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MULTIDIMENSIONAL CHILD DEPRIVATION IN ETHIOPIA

FIRST NATIONAL ESTIMATES

CENTRAL STATISTICAL AGENCY

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The Multidimensional Child Deprivation in Ethiopia is based on the Ethiopian Demographic and Health Surveys Data Sets of 2011 and 2016.

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Acronyms

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Care
BCG	Bacillus Calmette-Guérin (vaccine)
COFDRE	Constitution of the Federal Democratic Republic of Ethiopia
CRC	Convention on the Rights of the Child
CSA	Central Statistical Agency of Ethiopia
DPT	Diphtheria, Pertussis, and Tetanus (vaccine)
DRS	Developing Regional States
EDHS	Ethiopia Demographic and Health Survey
EPRI	Economic Policy Research Institute
FDRE	Federal Democratic Republic of Ethiopia
GBV	Gender-based Violence
GTP	Growth and Transformation Plan
HCE	Household Consumption and Expenditure Survey
HepB	Hepatitis B (vaccine)
HEW	Health Extension Worker
Hib	Haemophilus Influenzae Type B (vaccine)
HIV	Human Immunodeficiency Virus
HSTP	Health Sector Transformation Plan
ICT	Information and Communication Technology
IYCF	Infant and Young Child Feeding
MAD	Minimum Acceptable Diet
MCD	Multidimensional Child Deprivation
MDD	Minimum Dietary Diversity
MMF	Minimum Meal Frequency
MODA	Multiple Overlapping Deprivation Analysis
MOH	Ministry of Health
MRV	Monovalent Rotavirus Vaccine
OPM	Oxford Policy Management
ORS	Oral Rehydration Salt
PCV	Pneumococcal Conjugate Vaccine
SD	Standard Deviation
SDGs	Sustainable Development Goals
SNNPR	Southern Nations, Nationalities, and People's Region
SPRI	Social Policy Research Institute
UN	United Nations
UN Habitat	United Nations Human Settlements Programme
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WMS	Welfare Monitoring Survey

Foreword

Ethiopia experienced an impressive rate of economic growth during the last decade. The double-digit growth in the economy has also been translated to some extent into improvements in social welfare in the country. In the past five years, per capita GDP has more than doubled and the national headcount poverty rate has declined by 6 percentage points. Ethiopia has also achieved most of the MDG goals.

Despite the improvements made and high economic growth, the development process has not equally benefited the most vulnerable groups. Some 13 million children are estimated to live in poor households in Ethiopia, 2 million of whom in extreme poverty. Children account for more than half of the population of the country.

The Government of Ethiopia has implemented several poverty focused development strategies and programmes since 2000, notably Sustainable Development and Poverty Reduction Program (SDPR) and Plan for Accelerated and Sustained Development to End Poverty (PADEP). The Growth and Transformational Plans (I and II) have been characterized by huge investments in infrastructural facilities and emphasized the importance of industrialization and basic services. Ethiopia has also approved the 2015 global development agenda, specifically the Sustainable Development Goal SDG 1.2: "Reduce at least by half the proportion of children, men, and women living in poverty in all its dimensions by 2050."

For Ethiopia to escape out of the vicious circle of poverty and pave the way for achieving its vision to reach the level of middle income nation by 2025, it has to deepen its understanding of the multiple dimensions of child poverty.

This study adopts UNICEF's Multiple Deprivation Overlapping Analysis (MODA) methodology using the Ethiopian Demographic and Health Survey datasets from 2011 and 2016. The child is taken as the unit of analysis and child deprivations are discussed using a life cycle approach. The study assesses the

extent to which children's rights to survival, development and participation in the Convention of the Rights of the Child are not fulfilled in Ethiopia.

The analysis, jointly conducted with relevant government partners, reveals that 88 per cent or 36.2 million children are multidimensionally poor, defined as a headcount of children deprived in at least three or more dimensions in the fulfilment of their rights or needs for basic food or services. Based on a child poverty analysis in 2015 by CSA, UNICEF and OPM, an estimated 32.4 per cent or 13 million children are monetarily poor. This clearly shows that significantly more children are multidimensionally poor rather than monetarily poor in Ethiopia. This implies that access to households' financial resources does not necessarily guarantee access to basic goods and services particularly more so in rural areas.

This study will primarily serve to monitor Ethiopia's progress in achieving goals and objectives of the development agenda commitments and gain a comprehensive understanding of different aspects of children's deprivation and poverty. It is also expected that the results of this report will help all sectors to understand better multidimensional deprivation experienced by children of Ethiopia and help trigger policy makers to approach child poverty in an integrated and comprehensive manner through child sensitive policies and programming.

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Executive summary

This report presents the first national estimates of multidimensional child deprivation (MCD) in Ethiopia. The MCD incidence and intensity, deprivation, and other analyses have been carried out by applying UNICEF's Multiple Overlapping Deprivation Analysis (MODA) methodology to the Ethiopian country context and using the Demographic and Health Survey (DHS) datasets. The calculated MCD rate sets the baseline for the Sustainable Development Goal 1.2 on poverty reduction in all its dimensions for children in Ethiopia, and the report generates ample evidence to monitor the country's progress in other SDGs as well. The report also lays a comprehensive child poverty and deprivation profile: it identifies the most deprived children and their characteristics; sheds light into geographical inequalities in fulfilment of children's rights; it analyses the relationships between different dimensions of deprivation; identifies the factors associated with multidimensional child deprivation; investigates the relationship between MCD and household wealth; and tracks the country's progress in deprivation reduction by carrying out a trend analysis between 2011 and 2016 data.

Multidimensional child deprivation in this report was defined as deprivation in 3 to 6 age-specific dimensions: physical development (stunting), health, nutrition, education, health-related knowledge, information and participation, water, sanitation and housing. Deprivation was measured separately for children under 5 and children ages 5-17 years with corresponding indicators to reflect differing needs based on children's lifecycle. Several indicators were applied to smaller age sub-groups. The parameters used to apply UNICEF's MODA to the country context were selected through an extensive participatory discussion process involving the Central Statistical Agency (CSA), Ministry of Women and Child Affairs, Ministry of Labour and Social Affairs, National Planning Commission, and UNICEF Ethiopia Country Office, and the Economic Policy Research Institute (EPRI)/Social Policy Research Institute (SPRI).

Multidimensional child deprivation in Ethiopia is very high. Eighty-eight per cent of all Ethiopian children – 36.2 million – live in multidimensional poverty defined as deprivation in 3 to 6 dimensions, that is, unfulfillment of rights or needs for basic goods and services.

Deprivation incidence is significantly higher in rural areas and unequally spread across regions of the country. Ninety-four percent of children residing in rural areas, twice the percentage of their peers in urban areas (42 per cent), are deprived in three or more dimensions. The MCD rate ranges from 18 per cent in Addis Ababa to 91 per cent in Afar, Amhara, and SNNPR, though the incidence is very high also in Oromia and Somali (90 per cent each), and Benishangul-Gumuz (89 per cent). The differences in single dimension deprivation rates also hint to geographical disparities in service provision across areas and regions of residence.

There has been meagre progress in MCD incidence and intensity reduction over the last five years. The percentage of multidimensionally deprived children decreased from 90 per cent in 2011 to 88 per cent in 2016, while the average deprivation intensity that these children experience dropped from 4.7 to 4.5 deprivations. This decrease was affected mainly by improvements in coverage of healthcare services for children under 5 and their mothers, improvements in access to safe drinking water for all children under 18 and an increase in penetration of information devices (namely mobile phones).

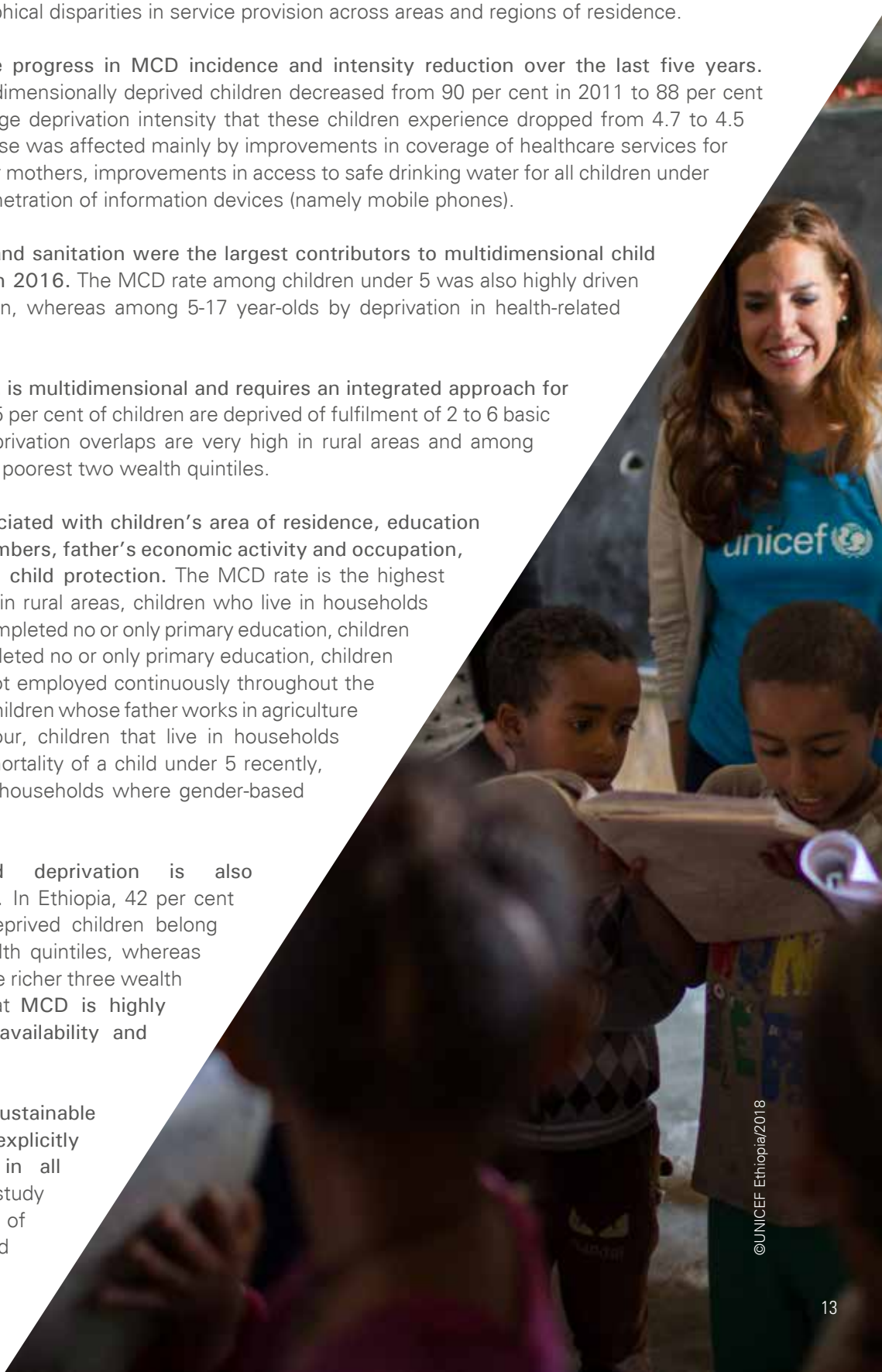
Deprivation in housing and sanitation were the largest contributors to multidimensional child deprivation in Ethiopia in 2016. The MCD rate among children under 5 was also highly driven by deprivation in nutrition, whereas among 5-17 year-olds by deprivation in health-related knowledge.

Child poverty in Ethiopia is multidimensional and requires an integrated approach for tackling it. In Ethiopia, 95 per cent of children are deprived of fulfilment of 2 to 6 basic needs and services. Deprivation overlaps are very high in rural areas and among children belonging to the poorest two wealth quintiles.

MCD in Ethiopia is associated with children's area of residence, education attainment of family members, father's economic activity and occupation, access to services, and child protection. The MCD rate is the highest among children residing in rural areas, children who live in households the head of which has completed no or only primary education, children whose mother has completed no or only primary education, children whose father is either not employed continuously throughout the year or not paid, among children whose father works in agriculture or unskilled manual labour, children that live in households that have experienced mortality of a child under 5 recently, and children that live in households where gender-based violence is justified.

