkire and Foster pertain to the generation of the multi-dimensional index of child deprivation while steps 1-6 lead to the generation of the within-dimension index.

A child was considered multi-dimensionally deprived if he/she was deprived in at least two of the four dimensions. We assessed multi-dimensional deprivation using two measures: the head count (H0) and depth or severity of deprivation (M1). The head count measure represents the percentage of children who are deprived in at least two of the four dimensions while the M1 measures the depth or severity of deprivation. M1 values range between 0 and 1, whereby zero corresponds to no deprivation, while the value 1 indicates total deprivation in all the dimensions and variables used in the analysis. The M1 measure is a weighted head count and accounts for: (i) the number of dimensions a child is deprived in and ii) the number of deprivations within each dimension. A detailed description of the methodology and multidimensional index is provided in Appendix 3 and in Alkire and Foster (2008).

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<sup>1</sup> When MCA approach is used to generate weights, the distribution of weights for a wealthier country will be more towards the right compared to the distribution of weights from a poor country. This means that when the median is used as a cut-off for deprivation, the wealthier country will have a higher median compared to a poor country. This will make deprived individual from a poor country be classified as not deprived which should not be the case. This raises the need to adopt an approach than can facilitate easy and comparable comparisons among countries.

**Table 2.1 Indicators, dimensions, and cut-off Values**

Dimension	Component	0-4 years	5-14 years	15-17 years	Deprivation Situation
<b>Education:</b> Deprivation cut-off: 1 and above	School enrolment	0	1	1	Indicator for school enrolment status (current years and in the previous 2 years) of a child aged 5-17 years.
	School attendance	0	1	1	Indicator for current school attendance of a child aged 5-17 years.
<b>Health:</b> Deprivation cut-off: 2 <sup>2</sup> and above	Full immunization	1	0	0	Deprived if a child aged above 12months did not receive any of the vaccines: BCG, DPT1, DPT2, DPT3, Polio1, Polio2, Polio3, and Measles.
	Death of a child 0 -4 years	1	1	1	An indicator for health deprivation if a household has registered a death of a child less than 5 years. This marks a deprivation because most deaths of children under 5 years result from poor health.
	Knowledge and attitude of HIV	0	0	1	Have knowledge about HIV/AIDS (No = deprived; Yes = not deprived).
	Early sexual debut	0	0	1	Early sexual debut (deprived if sexually active before the age of 18 years).
	Use of condom (15-17 yrs)	0	0	1	Among sexually active, deprived if not used condom in their last encounter.
	Bed-net	1	1	1	Presence of bed nets for sleeping <sup>3</sup> in a household an indicator of sleeping under bed-net (No = deprived; Yes = not deprived).
	Diarrhoea treatment	1	0	0	Deprived if a child with diarrhoea in the last 2 weeks did not receive any treatment.
Knowledge of modern FP method	0	0	1	Knowledge of any Family planning method (No=deprived, Yes= not deprived).	
<b>Protection:</b> Deprivation cut-off: 1 and above	Domestic violence	1	1	1	An indicator of presence of domestic violence in a household (Yes = deprived, No = not deprived).
	Child registration	1	0	0	Deprived if a child is not registered.
	Child-headed household	1	1	1	A child is deprived if a household is lead by someone aged less than 18 years.
	Early Marriage	0	0	1	Deprived if a child is in a marriage relationship before the age of 18 years .
<b>Food &amp; Nutrition:</b> Deprivation cut-off: 2 and above	Stunting or underweight or Wasting	1	0	0	A child is deprived if WAZ, HAZ or WHZ standardized values are <-2 .
	Vitamin	1	0	0	Presence of vitamins in child's diet (No=deprived, Yes= not deprived).
	Breastfeeding duration	1	0	0	A child is deprived if breastfeeding stopped or the duration lasted < 6 months
	Complementary feeding	1	0	0	An indicator for introduction of complementary food to a child aged > 6 months.(No = deprived; Yes = not deprived)
<b>Water &amp;</b>	Improved source of drinking water	1	1	1	Source of drinking water of the household.

<sup>2</sup> For age-group 5-14 years, the cut-off for health dimension is 1 instead of 2.

<sup>3</sup> The indicator on presence of bednet in a household in Lesotho was not considered because the risk of malaria in Lesotho is very small and hence the probability of finding a bednet in a household is close to zero.

<b>Sanitation:</b> cut-off: 1 and above					Source of drinking water. Deprived if source of drinking water is river/dam/lake/ ponds/stream/canal/irrigation, rainwater, tanker truck, cart with small tank, un protected well and spring; Not deprived if the source of drinking water is: piped into dwelling, piped to yard/plot, public tap/standpipe, tube well or borehole, protected well, protected spring, bottled water.
	Improved sanitation	1	1	1	Sanitation condition of household lived by the children. Deprived if type of toilet facility is: no facility/bush/field or composting toilet or bucket toilet or hanging toilet/hanging latrine. Not deprived if t type of toilet facility is: flush - to piped sewer system or to septic tank or to pit latrine or to somewhere else, pit latrine - ventilated improved pit or with slab or without slab/open pit or = not deprived.

Although each of the four dimensions had a varying number of indicators, each contributed equally towards the computation of the multi-dimensional deprivation measures. However, the overall contribution of a domain towards a child being multi-dimensionally deprived was directly proportional to the percentage of children deprived in that dimension relative to other dimensions. For example, if deprivation levels are high for the health dimension and child protection dimension and the cut-off point is 2 dimensions, a child who was classified multi-dimensionally deprived had high chances of being deprived in either of the two dimensions.

## **2.7 Determinants of child deprivation**

In order to assess the extent of inequity in child deprivation, we examine crude differentials in the deprivation headcount by place of residence, education level of the household head, sex of household head, and household wealth quintiles. We then use multivariate logistic regression to assess the extent to which these and other relevant differentials are significant after controlling for the effect of other factors.

For the multivariate analysis, deprivation status is the dependent variable. The explanatory variables are the socioeconomic and demographic factors proven to be associated with child health and general wellbeing in the literature. The demographic variables include sex of child, age of child, sex of household head, age of household head, and number of household members. Socioeconomic factors include religion, place of residence, region of residence, education level of the head of the household, household wealth status, and orphan-hood status. The detailed regression results for each country are presented in Chapter 8, but a summary of the results is presented for each age group.

## **2.8 Data Limitations**

The main limitation of the available data sets is that they did not have all the variables needed to measure all dimensions of child deprivation. The project started off with the intention of analyzing levels and trends in multidimensional child deprivation in all ESAR countries, but this was not possible because the variables that we set out to analyze were not consistently available over time and across countries. For instance, we excluded female circumcision from the child protection domain because the variable was not available in most data sets. Similarly, we dropped presence of iodine in food and complimentary food during illness from the analysis because the variables were missing in many data sets. Malawi's 2010 DHS data do not have child registration information; consequently, we exclude Malawi from the 0-4 age group analysis but include it in the analyses for the other age groups.

Lack of data for different dimensions was the main reason why the study used data from 9 countries rather than the 24 countries as shown in Appendix 2. In general, DHS data do not include comprehensive measures of child protection; they have little information related to the health of children above 5 years, and lack information on education for children aged less than 5 years.

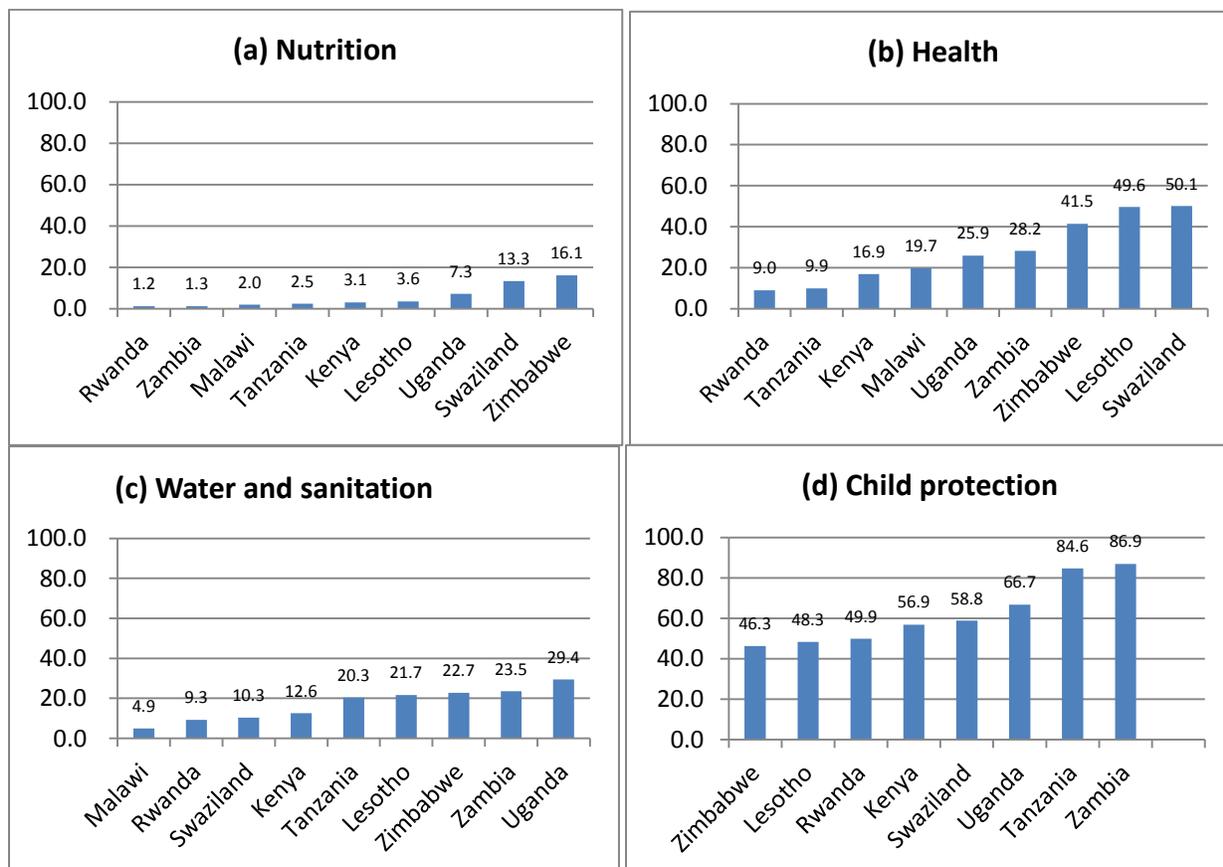
Most DHS data collected in the early 1990s did not include information related to reproductive health, child protection, HIV knowledge and female circumcision.

MICS data contain sufficient information related to the five dimensions and for all the three age groups. However, MICS data have not been as consistently collected as the DHS data, and many of the recent MICS surveys are not nationally representative. For example, the 2008, 2009, and 2011 MICS data for Kenya covered some of the provinces and did not provide national level estimates. MICS datasets collected before 2005 did not include data for males aged above 15 years. Due to these limitations analyses for seven countries were based on DHS data while we utilized MICS data for only two countries (Swaziland and Zimbabwe).

## CHAPTER 3: RESULTS: 0-4 YEARS

### 3.1 Trends in components of deprivation

Figures 3.1a to 3.1d show the ranking of countries according to levels of deprivation for the nutrition, health, water/sanitation and child protection dimensions amongst children aged 0-4 years. The deprivation levels show the percentage of children in the total sample who were deprived in a given dimension. Deprivation levels were highest in child protection followed by the health dimension, and were lowest in the nutrition dimension.



**Figure 3.1:** Deprivation levels for different dimensions for age-group 0-4 years.

#### *Food and nutrition*

Nutrition is very important for factor among children because it is directly linked to all aspects of their growth and development and also determines their level of health as adults. Results show that deprivation in food and nutrition range from 1% in Rwanda to 16% in Zimbabwe, with Swaziland at 13.3%. Given that the cut-off point for defining deprivation in this dimension was two indicators out of a possible four in this age group, the generally low levels of deprivation in nutrition suggest that the region is doing relatively well in this important measure of child health and general wellbeing.

### *Health*

Staying healthy among children is vital for proper growth and development of their mind and body. Protecting and promoting the health of children is an important goal since it has broader effects on educational achievement and other socio-economic outcomes. Deprivation levels in the health dimension range from 10% in Rwanda and Tanzania to about 50% in Lesotho and Swaziland. Zimbabwe is on the high end with a 40% deprivation level in the health dimension. The findings show regional pattern in that the highest four deprivation levels are recorded in Southern Africa while the lowest three are in East Africa. These results largely reflect the general progress that the nine countries have made towards reducing child mortality, with Rwanda, Tanzania, Kenya and Malawi leading the way.

### *Water and sanitation*

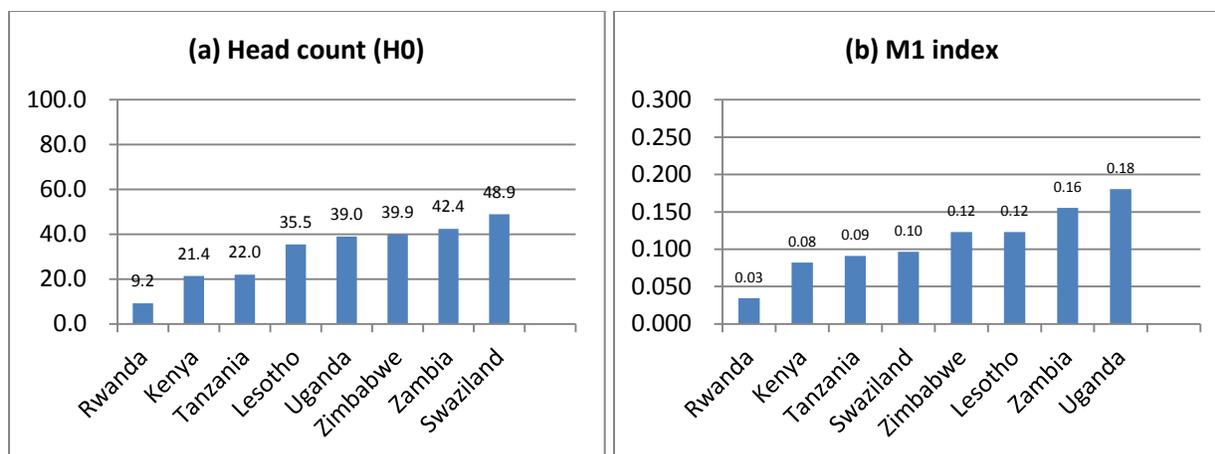
Safe water and sanitation are very important for children's well-being. Lack of clean water and sanitation point to potential direct health hazards to the child and other members of the household. Deprivation levels in water and sanitation range from 5% in Malawi to 29% in Uganda. Deprivation levels are moderately high (between 20% and 24%) in Tanzania, Lesotho, Zimbabwe and Zambia. Rwanda has the second lowest level (9.3%), followed by Swaziland and Kenya. When interpreting these results, caution should be exercised since the dimension has only two indicators (improved water source and improved sanitation). The definitions of safe water and toilet facility may be ambiguous due to data limitations. For instance, it is common for household heads to report that a household has a toilet facility when the facility may not be accessible to children. Deprivation in water and sanitation may also be understated since the survey questions did not include assessment of water quality or quantity, which would affect child health and wellbeing.

### *Child protection*

All children have a right to protection against abuse, neglect, exploitation and violence and many organizations have a statutory duty to safeguard and promote the welfare of children. The deprivation levels in the region are worrying with six out of nine countries having at least 50% of children deprived in the child protection dimension. The deprivation levels range from 46% in Zimbabwe to 87% in Zambia. Moreover, the levels of deprivation in child protection are higher among children aged less than 5 years than in the other two age groups. The results for Malawi were excluded in this dimension because data on birth registration for children aged below 5 year were not available in the Malawi 2010 DHS.

## **3.2 Multi-dimensional deprivation levels**

Figures 3.2a and 3.2b present the levels of child deprivation according to multi-dimensional deprivation measures – head count (H0) and the depth or severity of deprivation M1 index. The data used to generate the histograms are presented in table A3 in Appendix 4.



**Figure 3.2:** Levels of deprivation based on H0 and M1 for age group 0-4 years

Levels of multi-dimensional deprivation range from 9% in Rwanda to 49% in Swaziland. Deprivation levels in five out of the eight countries<sup>4</sup> is above 35%, and all the countries with high levels of deprivation are in southern Africa, with the exception of Uganda. This shows a regional pattern of deprivation with moderate to low levels in observed in eastern Africa (Rwanda, Kenya, and Tanzania) and higher deprivation levels observed in southern Africa (Swaziland, Zambia, Lesotho, and Zimbabwe).

The general patterns in the depth or severity of deprivation largely resemble those observed in the head count deprivation measure. For instance, Rwanda, Kenya and Tanzania remain the countries with the lowest severity of deprivation, while Uganda and Zambia emerge as the countries with the highest severity of deprivation. Swaziland is the main exception; it has the highest level of deprivation but the fourth lowest depth of deprivation among the eight countries.

