Incidence, Depth and Severity of Multiple Child Deprivations in Kenya

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Abstract

This paper measured multidimensional child deprivation of basic needs using data from 1993 to 2014 Kenya Demographic and Health Surveys. The Bristol approach multiple nonmonetary indicators of deprivation and the Alkire and Foster method for multidimensional poverty measurement are applied. The results show that the highest deprivation rates are in information, shelter and sanitation dimensions of child well-being. The lowest deprivation rates are in health and education dimensions. Deprivation rates are highest in North-Eastern and Eastern regions of Kenya. Third, deprivation rates in various dimensions and multidimensional child poverty declined between 1993 and 2014. These results suggest that provision of social halls community social halls with media centers, library/entertainment centers would enable children access information. In addition, government can consider zero rating building materials, and promoting research on appropriate building technologies to increase affordable housing. Investment by County governments in enhancing access to safe drinking water would reduce deprivation rate in this dimension. Child nutritional deprivation can be addressed through food supplements in the short-term and humanitarian assistance (relief food, tokens) for households with vulnerable children. Investments by National and County governments in collaboration with stakeholders will reduce deprivation rates in access to safe sanitation facilities.

Key Words: Child Rights; Deprivations; Multidimensional Poverty; Child Poverty; Kenya.
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1. Introduction

Poverty is widespread in Kenya. Poverty measure based on income and/or consumption expenditure per adult equivalent indicate that in 2005/06, the poverty incidence was 46.6%, a drop from 52.3% in 1997 (GOK, 1998; KNBS, 2007). However, the number of poor persons rose to 16.6 million in 2005/06 from 13.4 million in 1997. The poverty incidence declined further to 36.1% in 2015/16 but the number of poor persons rose to 16.4 million (KNBS, 2018). Overall, the poverty incidence declined but the number of poor persons rose between 1997and 2015/16. These estimates of poverty in Kenya provide a potrait of aggregate poverty.

Aggregate poverty measures mask the well-being of children. There is a strong reason to believe that children are disproportionately affected by poverty and deprivation. Moreover, as long as poverty measures are derived from income or consumption expenditures, child-specific needs are likely to receive limited attention, putting in jeopardy prospects of reducing child poverty because children experience poverty differently from adults (Minujin, Delamonica, Davidziuk and Gonzalez, 2006; Minujin, 2011).

Child malnutrition and mortality rates in Kenya are high in relation to internationally agreed targets of sustainable development goals (SDGs) (UN, 2015). In 2014, under-five mortality rate was 52 deaths per 1,000 live births, infant mortality rate was 39 deaths per 1,000 live births and neonatal mortality stood at 22 deaths per 1000 live births (KNBS, 2015). Malnourished children have higher probability of mortality and poor brain development, thus affecting their intelligence quotient (Shrimpton *et al.,* 2001). Prevalence of stunted children declined from 35% in 2008 to 26% in 2014, that of underweight children from 16% to 11%, and that of wasted children from 7% to 4% (KNBS, 2015). Basic child vaccination coverage declined from 77% in 2008 to 71% in 2014, posing serious challenges to child well-being (KNBS, 2015).

The population of Kenya in 2019 was estimated at 47.6 million of which 48.05% are children aged 0-18 years(KNBS, 2019). So, about half of Kenya's population are children. This has implications for resource allocation in both public and private sector. Childhood years are fundamental because the foundation for future life course is laid. Therefore, poverty and deprivation in childhood is acknowledged to have detrimental lifelong outcomes. Some deprivations may lead to death and/or disability; for example, if a child is not immunized against deadly diseases such as polio, TB or measles, the child may become disabled or die. Childhood years are key for brain development, laying the foundation for educational capabilities, mental and emotional health in childhood and adulthood (Minujin and Delamonica, 2005; Ortiz, 2012). Monetary based poverty measure is likely to miss critical dimensions of child well-being.

There is widespread agreement that empirical evaluation of child well-being calls for a multidimensional approach and child-specific welfare dimensions(Roelen and Gasmann, 2008; De Neubourg *et al.,* 2012). However, such evidence of child deprivation in Kenya is limited (Kabubo-Mariara et al., 2011; KNBS, 2017). Kabubo-Mariara *et al.,* (2011) analyzed two dimensions of child welfare-wealth and child health. The KNBS (2017) used only the 2014 KDHS data to examine multidimensional child poverty. This study contributes to the literature in a number of ways. First, it uses a comprehensive set of seven child-specific dimensions of well-being based on the Bristol method(Gordon et al, 2003). Second, it applies Alkire and Foster(2011) method to estimate not only the incidence, but also the depth and severity of child deprivation in Kenya. Third, the study employs cross-sectional survey datasets spanning two decades from 1993-2014.