Multidimensional child deprivation is also associated with wealth. In Ethiopia, 42 per cent of multidimensionally deprived children belong to the poorest two wealth quintiles, whereas another 46 per cent to the richer three wealth quintiles, suggesting that **MCD is highly dependent on service availability and accessibility.**

The United Nations Sustainable Development Agenda explicitly targets child poverty in all its dimensions. This study constructed an indicator of multidimensional child



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deprivation for Ethiopia by taking into account the country's conditions and context through a participatory discussion process. The MCD rate could be used to set the baseline for SDG 1.2 for Ethiopia and incorporated into the goal's routine monitoring and reporting activities of the country's progress. **This report therefore recommends that continuous support is provided for data collection tools to enable tracking Ethiopia's progress in SDG achievement.**

The report also highlights the **amendments to data collection tools that would be useful in enhancing evidence-based policymaking in the area of child poverty reduction.** Among others, the report recommends that more information is collected on child protection indicators, that the existing modules of child indicators are expanded to capture changes in needs and risks of children who have migrated to urban areas, that the sampling frame is expanded to allow for disaggregation of data at smaller geographical units, and that child-specific indicators are collected for all children rather than sub-samples.

The findings of this report provide useful insights for policymaking and programming in the area of child poverty reduction. As a first step, the report recommends that the findings are mainstreamed into national development plans and strategies to ensure that children receive dedicated attention. This is especially important considering that such documents serve as the basis for policymaking and programming in the country.

The findings of the report also shed an insight into geographical disparities in realization of children's rights and needs for basic goods and services. The report therefore recommends that the findings are used for **child-sensitive budgeting at different levels of governance** and in advocacy tools aimed at child poverty reduction.

Child poverty in Ethiopia is multidimensional and an integrated, multisectoral approach is necessary to tackle it. Solid governance including coordination at different levels, sustainable structures, and collaboration of service providers is essential for effectiveness of poverty and deprivation reduction. Pursuing "cash plus" interventions seems more of a must from the findings than an option worth considering.


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1. Introduction

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1.1. Background

Eradication of poverty in all forms and everywhere is at the forefront of the 2030 Sustainable Development Agenda, recognizing that poverty is not restricted only to financial means but includes multiple dimensions. The Sustainable Development Goals (SDGs) explicitly recognize that needs of women, children and men vary, hence the approach for alleviating poverty should be conducive with their needs. Ethiopia made the first step towards this commitment by ratifying the 1989 United Nations Convention on the Rights of the Child (CRC), which stipulates that each and every child has the right to survival, development, participation, and protection (UN, 1989). The 1995 Constitution of the Federal Democratic Republic of Ethiopia (FDRE) contains several provisions granting children rights to survival and development, including in Article 36. In addition, in 2015 the Government of Ethiopia approved the 2030 Sustainable Development Agenda and incorporated it into the second Growth and Transformation Plan (GTP II).

The UN defines child poverty as follows: "Children living in poverty are deprived of nutrition, water and sanitation facilities, access to basic healthcare services, shelter, education, participation and protection, and that while a severe lack of goods and services hurts every human being, it is most threatening and harmful to children, leaving them unable to enjoy their rights, to reach their full potential, and to participate as full members of the society" (UN, 2007). This definition uses a rights-based approach and incorporates the concept of access to basic goods and services. The multidimensionality of poverty has also been recognized in the academia. As early as 1901, Rowntree defined households as poor if they could not afford food, shelter, clothing, and other necessities at subsistence level. In 1979, Sen introduced the concept of measuring development through the capability approach which (in some instances also in combination with the rights-based approach) has been used as a basis for a myriad of tools developed over the last two decades for measuring multidimensional poverty (Sen, 1979; Townsend, 1987; Gordon, et al 2007; Alkire and Foster, 2011; de Neubourg, et al, 2012; Roche, 2013; Roelen, et al, 2011).

Most poverty studies until recently have been using monetary poverty to identify the poor and design interventions for tackling it. A household is considered poor if its income or expenditure is below an agreed poverty line. This measurement assumes that the financial resources enable households to fulfil their needs for goods and services, and that the markets are available and accessible, and the prices known. Especially for children, this approach has several shortcomings

considering that children do not have control over households' financial resources; that access to financial resources does not always translate into improvements in children's well-being; and that there may be intra-household inequalities in resource allocation. Deprivation analysis on the other hand focuses on the outcomes – whether a household and/or child has actual access to services and whether the latter are being utilized. As such, the approach accounts for factors that may constrain access to services, including their availability and quality, not having time or transportation to obtain services, not having information on them, discrimination and risk in accessing services, and cultural norms and traditions, among others.

1.2. Measuring child poverty

Using monetary approach and data from the HCE/WMS 2011 survey for measuring child poverty, the 2015 Child Well-being in Ethiopia report finds that 32.4 per cent of children in the country are poor, whereas 5.2 per cent live in extreme poverty (CSA, UNICEF, and OPM, 2015). While this report also looks at different dimensions of children's well-being in addition to monetary poverty – including nutrition, health, education, child protection, water and sanitation, and housing and energy – setting a baseline for SDG 1.2 target and its monitoring requires that children's well-being is measured through an integrated approach as UNICEF's Multiple Overlapping Deprivation Analysis (MODA) methodology.

This report uses UNICEF's MODA methodology (de Neubourg et al, 2012) to analyse child well-being in Ethiopia which has been implemented by more than 32 countries in the continent of Africa for the same purpose. MODA defines Multidimensional Child Deprivation (MCD) as non-fulfilment of basic rights listed in the CRC (1989) and measures deprivation at the level of the child. The indicators and dimensions used to measure well-being vary by children's age-group to account for differences in their needs by life cycle and are presented separately for children under 5 and children of ages 5-17 years. Some of the measures are also disaggregated by gender to gain an insight on disparities. The findings are presented at the national and regional level to highlight differences in approach to be pursued in interventions based on where the children reside. The study uses the unique Ethiopia Demographic and Health Survey (EDHS) 2016 and EDHS 2011 data to draw the first national estimates of child deprivation and show the progress achieved in the country over the last five years.

1.3. Purpose of the report and SDGs

This study aims to identify the most vulnerable groups of children deprived of multiple basic needs, services, and rights simultaneously to provide evidence for the design of child-sensitive poverty-reduction policies. The results of the study will also be used to set the baselines and monitor Ethiopia's progress in achieving SDG targets. The MODA approach corresponds with the UN 2030 Sustainable Development Goals (SDG) Agenda, especially Goal 1 "End poverty in all forms everywhere," and its target 1.2.: "By 2030, reduce at least by half the proportion of men, women, and children of all ages living in poverty in all its dimensions according to national definitions." The MCD rate calculated for this study will therefore be used to set the baseline and monitor progress in achieving this SDG. Disaggregated results by area and region of residence will serve to measure progress in achieving SDG 10 "Reducing inequalities with and among countries," while the other findings will be used to set baselines and monitor progress on SDG targets on nutrition, education, health, water and sanitation.

Table 1: Sustainable Development Goals (SDGs)

1	End poverty in all its forms everywhere	7	Ensure access to affordable, reliable, sustainable, and modern energy for all	13	Take urgent action to combat climate change and its impacts
2	End hunger achieve food security, and improved nutrition and promote sustainable agriculture	8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
3	Ensure healthy lives and promote well-being for all at all ages	9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	15	Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reserve land degradation and halt biodiversity loss
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	10	Reduce inequality within and among countries	16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
5	Achieve gender equality and empower all women and girls	11	Make cities and human settlements inclusive, safe, resilient, and sustainable	17	Strengthen the means of implementation and revitalize the global partnership for sustainable development
6	Ensure availability and sustainable management of water and sanitation for all	12	Ensure sustainable consumption and production patterns		

1.4. Organization of the report

This report is organized as follows: **Chapter One** presents the introduction and context to the report; **Chapter Two** presents the methodology, including a description of data and limitations; **Chapter Three** presents the main findings of the study; **Chapter Four** presents single dimension deprivation analysis for each indicator and the dimension used for the two age groups – children under 5 and children ages 5-17 years; **Chapter Five** presents deprivation overlap analysis; **Chapter Six** presents multiple deprivation analysis, including deprivation count and distribution, deprivation intensity, indices, decomposition of MCD, and factors associated with MCD; **Chapter Seven** includes analysis on the relationship between MCD and household wealth; and **Chapter Eight** concludes with a summary of findings and recommendations. Where applicable, the findings are complemented with trend analysis using EDHS 2011 to capture progress made over the last five years.

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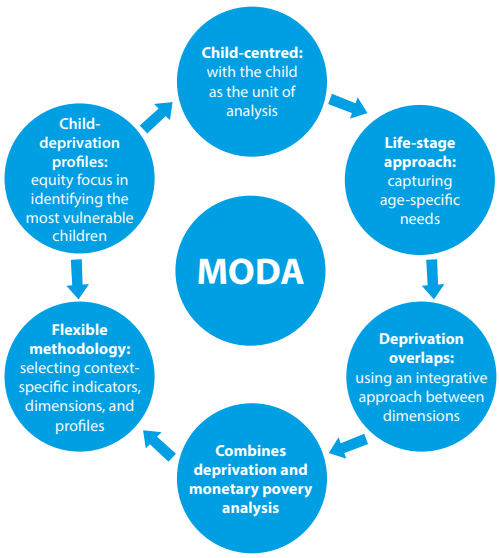
2. Methodology

2.1. Conceptual framework of multidimensional child poverty

This report uses the UNICEF MODA for assessing multidimensional deprivation of children in Ethiopia. The methodology uses a rights-based approach to identify children that are deprived of basic goods, needs, and services necessary for their survival, development, participation, and protection. MODA is a flexible methodology; it allows multidimensional deprivation measurement through selection of indicators, dimensions, and profiles that are specific to countries' contexts.

Figure 1: MODA - Conceptual framework



MODA is child-centred, that is, measurement of deprivation is carried out at the individual child level rather than at the level of their households. In addition, MODA adopts a life-stage approach, by using different indicators and dimensions for different groups of children corresponding with their age. For instance, while underweight may be an important indicator to measure whether children under 5 have access to adequate nutrition, for children of age 7-18 years, school attendance is a relevant indicator for measuring their access to education.

After children's deprivation rate in each of the selected indicators and dimensions has been calculated, it is necessary to see whether and in how many dimensions are children deprived simultaneously and to what extent these deprivations overlap. This is enabled through the deprivation overlap analysis which uses an integrative approach between dimensions analysed. Profiling of findings through characteristics of children and their households helps identifying the most deprived children. MODA also allows combining deprivation and monetary poverty analysis to measure both SDG 1.1 and SDG 1.2 However, this was not

possible for this study as the EDHS 2016 data does not include a module on income/expenditures.

Figure 2 illustrates the application of MODA methodology. The first child in the figure is deprived in two dimensions, the second child is deprived in one dimension, the fourth child is deprived in all three dimensions at the same time, whereas the third child is not deprived in any dimension.

Focusing on each child as unit of analysis helps to understand the level of deprivation on each of the dimensions (or rights) and identify the most vulnerable children who are deprived in a higher number of dimensions simultaneously.

Figure 2: Illustration of MODA methodology

	Nutrition	Health	Water	Number of deprivation
	X	X		2
	✓	X	✓	1
	✓	✓	✓	0
	X	X	X	3

2.2. Applying multidimensional child poverty deprivation (MCD) measurement

Single and multidimensional child deprivation figures presented in this report were calculated by adapting UNICEF MODA methodology to Ethiopia's context. A child under 18 in the country is considered deprived if one's rights as stipulated in the Constitution of the FDRE (1995), UN CRC (1989), and in the UN Resolution on the 2030 Sustainable Development Agenda (UN, 2015) are not fulfilled.

The parameters – indicators, dimensions, thresholds, and profiling variables – for applying UNICEF MODA for MCD measurement from the above-mentioned documents were selected through a participatory discussions process consisting of experts from the Central Statistical Agency (CSA), Ministry of Women and Child Affairs, Ministry of Labour and Social Affairs, National Planning Commission, and UNICEF Ethiopia Country Office, in collaboration with the Economic Policy Research Institute (EPRI)/ Social Policy Research Institute (SPRI). The choice of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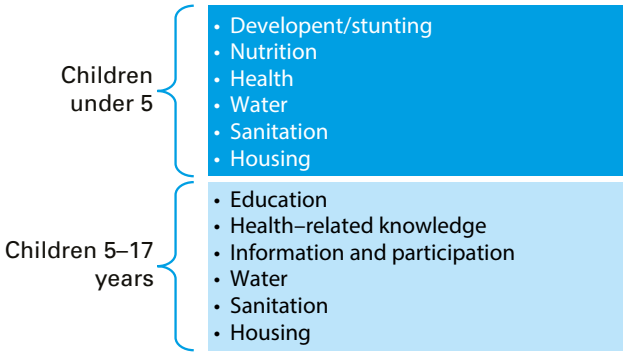
parameters was also influenced by availability of data in EDHS datasets of 2016 and 2011, therefore not all rights stipulated in the UN CRC or Constitution of the FDRE could be used in the analysis.