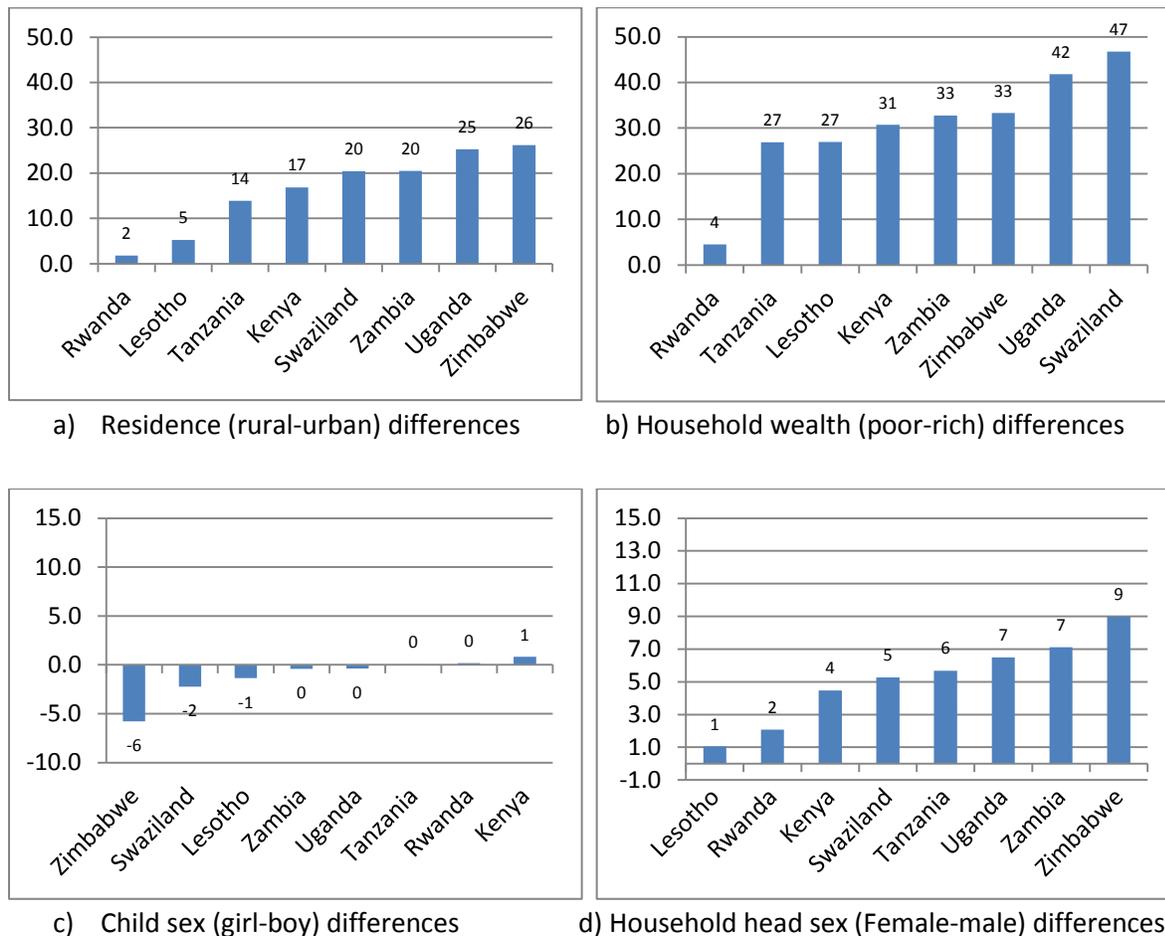
Taken in totality, these results show that deprivation levels are quite high and there is considerable variation across the countries in the ESAR region. The low deprivation levels in Rwanda are consistent with the fact that Rwanda is among countries that are on target to achieve MDG4 by 2015 (United Nations, 2011). Other countries that have relatively low levels of child deprivation, and are also on course towards achieving the MDG 4 are Kenya and Tanzania. Although Malawi is not included in the multi-dimensional deprivation index because it lacked birth registration data, its low levels of deprivation in nutrition, health, and water and sanitation also correspond with its impeccable progress towards achievement of MDG 4.

### 3.3 Differentials in child deprivation

To understand the extent of inequalities in child deprivation within and across countries, the H0 measure was decomposed by residence, household wealth index, child sex, and sex of the

<sup>4</sup> Results for Malawi were excluded for children aged 0-4 years because of lack of information on birth registration in child protection dimension.

household head. Figures 3.3a–3.2d present absolute differences in the level of deprivation between the sub-groups being compared for the 0-4 age group.



**Figure 3.3:** Differentials in child deprivation among children aged 0-4 years

The results show that children living in rural areas and those living in poor or female headed households exhibit higher levels of deprivation compared to their counterparts living in urban areas, in rich households, or in male-headed households. There are no marked differences in child deprivation between male and female children, with the exception of Zimbabwe where boys are more deprived than girls. The general pattern in the four charts shows that countries with lower levels of overall deprivation also have relatively low levels of inequities in deprivation across various social-economic factors. Rwanda, Tanzania, Lesotho and Kenya exhibit relatively low levels of inequity. This suggests that part of the driving force behind reducing overall levels of child deprivation centers on reducing inequities in child wellbeing.

### 3.4 Socioeconomic and demographic determinants of child deprivation

Table 3.1 presents a summary of the results of the logistic regression done to determine key socioeconomic determinants of child deprivation among children aged 0-4 years. The detailed regression results are presented separately for each country in Chapter 8.

**Table 3.1:** Regression analysis results on child deprivation for children aged 0-4 years

Variables	Levels	Kenya	Lesotho	Rwanda	Swaziland	Tanzania	Uganda	Zambia	Zimbabwe
<b>Child gender (ref: Male)</b>	Female	0	0	0	-	0	0	+	0
<b>HH gender (ref: Male)</b>	Female	-	0	+	-	+	0	0	0
<b>Age of the household head (ref: &lt; 25 years)</b>	25 - 34 years	0	0	-	-	0	0	0	-
	35 - 44 years	0	0	-	-	0	0	0	-
	45 - 54 years	0	0	-	-	0	-	0	-
	> 55 years	0	0	-	-	0	0	-	-
<b>Religion (ref: Christians)</b>	Muslim	-	.	0	0	.	0	0	0
	no religion	0	.	.	0	.	0	0	+
	Others	.	0	0	0	.	0	-	0
<b>Child age in years</b>	-	+	-	-	-	0	0	+	0
<b>Residence (ref: Urban)</b>	Rural	0	0	0	0	0	+	0	0
<b>No. of household members</b>	-	0	+	0	+	+	0	0	-
<b>Education level of HH (ref: No education)</b>	Primary	-	0	-	0	-	-	-	0
	Secondary +	-	0	-	0	-	-	-	-
<b>Household wealth (ref: poor)</b>	middle	-	-	-	-	-	-	-	-
	high	-	-	-	-	-	-	-	-
<b>Orphan hood (ref: Non orphan)</b>	Single orphan	.	0	0	-	-	-	+	+
	Double orphan	.	.	.	0	.	-	+	+

+: Significant (p-value < 0.05) and positively associated with increase in child deprivation

- : Significant (p-value < 0.05) and negatively associated with increase in child deprivation

0 : No significant association

. : Missing

### *Child sex*

Results show no significant association between gender of the child and deprivation status in six of the eight countries. In Swaziland girls are significantly less likely to be deprived than boys while the opposite is the case in Zambia.

### *Household head sex*

The results on the association between sex of the household head and child deprivation are not consistent across countries. There is no significant relationship in four countries (Lesotho, Uganda,

Zambia, and Zimbabwe). On the other hand, children in female-headed households are less likely to be deprived than their counterparts in male-headed households in Kenya and Swaziland, while children in female-headed households are more likely to be deprived in Rwanda and Tanzania.

#### *Age of the household head*

The results on the relationship between age of household head and the likelihood that a child will be deprived are also inconsistent across countries. In Rwanda, Swaziland, and Zimbabwe, children living in households headed by older people are significantly less likely to be deprived than those living in households headed by younger people aged less than 25 years. In Zambia and Uganda, this effect is only significant when older age groups are considered (55+ in Zambia and 45-54 in Uganda). There is no significant relationship between age of the household head and child deprivation in Kenya, Lesotho and Tanzania.

#### *Religion*

The findings on the association between child deprivation and religion are not consistent across countries. Children with no religion are more deprived than Christians in Zimbabwe those belonging to other religions are less deprived than Christians in Zambia while Muslim children are less likely to be deprived than Christians in Kenya. There is no significant association between religion and child deprivation in five out of the eight countries

#### *Child age*

The findings on the association between child age and child deprivation vary across countries. In Lesotho, Rwanda and Swaziland, the likelihood of deprivation is significantly lower for older children within the 0-4 age group. In contrast, , older children in this age-group exhibit higher levels of deprivation than the younger ones in Kenya and Zambia. There is no association between child's age and child deprivation in Tanzania, Uganda and Zimbabwe.

#### *Place of residence*

The results from seven out of eight countries do not show any significant association between child deprivation and area of residence (rural versus urban). In Uganda, children in rural areas are more deprived than those in urban areas. These results suggest that the big differences in deprivation between rural and urban areas may be a reflection of other socioeconomic differences controlled for in the analysis, rather than actual contextual differences.

#### *Number of household members*

Big families are often thought to have a negative impact on the wellbeing of children. The findings on the association between the number of household members and child deprivation are not consistent; while no significant association is observed in Kenya, Rwanda, Uganda, and Zambia., the expected negative effect of big families on child deprivation is confirmed in Lesotho, Swaziland and Tanzania. However, in Zimbabwe, an increase in the number of household members is associated with lower deprivation levels.

### *Household head education level*

In the literature, the mother's level of education is almost always associated with positive child development outcomes. Results from six out of eight countries support this hypothesis for education level of the head of household, although in Zimbabwe the significant effect is only observed at secondary or higher level of education. In Lesotho and Swaziland, there is no significant association between the level of education of the household head and child deprivation.

### *Household wealth*

The results from all countries show a significant decrease in the likelihood of child deprivation as household wealth increases.

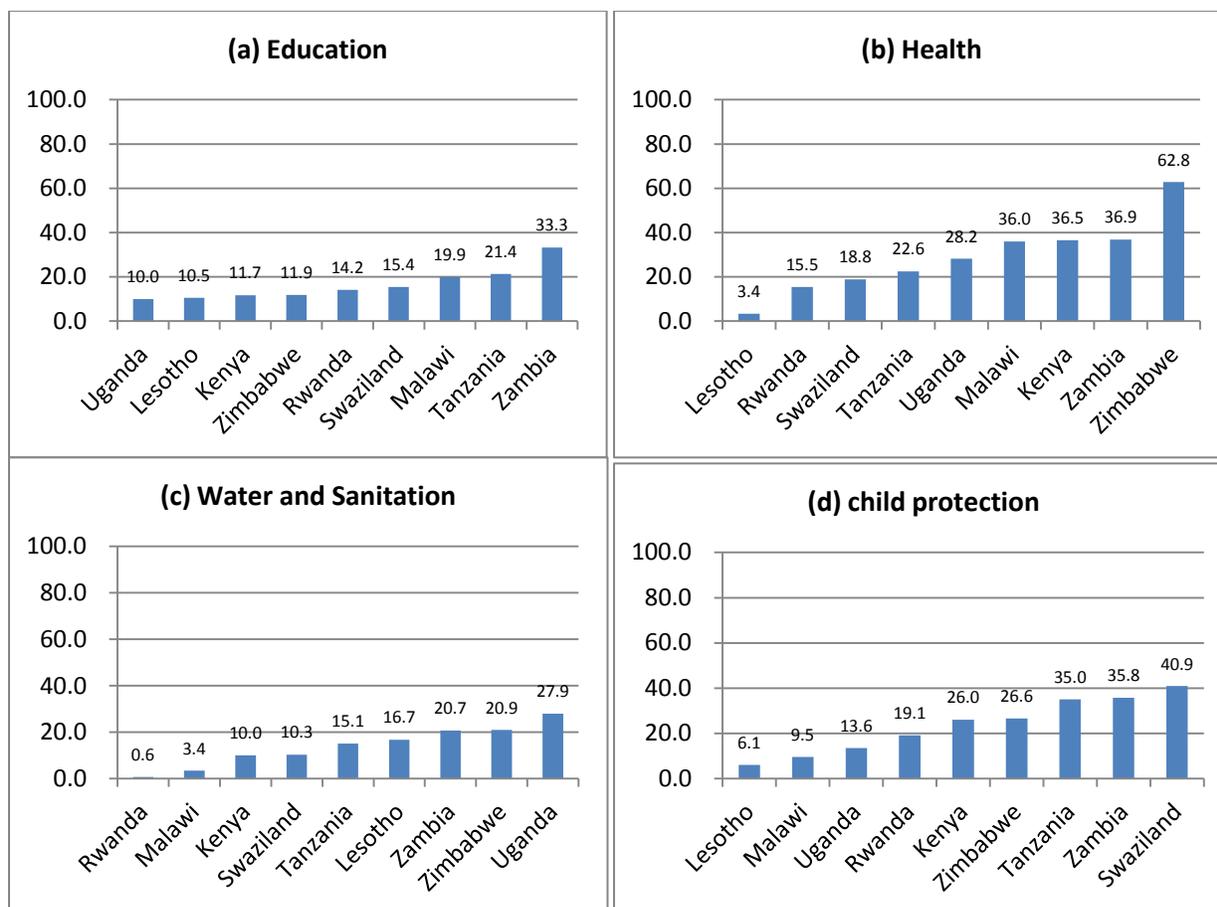
### *Orphan-hood status*

Children who are orphaned are expected to have more negative child development outcomes due to absence of parental care and support. The findings on the association between orphan-hood status and child deprivation are inconsistent. In Lesotho and Rwanda there are no significant differences between children who are orphaned and those with parents. In Zambia and Zimbabwe, orphans have higher levels of deprivation. In Uganda, orphans have lower levels of deprivation, while in Swaziland and Tanzania, single orphans have significantly lower levels of deprivation than non-orphans.

## CHAPTER 4: RESULTS: 5-14 YEARS

### 4.1 Trends in components of deprivation

Figures 4.1a- 4.1d show deprivation levels for each of the four dimensions for children aged 5-14 years. The percentages were based on the number of children that had scores below the cut-off levels defined in Table 2.1. Deprivation was highest in the health followed by child protection dimensions. The education and water/sanitation dimensions had relatively low levels of deprivation. Rwanda has relatively low deprivation levels in three out of four dimensions while Zambia has consistently high deprivation levels in three dimensions.



**Figure 4.1:** Deprivation levels for different dimensions for age-group 5-14 years

#### Education

Access to education is one of the key basic needs for children, and it is among the central MDG pillars for human capital development. Quality education is important among children since it determines the future of a nation's socio-economic and political wellbeing. Deprivation levels in education for the 5-14 age group range from 10% in Uganda to 33% in Zambia. In Swaziland, Malawi, Tanzania and Rwanda deprivation levels in education range from 14% to 21%. The levels for Lesotho, Kenya and Zimbabwe are close to the lowest level, ranging from 10 to 12%.

### Health

The health dimension for the 5-14 age group is generated from two variables (death of a child aged 0-4 in the family and availability of a bed net). The cut-off point for this is one of the two needs. The results show that deprivation is relatively high in the region; it ranges from a low of 3.4% in Lesotho to a high of 63% in Zimbabwe. Deprivation levels in Zambia, Kenya, and Malawi exceed 35%. The results also show low deprivation in Rwanda, followed by Swaziland, Tanzania, and Uganda.

### Water and sanitation

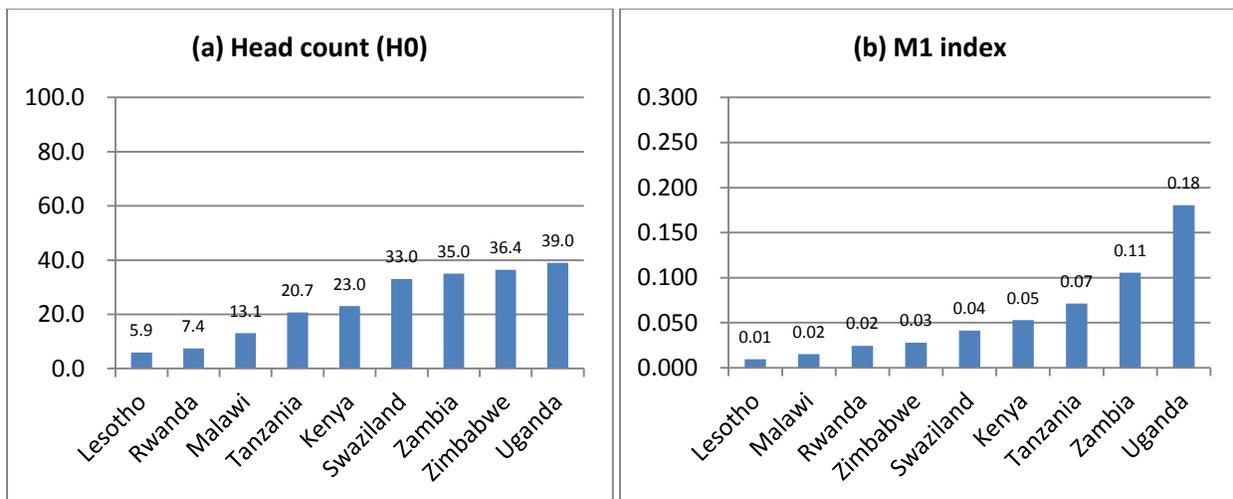
The results show that Rwanda and Malawi have the lowest deprivation levels of less than 5% while Uganda has the highest (28%). Zimbabwe and Zambia have the second lowest levels at around 21%.

### Child protection

The results show that deprivation in child protection ranges from 6% in Lesotho to 41% in Swaziland. Malawi has the second lowest, with Uganda, Rwanda Kenya and Zimbabwe recording moderate levels. Tanzania and Zambia's levels are close to the high end.

## 4.2 Multi-dimensional deprivation levels

Figure 4.2a presents multi-dimensional deprivation measure for children aged 5-14 based on head count (H0) while Figure 4.2b shows the depth or severity of deprivation based on M1 index. The data in the histograms are presented in the table in Appendix 4.