Thus, the study takes stock of well-being of Kenyan children since the ratification of the Convention of Child Rights (UN, 1989) in the early 1990s in Kenya and acts as a baseline for implementation of Sustainable Development Goals (SDGs). Lastly, the paper provides additional and detailed empirical evidence on the state of child well-being in Kenya and draws policy implications for reduction of child deprivations.

The paper is organized as follows. In the next section the theoretical and empirical literature is surveyed. Section 3 presents the methodology employed. Section 4 presents the findings, while section 5 concludes the study.

2. Literature
2.1 Theoretical literature

Poverty is a complex and ambiguous phenomenon and researchers have been grappling with its measurement since the beginning of the 19th century. Historically, poverty measurement was income based, an approach developed by Booth and Rowntree in London and York in the late 19th and early 21st centuries, respectively, and is commonly used up to today (Laderchi, Saith and Stewart, 2003). However, this approach is heavily criticized. First, monetary measures are narrow and insufficient to capture well-being of an individual (Sen, 1985). Second, these measures do not capture intra-household distribution which can be huge (Thorbecke, 2008). Consequently, Deaton (1997) proposed that use of consumption expenditure survey data to measure poverty would address this drawback. Further, consumption expenditure approximates welfare more closely than income. Nonetheless, income or consumption measures of welfare fluctuate considerably among the poor (Hulme and Mckay, 2013). Still, the notion of absolute poverty remained dominant.

Townsend (1979) criticized the notion of absolute poverty and proposed a broader conceptualization of poverty based on relative deprivation. The notion of relative deprivation paved way for multidimensional measurement of poverty. Deprivation is defined as "a state of observable and demonstrable disadvantage relative to the local community or the wider society or nation to which an individual, family or group belongs" (Townsend,1987, pp. 125). In other words, deprivation is a state of insufficient material and social conditions facing individuals or households in the society.

Sen (1983) moved the debate forward by proposing an ethical theory known as 'Capability and Functioning framework" in evaluating individual well-being. Sen argued for evaluating well-being using the space of 'capabilities' rather than income or expenditures since not all aspects of well-being are purchased or sold in the market (Sen, 1983). This approach evaluates 'functionings' or 'beings' achieved by an individual. Examples of 'functionings' include being healthy, being well nourished, being educated, and so on.

The Conventions on Rights of the Child (CRC) were ratified across the world by governments (UN, 1989). These rights give the children the right to survive, develop, participate and be protected by government irrespective of their status. The CRC affirms children's fundamental rights such as; the right to education, right to healthcare, right to adequate food, among others. Repudiation of these rights embodies child deprivation. The concept of deprivation is also found in the UN definition of absolute poverty as "*severe deprivation of basic needs*" (UN, 1995, pp. 57). Furthermore, the UN has adopted a definition of child poverty that identifies poor children as deprived of food, health, education, water, sanitation, and information (UN, 2007). This study

conceptualizes poverty in a multidimensional perspective and measures child deprivation in a multidimensional approach. This study is anchored on CRC (UN 1989) and borrows heavily from Amartya Sen's 'capability and functionings' approach (Sen 1983) to evaluate child deprivations among the Kenyan children.

2.2 Empirical Literature

Empirical studies of child well-being use can be categorized into two strands. One strand (Land et al., 2001; 2007) uses annual data. The studies construct the child and youth well-being index for the USA based on 28 well-being indicators aggregated into seven (7) domains for the period 1975-2001. The results suggest that the well-being of children in the USA deteriorated over the 1980s and reached low levels in the early 1990s. The child well-being index improved between 1993 and 1998 but still lower than 1975 level. Application of this index to developing countries is limited because some of the indicators used are not available in developing countries. Further, annual data on welfare indicators are rarely collected.

The second strand of literature derives child well-being indices from micro-level data. Moore et al. (2007) grouped 29 well-being indicators from the American household survey (NSAF) data collected in 1997, 1999 and 2002 into five (5) domains. The results indicate that girls have higher well-being than males. Children aged between 6-11 years had higher well-being than those between 12-17 years. The well-being of White Non-Hispanic children was higher than that of black non-Hispanic and Hispanic children. Further, family, community and socio-demographic variables are predictors of variation in overall child well-being index. Moore et al. (2008) used the 2003/2004 US National Survey of Children's Health data. The number of indicators was 69 and grouped into seven (7) domains. The results supported the findings of their earlier study.