Figure 3 presents the dimensions included in the MCD analysis. Details on each of the dimensions and the corresponding articles from the UN CRC (1989) and the FDRE Constitution (1995) can be found on Annex 1 and Annex 2.

Figure 3: Dimensions selected for multi-dimensional child deprivation analysis by age group



To account for differences in needs based on children's age – in compliance with the life-cycle approach principle of MODA methodology – the study divides the child population into two age groups to analyse age-specific dimensions. A few other dimensions apply to both age groups. The list below presents dimensions analysed by age group:

Children under 5 years: development (stunting), nutrition, health, water, sanitation and housing. Some of the indicators in the dimensions of nutrition and health were calculated for specific age sub-groups as illustrated in Table 2.

Children ages 5-17 years: education, health-related knowledge, information and participation, water, sanitation and housing. Some of the findings for this age group are presented separately for the sub-groups age 5-14 years and age 15-17 years due to differences in inclusion and measurement of some of the indicators: literacy for children age 15-17 years, and deprivation in health-related knowledge and information and participation measured at the household level for children age 5-14 years and at the individual child level for children age 15-17 years.

Table 2 presents dimensions, indicators, and deprivation thresholds for each age group (and age sub-groups in some instances). Deprivation in a dimension is measured as a binary variable with 0 denoting non-deprivation and 1 denoting deprivation in the dimension. When more than one indicator is used in the dimension, union approach is used to calculate deprivation in the dimension. A child deprived in either of the indicators is deprived in the whole dimension. For instance, a child of age 0-11 months is considered deprived in health if she/he was delivered by an unskilled birth attendant, one's mother did not receive adequate antenatal care (ANC) during pregnancy, or the child is not fully immunized. A child is not deprived in health if she/he was delivered by a skilled birth attendant, her/his mother received adequate ANC during pregnancy, and the child is fully vaccinated as per the national schedule of vaccination. Annex 3 contains a detailed description of parameters.

Table 2: Dimensions, indicators, and deprivation thresholds by age group

Dimension	Indicator and threshold	Under 5	5-14 years	15-17 years
Development (stunting)	Stunting: child's height-for-age is below -2SD from reference population	X		
Health	Skilled birth assistance: unskilled birth attendance	0-11 months		
	Adequacy of ANC services: mother had less than 4 ANC visits during pregnancy or 4+ ANC visits were performed by an unskilled health professional	0-11 months		
	Vaccination: incomplete vaccination	X		
	Mother's knowledge on ORS for treatment of diarrhoea: mother does not have knowledge	12-59 months		

Dimension	Indicator and threshold	Under 5	5-14 years	15-17 years
Nutrition	Exclusive breastfeeding: child is not exclusively breastfed	0-5 months		
	Infant and Young Child Feeding (IYCF) practices: child is not fed a Minimum Acceptable Diet (MAD)	6-23 months		
	Wasting: child's weight-for-height is below -2SD from the reference population	X		
	Underweight: child's weight-for-age is below -2SD from the reference population	X		
	Vitamin A supplement: child has not received a vitamin A supplement during the last 6 months	7-59 months		
Education	School attendance: child is not attending school		7-14 years	X
	Grade-for-age: child of primary school age (9-14 years) is attending school with two or more years of delay; child of secondary school age (15-17 years) is attending school with three or more years of delay		X	X
	Illiteracy: child cannot read a full sentence			X
Health-related knowledge	Knowledge on diarrhoea treatment: child lives in a household where no adolescent or adult female knows about ORS for treatment of diarrhoea		X	
	Knowledge about HIV/AIDS: child age 5-14 years lives in a household where none of the adolescent or adult members has knowledge about HIV/AIDS transmission and prevention; child age 15-17 years does not have knowledge on HIV/AIDS transmission and prevention		X	X
Information and participation	Information devices: no information device (TV, radio, phone or mobile phone) available in the household		X	X
	Participation in community events or conversations: child age 5-14 years lives in a household in which none of the adolescent or adult family members have heard any family planning messages in the last few months through participation in community events or conversations; child age 15-17 years has not heard about family planning messages in the last few months through participation in community events or conversations		X	X
Water	Water source: household uses an unimproved water source	X	X	X
	Distance to water: the water source is located more than 30 minutes away than is necessary to fetch water and return to the dwelling	X	X	X
Sanitation	Toilet type: household has access to an unimproved toilet type	X	X	X
Housing	Housing material: Floor, exterior walls or roof of the dwelling where the child resides are made of natural, non-permanent material	X	X	X
	Indoor pollution: child is exposed to indoor pollution from usage of solid cooking fuels for cooking inside the house with no separate kitchen	X	X	X

2.3. Computation of multi-dimensional child poverty indices

UNICEF MODA methodology contains two components of analyses: i. Single dimension deprivation analysis, which calculates the percentage of children deprived in each dimension and each of its constituting indicators, and ii. Multidimensional deprivation analysis which includes counting the number of dimensions that each child is deprived in to calculate the deprivation distribution, overlaps between deprivations and MCD indices. The analysis of MCD rates in this study includes also multivariate factor analysis using logistic regressions to gain an insight on factors associated with children's likelihood of being multidimensionally deprived. When calculating the MCD indices, each dimension

is given an equal weight since each represents a right and every one of them is an equally important contributor to children's overall well-being.

Multidimensional child deprivation (MCD) headcount rate

The MCD headcount rate (H) calculates the proportion of children out of the total reference population who are deprived in a number of dimensions that is equal to or above the chosen cut-off point (equivalent to poverty line). The calculation is based on the formula below:

$$H = \frac{q_K}{n_a}$$

$$q_K = \sum_{i=1}^{n} y_K$$

where

H – multidimensional child deprivation rate;
q_K – number of children deprived in at least K dimensions in the age group α;
n_a – total number of children in the age group α;
y_K – deprivation status of a child i depending on the cut-off point K;
D_i – number of deprivations that each child *i* experiences;
K – cut-off point.

The analysis in this study calculates the MCD rate for all the possible cut-off points – from 1 to 6 dimensions – however, the report focuses on presenting findings calculated using a cut-off point of three dimensions.

Average intensity of multidimensional deprivation

The average intensity of multidimensional deprivation (A) is equivalent to poverty depth in monetary poverty analysis and measures the breadth of deprivation among multidimensionally deprived children. It is calculated as the sum of all deprivations that multidimensionally deprived children (i.e. children deprived in 3 to 6 dimensions) experience as a share of all possible deprivations among those deprived in at least K dimensions (i.e. 6). This measure can be reported in two different forms: i. Average number of deprivations experienced by multidimensionally deprived children in absolute numbers, or ii. Proportion of deprivations experienced out of the total number of dimensions analysed, using the following formulas:

$$A_{\text{in absolute numbers}} = \frac{\sum c_K}{q_K}$$

$$A_{ratio} = \frac{\sum c_K}{q_{K\ x\ d}}$$

where

A – average intensity (in number or as ratio) of multidimensional deprivation according to the cut-off point K;
q_K – number of children deprived in at least K dimensions in the age group α;
d – total number of dimensions considered per child;
c_K – number of deprivations each multidimensionally deprived child *i* experiences, with $c_K = D_i * y_K$;
n_α – total number of children in the age group α;
K – cut-off point.

Adjusted MCD Index (M_0)

The Adjusted Multidimensional Child Deprivation Index M_0[1] is a composite measure that integrates both MCD headcount rate and average deprivation intensity. The index ranges between 0 and 1, 0 denoting that no child is multidimensionally deprived and 1 denoting that all children are multidimensionally deprived and that the average deprivation intensity is six. M_0 satisfies the "dimensional monotonicity"[2] property of poverty measures as it is sensitive to changes in either of its components. For instance, if a child that was previously deprived in three dimensions is now deprived in four of them, the index increases. Likewise, if the proportion of children who are multidimensionally deprived increases while average deprivation intensity remains the same, the index will also increase.

1 Equivalent to Alkire and Foster (2007) Adjusted Headcount Ratio of Multidimensional Poverty M_0/Multidimensional Poverty Index.

2 de Neubourg et al., 2012. Step-by-step guidelines to the Multiple Overlapping Deprivation Analysis (MODA). Available at: https://www.unicef-irc.org/publications/pdf/iwp_2012_10.pdf

The adjusted MCD index has been calculated using the following formula:

$$M_0 = H * A = \frac{\sum_1^{q_K} c_K}{n_a * d}$$

where

H- MCD headcount rate;
A- Average deprivation intensity among the multidimensionally deprived children;
q_K – number of children deprived in at least K dimensions in the age group α;
c_K – number of deprivations each multidimensionally deprived child i experiences, with $c_K=D_i*y_K$;
d- total number of dimensions considered per child;
K- cut-off point.

The M_0 also satisfied the axiom of "decomposability"[3] which allows assessing contribution of different sub-groups to the national adjusted headcount ratio. In other words, the sum of the weighted average of subgroup deprivation levels should equal to the overall national deprivation level. The weights for each sub-group are equal to their respective population shares out of the total.

This study decomposes the M_0 by both area of residence (rural/urban) and regions to understand the contribution of each to the national deprivation level. The formula below decomposes the M_0 by two regions as an example:

where

$$\frac{M_{0_1}\left(\frac{n_1}{n}\right)}{M_0} + \frac{M_{0_2}\left(\frac{n_2}{n}\right)}{M_0} = 1$$

M_0 – Adjusted MCD index at the national level;
M_{01} & M_{02} – Adjusted MCD index for region 1 and region 2;
n – total number of children;
n_1 & n_2 – number of children in region 1 and region 2.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2.4. Data

The quantitative analyses in this study have been carried out using EDHS 2016 as the basis and results were complemented with trend analysis using EDHS 2011.[4] This dataset has been selected as it is the most recent survey that includes a comprehensive list of child-specific variables, indicators and proxy parameters that are adequate for measuring their well-being. The data for EDHS 2016 have been collected over a period of six months between January and June 2016. A total of 16,650 households were interviewed, in which 15,683 interviews were completed with women age 15-49 years and 12,688 with men age 15-59 years. Overall, the dataset contains information on 37,892 children under 18. The data for EDHS 2011 were collected between

3 de Neubourg et al., 2012. Step-by-step guidelines to the Multiple Overlapping Deprivation Analysis (MODA). Available at: https://www.unicef-irc.org/publications/pdf/iwp_2012_10.pdf

4 The results in the text of the report are presented as rounded numbers for easier reading hence there are a few instances of one percentage-point differences for the same indicators/variables/indices.

December 2010 and June 2011. A total of 16,703 households were interviewed, in which 16,515 interviews were completed with women age 15-49 years, and 14,110 with men age 15-59 years. Overall, this dataset contains information on 36,229 children under 18.

2.5. Limitations

Application of UNICEF MODA methodology to Ethiopia's country context using EDHS 2016 included the following questionnaires: i. The Household Questionnaire; ii. The Woman's Questionnaire; iii. The Man's Questionnaire; iv. The Biomarker Questionnaire, and v. The Health Facility Questionnaire, whereas EDHS 2011 included only the first three. While these questionnaires contain abundant variables measuring children's well-being, the choice of indicators used in the analyses was driven by a set of criteria, including variance and the percentage of missing values, and availability of indicators in the datasets of both years.[5]

The percentage of missing values when selecting indicators is important because in the multidimensional deprivation analysis children who miss information on specific indicators are considered as "non-deprived." As such, the large percentage of missing values in a given indicator leads to underestimation of multidimensional child deprivation overall.

The EDHS 2016 and 2011 datasets contain a multitude of questions on child protection – including birth registration, domestic violence, exploitation, abuse and harmful practices – that could have been used to measure deprivation in this dimension. However, due to the high percentage of missing values, low variance of some of the indicators, and unfulfillment of other criteria for indicator selection, this dimension could not be included in deprivation analysis. Having in mind evidence of immediate and intergenerational adverse effects some of these indicators have on children, they have been incorporated in the analysis as profiling variables.