**Figure 4.2:** Levels of deprivation based on H0 and M1 indices for 5-14 years children

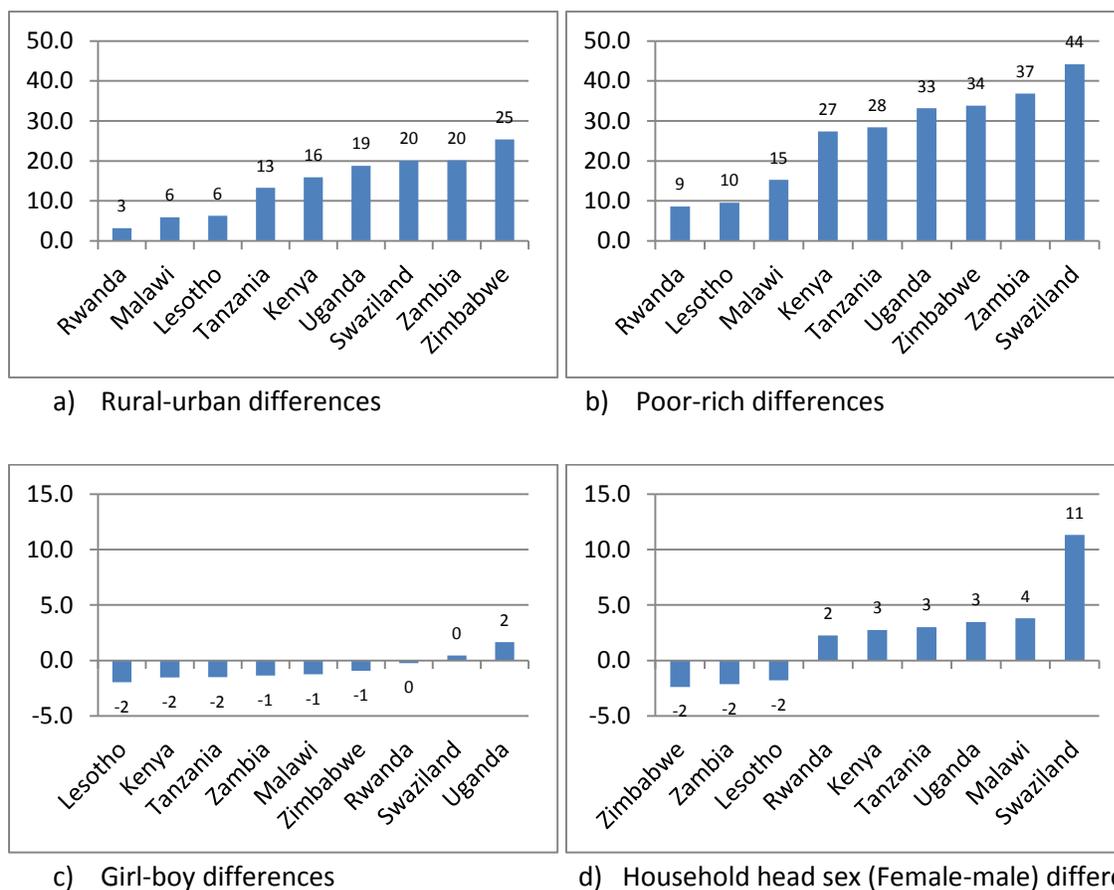
The deprivation patterns among children aged 5-14 years largely resemble findings observed among children aged 0-4 years. However, deprivation levels among children aged 5-14 are higher than for children aged 0-4 years.

The headcount measure of deprivation ranges from 6% in Lesotho to 39% in Uganda. Three other countries (Swaziland, Zambia, and Zimbabwe) have deprivation levels exceeding 30%. Deprivation levels for Malawi and Rwanda are relatively low.

The general patterns in the severity of deprivation resemble those for head count. For instance, Lesotho, Malawi and Rwanda have the lowest levels of deprivation and lowest depth while Uganda and Zambia are at the top end on both measures. Zimbabwe is a clear exception as it has the second highest levels of deprivation but has a relatively low level of severity or depth.

### 4.3 Differentials in child deprivation

To understand the extent of inequalities in child deprivation within and across countries, the H0 measure was decomposed by residence, household wealth index, child sex, and sex of the household head. Figures 4.3a–4.2d present absolute differences in the level of deprivation between the sub-groups being compared for the 5-14 age group.



**Figure 4.3:** Deprivation differentials by demographic characteristics for children aged 5-14 years

The rural-urban and wealth status differentials in deprivation for the 5-14 age group are similar to the ones observed for the 0-4 age group whereby children who are based in urban areas and the wealthier ones are less likely to be deprived than their corresponding counterparts. The

differences are lowest in Rwanda, Malawi and Lesotho and highest in Zimbabwe, Zambia, Swaziland, and Uganda for both measures.

However, notable differences are observed between the two age groups with regards to the gender-based differentials. While the differences in deprivation between boys and girls are generally small, girls are less disadvantaged than boys in six of the nine countries. Additionally, differentials in deprivation between children living in female versus male-headed households are smaller among those aged 5-14 years than among those aged 0-4 years, and in three countries girls exhibit lower levels of deprivation than boys. Rwanda and Lesotho exhibit the lowest differentials with regards to gender of household head while Swaziland exhibits the highest differentials.

#### 4.4 Socioeconomic and demographic determinants of child deprivation

Table 4.1 presents a summary of the logistic regression results done to determine key socioeconomic determinants of child deprivation among children aged 5-14 years. The detailed regression results are presented in Chapter 8 separately for each country.

**Table 4.1:** Regression analysis results on child deprivation for children aged 5-14 years

Variables	Levels	Kenya	Lesotho	Malawi	Rwanda	Swaziland	Tanzania	Uganda	Zambia	Zimbabwe
<b>Child gender (ref: Male)</b>	Female	0	-	0	0	+	0	0	+	0
<b>HH gender (ref: Male)</b>	Female	0	0	0	0	+	0	0	-	0
<b>Age of the household head (ref: &lt; 25 years)</b>	25 - 34 years	+	0	-	0	+	0	-	-	-
	35 - 44 years	+	0	-	0	+	0	-	-	-
	45 - 54 years	0	0	0	0	0	0	-	-	-
	> 55 years	0	0	0	-	0	0	-	-	-
<b>Religion (ref: Christians)</b>	Muslim	-	.	0	0	0	.	0	0	0
	no religion	+	.	0	.	0	.	0	0	+
	Others	.	0	+	0	+	.	0	+	0
<b>Child age in years</b>	-	-	-	-	-	-	+	-	-	-
<b>Residence (ref: Urban)</b>	Rural	0	+	0	0	0	0	0	0	0
<b>No. of household members</b>	-	-	+	0	-	+	+	0	0	-
<b>Education level of HH (ref: No education)</b>	Primary	-	-	-	-	-	-	-	-	-
	Secondary+	-	-	0	-	-	-	-	-	-
<b>Household wealth (ref: poor)</b>	Middle	-	-	-	-	-	-	-	-	-
	High	-	-	-	-	-	-	-	-	-

<b>Orphan hood (ref: Non orphan)</b>	Single orphan	.	0	+	0	+	0	0	0	0
	Double orphan	.	0	+	0	.	0	0	0	+

- +: Significant (p-value < 0.05) and positively associated with increase in child deprivation
- : Significant (p-value < 0.05) and negatively associated with increase in child deprivation
- 0 : No significant association
- . : Missing

### *Child sex*

There is no significant association between the sex of a child and deprivation in six of the nine countries. In Swaziland and Zambia, girls are more significantly deprived than boys while in Lesotho, boys are more deprived than girls.

### *Household head sex*

The sex of the household head does not have a significant effect in predicting child deprivation in seven countries. In Swaziland, children in female-headed household are significantly more likely to be deprived than children living in male-headed households, while the opposite pattern prevails in Zambia.

### *Age of the household head*

The results on the relationship between age of household head and child deprivation vary. The age of the household head is significantly correlated with lower levels of child deprivation among 0-14 year old children in Uganda, Zambia, Zimbabwe, and Malawi. In Kenya and Swaziland, children living in households headed by adults aged 25-44 years are more likely to be deprived than those living in households whose heads are less than 25 years old. The age of the household head has no significant effect of the level of children deprivation in Lesotho and Tanzania, and the difference is only significant for the oldest age group in Rwanda.

### *Religion*

The findings on the relationship between religion and child deprivation also vary. There is no significant difference in deprivation between Christian and Muslim children in all the countries except in Kenya where Muslims are less deprived than Christians. In the cases where we observe a significant difference in deprivation between children that have no religious affiliation or belong to other religions besides Christianity, those with no religious affiliation exhibit higher levels of deprivation than the later. This pattern is observed in Kenya and Zimbabwe for “no religion” and Malawi, Swaziland, and Zambia for “other religions”.

### *Child age*

An increase in child age significantly decreases the level of deprivation in eight countries. The exception is Tanzania where older children in the 5-14 age range are more likely to be deprived than their younger counterparts.

### *Place of residence*

There is no significant association between child deprivation and rural/urban residence in eight of the nine countries. The exception is Lesotho where children from rural areas are more deprived than their urban counterparts.

### *Number of household members*

The findings on the relationship between number of household members and deprivation are not consistent. There is no association between number of household members and child deprivation in Malawi, Uganda and Zambia. A higher number of household members is associated with a significant increase in child deprivation in Swaziland, Tanzania and Lesotho. Conversely, an increase in the number of household members is associated with lower deprivation level in Kenya, Rwanda and Zimbabwe,.

### *Household head education level*

Results from all countries show that an increase in education levels of the household head is associated with significant reduction in child deprivation levels. However, in Malawi, there is no significant difference in child deprivation between household where the heads has no education and those where the household head has at least some secondary education.

### *Household wealth*

In all the nine countries, a higher level of household wealth is associated with significantly lower levels of child deprivation.

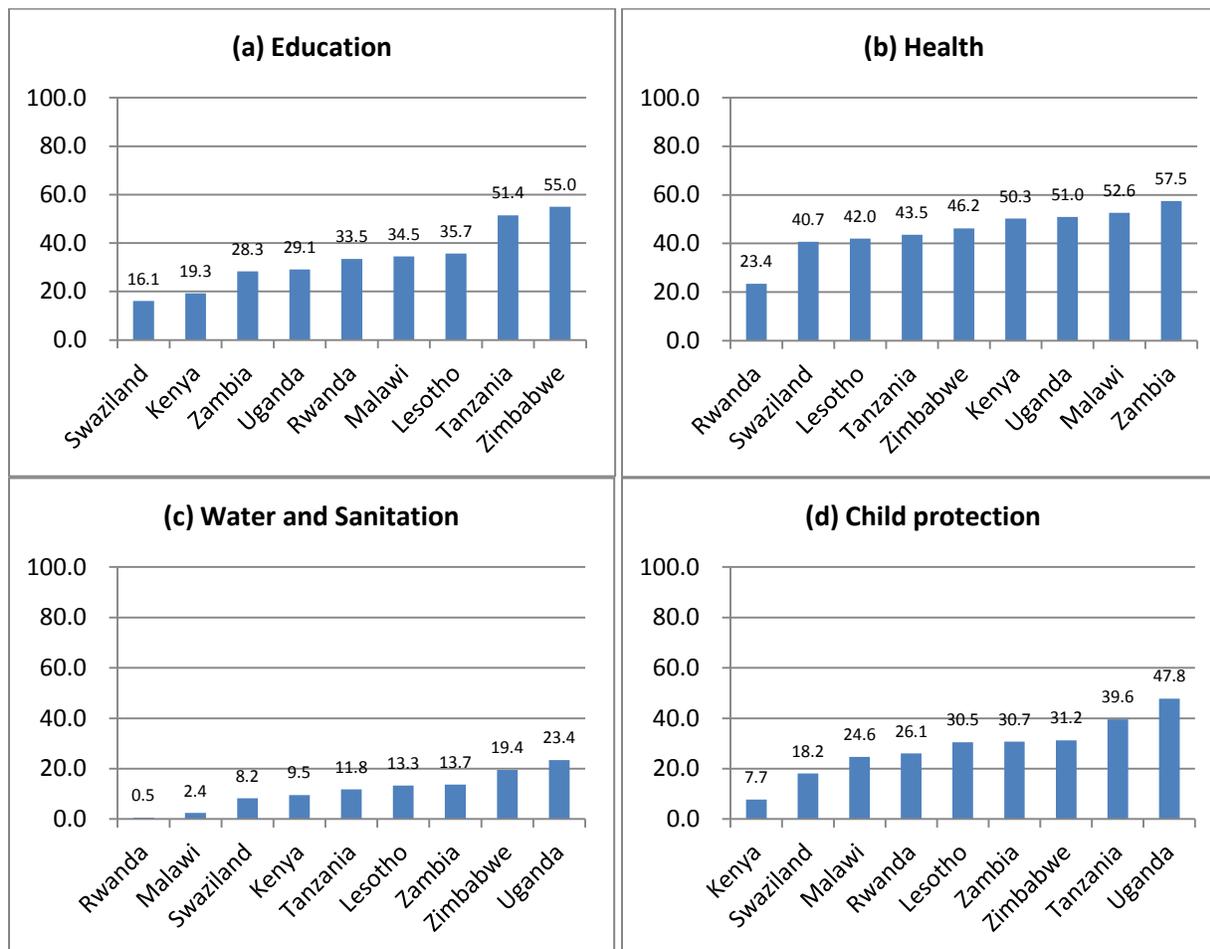
### *Orphan-hood status*

Orphan-hood is not significantly associated with child deprivation in five countries. In Malawi both single and double orphans have higher levels of deprivation than non-orphans. Single orphans are more deprived in Swaziland while in Zimbabwe it is only the double-orphaned children who are significantly more deprived than the non-orphans.

## CHAPTER 5: RESULTS: 15-17 YEARS

### 5.1 Trends in components of deprivation

Figures 5.1a-d show deprivation levels for children aged 15-17 years in the education, health, child protection, and water and sanitation dimensions. Deprivation was generally high in health, education, and child protection dimensions.



**Figure 5.1:** Deprivation levels for different dimensions for age-group 15-17 years

#### *Education*

Deprivation in education is higher among children aged 15-17 years than amongst those aged 5-14 years. Swaziland (16%) and Kenya (19%) have the lowest deprivation levels while Zimbabwe (55%) and Tanzania (51%) have the highest levels. Seven out of nine countries have at least 20% of the children deprived in education. In most of the countries included in this analysis, 15-17 year olds should be in secondary school, and these relatively high levels of deprivation in the education dimension mostly reflect low levels of progression to secondary school.

## Health

The deprivation levels in health range from as low as 23% in Rwanda to as high as 58% in Zambia. Deprivation levels in health for this age group are higher than those of the two other age groups. In fact, in eight out of the nine countries, deprivation levels are at least 40%. This is partly due to inclusion of additional indicators on sexual and reproductive health (SRH) which include knowledge of HIV/AIDS and contraceptive methods, early sexual debut, and condom use during last sexual encounter for persons who are not married.

## Water and sanitation

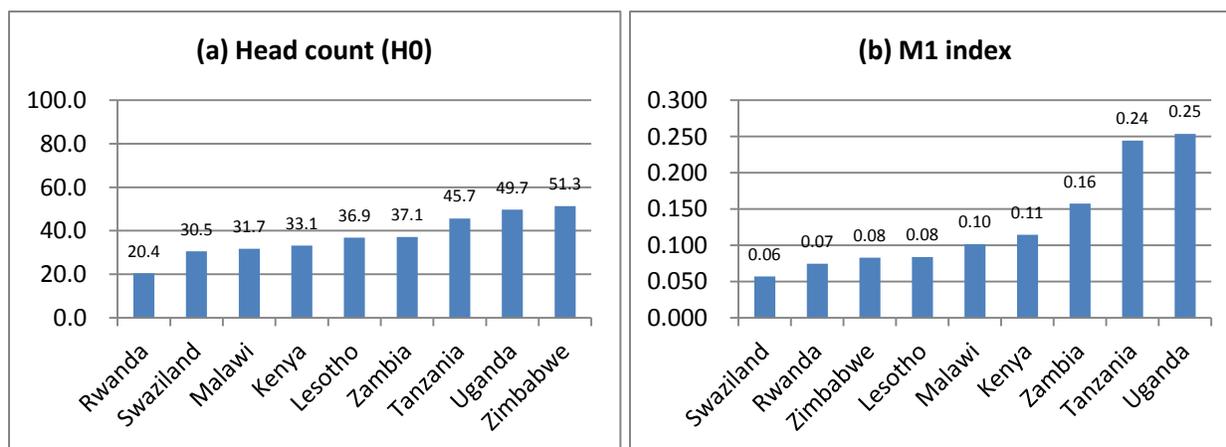
Deprivation levels in water and sanitation are relatively low. Rwanda (1%) and Malawi (2.4%) have the lowest deprivation levels while Uganda (23%) and Zimbabwe (19%) have the highest levels.

## Child Protection

Levels of deprivation in child protection range from a low of 8% in Kenya to a high of 48% in Uganda. Deprivation levels are at least 20% in seven out of nine countries.

## 5.2 Multi-dimensional deprivation levels

Figures 5.2a and 5.2b present findings based on the head count (H0) and M1 multi-dimensional deprivation measures for the 15-17 years age group.



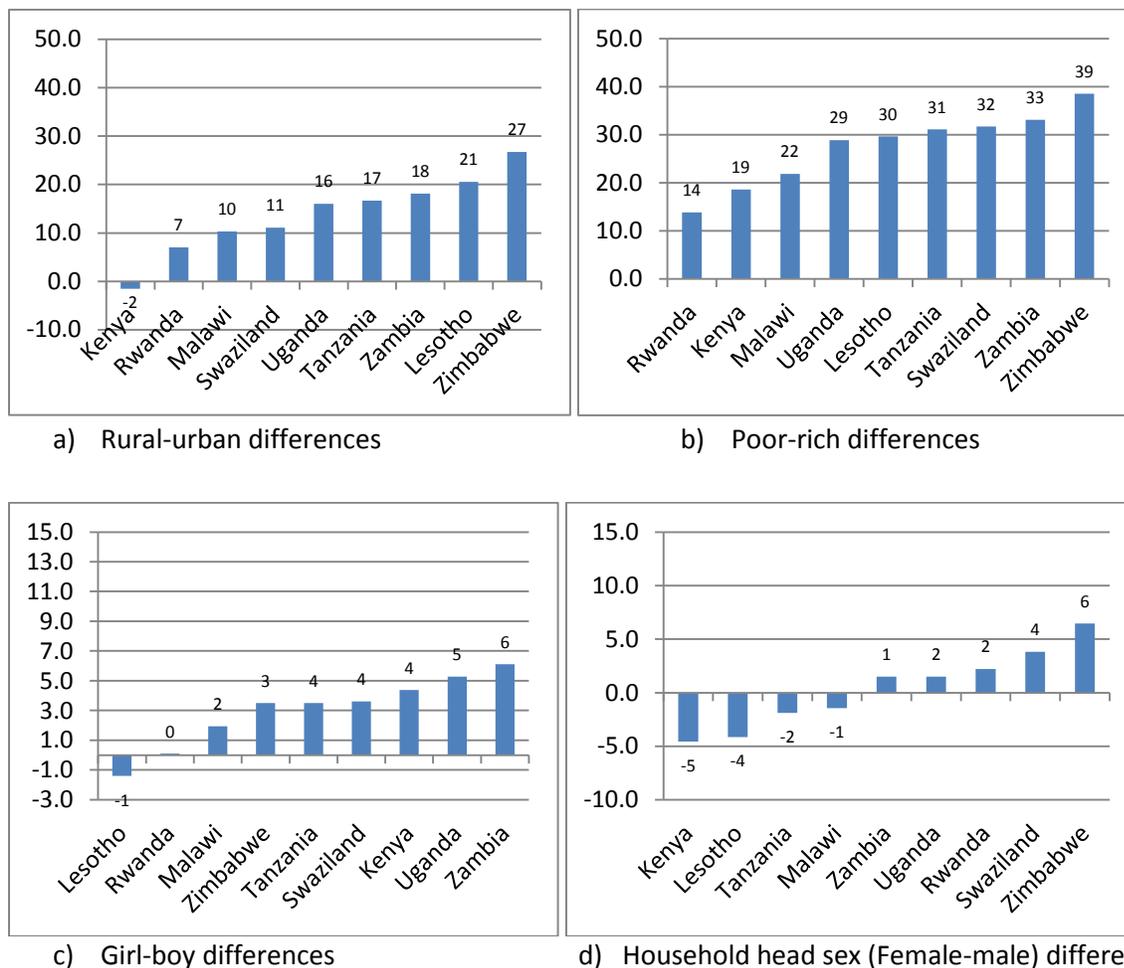
**Figure 5.2:** Levels of deprivation based on H0 and M1 for age group 15-17 years

The results show that multi-dimensional deprivation levels are higher in the 15-17 years age group than in the two other age groups. Deprivation levels range from 20% in Rwanda to 51% in Zimbabwe. In fact, with the exception of Rwanda, at least 30% of children aged 15-17 are multi-dimensionally deprived in the other eight countries. Swaziland and Malawi have moderately low deprivation levels while Uganda and Tanzania are close to the highest level.