Bradshaw, Hoelscher and Richardson (2007) analyzed child well-being in 25 EU member states. The index is based on 51 indicators grouped into 23 domains. Overall, Denmark emerged the top in child well-being while Lithuania the bottom. Bradshaw and Richardson (2009) expanded this index to cover 27 EU member states and updated the data. The two new countries were Norway and Iceland. The results showed that child well-being was highest in Netherlands and lowest in Lithuania. Further, the correlation between child well-being and GDP per capita was positive and the correlation between child well-being and inequality was negative.

Bastos, Fernandes and Passos (2004) measured and compared income poverty and child deprivation in Portugal. The results indicate that the two measures of well-being do not overlap. This suggests that it matters whether focus is on household income poverty or child-specific deprivations. However, Bastos and Nunes (2009) found contrary results in the same country. Both household income-based child poverty and non-monetary indicators based child poverty are consistent. Further, children from single parents were over-represented in terms of deprivations and families with more than three children.

The strand of the literature on multidimensional child deprivation in developing countries is traced to Gordon et al. (2003). The results showed that more than 50% of children were deprived in at least one dimension and more than 30% of children were deprived in at least two dimensions. Children from Sub-Saharan Africa and South Asia suffer severe deprivations of over 80%. Rural children in the two regions suffer severe deprivations of over 90% compared to their counterparts

in urban areas. Several studies (Batana et al., 2014 in Uganda; UNICEF, 2006 in Mozambique; Minujin and Delamonica, 2012 in Tanzania and Nanivazo, 2014 in DRC) have been undertaken based on this approach. The weakness of the Bristol approach is that it does not estimate the depth and severity of child deprivations (Delamonica and Minujin (2007).

The literature on multidimensional child poverty in Kenya is very thin. Kabubo-Mariara et al. (2011) analysed child well-being based on two dimensions (wealth and child health) with four indicators based on KDHS data from 1993 to 2003. The results show that the multidimensional poverty indices decrease as the cut-off (k) increases. For example, the multidimensional headcount ratio was 41% when k=1 and 0% when k=4. About 24.2% of children were multidimensional poor when k=1 and 5% when k=3.

KNBS (2017) estimated incidence of multidimensional child poverty in Kenya based on the 2014 KDHS data and a counting method. Nine dimensions were used to measure child poverty. A child was classified as poor if deprived in three to six dimensions. The results show significantly higher deprivation rates for children aged 12 and 59 months (29%) than for those aged between 0 and 11 months (12%).

The present study adds to the scarce literature on child poverty in Kenya. It applies the Bristol Approach (Gordon, 2003) to child well-being adopted by international organizations such as UNICEF. It goes beyond KNBS (2017) to apply Alkire and Foster (2011) method to estimate not only the incidence of child poverty but also the depth and severity of child poverty. The study also used a more comprehensive set of child well-being dimensions unlike Kabub-Mariara et al (2011). With five waves of the KDHS data the study provides rich portrait of multiple deprivation among children in Kenya.

3. Methodology
The study operationalized the Bristol indicators of deprivation to the Kenyan context, based on available data, literature and conventional measures as advocated by world health organization (WHO), United Nations (UN)and the Constitution of Kenya (COK)). The study used KDHS data from 1993 to 2014 and evaluated seven child specific dimensions as shown in Table 1.

Table 1: Operationalization of Bristol indicators to the Kenyan context

Dimension	Indicator	Age group	cut-off point	Source
Nutrition/ Food	Stunted Wasted Underweight	< 5 years	z-scores below -2 standard deviations below reference median	CRC Art. 24; CoK Art. 43, 53; SDG 2; WHO, 2006
Health	Immunization against BCG, DPT, Polio &measles	< 5 years	Have not been immunized against any disease	CRC Art. 24; CoK Art. 43, 53 SDG 3; WHO 2006
Water	Source of drinking water and distance to water source	All children	Children using surface water such as rivers, dam, lake, ponds, streams OR for whom a return trip to collect water takes 30 minutes or longer	CRC Art. 24; CoK Art. 43; SDG 6; WHO 2006
Sanitation	Type of toilet facility	All children	No access to toilet facility of any kind in or near dwelling	CRC Art. 24; CoK Art. 43; SDG 6 WHO 2006
Shelter	Main material of floor and roof	All children	Floor: earth, sand, dung Roof: thatch, palm leaf	CRC Art. 27; COK Art. 43, 53; SDG 11 UN HABITAT (2003)
Education	School attendance/ attainment	6-17 years	Children of school age who have never been to school or currently not attending school (UNESCO standards)	CRC Art. 28; CoK Art. 35, 43; SDG 4 WHO 2006
Information	Household possession of radio and television	3-17 years	No access to both radio and television	CRC art. 13; 17 COK Art 35

Source: Adapted from Gordon *et al.,* (2003)

3.1 Analytical Framework
This study uses Bristol deprivation approach (Gordon *et al.,* 2003), augmented with the Alkire and Foster (2011) methodology. This is because Bristol approach does not estimate the depth and severity of child deprivations (Delamonica and Minujin (2007).