In the EDHS 2016 dataset, 13 per cent of children under 5 miss information on the following indicators: skilled birth attendance, adequacy of ANC, exclusive breastfeeding, IYCF, vitamin A supplement, vaccination, and mother's knowledge on ORS for treatment of diarrhoea, as their mothers were not present in the household during the time of the survey or were not eligible for the Woman's Questionnaire. Nearly 6 per cent of children ages 5-17 years miss information on the following: health-related knowledge and participation in community events or conversations as none of their adult household members were eligible for the Woman's/ Man's Questionnaire. Both of these groups of children were omitted out of the multidimensional deprivation analysis to avoid underestimation of MCD.

5 According to UNICEF MODA methodology, seven main criteria are used to select indicators: i) relevance; ii) attribution to dimensions; iii) variance; iv) coverage; v) free from measurement bias; vi) scalability; and vii) parsimony and internal consistency. Three other aspects are also important when selecting indicators: (1) that the indicators should reflect actual deprivation rather than causes of it; (2) that the chosen indicators have a low percentage of missing values; and (3) that each indicator is defined by specifying the age and gender it refers to.

Annex 4 and Annex 5 show differences in characteristics and indicator deprivation rates between children whose mothers were not interviewed for the Woman's Questionnaire (children under 5) or who live in households where none of the adult members were eligible for the Woman's/Man's Questionnaire (children ages 5-17 years), and those who have complete information on all indicators. The sensitivity analysis for children under 5 reveals that there are no statistically significant differences in indicator deprivation rates between the two sub-groups, hence exclusion of these children does not affect the MCD rate. Sensitivity analysis among children ages 5-17 years shows that deprivation rates of children who live in households where none of the adult members were eligible for the Woman's/Man's Questionnaire – in the indicators of school attendance, grade-for-age, households' possession of information devices, improved source of drinking water, adequacy of sanitation, adequacy of housing (permanence of building materials), and indoor pollution – are significantly higher and statistically significant from their peers. The exclusion of these children leads to a slight underestimation of the MCD rate among this age-group, therefore the results for children ages 5-17 years in this study should be interpreted with caution.

Another limitation worth noting is that MODA methodology requires that indicators are selected uniformly for national estimates regardless of children's area of residence. Considering differences in nature of risks between urban and rural areas and within urban areas depending on settlements, some of the indicators may not fully capture deprivation in certain dimensions and indicators such as WASH and housing.

3. Main findings of the Multidimensional Child Deprivation study

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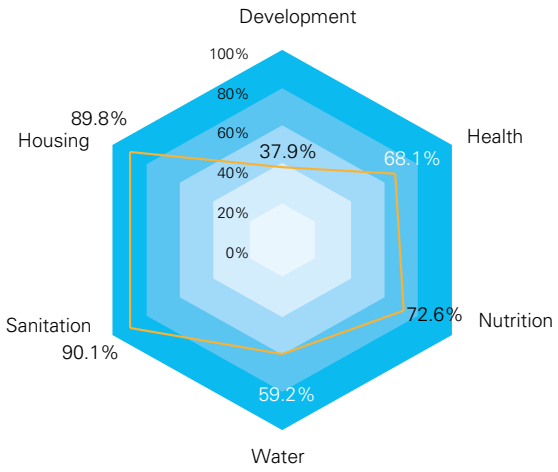
This chapter presents the main findings of the MCD analysis including incidence and intensity using different deprivation thresholds; incidence of deprivation by dimension for the two age groups; and deprivation count and distribution among all children. It also highlights differences in deprivation between Developing Regional States (DRS) and the national average, as well as changes in deprivation between 2011 and 2016.

3.1. Deprivation incidence by dimension

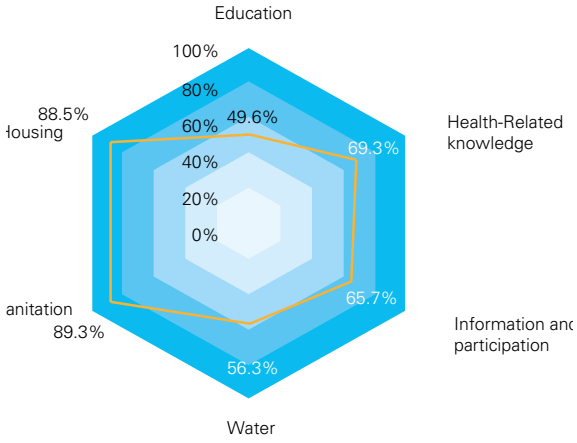
Six dimensions were selected for implementing MODA for Ethiopia, and deprivation incidence served as the basis for the rest of the analyses. The dimensions were selected based on children's age to capture differences in needs based on the stage of their life-cycle. Figure 4 summarizes deprivation rates by dimensions for children under 5. As illustrated in the graph, the deprivation rates for sanitation, housing (90 per cent each), and nutrition (73 per cent) were considerably higher. Among 5-17 year-olds, the deprivation rates for sanitation and housing (89 per cent each) and health-related knowledge (69 per cent) were the highest of the six dimensions analysed.

Figure 4: Deprivation by dimension, children under 5



Source: Authors' calculations using EDHS 2016 data.

Figure 5: Deprivation by dimension, age 5-17 years

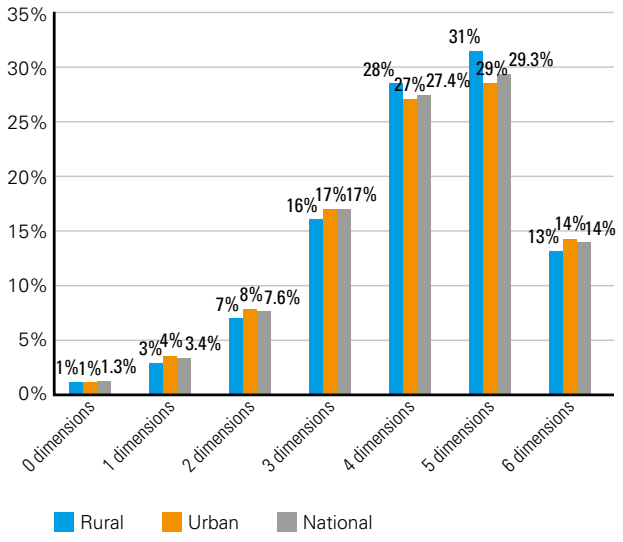


Source: Authors' calculations using EDHS 2016 data.

3.2. Deprivation count and distribution by age-group

This section counts the number of deprivations experienced by each child to measure how they are distributed across the population and to measure deprivation intensity. Figure 6 depicts distribution of deprivation by age group. The figure shows that only 1 per cent of children under 5 and 1 per cent of 5-17 year-olds in Ethiopia did not experience deprivation in any of the six dimensions analysed in 2016, while 3 per cent of children under 5 and 4 per cent of children age 5-17 years were deprived in only one dimension. Overall, 95 per cent of children under 18 were deprived in two or more dimensions in 2016, whereas 88 per cent experienced three or more deprivations. Fourteen per cent of children under 18 experienced six deprivations at the same time.

Figure 6: Deprivation count and distribution, per cent of children



Source: Authors' calculations using EDHS 2016 data.

3.3. MCD incidence and intensity

The MCD incidence and intensity in this study are presented through three parameters: MCD headcount rate (H) which measures the percentage of multidimensionally deprived children based on the chosen cut-off; average deprivation intensity (A) which calculates the average number or percentage of deprivations (out of the total six analysed) that the multidimensionally deprived children experience; and the Adjusted MCD Index (M_0) which is a composite index comprised of the headcount rate (H) and the average deprivation intensity (A).

Through extensive participatory discussions with institutions of the FDRE and development partners a consensus was reached that the cut-off (equivalent to poverty line) for multidimensional child deprivation in Ethiopia is set at three or more dimensions. As shown in Table 3, using a threshold of three or more dimensions, 88 per cent of children in Ethiopia under 18 were found to be multidimensionally deprived in 2016 with an average deprivation intensity of 4.5 dimensions. In other words, 88 per cent or 36.2 million children under 18 in Ethiopia were deprived of fulfilment of three or more basic rights and/or needs for basic goods and services in 2016.

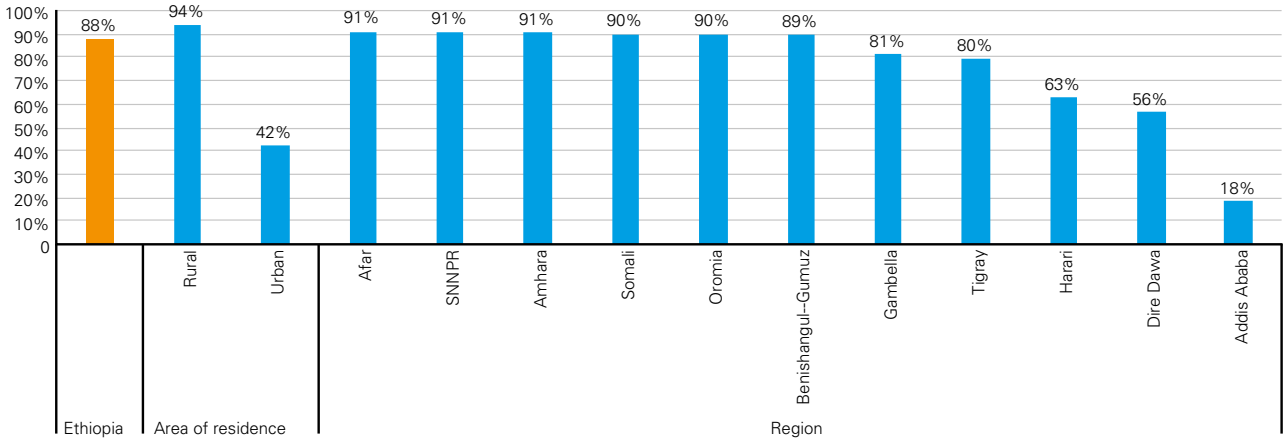
Figure 7 disaggregates the MCD headcount rate by children's area of residence and region, showing that MCD incidence is more than double in rural areas (94 per cent) compared to urban areas (42 per cent). The inequality in MCD incidence across regions is significant, ranging from 18 per cent in Addis Ababa to 91 per cent in Afar, SNNPR, and Amhara. It must be noted that the MCD headcount rate is very high also in Somali, Oromia (90 per cent each), and Benishangul-Gumuz (89 per cent).

Table 3: Multidimensional child deprivation incidence, intensity, and Adjusted MCD Index by dimensional cut-off, all children under 18

Cut-off K (dimensions)	Multidimensional Child Deprivation Rate (H), %	Multidimensionally deprived children (in absolute numbers)	Average deprivation intensity (A) (in number)	Average intensity among the deprived (A) (in %)	Adjusted Multidimensional Child Deprivation Index (M_0)
1-6 deprivations	99%	40,756,046	4.2	69%	0.68
2-6 deprivations	95%	39,364,157	4.3	71.0%	0.68
3-6 deprivations	88%	36,224,341	4.5	74.3%	0.65
4-6 deprivations	71%	29,204,517	4.8	80.2%	0.57
5-6 deprivations	43%	17,872,091	5.3	88.7%	0.38
6 deprivations	14%	5,762,233	6.0	100%	0.14
Total number of children: 41,285,822					

Source: Authors' calculations using EDHS 2016 data and CSA population projections for 2016

Figure 7: MCD incidence by area and region of residence, children under 18



Source: Authors' calculations using EDHS 2016 data.

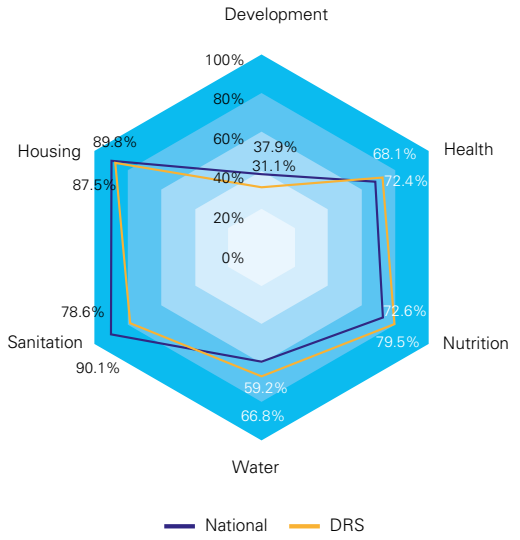
3.4 Deprivation in Developing Regional States (DRS)

This section compares the deprivation rates between the averages of DRS[6] and the national estimates. The figures for the DRS should be interpreted with caution since the EDHS sampling frame uses regions as strata rather than sub-regions based on their topographic features. Nonetheless, comparisons of approximate DRS deprivation rates with the national estimates are important considering the specificities of DRS and dedicated programmatic attention they have been receiving in the last decade.