The M1 deprivation measure shows that Tanzania and Uganda have the highest severity or depth of deprivation while Swaziland and Rwanda have the lowest. As was the case in the 5-14 age group, Zimbabwe records the highest level of deprivation, but a relatively low depth of deprivation.

### 5.3 Differentials in child deprivation

This section presents differentials in child deprivation by rural/urban residence, household wealth, child sex, and the sex of the household for children aged 15-17 years. Figures 5.3a–5.2d present absolute differences in the level of deprivation between the sub-groups being compared.



**Figure 5.3:** Deprivation differentials by background characteristics for children aged 15-17 years

The differentials in child deprivation largely resemble the patterns for the 5-14 age-group. Children who live in rural areas exhibit higher levels of deprivation than their urban counterparts in all countries except Kenya where the opposite scenario is observed. Kenya has the smallest difference in deprivation between rural and urban children (followed by Rwanda, Malawi, and Swaziland) while Zimbabwe had the highest difference. Children living in poor households are also more likely to be deprived than those living in richer households. Again, the differences are highest in Zimbabwe while they are lowest in Rwanda, Kenya and Malawi. Additionally, the variation in deprivation levels by household wealth is higher among children aged 15-17 years than among other age groups.

Girls are more deprived than boys in seven out of nine countries and the gender differences are much more pronounced than in the other two age groups. This pattern highlights the need to pay particular attention to girls in programming for the older children. The highest levels of deprivation among girls are observed in Zambia and Uganda while Rwanda has the lowest levels, followed by Lesotho and Malawi. Children in female-headed households have higher deprivation levels than those in male-headed households in Zimbabwe, Swaziland, Rwanda, Uganda and Zambia. However, male-headed households have higher levels of child deprivation in Kenya, Lesotho, Tanzania and Malawi.

#### 5.4 Socioeconomic and demographic determinants of child deprivation

Table 5.1 presents a summary of the logistic regression results done to determine key socioeconomic determinants of child deprivation among children aged 15-17 years. The detailed regression results are presented in Chapter 8 separately for each country.

**Table 5.1:** Regression analysis results on child deprivation for children aged 15-17 years

Variables	Levels	Kenya	Lesotho	Malawi	Rwanda	Swazil and	Tanzania	Uganda	Zambia	Zimbabwe
<b>Child gender (ref: Male)</b>	Female	0	-	0	-	+	+	0	+	0
<b>HH gender (ref: Male)</b>	Female	-	0	0	0	-	0	0	0	+
<b>Age of the household head (ref: &lt; 25 years)</b>	25 -34 years	-	-	-	0	-	-	-	-	-
	35 -44 years	-	-	-	-	-	-	-	-	-
	45 -54 years	-	-	-	-	-	-	-	-	-
	> 55 years	-	-	-	-	-	-	-	-	-
<b>Religion (ref: Christians)</b>	Muslim	0	.	0	0	0	.	0	-	0
	No religion	0	.	0	0	0	.	0	0	+
	Others	0	0	0	0	0	.	0	0	0
<b>Child age in years</b>	.	+	+	+	+	+	+	+	+	+
<b>Residence (ref: Urban)</b>	Rural	0	0	0	0	0	0	0	0	0
<b>No. of household members</b>	.	0	+	0	-	+	+	+	0	0
<b>Education level Of HH (ref: No education)</b>	Primary	-	0	0	-	0	-	-	-	-
	Secondary+	-	-	-	-	-	-	-	-	-
<b>Household wealth (ref: poor)</b>	middle	-	-	0	-	-	-	-	-	-
	high	-	-	-	-	-	-	-	-	-
<b>orphan hood (ref: Non orphan)</b>	Single orphan	.	0	0	0	+	0	-	0	0
	Double orphan	.	0	0	0	.	0	-	0	0

+: Significant (p-value < 0.05) and positively associated with increase in child deprivation

-: Significant (p-value < 0.05) and negatively associated with increase in child deprivation

0: No significant association

.: Missing

### *Child sex*

There is no significant association between the sex of a child and deprivation in Kenya, Malawi, Uganda and Zimbabwe. In Swaziland, Tanzania and Zambia, girls are significantly more deprived than boys, while girls are significantly less deprived than boys in Lesotho and Rwanda.

### *Household head sex*

There is no significant association between sex of the household head and child deprivation in six of the nine countries. In Kenya and Swaziland, children living in female-headed households are less likely to be deprived than those living in male-headed households. In Zimbabwe, however, children living in female-headed households exhibit significantly higher levels of deprivation.

### *Age of the household head*

Children living in households headed by older people are significantly less likely to be deprived than children living in households headed by younger people in all the nine countries. The effect of the age of the household head on child deprivation is much more consistent across the nine countries in the 15-17 age group than it is in the other age groups.

### *Religion*

There is no significant association between child deprivation and religion in seven out of nine countries. Muslim children are less deprived than Christian children in Zambia while in Zimbabwe children with no religion are more deprived than Christians.

### *Child age*

The results from all countries demonstrate that an increase in child age significantly increases the level of deprivation among children aged 15-17 years.

### *Place of residence*

The findings in the nine countries show no significant association between child deprivation and the rural/urban residence.

### *Number of household members*

The effect of the household size on child deprivation varies across the nine countries. There is no significant association between the two variables in Kenya, Malawi, Zambia and Zimbabwe. In another four countries (i.e. Lesotho, Swaziland, Tanzania, and Uganda), however, a higher number of household members is associated with an increase in child deprivation. Rwanda is the only country where a significant negative relationship is observed between household size and child deprivation.

### *Household head education level*

Results from all the nine countries demonstrate that an increase in education level of the household head is associated with significantly lower levels of child deprivation. However, in Lesotho, Malawi and Swaziland, significant differences are only evident at secondary level of education.

### *Household wealth*

An increase in household wealth significantly reduces child deprivation in all the nine countries, although the difference between the poorest and middle wealth status groups is not significant in Malawi.

### *Orphan-hood status*

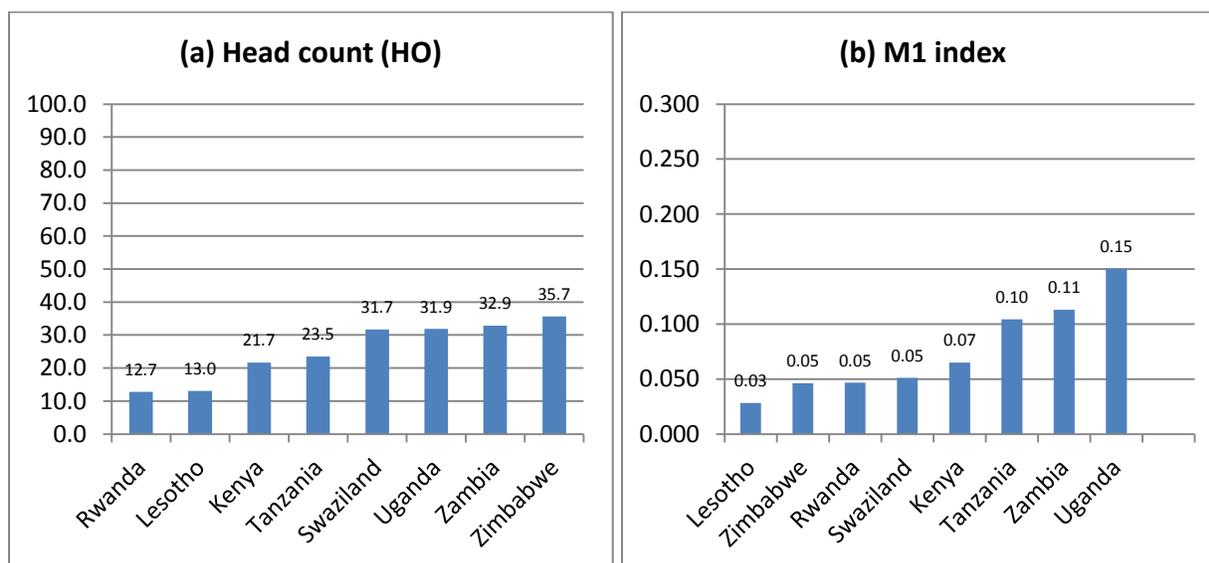
There is no significant difference in level of deprivation by orphan-hood status in six of the nine countries. In Uganda, orphans have lower levels of deprivation than non-orphans, while in Swaziland single orphans have higher levels of deprivation than non-orphans.

## CHAPTER 6: RESULTS: 0-17 YEARS

### 6.1 Multi-dimensional deprivation levels for children aged 0-17 years

To understand the extent of deprivation among all children aged 0-17 years, further analysis was conducted to generate the total H0 and M1 deprivation measures based on deprivation indices from the three age-groups. The total deprivation measures (H0 and M1) combined information from multi dimensional deprivation measures from the three age groups. For example, the total H0 measure was generated by taking H0s from the three age groups and weighting according to the contribution of the sample size of the age-group to the overall sample size of children aged 0-17 years.

Figures 6.1a and b show the total deprivation for children aged 0-17 years based on the head count and the M1 multi-dimensional deprivation measures.



**Figure 6.1:** Levels in child deprivation based on H0 and M1 indices for children aged 0-17 years

The results of the total H0 show that the overall level of child deprivation ranges from 12.7% in Rwanda and about 13.0% in Lesotho to 35.7% in Zimbabwe. Swaziland (31.7%), Uganda (31.9%), and Zambia (32.9%) have relatively high levels of deprivation. Intermediate levels of deprivation are observed in Kenya (21.7%) and Tanzania (23.5%). Malawi was excluded from the combined analysis because it did not have multidimensional indexes for the 0-4 age group.

The results for the severity or depth of deprivation (M1 index) show that Lesotho has the lowest depth of deprivation (0.028) while Uganda has the highest (0.15). The depth of deprivation is moderately low and about the same in Zimbabwe (0.046), Rwanda (0.047), Swaziland (0.051), and Kenya (0.065). Tanzania and Zambia have moderately high levels of depth of deprivation at 0.104 and 0.113 respectively. As noted before, this measure means there is greater intensity of

deprivation, or rather that children in Uganda are deprived in more indicators that make up the dimensions and/or in the dimensions themselves compared to children in Lesotho. The patterns between the H0 and M1 indexes are similar with the exception of Zimbabwe, which has one of the highest levels of overall deprivation but relatively low levels of depth or severity of deprivation. This means that despite having high proportion of children who are deprived in at least two of the four dimensions, the total number of indicators and dimensions where they are deprived is relatively low, on the average. Intervention programs should seek to reduce both the overall level of deprivation and the intensity of deprivation.

## **CHAPTER 7: SUMMARY AND IMPLICATIONS**

### **7.1 Background and Rationale**

Progress in monitoring policy and programme responses for upholding children’s human rights and reducing child poverty in Africa have partly been curtailed by lack of proper indicators to measure and monitor the vulnerability of children. Child wellbeing has mostly been measured using uni-dimensional approaches such as income, consumption, and prevalence of specific diseases such as malaria or diarrhea. The most commonly used composite measure of wellbeing is the wealth index generated from household assets and amenities. These approaches overlook the multidimensional nature of child poverty and fail to measure its severity since they do not incorporate all the key components of child wellbeing defined under the basic needs approach. This approach defines children’s human rights from the perspective of their access to a set of basic needs and services such as: adequate and nutritious food; clean water and sanitation services; healthcare; shelter; education; and child protection from various forms of discrimination, exploitation and harm (Gordon et al. 2003; UNICEF 2005). Accordingly, efforts to address child poverty must address deprivations in these multifaceted basic needs in a comprehensive manner.

This study was designed to fill some of these knowledge gaps by developing a standardized multi-dimensional measure of child deprivation that can enable identification of vulnerable children and allow cross-country comparison of levels and intensity of deprivation over time. The study generates the multi-dimensional deprivation index using the twelve-step methodology developed by Alkire and Foster (2008). The study then applies the index to assess levels, severity, and determinants of child deprivation in nine countries in Eastern and Southern Africa using the latest national level demographic and health data collected between 2007 and 2011. We examine child deprivation for three childhood age categories: the very young children aged 0-4 years, the younger school going children aged 5-14, and the older school going children aged 15-17 years. The multi-dimensional deprivation index is generated from five broad dimensions of needs for each age group: basic health, water and sanitation, food and nutrition, education, and child protection.

### **7.2 Key Findings**

The results of this study show worryingly high levels of child deprivation in the region. Marked and largely consistent differentials in child deprivation are observed across the age groups and countries, and between key population-sub-groups within countries. Out of the five dimensions of child deprivation used in the analysis, deprivation levels in the child protection and health dimensions were considerably higher. Generally, child deprivation increased with an increase in the age of the child. Deprivation levels were highest among children aged 15-17 years followed by children aged 5-14 years while children aged 0-4 years had the lowest deprivation levels. At

dimensional levels, deprivation was highest in child protection and health dimensions. Education and nutrition showed moderate deprivation levels while water/sanitation dimensions exhibited relatively low levels of deprivation. Levels of deprivation vary across the nine countries studied but Rwanda and Malawi have relatively low deprivation levels in while Zimbabwe and Uganda have the highest levels of deprivation in most dimensions.

The results of this exercise are quite informative in assessing trends and patterns in child deprivation across the countries. The high level of internal and external consistency of the results provides good confidence in the outcomes of the exercise. For instance, there are a number of countries that have consistently done well or poorly on a range of dimensions. Furthermore, the trends and patterns in the findings match very well with broader assessments of poverty and progress towards achievement of MDGs, particularly MDG 4 which is focused on the health of under-five children.

#### *Deprivation among Children aged 0-4 years*

The results for the 0-4 age group show high levels of child deprivation in the region. Deprivation levels range from 9% in Rwanda to 49% in Swaziland. In five of the eight countries, deprivation levels exceed 35%. Apart from Rwanda, Kenya and Tanzania also have relatively low levels of deprivation. The results are consistent with the fact that these countries have made good progress in reducing child mortality and are on course toward achievement of MDG4 by 2015 (United Nations, 2011). In the other five countries, the progress has stalled, raising serious concerns about the extent to which programs seeking to improve the wellbeing of children are performing in the region.

In at least half of the countries, deprivation levels in the three most critical dimensions of child health (food, nutrition, and health) are relatively high. Levels of deprivation in water and sanitation are moderately low. The findings on water and sanitation reflects the progress made since 1990 where the proportion of people without access to improved sanitation decreased by at least 8% while improved water coverage increased from 49% to 58% between 1990 and 2006 in SSA (Water and Sanitation Program-Africa, 2006). The countries that are on course towards achieving the child health MDG are making progress across the range of dimensions that we have examined in the study, highlighting the importance of integrated and equity conscious responses in addressing child deprivation. These countries have also made the most progress in reducing inequities between those living in rural and urban areas, those living in households headed by less and more educated heads, as well as those living in female and male-headed households.

#### *Deprivation among Children aged 5-14 years*

The wellbeing needs of children aged 5-14 years are a bit different from their younger counterparts. While the health-related dimensions are extremely important for the survival of the younger group, education becomes an increasingly important measure of wellbeing for the older children, and as they get older, issues relating to their sexuality dominate the health

dimensions. Therefore, in this age group, the highest levels of deprivation are observed in child protection and health, with education coming in as distant third.

Deprivation levels for those aged 5-14 years range from 6% in Lesotho to 39% in Uganda, with levels for four countries exceeding 35%. Rwanda and Malawi's deprivation levels are also relatively low, while levels for Swaziland, Zambia and Zimbabwe exceed 35%. As was the case with younger children, the countries with the lowest levels of overall deprivation also show relatively low intensities of deprivation and differentials across population-sub groups.

#### *Deprivation among Children aged 15-17 years*

This age group exhibits the highest levels of deprivation of all the three groups included in the study. Deprivation levels range from 20% in Rwanda to 52% in Zimbabwe, with levels in eight of the nine countries exceeding 35%. Swaziland and Malawi have relatively low deprivation levels while Uganda and Tanzania have very high levels.

While health and child protection remain highly significant factors of multidimensional deprivation for this age group, education is also a key factor. The health dimension shows the highest level of deprivation with all the nine countries having at least 20% of children deprived in this dimension. The findings are likely due to inclusion of additional indicators on sexual and reproductive health (SRH) (which includes knowledge of HIV/AIDS, early sexual debut, and condom use during last sexual encounter for persons not married and knowledge of any type of contraceptive method).