3.1.1   Bristol Deprivation Approach
Incidence of child deprivations
The formal notation of the Bristol deprivation approach (Gordon *et al.,* 2003) is taken from Roelen, Gassmann and De Neubourg (2008). The percentage of children falling below the specified threshold per indicator is denoted as the indicator deprivation rate (IV),

$$IV = \frac{\sum_{i=1}^{n} I_i}{n}, (1)$$

Where *n* stands for all children for which the indicator is observable while I_i represents a dichotomous variable with a value of 1 if the child is below the indicator threshold, and thus vulnerable, and a value of 0 if the child meets the threshold and is, therefore, not vulnerable.

The domain deprivation rate (DV) reflects the number of children experiencing deprivation within a specific domain as a percentage of children of whom the indicators within that domain are observable. The domain vulnerability rate is given by:

$$DV = \frac{\sum_{i=1}^{n} D_i}{n}, (2)$$

Where *n* is defined as in (1) and D_i stands for domain deprivation, a dichotomous variable with a value of 1 if the child is deprived in the specific domain and a value 0 if the child is not deprived in the domain. A child is considered to suffer domain vulnerability if it experiences indicator deprivation of one or more indicators within that domain. Thus:

$$D_i = 1, \quad if \sum_{i=1}^{d} I_i \geq 1, (3)$$

Where *d* stands for the total number of indicators identified per domain.

Severe Deprivations and Absolute Poverty Rates

Severe deprivation is defined as a child suffering one or more form(s) of deprivation while children experiencing two or more forms of deprivation are considered to be living in absolute poverty. The notation for constructing the rates for severe deprivation is shown by equation (4) while rates for absolute poverty is given in equation (5) as follows:

$$SevDep = \frac{\sum_{i=1}^{N} Sev_i}{N}, (4)$$

$$AbsPov = \frac{\sum_{i=1}^{N} Abs_i}{N}, (5)$$

Where N represents the sample of children aged 0-17 and Sev_i and Abs_i represent dichotomous variables with a value of 1 if a child is severely deprived or absolute poverty respectively:

$$Sev_i = 1 \; if \; \sum_{i=1}^{D} D_i \geq 1, (6)$$

$$Abs_i = 1 \; if \; \sum_{i=1}^{D} D_i \geq 2, (7)$$

Where D stands for the total number of domains within the specific approach. Severe deprivation and absolute poverty are not mutually exclusive concepts since by definition, children suffering from at least two dimensions include those who suffer from one or more dimension(s).

3.1.2   Alkire and Foster Methodology
Headcount Ratios
The headcount ratio, H is the percentage of the population identified as poor defined as:

$$H = \frac{q_k}{n}, (8)$$

Where $q_k = \sum_{i=1}^{n} \rho_k(x_i; z)$, is the number of children identified as poor based on the poverty line z and cut-off k, in set Z_k.

Depth of Child Deprivations

This is the average or intensity of deprivations suffered by children in a given population. Let *c(k)* be the censored vector of deprivation counts defined as follows: If $c_i \geq k$, then *ci(k)=ci*, or if *ci<k*, then *ci(k) =0*.

$$Depth \; (A) = \frac{\sum_{i=1}^{n} c_i \, (k)}{q}, (9)$$

Notice that c_i represents the censored deprivation score of child i and q, and is the number of children who are multidimensional poor.

Multidimensional Child Poverty

This measure combines the headcount ratio H, and the depth of deprivations, A. This index is referred to as adjusted headcount ratio (*M0*) given by:

$$M_0 = H \times A, (10)$$

The headcount ratio ignores changes in number of deprivations that the poor face. In contrast, the adjusted headcount ratio reflects the severity of deprivations among children who are multidimensional poor.

Decomposition of Multidimensional Poverty by Population Sub-groups

Decomposition of multidimensional child poverty by population subgroups quantifies the contribution of each dimension. In this study, the decomposition is by region and county. The rural-urban decomposition of the multidimensional poverty index (MPI) is expressed as follows:

$$MPI_{county} = \frac{n_u}{n} MPI_u + \frac{n_r}{n} MPI_r, (11)$$

Where u denotes urban; r denotes rural; n_u/n is the population of urban areas divided by the total population, and similarly n_r/n for the rural area (assuming $n_u+n_r=n)$.