Figures 8 and 9 compare deprivation rates by dimension between DRS and the national average for two age groups, children under 5 and children ages 5-17 years. Figure 8 shows that the percentage of children under 5 deprived in health, nutrition, and water is higher in DRS compared to the national average. Among 5-17 year-olds, the deprivation rates in DRS are higher for the dimensions of education, health-related knowledge, information and participation, and water compared to the average deprivation rates in Ethiopia.

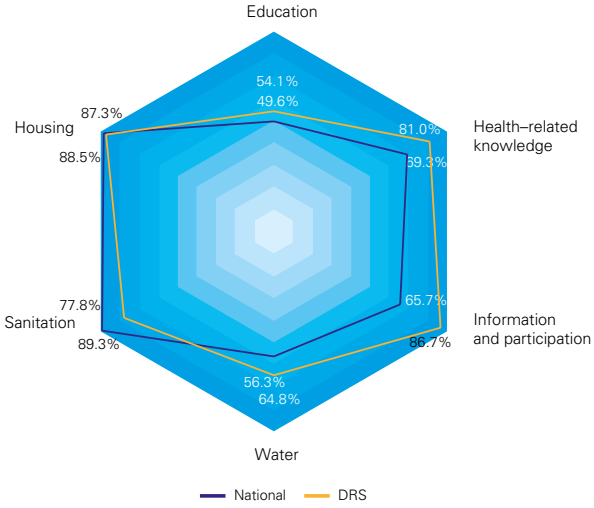
Comparison of deprivation count and distribution between DRS and Ethiopia in Figure 10 shows that children residing in DRS are more likely to experience a higher number of dimension deprivations compared to the national average. Ninety per cent of children residing in DRS are deprived of fulfilment of three or more basic needs and rights compared to the national average of 88 per cent. The difference is larger for a higher number of deprivations – 50 per cent of children under 18 in DRS compared to 43 per cent across Ethiopia on average are deprived in five or more dimensions.

Figure 8: Dimension deprivation rates, under 5, DRS and Ethiopia



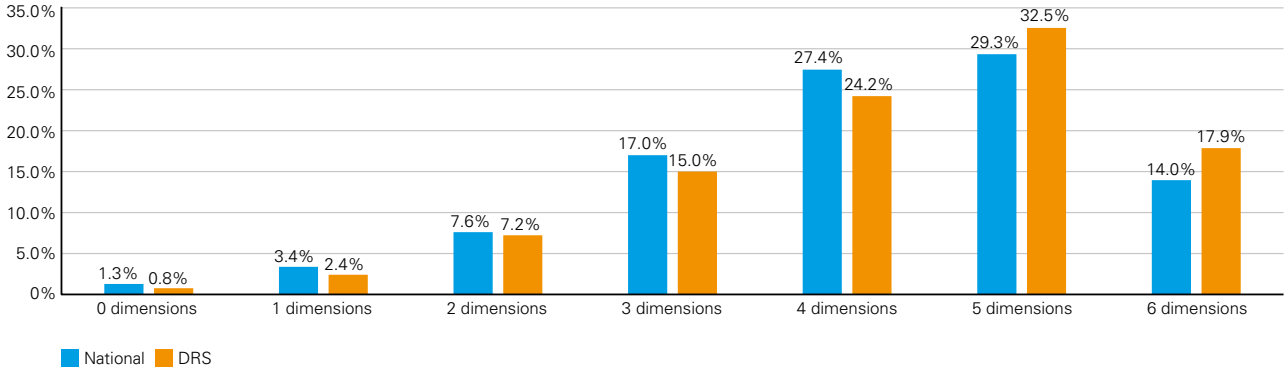
Source: Authors' calculations using EDHS 2016 data.

Figure 9: Dimension deprivation rates, 5-17 years, DRS and Ethiopia



Source: Authors' calculations using EDHS 2016 data.

Figure 10: Deprivation count and distribution, per cent of children under 18, DRS and Ethiopia



Source: Authors' calculations using EDHS 2016 data.

6 For the purposes of comparisons in this report, DRS include the following (whole) regions: Afar, Somali, Gambella, and Benishangul-Gumuz.

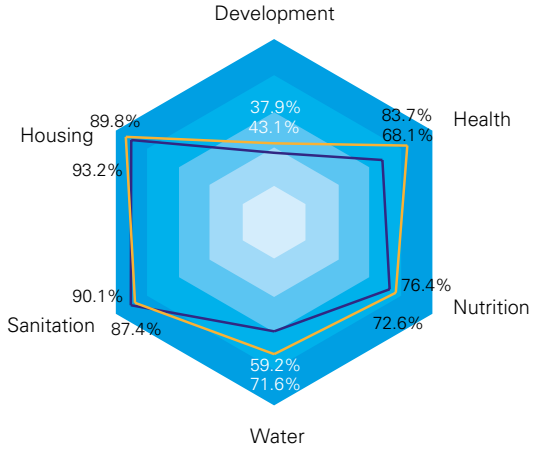
Comparison of the MCD indices shows that both MCD incidence and intensity are higher in DRS compared to the national average. Ninety per cent of children under 18 in DRS are deprived in three or more dimensions at the same time compared to the average of 88% of children across Ethiopia. Multidimensionally deprived children in DRS are deprived of an average 4.6 dimensions, while across the country the average deprivation intensity is 4.5 dimensions. Finally, the Adjusted MCD Index in DRS is 0.69 compared to the national index of 0.65.

3.5. Trend analysis: Changes in MCD between 2011 and 2016

Figures 11 and 12 show changes in deprivation between 2011 and 2016 across age-specific dimensions for children under 5 and children of age 5-17 years. Among children under 5, data shows improvements in realization of children's rights for all dimensions but sanitation. Decreases in the deprivation rates between 2011 and 2016 are significant for the dimensions of health and water. Among 5-17 year-olds significant improvements have been made only in access to safe drinking water. The deprivation rates in education and information and participation have also decreased over the period but to a lesser extent, by 6 and 4 per cent, respectively.

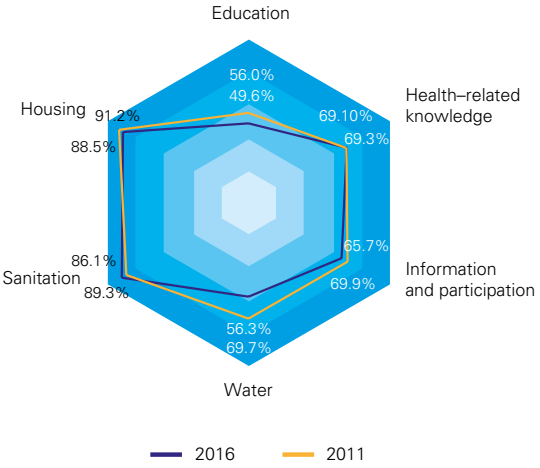
Trend analysis of deprivation count and distribution illustrated on Figure 13 indicates a slight drop in the number of deprivations that the multidimensionally deprived children experienced between 2011 and 2016. As show in the figure, the percentage of children deprived in all six dimensions analysed

Figure 11: Deprivation rates by dimensions, under 5, 2011 and 2016



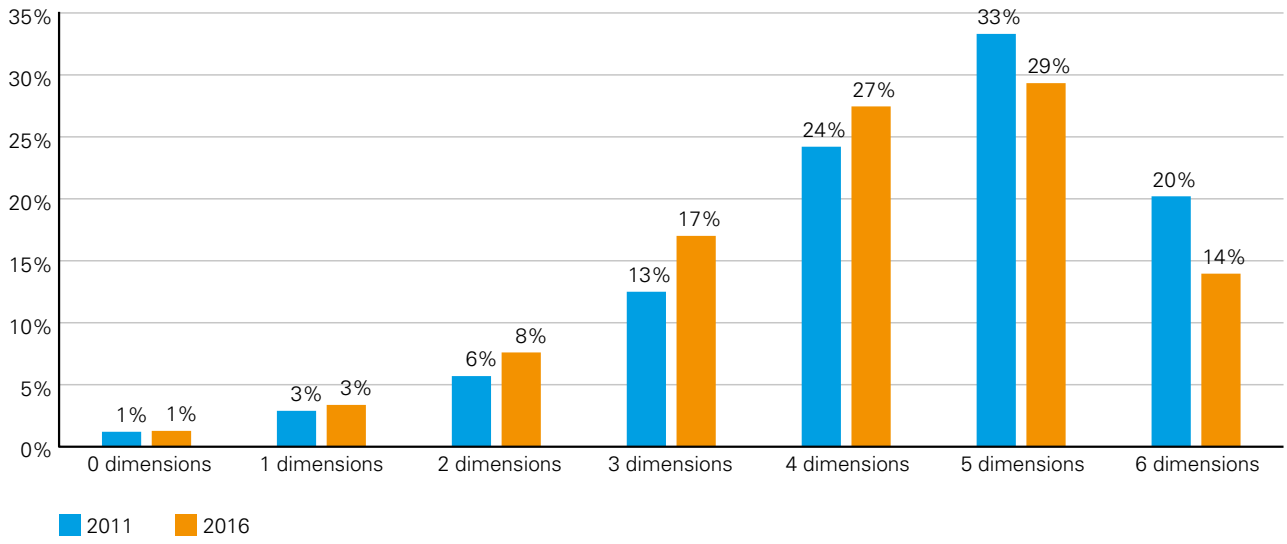
Source: Authors' calculations using EDHS 2016 and EDHS 2011 data.

Figure 12: Deprivation rates by dimension, 5-17 years, 2011 and 2016



Source: Authors' calculations using EDHS 2016 and EDHS 2011 data.

Figure 13: Deprivation count and distribution, children under 18, 2011 and 2016



Source: Authors' calculations using EDHS 2016 and EDHS 2011 data.

decreased from 20 per cent in 2011 to 14 per cent in 2016, while the percentage of children who experienced five or more deprivations decreased from 33 per cent to 29 per cent. These children have been distributed across those that experience two, three, or four or more deprivations, shifting the deprivation distribution curve to the left in 2016.

Trend analysis of indices for MCD incidence and intensity shows that both have experienced a decline, albeit insignificant, between 2011 and 2016. The MCD incidence – percentage of children deprived in 3 to 6 dimensions at the same time – decreased from 90 per cent to 88 per cent, the average deprivation intensity decreased from 4.7 to 4.5 dimensions; and the Adjusted MCD Index decreased from 0.70 to 0.65 between 2011 and 2016.

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4. Single dimension deprivation analysis

4.1. Single deprivation analysis for children under 5 years

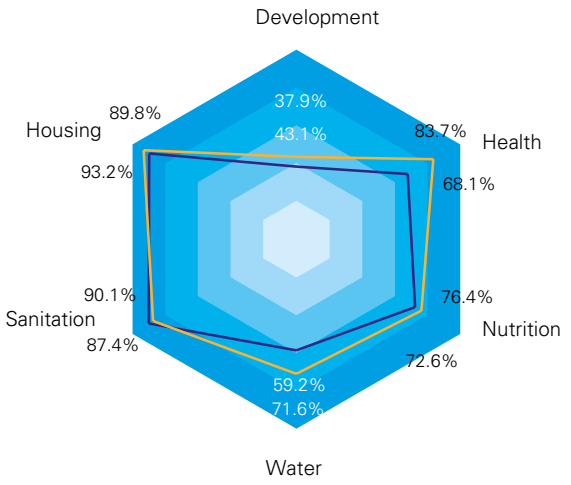
The single deprivation analysis presents the results for each of the separate indicators and dimensions that have been selected for the analysis for children under 5 years. The results give an indication of which sectors should receive specific attention. For children under 5, sanitation, housing, and nutrition present the highest deprivation rates, 90 per cent, 90 per cent, and 73 per cent, respectively.