These results point to the need to intensify policy and program responses on these key dimensions that form the cornerstone of UNICEF's work on upholding the rights of children. The relatively high levels of deprivation in education among the older children (who are of secondary school age) may reflect high levels of school drop out at the higher levels of primary school and low levels of progression to secondary school. High levels of deprivation in health among the older children calls for more concerted efforts to meet this group's sexual and reproductive health information and service needs.

Although deprivation is higher for this age group compared to the 0-4 year old children, deprivation of basic needs has far more dire implications on the loss of lives and other cognitive and related child developmental outcomes for the younger children than it has for the older ones (Sorhaindo and Feinstein 2006).

#### *Deprivation among children aged 0-17 years*

For all the 0-17 year old children combined, the multidimensional measure of child deprivation ranges from a low of about 13% in Rwanda and Lesotho to a high of 36% in Zimbabwe. Swaziland (31.7%), Uganda (31.9%), and Zambia (32.9%) have relatively high levels of deprivation, while moderate levels are observed in Kenya (21.7%) and Tanzania (23.5%). The countries with high levels of overall deprivation also tend to have more severe or intense levels

of deprivation. Zimbabwe is an exception in that it has high levels of deprivation but exhibits relatively low levels of intensity or severity of deprivation.

### *Differentials in child deprivation*

The results confirm that the overall level of child deprivation varies widely across various socioeconomic groups within the study countries. In general, countries with lower levels of overall deprivation also have relatively low levels of inequities in deprivation across the socioeconomic factors examined in this study. This suggests that part of the driving force behind the reduction of overall levels of child deprivation centers on the reduction of inequities in child wellbeing.

At descriptive level, children who are living in rural areas and those in poor households exhibit higher levels of deprivation than their urban and richer counterparts in all the three age groups. While the negative effect that wealth status has on child deprivation is confirmed in all the study countries for all three age groups in the multivariate analyses, the effect of area of residence is mostly insignificant after controlling for the effect of other factors. There are only two exceptions where rural residence is associated with higher levels of deprivation: Uganda for the 0-4 age group and Lesotho for the 5-14 age-group.

Children living in female-headed households are more likely to be deprived than those in male-headed households, particularly for the 0-4 age group. For the older age groups, there are variations whereby this relationship (higher deprivation among children in female-headed households) is confirmed in most countries for the 5-14 age-group. However, among children aged 15-17 years, there is no significant association between the gender of the household head in most countries. After controlling for the effect of other factors, the disadvantage that children in female-headed households face is only confirmed in two countries for the 0-5 age group, in one country for the 5-9 age group, and in one country for the 15-17 age-group.

A key feature of the differentials is that while differences in deprivation levels between boys and girls are not observed for the first two age groups, girls are more disadvantaged than boys in the 15-17 age-group in eight of the nine countries. This disadvantage reflects the disproportionate cultural and socioeconomic burden that girls face, resulting in early dropout from school, early marriages, and more unfavorable sexual and reproductive health outcomes than those of boys. This disadvantage is confirmed in Zambia, Tanzania, and Swaziland at multivariate analysis level, but it is worth noting that girls are significantly less likely to be deprived than boys in Rwanda and Lesotho, countries that have the lowest overall child deprivation.

The differentials in child deprivation by residence and sex of household head that are observed at descriptive level are largely insignificant after controlling for the effect of other factors. This suggests that that these differences are a reflection of other socioeconomic factors controlled for in the analysis. It also implies that efforts to address these inequities should focus on

understanding and addressing the mechanisms through which these contextual disadvantages operate.

The multivariate regression analyses give varying results. For example, it is not clear why orphan hood is associated with reduced deprivation in some countries while it is not in others. The same applies to the inconsistent effects that we observe for age of household head, religion and number of household members. Further research is needed to explain these inconsistencies.

### **7.3 Implications and recommendations**

The multi-dimensional approach used in this study is useful for operationalizing the concept of children's human rights from the perspective of their access to a set of basic needs and services, which they need to grow up into healthy, skilled, and productive adults. The multi-dimensional measure of child deprivation developed in this study could be a valuable tool for identifying children who are most vulnerable and in most need of the comprehensive set of rights defined under the basic needs approach. Careful use of the index can help to document the characteristics of children whose wellbeing is likely to be undermined by lack of basic needs and use those characteristics as a targeting tool for preventive interventions. The approach would enable policymakers and program practitioners to examine a child as a whole being and direct their interventions towards meeting the diverse needs that children at different age groups have.

Despite the ongoing efforts to improve the welfare of children in the region, significant gaps still exist, particularly in the child protection and health dimensions, as well as the education dimension for the older group. A key factor that distinguishes the countries that have relatively low levels and intensity of deprivation is consistency in good performance across the age groups, dimensions of deprivation, and various socioeconomic sub-groups. Malawi, Rwanda, and Lesotho (and to some extent Tanzania and Kenya) have stood out in this analysis as countries that have low levels of child deprivation, and this pattern corresponds to the findings on the assessments of MDGs 4 and 2 where these countries are making good progress. The clear lesson from this pattern is that countries need to adopt a comprehensive approach that tackles the different dimensions of child wellbeing simultaneously. Countries in the region should reinforce their efforts to close service and opportunity gaps between the poor and the rich, the less educated and more educated, and those living in rural and urban areas. The positive results from Malawi and Rwanda are in line with the re-orientation of their health service delivery system towards more community outreach over the last decade.

In order to enhance the utility of the multi-dimensional analyses presented in this report, it is important to go beyond the patterns and trends to understand the key drivers of progress in the countries where good progress has been made. Complimenting the analyses with an assessment of policy and program environments in selected countries that are registering different levels of progress would provide useful lessons on how to develop and implement comprehensive health and social programs that would help to reduce overall levels child deprivation and the persistent inequities among various population sub-groups. Furthermore, it is important to have consistent data over time and across countries in order to make meaningful comparisons and draw appropriate policy lessons. Such type of data would enable analysts to concretize the methodology for assessing multi-dimensional child deprivation, and would allow country teams to produce regular indicators of child deprivation to guide program efforts. International survey programs such as DHS and MICS should therefore ensure that data that would facilitate this nature of analysis is collected regularly and in all countries. Further analysis of such data would enable generation of real-time early signals to allow the targeting of children who are in danger of suffering acute deprivation.

## **CHAPTER 8: COUNTRY PROFILES**

Chapter 8 presents results for the 9 countries. Each country has three diagrams and four tables based on three age groups 0-4, 5-14, and 15-17 years. The figure and table numbering is uniform throughout the chapter. The first digit represents the chapter number, the second digit represents the country index (e.g. Kenya has x=1) while the third index represents the figure/table number. Table 8.x.1 presents deprivation levels at dimension level and segregated according to their respective demographic and socio-economic characteristics. Table 8.x.2 presents deprivation levels at multi-dimension level and segregated by four demographic/socio-economic characteristics. Table 8.x.3 presents results for logistic regression analysis at two time-points.

## 8.1 Kenya

**Table 8.1.1:** Levels of deprivation levels segregated by respective demographic and socio-economic characteristics for Kenya DHS 2008-9

Data point	Factor	Level	0-4 years				5-14 years				15-17 years			
			Nutr.	Health	San.	Prot.	Educ.	Health	San.	Prot.	Educ.	Health	San.	Prot.
DHS 2008-9	National		3.1	16.9	12.6	56.9	3.1	16.9	12.6	56.9	3.1	16.9	12.6	56.9
	Child sex	Male	3.2	18.2	12.6	56.2	3.2	18.2	12.6	56.2	3.2	18.2	12.6	56.2
		Female	3.0	15.6	12.6	57.6	3.0	15.6	12.6	57.6	3.0	15.6	12.6	57.6
	HH head gender	Male	2.6	10.8	11.2	58.9	2.6	10.8	11.2	58.9	2.6	10.8	11.2	58.9
		Female	2.0	12.0	15.5	56.8	2.0	12.0	15.5	56.8	2.0	12.0	15.5	56.8
	Residence location	Urban	2.7	18.3	3.6	42.6	2.7	18.3	3.6	42.6	2.7	18.3	3.6	42.6
		Rural	3.2	16.6	14.7	60.2	3.2	16.6	14.7	60.2	3.2	16.6	14.7	60.2
	HH wealth levels	Poor	3.6	20.1	28.7	67.2	3.6	20.1	28.7	67.2	3.6	20.1	28.7	67.2
		Middle	3.3	14.4	5.9	58.3	3.3	14.4	5.9	58.3	3.3	14.4	5.9	58.3
Rich		2.6	16.3	3.0	45.2	2.6	16.3	3.0	45.2	2.6	16.3	3.0	45.2	

**Table 8.1.2:** Multi-dimensional measures segregated according to demographic and socio-economic characteristics (at k=2)

Factor	Level	H0 index			M1 index		
		0-4 yrs	5-14 yrs	15-17 yrs	0-4 yrs	5-14 yrs	15-17 yrs
Overall		21.4	23.0	33.1	0.082	0.053	0.114
Residence location	Urban	8.9	10.2	34.3	0.034	0.024	0.112
	Rural	25.7	26.1	32.8	0.098	0.060	0.115
Child sex	Male	21.1	23.8	30.0	0.080	0.055	0.110
	Female	21.9	22.3	34.4	0.084	0.051	0.116
HH head gender	Male	17.9	22.1	34.9	0.068	0.052	0.122
	Female	22.3	24.8	30.3	0.083	0.055	0.102
HH wealth levels	Poor	39.3	35.4	45.5	0.149	0.082	0.165
	Middle	14.2	13.6	24.6	0.056	0.030	0.081
	Rich	8.6	8.0	27.0	0.033	0.019	0.089

**Table 8.1.3:** Logistic regression analysis results for modeling the probability of deprivation (at k>2)

Variables	Levels	0-4 years		5-14 years		15-17 years	
		OR	P>z	OR	P>z	OR	P>z
<b>Child gender (ref: Male)</b>	<b>Female</b>	1.04	0.674	0.94	0.415	1.09	0.572
<b>HH gender (ref: Male)</b>	<b>Female</b>	0.80	0.046	0.90	0.221	0.49	0.000
<b>Age of the household head (ref: &lt; 25 years)</b>	25 - 34 years	0.75	0.078	1.59	0.028	0.29	0.003
	35 - 44 years	0.86	0.371	1.62	0.022	0.10	0.000
	45 - 54 years	0.83	0.393	1.21	0.378	0.08	0.000
	> 55 years	0.83	0.333	0.90	0.649	0.06	0.000
<b>Religion (ref: Christians)</b>	Muslim	0.59	0.010	0.61	0.001	0.63	0.095
	No Religion	1.72	0.004	2.39	0.000	2.07	0.124
<b>Region (ref: Nairobi)</b>	Central	0.86	0.699	1.50	0.165	0.85	0.711
	Coast	2.86	0.006	1.10	0.735	1.33	0.490
	Eastern	1.64	0.135	0.94	0.836	0.83	0.665
	Nyanza	1.94	0.037	0.85	0.595	0.87	0.737
	Rift Valley	1.46	0.241	1.95	0.035	0.95	0.911
	Western	0.64	0.204	0.62	0.116	0.50	0.112
	North Eastern	1.46	0.364	2.06	0.039	1.62	0.346
<b>Child age in years</b>		1.13	0.000	0.91	0.000	1.34	0.000
<b>Residence (ref: Urban)</b>	Rural	1.11	0.659	0.79	0.342	0.81	0.524
<b>No. of household members</b>		1.03	0.184	0.97	0.041	0.97	0.285
<b>Education level of HH (ref: No education)</b>	Primary	0.37	0.000	0.53	0.000	0.53	0.001
	Secondary	0.17	0.000	0.32	0.000	0.28	0.000
<b>Household Wealth (ref: Poor)</b>	Middle	0.32	0.000	0.47	0.000	0.45	0.000
	High	0.36	0.000	0.40	0.000	0.46	0.001

## 8.2 Lesotho

**Table 8.2.1:** Levels of deprivation levels segregated by respective demographic and socio-economic characteristics for Lesotho DHS 2009

Data point	Factor	Level	0-4 years				5-14 years				15-17 years			
			Nutr.	Health	San.	Prot.	Educ.	Health	San.	Prot.	Educ.	Health	San.	Prot.
DHS 2009	National		3.6	49.6	21.7	48.3	10.5	3.4	16.7	6.1	35.7	42.0	13.3	30.5
	Child sex	Male	3.6	51.1	22.5	47.2	13.4	3.3	17.1	6.2	40.8	41.2	13.2	28.2
		Female	3.5	48.1	21.0	49.4	7.6	3.5	16.4	6.0	30.5	42.8	13.4	32.9
	HH head gender	Male	2.8	41.7	22.2	56.7	11.5	3.8	17.6	6.2	36.9	42.2	13.5	33.1
		Female	4.6	39.6	20.4	59.9	8.8	2.6	15.2	5.9	33.6	41.7	13.0	26.0
	Residence location	Urban	4.7	52.5	6.8	45.3	6.5	1.7	1.3	3.6	21.6	35.5	2.1	23.3
		Rural	3.2	48.7	26.3	49.2	11.5	3.8	20.6	6.7	39.6	43.8	16.4	32.5
	HH wealth levels	Poor	3.0	51.7	42.5	53.2	14.8	4.1	32.5	7.9	47.6	45.2	28.7	32.8
		Middle	4.0	47.1	16.9	50.2	7.8	3.5	5.7	5.2	33.2	43.5	6.1	32.5
		Rich	3.6	50.0	5.8	41.5	5.2	1.4	0.0	3.3	17.9	32.2	0.2	21.4

**Table 8.2.2:** Multi-dimensional measures segregated according to demographic and socio-economic characteristics (at k=2)

Factor	Level	H0 index			M1 index		
		0-4 yrs	5-14 yrs	15-17 yrs	0-4 yrs	5-14 yrs	15-17 yrs
Overall		35.5	5.9	36.9	0.123	0.009	0.084
Residence location	Urban	27.7	0.5	19.9	0.064	0.001	0.039
	Rural	32.9	6.9	40.5	0.118	0.011	0.093
Child sex	Male	31.5	6.9	37.6	0.113	0.011	0.084
	Female	30.2	5.0	36.2	0.105	0.008	0.083
HH head gender	Male	36.7	6.6	38.4	0.127	0.011	0.088
	Female	37.7	4.8	34.2	0.139	0.007	0.075
HH wealth levels	Poor	48.2	9.8	46.4	0.175	0.015	0.114
	Middle	30.3	1.9	33.8	0.103	0.004	0.069
	Rich	21.2	0.2	16.8	0.063	0.000	0.032

**Table 8.2.3:** Logistic regression analysis results for modeling the probability of deprivation (at  $k > 2$ )

Variables	Levels	0-4 years		5-14 years		15-17 years	
		OR	P>z	OR	P>z	OR	P>z
<b>Child gender (ref: Male)</b>	Female	0.95	0.548	0.72	0.002	0.84	0.038
<b>HH gender (ref: Male)</b>	Female	1.11	0.331	0.95	0.715	0.93	0.477
<b>Age of the household head (ref: &lt; 25 years)</b>	25 - 34 years	0.88	0.541	0.55	0.125	0.58	0.033
	35 - 44 years	0.96	0.871	0.59	0.177	0.33	0.000
	45 - 54 years	0.65	0.072	0.48	0.059	0.20	0.000
	> 55 years	0.71	0.136	0.28	0.001	0.14	0.000
<b>Religion (ref: Christians)</b>	Muslim	-	-	-	-	-	-
	Others	1.50	0.174	1.05	0.838	1.36	0.117
<b>Region (ref: Butha-bothe)</b>	Leribe	1.83	0.001	2.07	0.005	2.04	0.000
	Berea	1.14	0.495	1.00	0.994	1.22	0.300
	Maseru	1.67	0.004	1.32	0.349	1.32	0.131
	Mafeteng	1.00	0.981	1.10	0.748	1.90	0.001
	Mohale's hoek	0.93	0.707	1.03	0.903	2.05	0.000
	Quthing	1.32	0.134	1.51	0.116	1.88	0.001
	Qacha's-nek	0.83	0.344	0.83	0.502	0.94	0.734
	Mokhotlong	0.97	0.882	1.87	0.009	1.34	0.123
	Thaba-tseka	1.50	0.015	1.91	0.007	1.89	0.000
<b>Child age in years</b>	-	0.83	0.000	0.92	0.001	1.30	0.000
<b>Residence (ref: Urban)</b>	Rural	0.74	0.062	2.91	0.007	1.19	0.254
<b>No. of household members</b>	-	1.08	0.000	1.07	0.002	1.13	0.000
<b>Education level of HH (ref: No education)</b>	Primary	0.87	0.201	0.63	0.000	1.02	0.868
	Secondary	0.81	0.173	0.32	0.000	0.40	0.000
<b>Households wealth (ref: Poor)</b>	Middle	0.48	0.000	0.25	0.000	0.50	0.000
	High	0.31	0.000	0.06	0.000	0.30	0.000
<b>Orphan hood (ref: Non orphan)</b>	Single orphan	1.07	0.956	1.18	0.556	1.11	0.427
	Double orphan	-	-	1.32	0.292	1.03	0.832

## 8.3 Malawi

**Table 8.3.1:** Levels of deprivation levels segregated by respective demographic and socio-economic characteristics for Malawi DHS 2010

Data point	Factor	Level	0-4 years				5-14 years				15-17 years			
			Nutr.	Health	San.	Prot.	Educ.	Health	San.	Prot.	Educ.	Health	San.	Prot.
DHS 2010	National		2.0	19.7	4.9	-	19.9	36.0	3.4	9.5	34.5	52.6	2.4	24.6
	Child gender	Male	2.1	20.6	5.0	-	20.9	36.3	3.2	10.1	25.6	57.4	3.3	25.2
		Female	1.9	18.8	4.8	-	18.8	35.7	3.6	9.0	37.6	51.0	2.1	24.4
	HH head gender	Male	0.9	10.9	4.3	-	19.6	31.7	3.0	9.5	36.0	50.5	2.1	25.9
		Female	1.0	16.3	6.3	-	20.4	46.7	4.5	9.6	31.3	57.1	3.1	22.0
	Place of residence	Urban	2.7	18.8	1.9	-	11.9	28.5	0.6	11.2	28.0	42.8	0.4	21.1
		Rural	1.9	19.9	5.4	-	21.1	37.2	3.8	9.3	36.1	54.9	2.8	25.4
	HH wealth levels	Poor	2.2	23.2	8.1	-	27.3	46.7	6.7	9.2	44.2	64.0	5.4	28.6
		Middle	1.8	19.3	3.9	-	17.8	33.0	1.5	9.4	36.6	55.8	1.7	26.1
		Rich	2.0	16.6	2.7	-	7.6	18.9	0.2	10.6	22.8	38.2	0.1	19.1