Given the above expression, the contribution of each sub-group to overall poverty is computed using the following formula:

$$Contribution\ of\ u\ to\ MPI = \frac{\frac{n_u}{n} MPI_U}{MPI_{county}} \times 100, (12)$$

The sum of the contribution of all the subgroups should add up to 100 percent.

Breakdown by dimensions

The MPI is also decomposable by its components/dimensions. The dimensional break down is;

$$MPI = w_1 CH_1 + w_2 CH_2 + \cdots + w_7 CH_7, (13)$$

Where w_1, is the weight of indicator 1 and CH_1, is the censored headcount ratio of indicator 1, and similarly for the other seven indicators, with $\sum_{i=1}^{d} w_1 = 1$

$$Contribution\ of\ dimension\ i\ to\ MPI = \frac{w_1 CH_1}{MPI} \times 100, (14)$$

The sum of the contributions of all dimensions is equal to 100 per cent.

4. Results and Discussions
4.1 Incidence and trends of deprivations by dimension
Table 2 presents the incidence and trends of deprivation by dimension, based on the Bristol deprivation approach. The highest rates of deprivation were observed in the information dimension. The proportion of information deprived children was 94.34% in 1993, declining to 79.09% in 2008, but increasing to 80.29% in 2014. This suggest that most Kenyan children do not access vital information and education through the broadcast media. The government policy of 100% digital migration could worsen access to information through television because of the additional cost of buying decoders. The KNBS (2017) study based on the 2014 KDHS found that 27% of children aged 15-17 years and 25% of children aged 5-17 years were information deprived. The KNBS study excluded children under age 5 years and the indicators of this dimension were no television, radio, telephone or mobile devices in a household. This study could not include access to telephones or mobile phones since in 1990s there were no mobile phones in Kenyan households.

The second highest deprivation rates were observed in the shelter dimension, where 77.84% of children were deprived in 1993but this declined to 41.28% in 2014.This finding supports the finding by KNBS (2017) where 53% of children under five years, 47% of children aged between 5-14 years and 52% of children aged 15-17 years were deprived in shelter dimension in 2014. The slight difference is due to the fact that the KNBS study included indoor air pollution as one of the indicators in shelter dimension.

In education dimension, 5.92% of children experienced deprivation1993 and declined to 8.61 % in 1998. By the time of implementation of Millennium Development Goals (MDGs) on universal free primary education in 2003 in Kenya, the proportion of deprived children was 23.82%, declining modestly to 19.32% in 2014. KNBS (2017) found that 22% of children aged 5-14 years and 37% aged 15-17 years were deprived in education dimension in 2014. The huge difference is because the KNBS study includes delay in grade-for-age as an indicator for education dimension. The KNBS (2017) study reveal that some children have delayed as per their grade-for-age. The results for this dimension are rather disturbing since the government has fully implemented universal primary education since 2003.This calls for an in-depth research in this area to examine the underlying causes of children not attending school

The lowest levels of deprivations were observed in the health dimension with rates of less than 10% in all the surveys. On the contrary, 42% of children aged 0-11 months and 33% of children suffered deprivation in access to health in 2014 (KNBS, 2017). The difference of findings between this study and KNBS (2017) study is that the indicators for health dimension included birth attendance by unskilled worker and mother's knowledge on oral rehydration salts for diarrhoea treatment. However, given the risks associated with the lack of immunization, the number of non-immunized cases should be brought down to zero.

Nutritional deprivation stood at 32.22% in 1993, declining to 29.41% in 2014.Compared to KNBS study, 37% of children aged 12-59 months and 11% of children aged 0-11 months were deprived in nutrition dimension. Deprivation in other dimensions were as follows; water was 69.70% in 1993 but declined to 49.71% in 2014, sanitation worsened from 16.66% in 1993 to 23.15% in 2014.These trends raise serious questions about environmental quality and may be associated with the problem of waterborne diseases.

Comparing these results with Gordon *et al.,* (2003) findings, the major problems in developing world were shelter dimension at 62% followed by sanitation dimension at 31% while 25% of children suffered information deprivation. When the results were compared by region, Sub-Sahara Africa suffered the highest rates in four out of the seven dimensions. This justifies undertaking country specific studies since child deprivations differ between countries.