The trend analysis in Figure 14 shows that there has been significant progress in improving access to basic healthcare services (for children under 5 and their mothers) and safe drinking water during the last five years in Ethiopia. The percentage of children deprived of basic healthcare services has decreased from 84 per cent in 2011 to 68 per cent in 2016, mainly attributed to increase in coverage of adequate antenatal care services, skilled birth attendance and vaccination. The number of children under 5 deprived of safe drinking water has decreased by more than 10 percentage points, from 72 per cent in 2011 to 59 per cent in 2016.

Disaggregation of dimension deprivation rates by children's area of residence in Figure 15 shows large discrepancies: a significantly larger share children under 5 in rural areas are deprived of fulfilment of their basic needs and rights compared to their counterparts residing in urban areas. The inequality is drastically high for access to adequate housing, sanitation and safe drinking water.

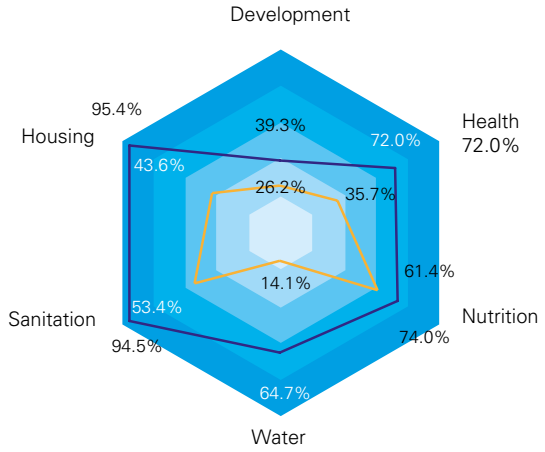
Disaggregation of dimension deprivation rates in Annex 6 highlight the disparities in realization of children's rights across regions. A significantly higher percentage of children under 5 in Afar are deprived in health (80 per cent), nutrition (85 per cent), and housing (93 per cent); Amhara has the highest deprivation rate in physical development (stunting) (47 per cent) and along with Oromia and Benishangul-Gumuz ranks among the most deprived regions in housing and sanitation; whereas Somali has the highest deprivation rate in water (74 per cent). A significantly lower percentage of children residing in Addis Ababa are deprived in development (15 per cent), health (14 per cent), water (3 per cent), sanitation (19 per cent), and housing (19 per cent).

Figure 14: Deprivation rates by dimension, under 5, 2011 and 2016



Source: Authors' calculations using EDHS 2016 and EDHS 2011

Figure 15: Deprivation rates by dimension, under 5, area of residence



Source: Authors' calculations using EDHS 2016.

Figure 16 illustrates deprivation rates by indicator and dimension for children under 5, highlighting the main drivers of dimension deprivations for different age sub-groups. As shown in the figure, deprivation in health among children under 12 months is mainly driven by deprivation in mother's access to adequate antenatal services (66 per cent) and skilled birth attendance (61 per cent), whereas among children under 5 by incomplete vaccination (61 per cent). The figure also shows that deprivation in nutrition among children age 6-23 months years is mainly driven by IYCF (93 per cent), pointing to issues with food security in Ethiopia. Additionally, more than half (54 per cent) of children age 7-59 months are deprived of vitamin A supplement provision. Annex 7 illustrates trend analysis in indicator and deprivation rates among children under 5 years.

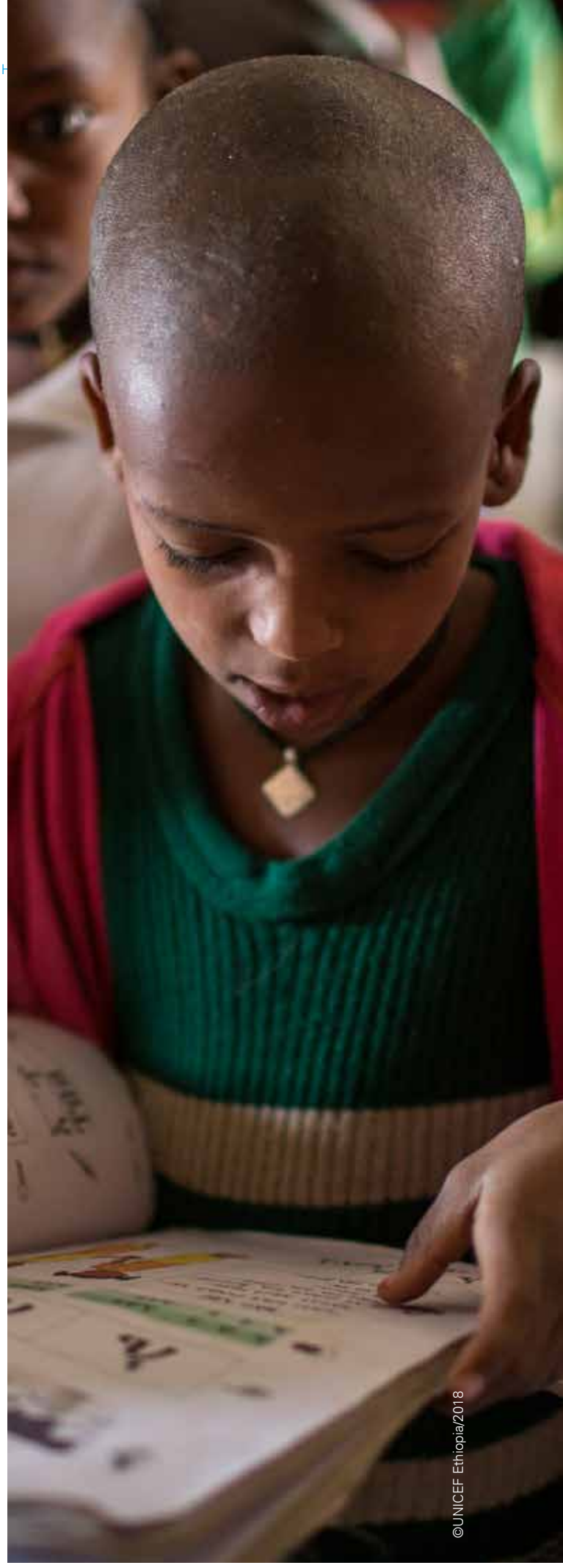


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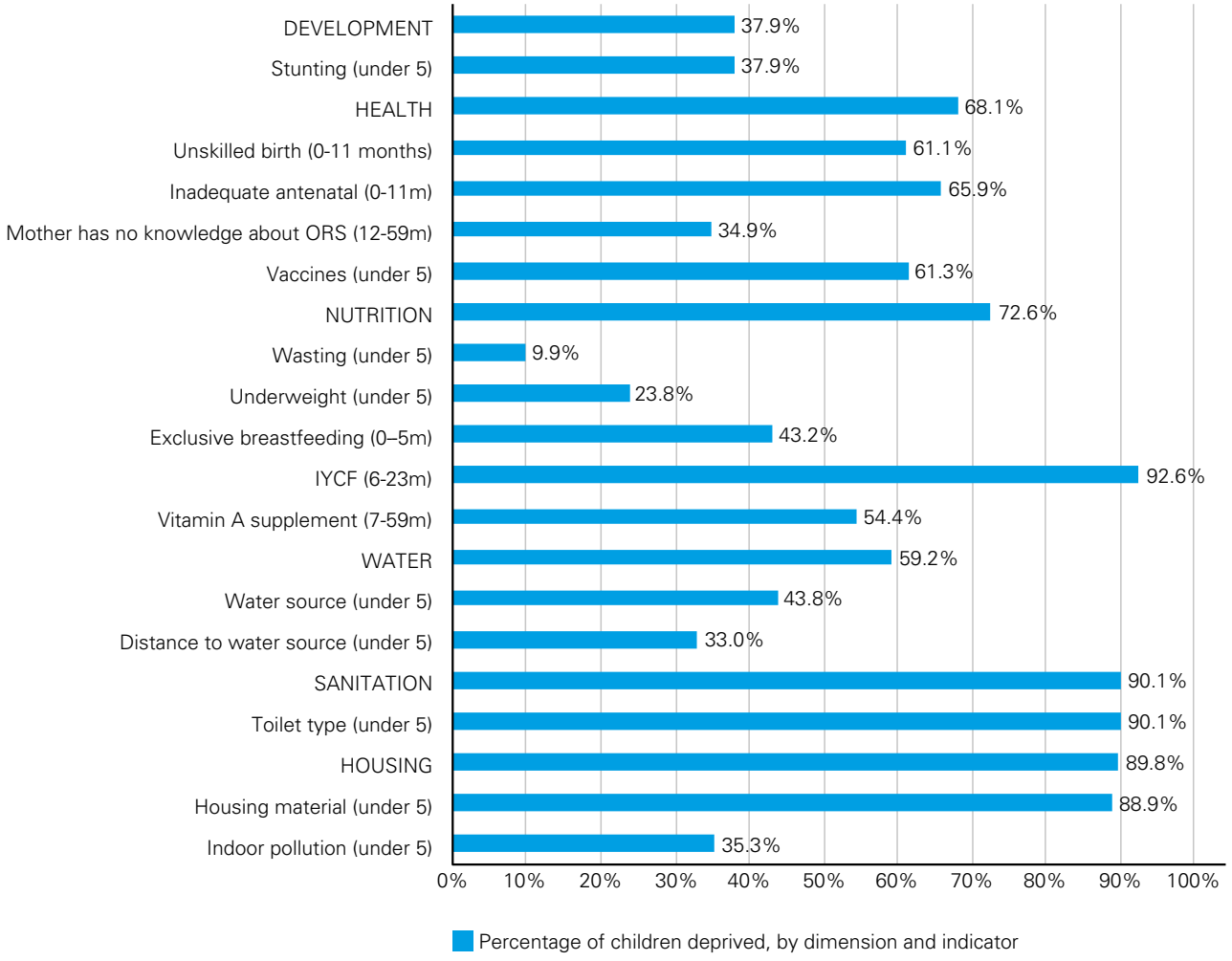
Figure 16: Deprivation rates by indicator and dimension, under 5, 2016



Source: Authors' calculations using EDHS 2016.

4.1.1. Development (Physical Development/ Stunting)

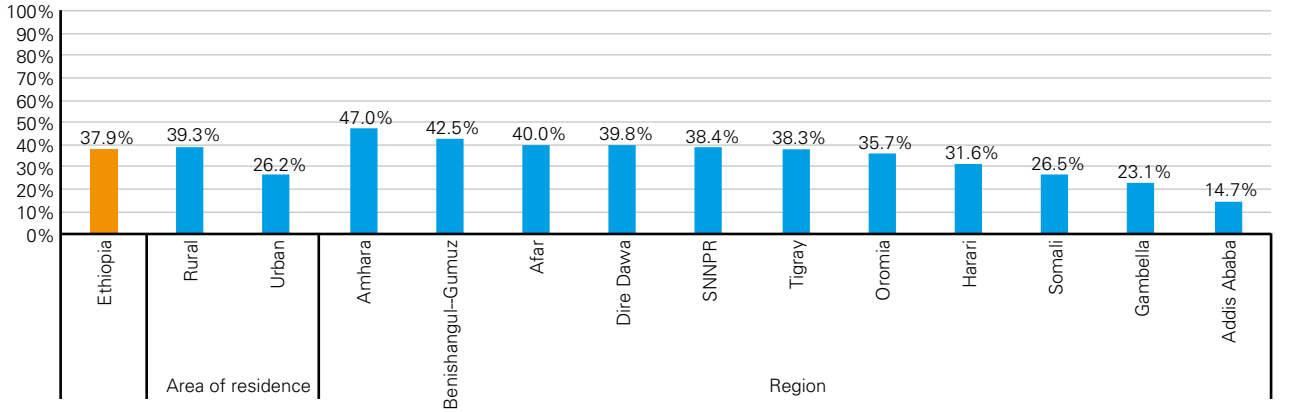
The Constitution of the FDRE (1995) contains two provisions that are related to children's development. Article 36 on Rights of Children, paragraph (a) stipulates that every child has the right "Life"; and Article 90 on Social Objectives, paragraph 1 stipulates "To the extent the country's resources permit, policies shall aim to provide all Ethiopians access to public health and education, clean water, housing, food, and social security." Additionally, the Health Sector Transformation Plan (HSTP) 2015/16–2019/20 places improvement of maternal, neonatal, child, adolescent, and youth health and nutrition at the forefront of the agenda by setting ambitious targets for coverage of vitamin A supplement for children age 7-59 months, increasing the rate of exclusive breastfeeding, and coverage of growth monitoring. Ensuring quality and equity in healthcare is also one of the four transformation agendas (MOH, October 2015).