**Table 8.3.2:** Multi-dimensional measures segregated according to demographic and socio-economic characteristics (at k=2)

Factor	Level	H0 index			M1 index		
		0-4 yrs	5-14 yrs	15-17 yrs	0-4 yrs	5-14 yrs	15-17 yrs
Overall		-	13.1	31.7	-	0.015	0.101
Residence location	Urban	-	7.7	22.8	-	0.012	0.071
	Rural	-	13.6	33.1	-	0.015	0.106
Child sex	Male	-	13.7	30.3	-	0.016	0.096
	Female	-	12.5	32.2	-	0.014	0.103
HH head gender	Male	-	12.0	32.2	-	0.014	0.105
	Female	-	15.8	30.7	-	0.017	0.093
HH wealth levels	Poor	-	19.5	41.0	-	0.021	0.129
	Middle	-	9.8	33.4	-	0.012	0.108
	Rich	-	4.3	19.1	-	0.007	0.062

**Table 8.3.3:** Logistic regression analysis results for modeling the probability of deprivation (at  $k>2$ )

Variables	Levels	5-14 years		15-17 years	
		OR	P>z	OR	P>z
<b>Child gender (ref: Male)</b>	Female	0.98	0.841	0.70	0.007
<b>HH gender (ref: Male)</b>	Female	1.27	0.005	0.82	0.127
<b>Age of the household head (ref: &lt; 25 years)</b>	25 - 34 years	1.03	0.883	0.17	0.000
	35 - 44 years	0.95	0.797	0.10	0.000
	45 - 54 years	1.17	0.458	0.10	0.000
	> 55 years	1.04	0.855	0.08	0.000
<b>Religion (ref: Christians)</b>	Muslim	0.79	0.104	0.96	0.846
	Others	1.04	0.701	0.78	0.165
<b>Region (ref: Northern)</b>	Central	1.56	0.000	0.80	0.176
	Southern	1.08	0.525	0.58	0.001
<b>Child age in years</b>	-	0.83	0.000	1.21	0.000
<b>Residence (ref: Urban)</b>	Rural	0.77	0.106	0.65	0.049
<b>No. of household members</b>	-	1.01	0.582	0.96	0.147
<b>Education level of HH (ref: No education)</b>	Primary	0.86	0.154	0.88	0.423
	Secondary +	0.74	0.042	0.37	0.000
<b>Household wealth (ref: poor)</b>	middle	0.55	0.000	0.73	0.022
	high	0.33	0.000	0.37	0.000
<b>Orphan hood (ref: Non orphan)</b>	Single orphan	1.30	0.028	0.87	0.411
	Double orphan	2.40	0.000	1.02	0.944

## 8.4 Rwanda

**Table 8.4.1:** Levels of deprivation levels segregated by respective demographic and socio-economic characteristics for Rwanda DHS 2010

Data point	Factor	Level	0-4 years				5-14 years				15-17 years			
			Nutr.	Health	San.	Prot.	Educ.	Health	San.	Prot.	Educ.	Health	San.	Prot.
DHS 2010	National		1.2	9.0	9.3	49.9	14.2	15.5	0.6	19.1	33.5	23.4	0.5	26.1
	Child sex	Male	1.1	9.5	9.1	49.6	15.0	15.3	0.6	18.9	33.2	23.4	0.6	27.9
		Female	1.2	8.5	9.4	50.1	13.4	15.7	0.7	19.3	33.7	23.4	0.4	24.3
	HH head gender	Male	1.0	8.0	0.7	50.9	14.2	12.4	0.5	19.8	32.3	22.1	0.2	26.4
		Female	1.0	10.0	1.8	55.6	14.3	22.5	1.1	17.5	35.1	25.2	0.8	25.6
	Residence location	Urban	1.1	8.1	10.4	47.5	9.9	10.9	0.2	16.6	36.8	15.7	0.3	23.4
		Rural	1.2	9.1	9.1	50.2	14.8	16.1	0.7	19.4	32.9	24.6	0.5	26.5
	HH wealth levels	Poor	1.3	11.2	10.7	52.5	19.0	21.6	1.4	20.2	37.7	31.2	1.1	28.8
		Middle	1.2	8.9	8.4	51.2	12.6	13.0	0.2	20.5	29.0	21.5	0.2	26.9
		Rich	0.9	6.9	8.8	45.9	7.1	7.3	0.0	13.5	34.5	14.7	0.0	20.3

**Table 8.4.2:** Multi-dimensional measures segregated according to demographic and socio-economic characteristics (at k=2)

Factor	Level	H0 index			M1 index		
		0-4 yrs	5-14 yrs	15-17 yrs	0-4 yrs	5-14 yrs	15-17 yrs
Overall		9.2	7.4	20.4	0.034	0.024	0.074
Residence location	Urban	7.7	4.6	14.5	0.027	0.014	0.056
	Rural	9.4	7.8	21.5	0.036	0.025	0.078
Child sex	Male	9.1	7.5	20.3	0.034	0.024	0.075
	Female	9.3	7.3	20.4	0.035	0.024	0.074
HH head gender	Male	2.7	6.7	19.5	0.010	0.021	0.073
	Female	4.8	9.0	21.7	0.019	0.031	0.076
HH wealth levels	Poor	11.4	11.1	27.1	0.043	0.036	0.095
	Middle	9.3	6.0	18.8	0.035	0.020	0.072
	Rich	7.0	2.5	13.3	0.026	0.008	0.049

**Table 8.4.3:** Logistic regression analysis results for modeling the probability of deprivation (at k>2)

Variables	Levels	0-4 years		5-14 years		15-17 years	
		OR	P>z	OR	P>z	OR	P>z
Child gender (ref: Male)	Female	1.47	0.051	1.01	0.931	0.80	0.003
HH gender (ref: Male)	Female	1.62	0.039	1.24	0.014	0.90	0.270
Age of the household head (ref: < 25 years)	25 - 34 years	0.96	0.890	1.13	0.641	0.84	0.382
	35 - 44 years	0.43	0.053	1.11	0.697	0.56	0.001
	45 - 54 years	0.59	0.228	1.18	0.541	0.36	0.000
	> 55 years	0.60	0.324	0.76	0.336	0.25	0.000
Religion (ref: Christians)	Muslim	2.02	0.384	0.63	0.237	0.89	0.690
	Others	4.62	0.000	1.03	0.913	1.20	0.482
Region (ref: Kigali city)	South	3.51	0.064	0.95	0.816	0.43	0.000
	West	4.83	0.025	1.21	0.421	0.72	0.085
	North	4.47	0.034	1.19	0.461	0.92	0.682
	East	4.26	0.033	1.15	0.559	0.90	0.606
Child age in years	-	1.11	0.142	0.79	0.000	1.06	0.000
Residence (ref: Urban)	Rural	0.86	0.737	1.23	0.225	1.08	0.613
No. of household members	-	1.03	0.683	0.92	0.000	1.01	0.647
Education level of HH (ref: No education)	Primary	0.56	0.010	0.87	0.072	0.65	0.000
	Secondary	0.38	0.087	0.67	0.023	0.34	0.000
Households wealth (ref: Poor)	Middle	0.85	0.438	0.57	0.000	0.57	0.000
	High	0.39	0.003	0.28	0.000	0.37	0.000
Orphan hood (ref: Non orphan)	Single orphan	0.00	0.000	1.20	0.553	0.71	0.001
	Double orphan	0.01	0.000	1.17	0.592	0.71	0.000

## 8.5 Swaziland

**Table 8.5.1:** Levels of deprivation levels segregated by respective demographic and socio-economic characteristics for Swaziland MICS 2010

Data point	Factor	Level	0-4 years				5-14 years				15-17 years			
			Nutr.	Health	San.	Prot.	Educ.	Health	San.	Prot.	Educ.	Health	San.	Prot.
MICS 2010	National		13.3	50.1	10.3	58.8	15.4	18.8	10.3	40.9	16.1	40.7	8.2	18.2
	Child sex	Male	12.7	50.3	11.5	55.1	13.0	21.9	10.7	35.4	11.6	43.3	9.4	20.2
		Female	12.0	48.9	11.5	54.9	12.3	19.9	10.7	31.7	17.4	42.5	9.7	20.8
	HH head gender	Male	12.1	56.1	8.5	60.4	14.5	17.1	8.5	36.0	18.5	37.7	6.0	20.9
		Female	15.3	46.7	11.3	57.4	16.4	20.2	11.3	44.9	14.5	43.4	10.0	15.7
	Residence location	Urban	14.3	51.5	12.3	47.2	16.4	19.4	12.1	42.0	15.6	41.7	9.9	18.7
		Rural	11.8	49.7	1.1	61.9	11.5	16.3	1.0	35.9	19.9	36.4	0.0	15.6
	HH wealth levels	Poor	16.3	52.2	17.1	66.0	19.9	20.0	17.0	44.1	17.4	44.8	14.4	19.7
		Middle	11.2	51.7	0.8	56.9	10.8	19.0	0.9	39.3	15.0	38.5	0.4	16.4
		Rich	9.3	46.8	0.0	37.0	7.7	14.4	0.0	31.9	15.2	30.6	0.0	15.7

**Table 8.5.2:** Multi-dimensional measures segregated according to demographic and socio-economic characteristics (at k=2)

Factor	Level	H0 index			M1 index		
		0-4 yrs	5-14 yrs	15-17 yrs	0-4 yrs	5-14 yrs	15-17 yrs
Overall		48.9	33.0	30.5	0.097	0.041	0.057
Residence location	Urban	34.1	38.0	33.2	0.063	0.048	0.064
	Rural	54.5	18.0	22.1	0.109	0.019	0.034
Child sex	Male	50.1	32.8	28.7	0.098	0.041	0.055
	Female	47.9	33.3	32.3	0.095	0.042	0.059
HH head gender	Male	46.2	26.9	28.5	0.090	0.033	0.051
	Female	51.4	38.2	32.3	0.103	0.048	0.063
HH wealth levels	Poor	64.9	50.0	44.3	0.134	0.066	0.089
	Middle	37.7	16.1	16.0	0.066	0.015	0.024
	Rich	18.1	5.9	12.6	0.031	0.005	0.016

**Table 8.5.3** Logistic regression analysis results for modeling the probability of deprivation (at k>2)

Variables	Levels	0-4 years		5-14 years		15-17 years	
		OR	P>z	OR	P>z	OR	P>z
<b>Child gender (ref: Male)</b>	Female	0.81	0.003	1.24	0.000	1.28	0.001
<b>HH gender (ref: Male)</b>	Female	0.73	0.000	1.19	0.008	0.86	0.044
<b>Age of the household head (ref: &lt; 25 years)</b>	25 - 34 years	0.67	0.016	2.13	0.000	0.54	0.002
	35 - 44 years	0.65	0.007	1.86	0.000	0.69	0.025
	45 - 54 years	0.72	0.050	1.14	0.390	0.33	0.000
	> 55 years	0.54	0.000	0.77	0.070	0.23	0.000
<b>Religion (ref: Christians)</b>	Muslim	0.49	0.265	1.00	-	3.28	0.091
	Others	0.99	0.951	0.79	0.098	0.99	0.953
<b>Region (ref: Hhohho)</b>	Manzini	1.50	0.000	1.35	0.001	1.21	0.077
	Shiselweni	1.35	0.004	1.13	0.148	0.57	0.000
	Lubombo	0.83	0.075	1.06	0.550	1.14	0.230
<b>Child age in years</b>	-	0.86	0.000	0.88	0.000	1.09	0.019
<b>Residence (ref: Urban)</b>	Rural	0.84	0.076	1.06	0.551	0.86	0.201
<b>No. of household members</b>	-	1.09	0.000	1.06	0.000	1.06	0.000
<b>Education level of HH (ref: No education)</b>	Primary	1.00	0.990	0.74	0.000	0.89	0.240
	Secondary	0.91	0.358	0.51	0.000	0.46	0.000
<b>Households wealth (ref: Poor)</b>	Middle	0.25	0.000	0.16	0.000	0.24	0.000
	High	0.10	0.000	0.07	0.000	0.19	0.000
<b>Orphan hood (ref: Non orphan)</b>	Single orphan	1.04	0.786	6.30	0.000	1.34	0.000
	Double orphan	-	-	-	-	-	-

## 8.6 Tanzania

**Table 8.6.1:** Levels of deprivation levels segregated by respective demographic and socio-economic characteristics for Tanzania DHS 2010

Data point	Factor	Level	0-4 years				5-14 years				15-17 years			
			Nutr.	Health	San.	Prot.	Educ.	Health	San.	Prot.	Educ.	Health	San.	Prot.
DHS 2010	National		2.5	9.9	20.3	84.6	21.4	22.6	15.1	35.0	51.4	43.5	11.8	39.6
	Child sex	Male	2.9	10.4	19.6	84.6	22.4	23.2	16.0	35.1	46.8	42.6	11.7	39.6
		Female	2.1	9.5	20.3	84.6	20.4	22.0	14.1	34.8	56.2	44.5	12.0	39.7
	HH head gender	Male	1.6	3.5	18.5	89.2	20.9	20.4	14.6	32.4	51.2	43.4	11.6	40.2
		Female	1.5	4.6	24.4	88.7	23.0	30.0	16.6	35.7	52.2	43.9	12.4	38.0
	Residence location	Urban	1.9	10.3	7.2	64.9	11.3	16.1	2.2	32.4	39.3	32.0	2.1	35.0
		Rural	2.7	9.9	23.2	89.6	23.9	24.2	18.3	35.7	55.9	47.7	15.4	41.3
	HH wealth levels	Poor	2.5	11.6	33.8	92.6	31.4	27.5	26.6	36.7	63.9	51.5	24.9	40.8
		Middle	2.9	9.8	19.2	90.3	16.1	21.8	9.0	36.7	49.4	46.0	7.6	44.0
		Rich	2.2	8.4	6.8	70.9	8.5	11.0	0.3	26.1	36.8	27.1	0.4	29.6

**Table 8.6.2:** Multi-dimensional measures segregated according to demographic and socio-economic characteristics (at k=2)

Factor	Level	H0 index			M1 index		
		0-4 yrs	5-14 yrs	15-17 yrs	0-4 yrs	5-14 yrs	15-17 yrs
Overall		22.0	20.7	45.7	0.091	0.071	0.245
Residence location	Urban	6.4	10.0	33.0	0.026	0.037	0.169
	Rural	20.2	23.3	49.7	0.078	0.079	0.268
Child sex	Male	17.6	21.5	44.0	0.068	0.073	0.233
	Female	17.6	20.0	47.5	0.067	0.070	0.256
HH head gender	Male	18.7	20.1	46.1	0.073	0.068	0.248
	Female	24.4	23.1	44.2	0.092	0.083	0.235
HH wealth levels	Poor	36.2	32.3	58.6	0.144	0.108	0.323
	Middle	22.2	16.6	45.5	0.094	0.059	0.242
	Rich	9.4	3.9	27.5	0.043	0.015	0.137

**Table 8.6.3:** Logistic regression analysis results for modeling the probability of deprivation (at  $k>2$ )

Variables	Levels	0-4 years		5-14 years		15-17 years	
		OR	P>z	OR	P>z	OR	P>z
<b>Child gender (ref: Male)</b>	Female	1.00	0.986	0.90	0.103	1.13	0.263
<b>HH gender (ref: Male)</b>	Female	1.26	0.036	1.05	0.521	0.76	0.038
<b>Age of the household head (ref: &lt; 25 years)</b>	25 - 34 years	0.91	0.585	1.13	0.617	1.52	0.204
	35 - 44 years	0.98	0.919	0.80	0.386	0.95	0.851
	45 - 54 years	0.75	0.147	0.60	0.045	0.81	0.491
	> 55 years	0.81	0.302	0.71	0.183	0.72	0.303
<b>Region (ref: Dodoma)</b>	Arusha	1.72	0.024	0.84	0.369	1.80	0.095
	Kilimanjaro	0.22	0.015	0.55	0.008	1.17	0.685
	Tanga	0.98	0.955	0.31	0.000	1.03	0.938
	Morogoro	1.17	0.566	0.95	0.767	2.14	0.024
	Pwani	0.28	0.000	0.24	0.000	1.27	0.503
	Dar-es-Salaam	1.19	0.672	0.49	0.039	1.13	0.728
	Lindi	0.97	0.92	0.33	0.000	2.40	0.019
	Mtwara	1.03	0.901	0.50	0.001	1.48	0.245
	Ruvuma	0.13	0.000	0.23	0.000	1.08	0.826
	Iringa	0.36	0.008	0.56	0.007	1.78	0.079
	Mbeya	1.71	0.025	0.93	0.699	1.63	0.15
	Singida	1.53	0.04	1.06	0.726	1.59	0.124
	Tabora	2.86	0.000	0.91	0.571	1.77	0.063
	Rukwa	1.67	0.017	1.28	0.17	1.88	0.075
	Kigoma	1.29	0.299	0.84	0.418	1.30	0.48
	Shinyanga	2.08	0.000	0.68	0.024	1.52	0.159
	Kagera	1.23	0.364	0.56	0.002	0.96	0.907
	Mwanza	1.66	0.014	0.86	0.386	2.66	0.003
	Mara	4.50	0.000	1.36	0.066	2.72	0.002
	Manyara	1.44	0.087	0.42	0.000	0.94	0.859
Zanzibar north	0.67	0.154	0.28	0.000	2.59	0.004	
Zanzibar south	0.83	0.563	0.17	0.000	2.39	0.013	
Town west	0.42	0.053	0.26	0.000	2.99	0.001	
Pemba north	0.87	0.548	0.25	0.000	2.61	0.003	
Pemba south	1.18	0.499	0.37	0.000	1.67	0.08	
<b>Child age in years</b>	-	0.97	0.327	1.04	0.000	1.02	0.077
<b>Residence (ref: Urban)</b>	Rural	1.23	0.231	1.06	0.634	1.38	0.064
<b>No. of household members</b>	-	1.06	0.000	1.02	0.139	1.06	0.000
<b>Education level of HH (ref: No education)</b>	Primary	0.55	0.000	0.72	0.000	0.66	0.005
	Secondary +	0.45	0.005	0.28	0.000	0.28	0.000
<b>Household wealth (ref: poor)</b>	middle	0.48	0.000	0.45	0.000	0.83	0.161
	high	0.22	0.000	0.16	0.000	0.36	0.000
<b>Orphan hood (ref: Non orphan)</b>	Single orphan	0.39	0.021	0.83	0.477	1.06	0.748
	Double orphan	0.32	0.000	1.00	0.996	0.81	0.109