Table 2: Incidence and trends of child deprivations (%)

Dimension	Year of survey				
	1993	1998	2003	2008	2014
Nutrition	32.22	43.77	36.38	41.31	29.41
Health	5.38	9.58	11.07	5.82	2.66
Education	15.56	8.61	23.82	21.16	19.01
Shelter	77.84	72.88	70.40	70.54	41.28
Water	69.70	80.17	67.22	54.24	49.71
Sanitation	16.68	15.13	23.28	25.48	23.15
Information	94.34	87.57	81.58	79.09	80.29

Source: Authors' calculation from KDHS 1993-2014

4.2 Count of deprivation, Severity of Deprivations and Absolute Child Poverty

Table 3 presents the number of deprivations each child is deprived in, rates of severe deprivation and rates of absolute poverty. The results indicate that the proportion of children who were not deprived in any dimension increased from 5.03% in 1993 to 12.32% in 2014. This corroborates the KNBS (2017) study which found that 13% of children did not experience any deprivation in 2014. In 1993, 94.98% of children were deprived in at least one dimension, and this figure declined to 87.68% in 2014 which also confirms the finding by KNBS (2017) where 87.3% of children were deprived in at least one dimension. This approach is known as union approach (Atkinson, 2003; Bourguignon and Chakravarty, 2003). The drawback of this approach is that it overestimates deprivations. In contrast, the intersection approach (which considers deprivation in all dimensions) underestimate deprivations. The proportion of children deprived in all dimensions is less than 1 percent during the study period. The proportion of children living in absolute poverty (deprived in at least two dimensions) was 78% in 1993 and declined to 59.5% in 2014.

Table 3: Count of deprivation, Severity and Absolute Child Poverty (%)

Number of deprivations	Year of survey					Rate of change			
	1993	1998	2003	2008	2014	1998-1993	2003-1998	2008-2003	2014-2008
0	5.03	6.31	9.16	17.33	12.32	1.28	2.85	8.17	-5.01
1	16.95	14.5	15.44	26.56	28.18	-2.45	0.94	11.12	1.62
2	35.44	35.05	28.58	25.15	28.97	-0.39	-6.47	-3.43	3.82
3	27.94	29.6	24.83	17.56	18.21	1.66	-4.77	-7.27	0.65
4	11.42	12.17	14.97	9.7	9.14	0.75	2.8	-5.27	-0.56
5	2.82	2.18	5.91	3.18	2.93	-0.64	3.73	-2.73	-0.25
6	0.39	0.19	1.05	0.47	0.24	-0.2	0.86	-0.58	-0.23
7	0.02	0	0.07	0.05	0.01	-0.02	0.07	-0.02	-0.04
Severe deprivation	94.98	93.69	90.85	82.67	87.68	-1.29	-2.84	-8.18	5.01
Absolute poverty	78.03	79.19	75.41	56.11	59.5	1.16	-3.78	-19.3	3.39

Source: Authors' calculation from KDHS 1993-2014

4.4 Multidimensional child poverty indices

This section analyses multidimensional child poverty indices using the Alkire and Foster, (2011) approach. Table 4presents the adjusted headcount ratios (M0), multidimensional headcount ratios (H), and depth of child deprivations (A) based on the chosen poverty cut-off point of deprivation of 40% of all dimensions. The adjusted headcount ratio (M0) reduced from 37.8% in 1993 to 26.1% in 2014. The multidimensional headcount ratios dropped significantly from 72.8% in 1993 to 50.8% in 2014 while the depth of child deprivations reduced modestly from51.9% in 1993 to 51.4% in 2014.We argue that the reduction in adjusted headcount ratios was due to reduction of multidimensional headcount ratios as a key driver other than the depth of deprivations. Using a cut-off of three dimensions, KNBS (2017) found that 29.0% of children were multidimensional poor in 2014. Kabubo-Mariara *et al*., (2011) found that adjusted head count ratio was 24.2% when weighted sum of the deprivations experienced equals to 1. It is clear from these results that multidimensional poverty has decreased.

Table 4: Trends of multidimensional child poverty in Kenya from 1993-2014, K=40%

Year	Multidimensional poverty index (M0)	Multidimensional headcount ratio (H)	Depth/Intensity of poverty (A)
1993	0.378	0.728	0.519
1998	0.393	0.749	0.525
2003	0.371	0.664	0.560
2008	0.358	0.646	0.555
2014	0.261	0.508	0.514

Source: Authors' calculation using KDHS 1993-2014

4.5 Breakdown of multidimensional poverty index (M0) by dimensions

This section measures the contribution of various dimensions to overall poverty for targeting purposes. Table 5presents breakdown of multidimensional poverty index (M0) into its dimensions. The nutrition dimension was the highest contributor to M0 at 41.7% in 1993. From 1998 to 2014, information dimension contributed the highest to M0in all surveys. A similar trend was observed regarding the percentage contribution of each dimension to multidimensional poverty. The health and education dimensions contributed the least to multidimensional poverty.