The dimension of physical development is measured with the indicator of stunting. Children under 5 are considered stunted if they are short for their age (EDHS 2016). The threshold used is the child's height-for-age Z-score below two standard deviations (-2SD) from the median of the WHO reference population. Children's physical development is measured separately from the other dimensions as it is affected by inadequate nutrition and recurring/ chronic illnesses.

Thirty eight per cent of children under 5 in Ethiopia were stunted in 2016, showing a slight decrease from 43 per cent in 2011. A lower percentage of girls, 36 per cent, compared to 41 per cent of boys were stunted.

Figure 17 shows that the stunting rate in rural areas is higher than in the urban areas, 39 per cent compared to 26 per cent, respectively. The figure also depicts large inequalities in physical development across regions, with the deprivation rate ranging from 15 per cent in Addis Ababa to 47 per cent in Amhara.

Figure 17: Per cent of children under 5 deprived in physical development/stunted, by area and region of residence



Source: Authors' calculations using EDHS 2016.

Table 4 presents the results of multivariate logistic regression analysis showing the main household and demographic characteristics associated with the probability of a child under 5 years to be stunted. The results show marginal effects expressed as a percentage point difference in the probability to be stunted between the listed groups and reference categories.

The results show that holding all other factors constant, living in a household that belongs to the bottom 40 per cent of wealth distribution is associated with a higher probability to be stunted. Children belonging to these quintiles have a 9-percentage-point higher probability to be stunted compared to children belonging to the three other wealth quintiles (medium, rich, and richer). Considering wealth as a proxy of households' financial well-being, this result is reasonable having in mind that stunting is affected by nutrition (i.e. availability of food in the household) among other factors.

Stunting is also associated with mother's education attainment. Children whose mother has not completed any education or only primary education have a 14-percentage-point higher probability to be stunted compared to children whose mother has completed secondary or higher education. This result may stem from one or both of the following factors: i) That women with secondary or higher education in Ethiopia have positive labour market outcomes,[7] hence their economic activity lowers the probability of food insecurity in the household, and ii) That women who are more educated have broader knowledge on health-related issues and feeding practices.

Stunting is also correlated with gender. The results show that girls under 5 have a 5-percentage-point lower probability to be stunted compared to boys.[8]

Physical development is also correlated with where the children reside. Children residing in rural areas have a 6-percentage-point higher probability to be stunted compared to children residing in urban areas. Regarding regions, compared to children residing in Tigray, children in Amhara have an 8-percentage-point higher probability to be stunted, whereas children in Oromia, Somali, and Addis Ababa have lower probabilities to be deprived of physical development. These results are in line with the differences in stunting rates across these regions depicted in Figure 17.

The multivariate logistic regression analysis also controlled for child's age, gender of the household head, mother's health-related knowledge, the age of the mother at first birth, child's living arrangements, the number of young children in the household, and the number of adults of different ages in the household, but none of them shows a statistically significant relationship with stunting.

7 World Bank Country Study "Strengthening the Foundation for Sustainable Progress" (2005) finds that the unemployment rate in Ethiopia decreases with each subsequent level of education while the returns from employment for both genders show an increase (WB, 2005, p.182-186).

8 EDHS 2016 calculations for this report show that the stunting and underweight rates are lower for girls compared to boys under 5, (36% compared to 41%) and (22% compared to 25%), respectively.

Table 4: Factors associated with the probability to be stunted

Multivariate analysis reporting percentage change in probability to be stunted (in decimals)		
Variable	Category	Marginal effects
Child's gender	Girl (ref. boy)	(-0.052) **
Child's age	Additional year	(-0.001)
Wealth quintiles	Poorest or poor (ref. middle, richer, richest)	0.09**
Mother's/caretaker's education attainment	Mother has completed no or only primary education (ref. secondary or higher education)	0.136**
Mother's/caretaker's health-related knowledge	Knowledge on ORS for treatment of diarrhoea	(-0.01)
Mother's age at first birth	Under 18 (ref. 18+ years)	0.017
Child's caretaking status	Child lives without a parent (ref. child lives with both parents)	(-0.011)
Gender of the household head	Woman household head (ref. man household head)	0.039
Number of children under 12 in the household	3 or more children age 0-12 years (ref. less than 3 children under 12 in the household)	(-0.007)
Number of adults in the household	Additional household member age 18-59	0.002
Number of senior household members	Additional household member age 60+	0.008
Area of residence	Rural (ref. urban)	0.056*
Region	Afar (ref. Tigray)	-0.04
	Amhara (ref. Tigray)	0.075**
	Oromia (ref. Tigray)	(-0.055) *
	Somali (ref. Tigray)	(-0.173) **
	Benishangul-Gumuz (ref. Tigray)	0.001
	SNNPR (ref. Tigray)	(-0.018)
	Gambella (ref. Tigray)	(-0.164)
	Harari (ref. Tigray)	(-0.052)
	Addis Ababa (ref. Tigray)	(-0.169) **
	Dire Dawa	0.028
Observations		6,965
Significance levels: * p<0.05; ** p<0.01		
Sample: children age 0-59 months with mothers/caretakers in the household answering the Woman's Questionnaire.		

Source: Authors' calculations using EDHS 2016.

4.1.2. Health

The Constitution of the FDRE (1995) contains several provisions related to children's and women's healthcare. Article 36 on Rights of Children, paragraph a) stipulates that every child has the right "Life"; Article 41 on Economic, Social, and Cultural Rights, paragraph 4 stipulates "The State has the obligation to allocate ever increasing resources to provide to the public health, education, and other social services"; and Article 90 on Social Objectives, paragraph 1 stipulates "To the extent the country's resources permit, policies shall aim to provide all Ethiopians access to public health and education, clean water, housing, food, and social security." Additionally, HSTP 2015/16–2019/20, places maternal and newborn health at the forefront of improving the health status with ambitious targets for ANC coverage, skilled birth attendance and immunization. Ensuring quality and equity in healthcare is also one of the four transformation agendas (MOH, October 2015).

In this study, deprivation of children in health is measured by indicators that show children's and mother's access to basic healthcare services. For children of age 0-11 months, the study uses indicators of skilled birth attendance and adequacy of antenatal care for women during pregnancy; for children ages 12-59 months, mother's knowledge on usage of ORS for treatment of diarrhoea is used, whereas for all children under 5 the study investigates whether they have received all the mandatory vaccines in accordance with the national schedule for immunization.

Overall, 68 per cent of children under 5 in Ethiopia are deprived in health, showing a great improvement in coverage of healthcare services compared to 2011 when the deprivation rate in health was 84 per cent. There are large discrepancies in access to healthcare by children's area of residence; the deprivation rate in health in rural areas is twice that in urban areas, 72 per cent compared to 36 per cent, respectively. Figure 18 shows that there are large discrepancies in access to healthcare across regions, with deprivation rates ranging from 14 per cent in Addis Ababa to 80 per cent in Afar.

The deprivation rate in health is equal for girls and boys, 68 per cent.

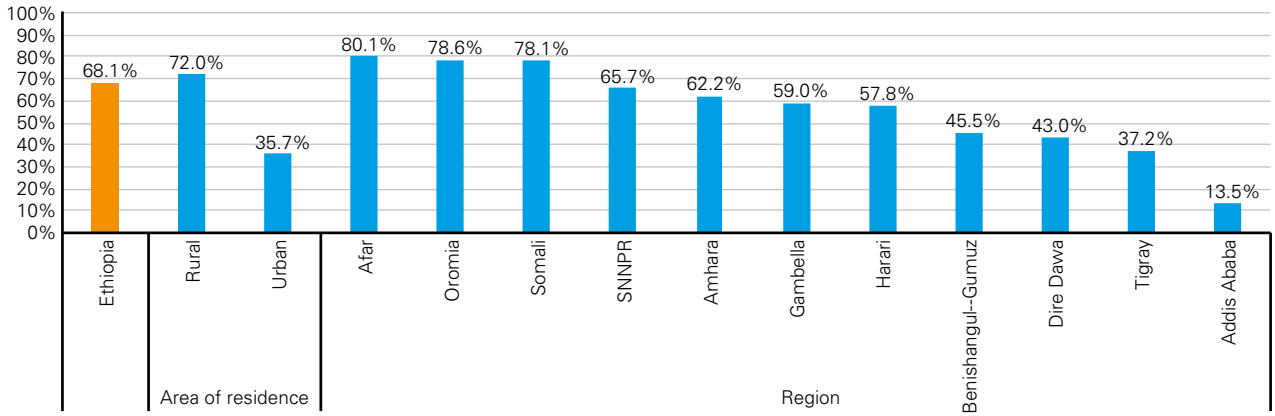
Skilled birth attendance

Skilled birth attendance is a proxy indicator for measuring access to healthcare for children age 0-11 months. Based on EDHS 2016, skilled birth attendants include doctors, nurses, midwives, Health Extension Workers (HEWs), and other health personnel. Data shows that there has been a significant improvement in coverage of skilled birth delivery over the last five years. In 2016, 61 per cent of children age 0-11 months were delivered with an unskilled birth attendant or no attendant at all compared to 87 per cent in 2011.[9] The data shows drastic inequalities in skilled birth attendance coverage by area and region of residence in Annex 8. Sixty eight per cent of children age 0-11 months in rural areas were delivered by an unskilled birth attendant compared to 9 per cent in urban areas. Deprivation in skilled birth attendance ranges from 2 per cent in Addis Ababa to 75 per cent in Afar.

Antenatal care (ANC)

Antenatal care is another proxy indicator for measuring access to healthcare for children ages 0-11 months. A child is considered deprived in this indicator if one's mother had less than four ANC visits during pregnancy or if the four or more ANC visits were provided by persons other than doctors, nurses, midwives, HEWs, and other health personnel (EDHS 2016).[10] Data shows that there has been a significant improvement in coverage of adequate ANC visits during the last five years. In 2016, 66 per cent of mothers with children age 0-11 months did not have four ANC visits or their ANC visits were carried out by unskilled health personnel, compared to 87 per cent in 2011. Data in Annex 8 shows that inequality in coverage of adequate ANC by area and region of residence is significant. Seventy one per cent of children ages 0-11 months in rural areas are deprived of adequate ANC, compared to a third in urban areas (33 percent). Deprivation in adequate ANC ranges from 13 per cent in Addis Ababa to 85 per cent in Somali.

Figure 18: Per cent of children under 5 deprived in health, by area and region of residence, 2016



Source: Authors' calculations using EDHS 2016.

9 EDHS 2011 defines skilled birth attendance as births delivered by doctors, nurses, and midwives (EDHS, 2011).

10 EDHS 2011 definition of skilled health personnel for ANC visits includes doctors, nurses, and midwives (EDHS, 2011).

Mother's knowledge of ORS for treating diarrhoea

The third indicator used for measuring children's deprivation in health is the mother's knowledge of ORS for treatment of diarrhoea. The rationale for using this indicator is that children who live with mothers with health-related knowledge have better health outcomes and health seeking behaviour (given that healthcare services are available and accessible). A child aged 12-59 months is considered deprived in maternal health-related knowledge if the mother has not used ORS for treating diarrhoea or does not know that ORS can be used for treating it. Data shows no significant changes in deprivation rates between 2011 and 2016, 34 per cent and 35 per cent, respectively. Disaggregation of the deprivation rate by children's area and region of residence in Annex 8 highlights great inequalities in mother's health-related knowledge. Thirty-eight per cent of children in rural areas are deprived in this indicator compared to 9 per cent of children in urban areas. The deprivation rate in mother's knowledge on ORS for treating diarrhoea ranges from 4 per cent in Addis Ababa to 40 per cent in Oromia.

Vaccination

The fourth indicator used for measuring deprivation of children under 5 in health is vaccination. The threshold for defining deprivation in this indicator depends on child's age: children ages 11-59 months are considered deprived of immunization if they are not fully vaccinated,[11] whereas children younger than 11 months are considered deprived if they have not been vaccinated according to the national schedule in correspondence with their age.[12] Since the data on vaccination is missing for 40 per cent of the children in the sample in EDHS 2016 – mainly for children of ages 36-59 months – data have been imputed from their younger siblings as a proxy. Results show that there has been a significant improvement in immunization coverage in Ethiopia during the last five years: 75 per cent of children under 5 were not fully vaccinated in 2011 compared to 61 per cent in 2016. While no differences in deprivation are observed when disaggregating data by gender – 61 per cent of girls under 5 compared to 62 per cent of boys – the differences by area and region of residence shown in Annex 8 are vast. Sixty-four per cent of children residing in rural areas were not fully vaccinated in 2016 compared to 35 per cent of children in urban areas. The percentage of children who were not fully immunized was the highest in Afar (85 per cent) and the lowest in Addis Ababa (10 per cent).