## 8.7 Uganda

**Table 8.7.1:** Levels of deprivation levels segregated by respective demographic and socio-economic characteristics for Uganda DHS 2011

Data point	Factor	Level	0-4 years				5-14 years				15-17 years			
			Nutr.	Health	San.	Prot.	Educ.	Health	San.	Prot.	Educ.	Health	San.	Prot.
DHS 2011	National		7.3	25.9	29.4	66.7	10.0	28.2	27.9	13.6	29.1	51.0	23.4	47.8
	Child gender	Male	7.9	26.6	29.4	66.2	9.7	27.9	28.2	13.0	23.6	50.6	25.0	46.5
		Female	6.6	25.2	29.4	67.3	10.3	28.5	27.6	14.2	34.8	51.4	21.6	49.1
	HH head gender	Male	7.5	19.9	28.6	73.7	9.6	26.5	26.8	14.2	29.2	51.7	22.4	49.4
		Female	8.3	23.2	32.2	75.7	10.8	32.1	30.4	12.1	28.9	49.5	25.4	44.3
	Place of residence	Urban	4.2	18.5	8.0	57.6	4.5	19.4	8.8	10.3	34.5	42.7	5.5	39.4
		Rural	7.8	27.1	33.0	68.3	10.7	29.3	30.3	14.0	28.1	52.5	26.6	49.3
	HH wealth levels	Poor	7.5	30.9	50.8	71.5	16.7	33.0	45.6	15.6	32.8	56.7	41.6	51.3
		Middle	8.4	27.4	27.9	69.0	5.8	27.4	19.2	13.2	25.1	51.5	18.1	50.5
		Rich	5.9	19.4	9.5	59.7	3.3	17.8	4.1	9.3	31.1	40.7	4.2	36.7

**Table 8.7.2:** Multi-dimensional measures segregated according to demographic and socio-economic characteristics (at k=2)

Factor	Level	H0 index			M1 index		
		0-4 yrs	5-14 yrs	15-17 yrs	0-4 yrs	5-14 yrs	15-17 yrs
Overall		39.0	22.1	49.7	0.180	0.079	0.254
Residence location	Urban	15.3	6.8	37.7	0.072	0.027	0.189
	Rural	40.5	25.6	53.7	0.190	0.090	0.275
Child sex	Male	35.3	21.3	47.1	0.167	0.077	0.232
	Female	34.9	23.0	52.4	0.163	0.081	0.276
HH head gender	Male	38.7	21.0	50.4	0.182	0.074	0.257
	Female	45.2	24.5	48.3	0.212	0.088	0.247
HH wealth levels	Poor	60.0	36.9	62.9	0.267	0.127	0.330
	Middle	37.9	13.0	46.8	0.181	0.051	0.233
	Rich	18.3	3.8	34.1	0.091	0.016	0.171

**Table 8.7.3:** Logistic regression analysis results for modeling the probability of deprivation (at  $k>2$ )

Variables	Levels	0-4 years		5-14 years		15-17 years	
		OR	P>z	OR	P>z	OR	P>z
<b>Child gender (ref: Male)</b>	Female	0.90	0.158	1.07	0.232	0.91	0.284
<b>HH gender (ref: Male)</b>	Female	1.08	0.435	1.09	0.229	0.90	0.326
<b>Age of the household head (ref: &lt; 25 years)</b>	25 - 34 years	0.93	0.577	0.60	0.002	0.61	0.033
	35 - 44 years	0.82	0.159	0.54	0.000	0.45	0.000
	45 - 54 years	0.69	0.039	0.47	0.000	0.35	0.000
	> 55 years	0.79	0.223	0.48	0.000	0.20	0.000
<b>Religion (ref: Christians)</b>	Muslim	0.89	0.173	1.05	0.444	0.92	0.431
	Others	1.02	0.906	1.17	0.122	1.16	0.301
<b>Region (ref: Kampala)</b>	Central 1	0.69	0.27	1.01	0.986	0.61	0.055
	Central 2	0.86	0.63	1.31	0.356	0.89	0.627
	East Central	1.37	0.309	2.12	0.008	0.97	0.886
	Eastern	0.98	0.946	1.51	0.142	1.02	0.943
	North	0.82	0.543	1.56	0.109	0.67	0.094
	Karamoja	0.96	0.908	4.43	0.000	2.38	0.005
	West-Nile	0.57	0.081	0.93	0.781	0.54	0.009
	Western	0.69	0.233	0.97	0.900	0.60	0.032
	Southwest	0.21	0.000	0.51	0.022	0.32	0.000
<b>Child age in years</b>	-	0.96	0.118	0.94	0.000	1.14	0.000
<b>Residence (ref: Urban)</b>	Rural	1.67	0.003	1.21	0.18	1.32	0.074
<b>No. of household members</b>	-	1.01	0.622	1.01	0.509	1.04	0.026
<b>Education level of HH (ref: No education)</b>	Primary	0.72	0.005	0.67	0.000	0.77	0.039
	Secondary +	0.49	0.000	0.47	0.000	0.46	0.000
<b>Household wealth (ref: poor)</b>	middle	0.58	0.000	0.45	0.000	0.59	0.000
	high	0.23	0.000	0.16	0.000	0.36	0.000
<b>Orphan hood (ref: Non orphan)</b>	Single orphan	0.38	0.021	1.14	0.559	0.64	0.004
	Double orphan	0.53	0.056	1.11	0.617	0.77	0.015

## 8.8 Zambia

**Table 8.8.1:** Levels of deprivation levels segregated by respective demographic and socio-economic characteristics for Zambia DHS 2007

Data point	Factor	Level	0-4 years				5-14 years				15-17 years			
			Nutr.	Health	San.	Prot.	Educ.	Health	San.	Prot.	Educ.	Health	San.	Prot.
DHS 2007	National		1.26	28.15	23.5	86.94	33.32	36.9	20.65	35.76	28.31	57.48	13.69	30.69
	Child sex	Male	1.23	29.2	32.5	86.21	32.99	37.12	20.77	34.9	17.38	57.81	12.47	31.16
		Female	1.29	27.1	32.9	87.66	33.63	36.69	20.54	36.57	38.31	57.18	14.82	30.25
	HH head gender	Male	0.59	21	22.5	92.07	33.77	35.88	19.23	36.66	28.58	56.33	87.74	33.07
		Female	1.12	23.3	28.5	92.62	31.84	40.23	25.32	32.57	27.44	61.26	81.57	22.83
	Residence location	Urban	0.78	20.1	1.15	85.43	20.5	36.37	0.91	36.86	26.14	50.81	0.39	28.96
		Rural	0.64	21.9	32.41	94.84	39.73	37.17	30.53	35.13	30.21	63.32	25.35	32.2
	HH wealth levels	Poor	0.94	30.01	52.85	92.15	43.55	41.19	40.59	35.28	34.76	66.65	34.53	32.86
Middle		1.7	27.5	29.56	87.65	32.24	36	9.36	38.78	28.33	62.1	6.49	33.58	
Rich		1.13	26.93	15.71	81	13.03	29.32	0.06	31.41	21.8	43.62	0	25.59	

**Table 8.8.2:** Multi-dimensional measures segregated according to demographic and socio-economic characteristics (at k=2)

Factor	Level	H0 index			M1 index		
		0-4 yrs	5-14 yrs	15-17 yrs	0-4 yrs	5-14 yrs	15-17 yrs
Overall		42.4	35.0	37.1	0.155	0.106	0.157
Residence location	Urban	28.6	22.9	27.8	0.106	0.062	0.105
	Rural	49.1	43.0	45.9	0.179	0.134	0.207
Child sex	Male	42.6	35.7	33.8	0.157	0.107	0.148
	Female	42.2	34.4	39.9	0.154	0.104	0.165
HH head gender	Male	35.0	34.7	36.7	0.125	0.107	0.161
	Female	42.1	36.2	38.2	0.151	0.102	0.147
HH wealth levels	Poor	61.1	50.7	53.5	0.223	0.154	0.235
	Middle	39.6	32.0	36.9	0.145	0.100	0.161
	Rich	28.4	13.9	20.4	0.105	0.032	0.074

**Table 8.8.3:** Logistic regression analysis results for modeling the probability of deprivation (at  $k>2$ )

Variables	Levels	0-4 years		5-14 years		15-17 years	
		OR	P>z	OR	P>z	OR	P>z
<b>Child gender (ref: Male)</b>	Female	1.22	0.037	1.33	0.000	1.24	0.037
<b>HH gender (ref: Male)</b>	Female	0.90	0.374	0.88	0.094	0.86	0.235
<b>Age of the household head (ref: &lt; 25 years)</b>	25 - 34 years	0.91	0.414	1.67	0.000	0.26	0.000
	35 - 44 years	0.82	0.121	1.29	0.072	0.21	0.000
	45 - 54 years	0.88	0.408	1.27	0.102	0.19	0.000
	> 55 years	0.51	0.000	0.88	0.371	0.15	0.000
<b>Religion (ref: Christians)</b>	Muslim	2.31	0.183	0.76	0.412	0.05	0.008
	Others	1.94	0.008	1.63	0.000	1.21	0.619
<b>Region (ref: Central)</b>	Copperbelt	1.14	0.387	2.04	0.000	1.18	0.418
	Eastern	1.42	0.006	1.87	0.000	0.83	0.386
	Luapula	0.28	0.000	1.02	0.852	0.62	0.033
	Lusaka	1.01	0.974	2.29	0.000	1.36	0.147
	Northern	0.80	0.086	1.95	0.000	0.82	0.336
	Northwestern	0.49	0.000	1.06	0.533	0.63	0.032
	Southern	2.56	0.000	2.44	0.000	1.32	0.169
	Western	1.45	0.008	1.64	0.000	1.17	0.504
<b>Child age in years</b>	-	1.09	0.000	0.85	0.000	1.19	0.000
<b>Residence (ref: Urban)</b>	Rural	1.06	0.605	1.27	0.000	0.77	0.079
<b>No. of household members</b>	-	0.97	0.070	0.99	0.23	1.01	0.521
<b>Education level of HH (ref: No education)</b>	Primary	0.62	0.000	0.78	0.001	0.55	0.000
	Secondary +	0.36	0.000	0.50	0.000	0.38	0.000
<b>Household wealth (ref: poor)</b>	middle	0.46	0.000	0.61	0.000	0.42	0.000
	high	0.23	0.000	0.30	0.000	0.18	0.000
<b>Orphan hood (ref: Non orphan)</b>	Single orphan	3.65	0.000	2.49	0.000	0.69	0.016
	Double orphan	2.41	0.000	2.43	0.000	0.63	0.000

## 8.9 Zimbabwe

**Table 8.9.1:** Levels of deprivation levels segregated by respective demographic and socio-economic characteristics for Zimbabwe MICS 2009

Data point	Factor	Level	0-4 years				5-14 years				15-17 years			
			Nutr.	Health	San.	Prot.	Educ.	Health	San.	Prot.	Educ.	Health	San.	Prot.
MICS 2009	National		16.1	41.5	22.7	46.3	11.9	62.8	20.9	26.6	55.0	46.2	19.4	31.2
	Child sex	Male	16.3	39.1	23.9	52.7	12.8	64.8	20.8	24.9	53.1	50.3	19.2	27.0
		Female	16.0	44.0	21.3	38.6	10.9	60.8	21.0	28.2	56.6	42.6	19.6	35.0
	HH head gender	Male	15.8	39.8	21.9	42.1	13.0	63.3	21.7	27.0	48.9	50.1	18.8	26.0
		Female	17.0	44.6	24.4	55.4	10.8	62.4	20.2	26.1	59.5	43.4	19.9	35.1
	Residence location	Urban	16.7	35.3	2.4	30.7	8.2	52.4	1.7	19.8	50.1	35.2	1.6	25.6
		Rural	16.0	43.8	31.0	52.6	13.3	66.9	28.4	29.2	57.3	51.5	28.0	33.9
	HH wealth levels	Poor	16.2	45.7	40.7	56.5	17.8	70.0	38.2	30.7	64.7	54.1	40.3	34.9
		Middle	16.7	44.2	25.5	50.7	10.2	68.4	22.4	27.9	51.3	50.9	17.7	32.8
Rich		15.6	34.5	2.6	32.3	7.7	49.9	2.2	21.1	48.8	33.7	0.3	25.9	

**Table 8.9.2:** Multi-dimensional measures segregated according to demographic and socio-economic characteristics (at k=2)

Factor	Level	H0 index			M1 index		
		0-4 yrs	5-14 yrs	15-17 yrs	0-4 yrs	5-14 yrs	15-17 yrs
Overall		39.9	36.4	51.3	0.123	0.028	0.083
Residence location	Urban	20.1	17.0	31.9	0.056	0.004	0.040
	Rural	46.3	42.4	58.6	0.145	0.035	0.099
Child sex	Male	42.6	36.9	49.4	0.132	0.028	0.082
	Female	36.8	36.0	52.9	0.112	0.027	0.084
HH head gender	Male	37.0	37.7	47.6	0.113	0.028	0.079
	Female	46.0	35.3	54.0	0.144	0.027	0.085
HH wealth levels	Poor	53.4	50.9	68.6	0.170	0.047	0.122
	Middle	43.1	37.4	50.7	0.133	0.027	0.080
	Rich	20.1	17.1	30.1	0.056	0.004	0.036

**Table 8.9.3:** Logistic regression analysis results for modeling the probability of deprivation (at  $k > 2$ )

Variables	Levels	0-4 years		5-14 years		15-17 years	
		OR	P>z	OR	P>z	OR	P>z
<b>Child gender (ref: Male)</b>	Female	0.94	0.102	0.99	0.837	0.88	0.040
<b>HH gender (ref: Male)</b>	Female	1.10	0.032	0.98	0.622	1.43	0.000
<b>Age of the household head (ref: &lt; 25 years)</b>	25 - 34 years	0.42	0.000	0.84	0.054	0.59	0.000
	35 - 44 years	0.40	0.000	0.83	0.051	0.37	0.000
	45 - 54 years	0.42	0.000	0.80	0.02	0.39	0.000
	> 55 years	0.36	0.000	0.81	0.036	0.38	0.000
<b>Religion (ref: Christians)</b>	Muslim	0.74	0.209	1.59	0.055	0.99	0.975
	Others	1.11	0.036	1.22	0.000	1.17	0.036
<b>Region (ref: Bulawayo)</b>	Manicaland	1.24	0.063	0.89	0.349	0.68	0.006
	Mashonaland Central	1.02	0.852	0.94	0.638	0.75	0.042
	Mashonaland East	1.42	0.003	1.24	0.107	1.08	0.619
	Mashonaland West	1.47	0.000	1.57	0.000	1.40	0.015
	Matabeleland North	1.47	0.001	1.40	0.009	1.38	0.03
	Matabeleland South	2.11	0.000	1.44	0.005	1.36	0.032
	Midlands	1.38	0.004	1.19	0.165	0.86	0.262
	Masvingo	1.15	0.205	1.05	0.711	0.83	0.202
	Harare	1.21	0.048	1.37	0.004	0.83	0.105
<b>Child age in years</b>	-	1.01	0.193	1.03	0.000	1.16	0.000
<b>Residence (ref: Urban)</b>	Rural	1.07	0.49	1.43	0.001	0.68	0.011
<b>No. of household members</b>	-	0.98	0.014	0.95	0.000	0.98	0.015
<b>Education level of HH (ref: No education)</b>	Primary	1.07	0.225	0.83	0.002	0.70	0.000
	Secondary +	1.03	0.623	0.70	0.000	0.51	0.000
<b>Household wealth (ref: poor)</b>	Middle	0.66	0.000	0.65	0.000	0.49	0.000
	High	0.29	0.000	0.27	0.000	0.15	0.000
<b>Orphan hood (ref: Non orphan)</b>	Single orphan	1.30	0.000	1.12	0.012	0.92	0.205
	Double orphan	1.20	0.065	1.20	0.009	1.33	0.000

## REFERENCES

- Alkire, S. and Foster, J. (2008). Counting and Multidimensional Poverty Measurements. *OPHI Working Paper No. 7*. Oxford, Oxford University.
- Alkire, S. and Suman, S. (2008). Measuring Multidimensional Poverty in India: A New Proposal. *OPHI Working Paper No. 15*. Oxford, Oxford University.
- Asselin, L-M. (2009). *Analysis of Multidimensional Poverty: Theory and Case Studies*. IDRC/CRDI and Springer. New York.
- Barnett, D., Manly, J. T., and Cicchetti, D. (1993). Defining child maltreatment: The interface between policy and research. In D. Cicchetti & S. L. Toth (Eds.), *Child abuse, child development, and social policy*. Norwood, NJ: Ablex publications.
- Batana, Y. M. (2008). Multidimensional Measurement of Poverty in Sub-Saharan Africa. *OPHI Working Paper No. 13*. Oxford, Oxford University.
- Bhutta, Z. A., Ahmed, T., Black, R. E., Cousens, S., Dewey, K., Giugliani, E., Haider, B. A., Kirkwood, B., Morris, S. S., Sachdev, H. P., and Shekar, M. (2008). What works? Interventions for maternal and child undernutrition and survival. *The Lancet*, 371(9610): 417-440.
- Bold, T., Kimenyi, M., Mwabu, G., and Sandefur, J. (2011). *The high quality of low-cost private schools in a poor country*. CSAE, Oxford University.
- Boyle, M. H. (2002). Home ownership and the emotional and behavioral problems of children and youth. *Child Development*, 73(3): 883-892.
- Fernandes, W. (2006) : Liberalisation and Development –Induced displacement, *Social Change*, 36:1, March 2006.
- Greenacre, M. and Blasius, J. (2006). *Multiple Correspondence Analysis and Related Methods*. Chapman & Hall CRC, Boca Raton, FL.
- Gordon, D., Nandy, S., Pantazis, C., Pemberton, S., and Townsend, P. (2003). *Child\_Poverty in the Developing World*. Bristol: Policy Press.
- Gordon, D., Nandy, S., Pantazis, C., Pemberton, S., and Townsend, P. (2003). *The distribution of child poverty in the developing world*. Bristol: University of Bristol.
- Hill, M. S. and Duncan, G. J. (1987). Parental family income and the socioeconomic attainment of children. *Social Science Research*, 16: 39-73
- Johnson, A. and Wichern, W. (2007). *Applied Multivariate Statistical Analysis*. Pearson Education Inc., Upper Saddle River, sixth edition.
- Kabubo-Mariara, J., Wambugu, A., and Musau, S. (2010). Multidimensional Poverty in Kenya: Analysis of Maternal and Child Wellbeing. *Poverty and Economic Policy (PEP) Research Network*.
- Kabubo-Mariara, J., Araar, A., and Duclos, J-Y. (2008). Multidimensional Poverty and Child Wellbeing in Kenya. *Mimeo, University of Nairobi, PEP and CIRPÉE*.
- Ki, J. B., Faye, S., and Faye, B. (2005). Multidimensional Poverty in Senegal: A Non-Monetary Basic Needs Approach. *PEP Working Paper 2005-05*.
- Lawson Body, B. K., Baninganti, K., Homevoh, E., and Lamadokou, E. A. (2007). Comparative Analysis of Poverty and Inequality in Togo: A Multidimensional Approach Based on a Wealth Index. *Poverty and Economic Policy Research Network Working Paper No. PMMA-2007-10*.
- Minujin, A., Delamonica, E., Gonzalez, E., and Davidziuk, A. (2005). *Children living in poverty: A review of child poverty definitions, measurements and policies*. UNICEF conference on children and poverty: Global context, local solutions New York: UNICEF, New School University.
- Noble, M., Babita, M., Barnes, H., Dibben, C., Magasela, W., Noble, S., Ntshongwana, P., Phillips, H., Rama, S., Roberts, B., Wright, G., and Zungu, S. (2006). *The Provincial Indices of Multiple Deprivation*

for South Africa 2001, Oxford: Centre for the Analysis of South African Social Policy, University of Oxford.