Table 5: Contribution of each dimension to overall multidimensional poverty index

	1993	1998	2003	2008	2014
Adjusted headcount ratio (M_0)	0.38	0.39	0.37	0.36	0.26
Absolute contribution to M_0					
Nutrition	0.417	0.054	0.044	0.045	0.033
Health	0.007	0.012	0.014	0.001	0.003
Education	0.215	0.012	0.032	0.027	0.024
Shelter	0.096	0.096	0.085	0.084	0.054
Water	0.084	0.093	0.072	0.069	0.060
Sanitation	0.024	0.022	0.033	0.035	0.070
Information	0.103	0.11	0.091	0.089	0.082
Percentage contribution to M_0					
Nutrition	11.04	13.71	11.88	12.52	10.19
Health	1.85	2.98	3.66	1.89	0.88
Education	5.71	2.99	8.65	7.63	7.25
Shelter	25.42	24.33	22.80	23.72	16.54
Water	22.36	23.72	19.51	19.23	18.31
Sanitation	6.31	5.50	8.92	10.00	21.64
Information	27.32	26.77	24.57	24.99	25.18

Source: Authors' calculation using KDHS 1993-2014

4.7 Decomposition of Multidimensional poverty indices by region

It is also important to measure multidimensional poverty in rural or regional level. This is important for targeting and also assessing the success or otherwise of anti-poverty programmes and projects in a region/country. Table 6 presents decomposition of multidimensional poverty indices in Kenya by region. The results indicate that Eastern region recorded the highest rates of multidimensional poverty in 1993 and 1998. It was noted that the KDHS surveys were not undertaken in North Eastern region during the 1993 and 1998 surveys. However, in 2003, the North Eastern region recorded the highest percentage of children affected by multidimensional poverty. Nairobi region recorded the lowest rates of multidimensional poverty in all the surveys. All the eight regions recorded a gradual decline in multidimensional headcount ratios, but the average intensity of deprivation did not change much.

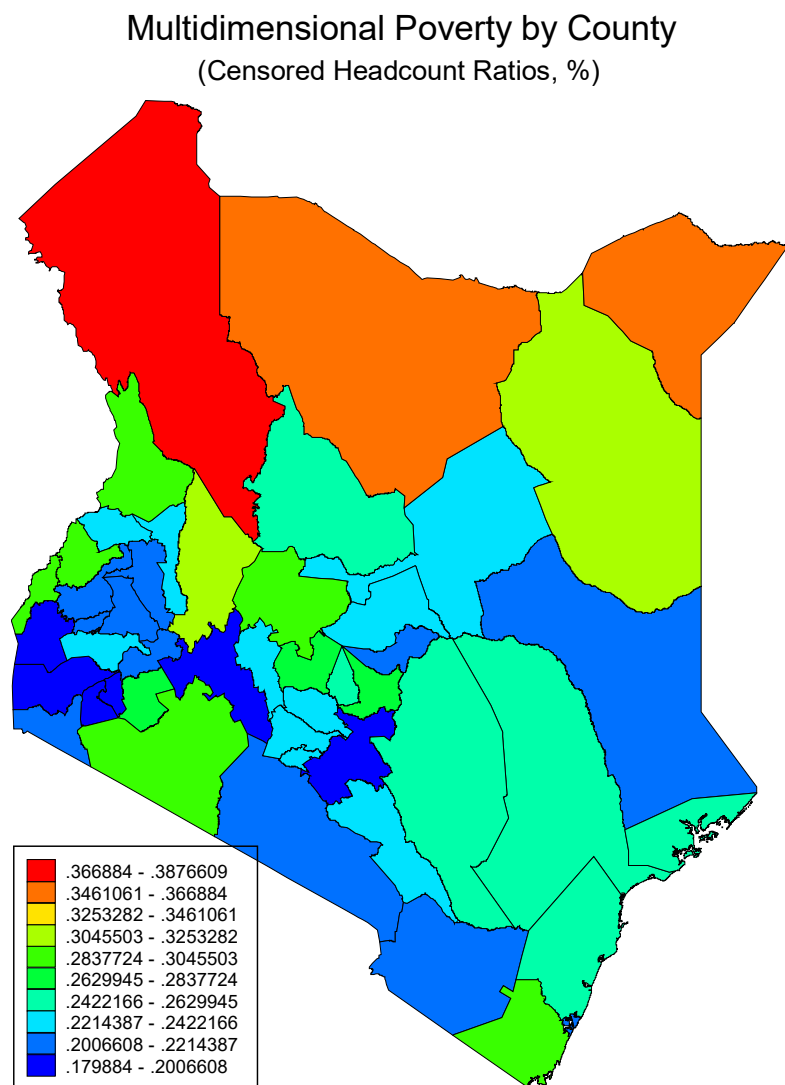**Table 6: Multidimensional Child Poverty by Region**