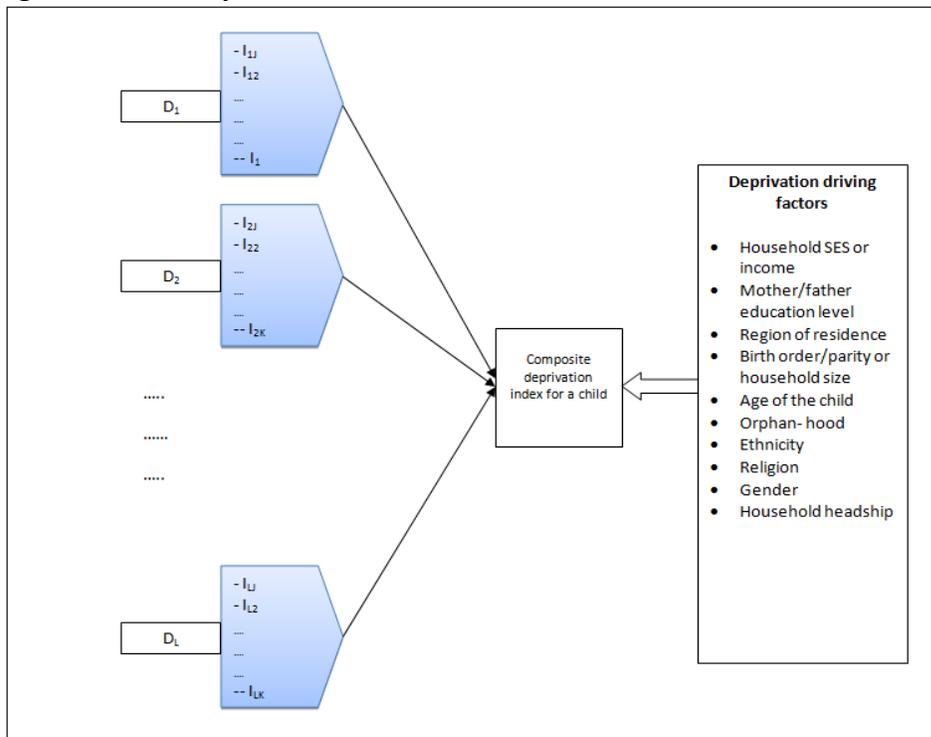
- Sorhaindo, A. and Feinstein L. (2006). What is the relationship between child nutrition and school outcomes? *Wider Benefits of Learning Research Report No.18*. Centre for Research on the Wider Benefits of Learning Institute of Education, 20 Bedford Way, London WC1H 0AL.
- Totsika, V. and Sylva, K. (2004). The home observation of measurement of the environment. *Child and Adolescent Mental Health*, 9(1):25-35
- UNESCO. (2003). *Education for All Global Monitoring Report 2003/4. The introduction of free primary education in sub-Saharan Africa*. UNESCO Publishing. Paris
- UNESCO. (2009). *Education for All Global Monitoring Report 2009*. UNESCO Publishing. Paris
- UNESCO. (2011). *Education for All Global Monitoring Report 2011. The Hidden Crisis: Armed Conflict and Education*. UNESCO Publishing. Paris.
- United Nations. (2011). *The Millennium Development Goals Report 2011*. United Nations. New York.
- UNICEF. (2005). *The state of the world's children 2005*. New York.
- UNICEF and WHO. (2010). *WHO/UNICEF Joint Monitoring Report 2010. Progress on Drinking Water and Sanitation*. WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation. New York.
- USAID. (2011). *A Summary Report of "New Evidence" that Gender Perspectives Improve Reproductive Health Outcomes*. Population Reference Bureau. Washington DC.
- Water and Sanitation Program-Africa (2006). *Getting Africa on track to meet the MDG on water and Sanitation. A Status Overview of Sixteen African Countries*, WSP-Africa Report, Nairobi Kenya
- Williams Shanks, T. R. and Destin, M. (2009). Parental expectations and educational outcomes for young African American adults: Do household assets matter? *Journal of Race and Social Problems*, 1(1): 27-35.
- White, H., Leavy, J., and Masters, A. (2003). Comparative Perspective of Child Poverty: A review of poverty measures. *Journal of Human Development* 4(3): 379-396.
- World Bank. (2010). *Global Economic Prospects 2010. Fiscal Headwinds and Recovery*. The World Bank. Washington DC.
- Yeung, W. J., Linver, M. R., and Brooks-Gunn, J. (2002). How money matters for young children's development: Parental investment and family processes. *Child Dev.* 73: 1861–1879.

# APPENDIX

## Appendix 1: Conceptual framework

The multi-dimensional measure pools information from different domains to generate a composite deprivation measure as shown in figure 2.1. The multidimensional deprivation measure has information from two layers (i) the domain or dimension layer will have L dimensions  $D_1, D_2, \dots, D_L, \dots, D_L$ ; (ii) the second layer consist of indicators where each dimension D will have K indicators  $I_{11}, I_{12}, \dots, I_{1K}, \dots, I_{LK}$  components

**Figure 2.1: Conceptual framework**



The overall composite deprivation index was generated by pooling deprivation indices from different dimensions while deprivation index within a dimension was constructed by pooling information from different variables/indicators within a dimension. For example, the deprivation index for water/sanitation dimension was generated by pooling 0/1 scores from different variables where 1 represents deprivation and 0 represents safe drinking water and improved sanitation facilities. Table 2.1 gives a comprehensive list of dimensions and variables that were used to generate the composite measures of deprivation. The indicators are listed based on the three age groups. The construction of composite index was done at two levels, within each dimension and among dimensions. The within dimension deprivation index was used to measure deprivation levels within a dimension while the multi-dimension deprivation index was used to measure the overall deprivation.

## Appendix 2:

### ESAR Countries Included and Excluded in the Study by Data Sources

	Country	Latest DHS Data	MICS Data	Inclusion/exclusion criteria
<b>ESAR Countries Included in the Study</b>				
1	Kenya	2008-09	2009 (Mombasa)	Used 2008-9 DHS data for analysis because the 2009 MICS data were not national surveys
2	Lesotho	2009	2000	Used 2009 DHS
3	Malawi	2010	2006	Used 2010 DHS data
4	Rwanda	2010	2000	Used 2010 DHS data
5	Swaziland	2006-07	2010	Used 2010 MICS data
6	Tanzania	2010		Used 2010 DHS data
7	Uganda	2011	2009	Used 2011 DHS data
8	Zambia	2007	1999	Used 2007 DHS data
9	Zimbabwe	2005-06	2009	Used 2009 MICS data
<b>ESAR Countries Excluded From the Study</b>				
10	Madagascar	2008-09	2000	Excluded because the latest DHS dataset does not have domestic violence variables
11	Mozambique	2003	2008	Excluded because the latest MICS data was not available and the latest DHS dataset does not have domestic violence variables
12	Namibia	2006-07		Excluded because the latest DHS dataset does not have domestic violence variables
13	Angola		2001	Excluded because the most recent data was collected before 2005
14	Botswana	1988	2000	Excluded because the most recent data was collected before 2005
15	Burundi	2010 - preliminary	2005	Excluded because no data has been collect after 2005
16	Comoros	1996	2000	Excluded because the most recent data was collected before 2005
17	Djibouti			Excluded due to lack of data
18	Eritrea	2002		Excluded because the most recent data was collected before 2005
19	Ethiopia	2010 - preliminary		Excluded because the most recent data was collected before 2005
20	Mauritius			Excluded due to lack of data
21	Seychelles			Excluded due to lack of data
22	Somalia		2006	Excluded because of lack of DHS data and

				the most recent MICS data was collect in 2006
23	South Africa	2003		Excluded because the most recent data was collected before 2005
24	Sudan	1989-90	2000	Excluded because the recent data was collected before 2005

### Appendix 3: Computation of Multi-dimensional deprivation

A composite inter-dimensional deprivation index can be generated using either a simple summation method or the Alkire and Foster method, which uses a dual cut-off and counting approach in order to identify the deprived (Alkire and Foster, 2008). To identify deprived children, we use the Alkire and Foster method (2008) summarized in chapter 2 to pool information from different deprivation dimensions and generate a multi-deprivation measure and a binary variable (0=un-deprived and 1=deprived). The method allows the researcher to determine the benchmark or the number of dimensions in which a person has to be deprived in order to be considered deprived (Asselin, 2009). The approach also provides the freedom to assign different weights to each dimension.

The Alkire and Foster approach aims at identifying “who is poor” by considering the range of deprivations they suffer, and aggregating that information to reflect societal poverty in a way that is robust and decomposable. The Alkire and Foster approach has been used in many poverty analyses in developing country settings. For example, Batana (2008) used the approach to estimate multi-dimensional poverty in fourteen Sub-Sahara Africa countries. Kabubo-Mariara et al (2008) used the approach to study poverty dominance among Kenyan children while Alkire and Suman (2008) applied the approach to study multidimensional poverty in India.

#### Headcount deprivation measure

The first multi-dimensional measure that we generate is the head count ratio  $H_0$  which is the proportion of children that are poor and is given by;

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

Where  $q$  is the number of children identified in the set  $z_k$  as described above. Though  $H_0$  provides information about the proportion of children who are poor, it does not depict the breadth, depth or severity of poverty. Therefore the head count measure is a crude, easy to compute measure of multi-dimensional deprivation, which does not satisfy dimensional monotonicity principle.<sup>5</sup>

#### Adjusted headcount ratio measure

Due to the limitations of the head count ratio, we also present the adjusted headcount (  $A$  ) measure, which is headcount adjusted by the number of deprivations experienced by the poor.

Define  $c(k)$ , a censored vector of deprivation counts as

$$c_i(k) = \begin{cases} c_i, & \text{if } c_i \geq k \\ 0, & \text{if } c_i < k \end{cases}$$

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<sup>5</sup> The principle of monotonicity states that, given other things, a reduction in the income of a poor household must increase the poverty measure.

That is  $c(k)$ , the count of deprivation is always equal to zero to those children that are not poor according to  $\rho_k$  dual cutoff method, while children that were identified as poor keep the original vector of deprivation count  $c_i$ .  $c(k)$ , then represents the shared possible deprivations experienced by a poor child  $i$ , and hence the average deprivation shared across the poor is given by

$$A = \frac{|c(k)|}{qd}$$

The adjusted headcount ratio,  $M_0(y; z)$ , is given by  $M_0 = HA$ . That is the product of the headcount ratio  $H$  and the average deprivation shared across the poor  $A$ .  $M_0$  satisfies dimensional monotonicity since  $A$  increases when a poor child becomes deprived in an additional dimension.  $M_0$  has also been shown to satisfy decomposability, replication invariance, symmetry, poverty and deprivation focus, weak monotonicity, non-triviality, normalization and weak arrangement (Alkire and Foster, 2008).

$M_0$  can be decomposed into population subgroups obtained as

$$M_0(x, y; z) = \frac{n(x)}{n(x, y)} M_0(x; z) + \frac{n(y)}{n(x, y)} M_0(y; z)$$

Where  $x$  and  $y$  are the distributions of two subgroups  $(x, y)$  obtained by merging  $n(x)$ , the number of children in subgroup  $x$  and  $n(y)$  the number of children in subgroup  $y$ .  $n(x, y)$  is the number of children in  $(x, y)$ .

The overall poverty is the weighted average of subgroup poverty levels where weights are subgroup population shares. This decomposition can be extended to any number of subgroups. It is also possible to breakdown the overall multidimensional poverty measure to reveal the contribution of each dimension  $j$  to it. Once the identification step has been completed, a censored matrix of deprivations  $g^0(k)$  is defined whose typical entry is given by

$$g_{ij}^0(k) = \begin{cases} g_{ij}^0, & \text{if } c_i \geq k \\ 0, & \text{if } c_i < k \end{cases}$$

Then  $M_0(y; z)$  can be broken down into dimensional groups as

$$M_0(y; z) = \frac{\sum_j \mu(g_{j}^0(k))}{d}$$

Where  $\mu(g_{j}^0(k))$  is the mean of the matrix  $g_{j}^0(k)$ ; consequently,

$$\frac{1}{d} \left[ \frac{\mu(g_{j}^0(k))}{M_0(y; z)} \right]$$

can be interpreted as the post-identification contribution of dimension  $j$  to overall multidimensional poverty.

### Other Multi-dimensional Measures of Deprivation

The Alkire and Foster (2008) dual cutoff method also generates other classes of poverty measures.  $M_1(y; z)$  reflects the incidence, intensity and depth of poverty, which is the “gap” ( $G$ ) between poverty and the poverty line ( $M_1 = HxAxG$ ).  $M_2(y; z)$  reflects the incidence,

intensity, depth of poverty and inequality among the poor (the squared gap,  $S$ ) ( $M_2 = HxAxS$ ).  $M_0$  can be calculated with ordinal and cardinal data. However, cardinal data are required to calculate  $M_1$  and  $M_2$ . A detailed description of each step is discussed in Alkire and Foster (2008).

## Application

The head count measure  $H_0$  represents the percentage of children who are deprived in at least two of the four dimensions. Results for the  $M_1$  deprivation measure are presented in values ranging between 0 and 1. The value zero corresponds to no deprivation, while the value 1 indicates total deprivation. The  $M_1$  measure is a weighted head count and accounts for (i) the number of dimensions a child is deprived and ii) the depth of deprivation at each dimension. For example, the  $M_1$  index for a child who is deprived in 2 dimensions has less weight than that of a child who is deprived in 4 dimensions. To obtain the depth of deprivation, the weights were computed at dimension level. For example, with regards to the health dimension, which has a total of 6 indicators and a cut-off of 2, a child that had an  $M_1$  index of 4 would have had a lower depth weight compared to a child that had an  $M_1$  index of 6. Deprivation indices were computed for each age group.

Among children aged 0-4 years, the two multi-dimensional deprivation measures were computed from nutrition, health, water/sanitation and child protection dimensions. Among the school going children (ages 5-14 and 15-17 years), the multi-dimensional deprivation measures were constructed using education, health, water/sanitation and child protection. Though each one of the four dimensions had varying number of indicators, each dimension contributed equally towards the computation of the multi-dimensional deprivation measures. A child was considered multi-dimensionally deprived if he/she was deprived in at least two of the four dimensions.

We hypothesized that the higher the proportion of deprivation a domain had, the higher the contribution a domain had towards total deprivation. This means that the contribution of a domain towards a child being multi-dimensionally deprived was directly proportional to the percentage of children deprived in that dimension relative to other dimensions. For example, it is evident from the preliminary results that the majority of children were deprived in health and child protection. This means that if the cut-off is 2 dimensions, a child who was classified as multi-dimensionally deprived had high chances of being deprived in one of the two dimensions since the prevalence of deprivation in the two dimensions was higher relative to the other three dimensions.

**Appendix 4:**  
**Multi-dimensional deprivation levels and trends**

**Table A3:** Child deprivation level at multi-dimensional levels (H0 and M1 index) for age-groups 0-4, 5-14 and 5-18 years at k=2

Country	H0			M1		
	0-4 Years	5-14 Years	15-17 Years	0-4 Years	5-14 Years	15-17 Years
<b>Kenya</b>	21.4	23.0	33.1	0.082	0.053	0.114
<b>Lesotho</b>	35.5	5.9	36.9	0.123	0.009	0.084
<b>Malawi</b>	-	13.1	31.7	-	0.015	0.101
<b>Rwanda</b>	9.2	9.2	20.4	0.034	0.034	0.074
<b>Swaziland</b>	48.9	33.0	30.5	0.097	0.041	0.057
<b>Tanzania</b>	22.0	20.7	45.7	0.091	0.071	0.245
<b>Uganda</b>	39.0	22.1	49.7	0.180	0.079	0.254
<b>Zambia</b>	42.4	35.0	37.1	0.155	0.106	0.157
<b>Zimbabwe</b>	39.9	36.4	51.3	0.123	0.028	0.083