Region	1993			1998			2003			2008			2014		
	H	**A**	**M0**	**H**	**A**	**M0**	**H**	**A**	**M0**	**H**	**A**	**M0**	**H**	**A**	**M0**
Nairobi	0.70	0.51	0.36	0.60	0.50	0.30	0.63	0.54	0.34	0.63	0.57	0.36	0.52	0.52	0.27
Central	0.71	0.52	0.37	0.78	0.52	0.41	0.61	0.55	0.34	0.65	0.56	0.36	0.53	0.54	0.29
Coast	0.72	0.52	0.38	0.68	0.50	0.34	0.67	0.57	0.38	0.67	0.56	0.37	0.64	0.56	0.36
Eastern	0.79	0.52	0.41	0.83	0.55	0.45	0.69	0.56	0.39	0.68	0.57	0.39	0.65	0.56	0.36
Nyanza	0.71	0.51	0.36	0.80	0.54	0.43	0.67	0.57	0.38	0.62	0.55	0.34	0.58	0.54	0.31
Rift Valley	0.71	0.51	0.36	0.70	0.50	0.35	0.67	0.56	0.38	0.64	0.55	0.35	0.64	0.55	0.36
Western	0.73	0.52	0.38	0.64	0.49	0.32	0.65	0.55	0.36	0.65	0.55	0.36	0.56	0.53	0.30
North Eastern							0.76	0.58	0.44	0.66	0.56	0.37	0.56	0.53	0.29
Total	**0.73**	**0.52**	**0.38**	**0.75**	**0.53**	**0.39**	**0.66**	**0.56**	**0.37**	**0.65**	**0.55**	**0.36**	**0.60**	**0.55**	**0.33**

Source: Authors' calculation using KDHS 1993-2014

A=   Depth/Intensity of poverty
H=   Multidimensional headcount ratio
M0=   Multidimensional poverty index

4.8   Decomposition of multidimensional poverty index (MPI) by County

The KDHS 2014 collected data based on the new structure of administration after the promulgation of the Constitution of Kenya 2010. We therefore analysed MPI based on the 47 county governments of Kenya (see Figure 1). We found that Turkana, Marsabit and Mandera counties had the highest proportion of children who are multidimensionally poor. This was followed by Wajir, Narok, Busia, Bungoma, West Pokot, Baringo, Laikipia, and Kwale counties with MPI scores 24%-30% of children who are multidimensional poor. The lowest proportion of children who are multidimensionally poor were observed in Nairobi, TaitaTaveta, Kajiado, and Embu Counties.

Multidimensional Poverty by County
(Censored Headcount Ratios, %)

Source: Author's Calculation using KDHS 2014

Figure 1: Multidimensional Child Poverty by County

5.   Conclusions

This study measured the incidence, depth and severity of multiple child deprivations among Kenyan children using five waves of KDHS data from 1993 to 2014.The study has used two approaches of multidimensional deprivation analysis-Bristol deprivation approach and Alkire and Foster dual cut-off methodology. The results show that the highest incidence of deprivation was in the information dimension followed by shelter and water dimensions. The lowest incidence of deprivation was in the health dimension. The multidimensional poverty indices among the children have decreased over time. Children from North-Eastern region experience multiple deprivations followed by Eastern region compared to other regions.

Based on the findings, we prescribe the following policy recommendations. First, we recommend the provision of radio and television programmes in schools and local communities (social halls) so that children are exposed to what is happening around the world and further their learning. The Government in collaboration with stakeholders should also make this media equipment affordable for households by exempting them from taxation. Similarly, the Government should zero rate building materials like iron sheets and cement to enable parents construct better houses and invest in appropriate building technologies for innovations. The government should enhance access to safe drinking water by expanding water supply infrastructure in ASALs provision of water kiosks in informal settlements. During rainy seasons, households should be encouraged to harvest rainwater for use during dry seasons. Donating water tanks to poor households would boost the success of this undertaking.

In marginalized areas like the North-Eastern region, the Government in collaboration with stakeholders should provide low cost boarding schools to encourage children to attend school where they also enjoy incentives such as fortified meals/food. There should also be a policy to discourage nomadism by children so that they can attend school. The health sector should investigate and address the underlying causes of non-immunization of some children.

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