4.1.3. Nutrition

The Constitution of the FDRE (1995) contains two provisions that are related to children's nutrition. Article 36 on Rights of Children, paragraph (a) stipulates that every child has the right to "Life"; and Article 90 on Social Objectives, paragraph 1 stipulates "To the extent the country's resources permit, policies shall aim to provide all Ethiopians access to public health and education, clean water, housing, food, and social security." Additionally, the HSTP 2015/16–2019/20 places improvement of maternal, neonatal, child, adolescent, and youth health and nutrition at the forefront of the agenda by setting ambitious targets for coverage of vitamin A supplements for children ages 7-59 months, increasing the rate of exclusive breastfeeding, and coverage of growth monitoring. Ensuring quality and equity in healthcare is also one of the four transformation agendas (MOH, October 2015).

In this study, deprivation in nutrition is measured using the indicators of exclusive breastfeeding for children under 6 months, Infant and Young Child Feeding (IYCF) practices for children 6-23 months, underweight and wasting for children under 5, and provision of vitamin A supplements during the last six months for children ages 7-59 months.[13]

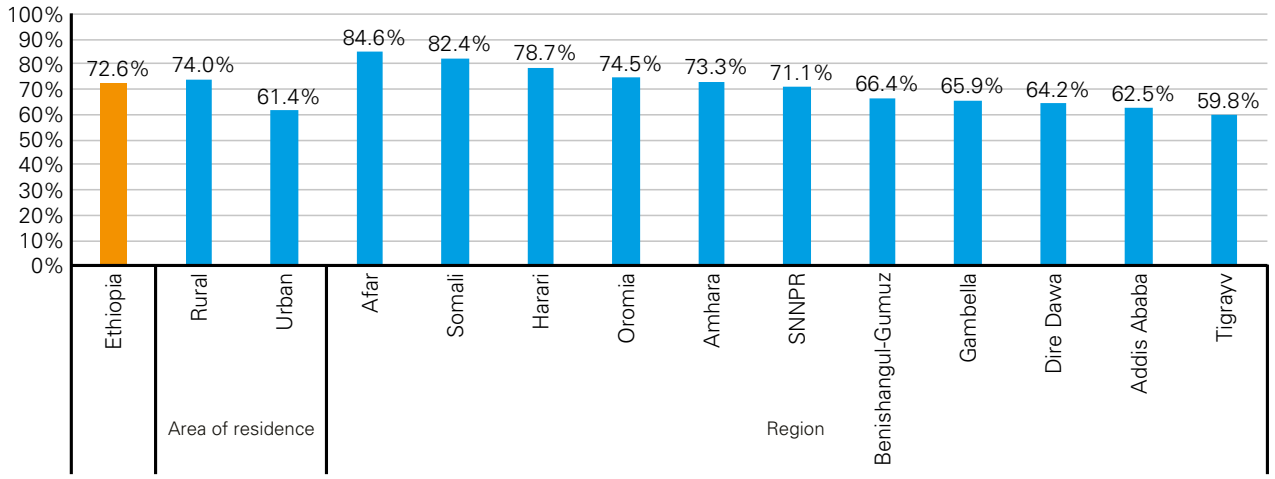
Overall, 73 per cent of children under 5 in Ethiopia are deprived in nutrition, showing an insignificant decrease in deprivation compared to 2011 (76 per cent). There are notable disparities in deprivation across areas and regions of residence, but they are smaller compared to the other dimensions analysed, highlighting that issues with food security and financial welfare of households remain widespread

11 The list of vaccines includes: BCG, 3 doses of DPT-HepB-Hib (pentavalent), 3 doses of Polio, and Measles (See http://www.who.int/countries/eth/areas/immunization/routine/en/index3.html). The Pneumococcal Conjugate Vaccine (PCV) and Monovalent Rotavirus Vaccine (RV) have been added into the national immunization program in 2011-12 (EDHS, 2016), however, these two vaccines were not used in defining deprivation in immunization to allow for trend analysis between 2016 and 2011.

12 BCG - age of 1 month; DPT-HepB-Hib, dose 1 – age 3 months; DPT-HepB-Hib, dose 2 – age 4 months; DPT-HepB-Hib, dose 3 – age 5 months; Polio1 – age 3 months, Polio2- age 4 months, Polio3-age 5 months; Measles-10 months. The deprivation for each of the vaccines was set 1 month higher than the national schedule to account for the requirement that the child needs to be healthy to be vaccinated.

13 The vitamin A supplement in Ethiopia is provided in healthcare facilities from the age of 6 months, however, the threshold allows for 1-month flexibility, as for vaccinations.

Figure 19: Per cent of children under 5 deprived in nutrition, by area and region of residence, 2016



Source: Authors' calculations using EDHS 2016.

Seventy-four per cent of children under 5 residing in rural areas compared to 61 per cent in urban areas are deprived in nutrition. The deprivation rate in nutrition is the highest in Afar (85 per cent) and the lowest in Addis Ababa (63 per cent).

The differences in deprivation in nutrition between girls and boys are insignificant, 73 per cent compared to 72 per cent, respectively.

Exclusive breastfeeding

Exclusive breastfeeding is one of the components of the Infant and Young Child Feeding practices (IYCF) indicator used to measure deprivation in nutrition among children under 6 months. It is analysed separately in this study considering its importance for children's survival and nutrition. A child is considered deprived in the indicator if she/he is not being breastfed or if one is fed any type of other liquid, solid, or semi-solid foods in addition to being breastfed. Overall, 43 per cent of children under 6 months in Ethiopia are deprived of exclusive breastfeeding, showing a slight drop in the deprivation rate from 48 per cent in 2011. The difference in deprivation is insignificant between rural and urban areas, 43 per cent and 42 per cent, respectively. However, disaggregation of data by regions in Annex 8 points to large inequalities with the deprivation rate ranging from 28 per cent in Tigray to 62 per cent in Somali. Disaggregation of the deprivation rate in exclusive breastfeeding by gender shows no significant differences; 42 per cent of girls compared to 44 per cent of boys under 6 months are deprived of exclusive breastfeeding.

Infant and Young Child Feeding (IYCF) practices

IYCF practices is one of the indicators used to measure deprivation in nutrition among children 0-23 months through a set of indicators defined in the WHO/UNICEF[14] guidelines. In this study, deprivation in exclusive breastfeeding is separated from the other indicators for children 0-6 months, whereas for children 6-23 months, the following indicators are used to measure deprivation in nutrition: minimum acceptable diet (MAD) which combines minimum dietary diversity (MDD) and minimum meal frequency (MMF) depending on child's age and whether the child is breastfed. If the child does not meet either MDD or MMF, she/he is considered deprived in IYCF practices. Children age 6-23 months are considered deprived of MDD if their food intake includes less than 4 out of 7 food groups which include: 1. Grains, roots, and tubers; 2. Legumes and nuts; 3. Dairy products (milk, yogurt, cheese); 4. Flesh foods (meat, fish, poultry, and liver/organ meat); 5. Eggs; 6. Vitamin A-rich fruits and vegetables; and 7. Other fruits and vegetables. In terms of MMF, children who are breastfed are considered to receive adequate MMF if they are fed solid, semi-solid or soft foods at least twice a day (age 6-8 months) or at least three times a day (age 9-23 months). Children who are not breastfed are considered to meet the minimum MMF if they are fed solid, semi-solid or soft foods at least four times a day (EDHS 2016).

14 UNICEF, WHO, USAID, AED, FANTA2, UCDAVIS, IFPRI. 2010. Indicators for assessing infant and young child feeding practices. Part 3 – Country Profiles. Available at: https://www.unicef.org/nutrition/files/IYCF_Indicators_part_III_country_profiles.pdf

Overall, 93 per cent of children ages 6-23 months in Ethiopia do not meet the minimum acceptable diet necessary for their growth and development, with an insignificant decrease in deprivation from 96 per cent in 2011. Annex 8 shows that 94 per cent per cent of children residing in rural areas are deprived in IYCF practices compared to 80 per cent of children in urban areas. Among regions, the deprivation rate in IYCF practices is the highest in Afar (99 per cent) and the lowest in Addis Ababa (69 per cent) (see Table 2 in the Annex).

Disaggregation of deprivation rates by gender shows no significant differences between girls (93 per cent) and boys (92 per cent).

Wasting

The indicator of wasting for children under 5 is measured using data on their height and weight. Children with a weight-for-height Z-score below two standard deviations (-2SD) from the median of the WHO reference population are considered too thin for their height or wasted (i.e. acutely malnourished).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Trend analysis of wasting between 2011 and 2016 shows no change in the deprivation rate at 10 per cent for both years. There is an insignificant difference in the percentage of wasted children between rural (10 per cent) and urban (9 per cent) areas, but disaggregation by region in Annex 8 highlights greater disparities, with percentage of wasted children ranging from 4 per cent in Addis Ababa to 23 per cent in Somali. The percentage of wasted girls and boys is equal.

Underweight

The indicator of underweight for children under 5 is measured using data on their weight and age. Children with a weight-for-age Z-score below two standard deviations (-2SD) from the median of the WHO reference population are considered too thin for their age or underweight.

Overall, 24 per cent of children under 5 in Ethiopia are underweight, showing a slight decrease from 28 per cent in 2011. Nearly twice as many children residing in rural areas (25 per cent) are too thin for their age than in urban areas (14 per cent). Disaggregation of the underweight deprivation rate by region in Annex 8 shows large discrepancies across regions; the highest underweight rates are noted in Afar (36 per cent) and Benishangul-Gumuz (35 per cent), and the lowest in Addis Ababa (5 per cent). A slightly lower percentage of girls under 5 (22 per cent) are underweight compared to boys (25 per cent).

Vitamin A supplement

Vitamin A and iron are essential micronutrients for children's immune system and development. In this study, children ages 7-59 months[15] are considered deprived in vitamin A if they have not received a supplement of the micronutrient during the last six months preceding the survey. Fifty four per cent of children in Ethiopia were deprived in vitamin A in 2016, showing a significant increase from the deprivation rate of 46 per cent in 2011. Disaggregation of data by region in Annex 8 shows that more than half (56 per cent) of children ages 7-59 months in rural areas did not receive a vitamin A supplement during the last six months compared to 40 per cent of children residing

15 The vitamin A supplement in Ethiopia is provided in healthcare facilities from the age of 6 months, however, the threshold allows for 1-month flexibility, as for vaccinations.

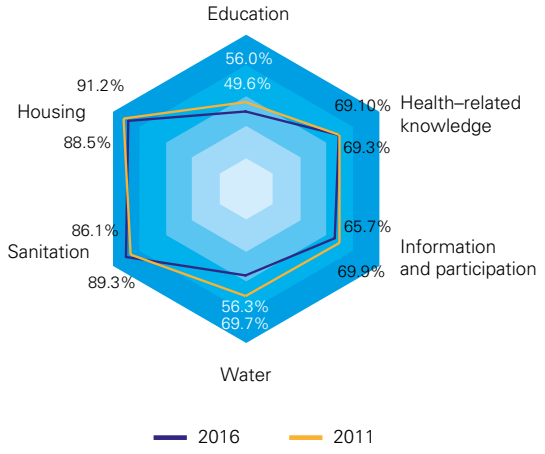
in urban areas. Tigray has the lowest deprivation rate at 27 per cent, while Afar ranks as the most deprived region with a deprivation rate of 66 per cent (see Table 2 in the Annex). Gender differences in vitamin A deprivation are insignificant.

4.2. Single dimension deprivation analysis for children 5-17 years

The single deprivation analysis presents the results for each of the separate indicators and dimensions that have been selected for the analysis for children ages 5-17 years. The results give an indication of which sectors should receive specific attention. Sanitation, housing, and health-related knowledge note the highest deprivation rates, of 85 per cent, 83 per cent and 69 per cent, respectively.

The trend analysis in Figure 20 shows that there has been significant progress in improving access to safe drinking water during the last five years in Ethiopia. The percentage of children deprived of safe drinking water decreased from 70 per cent in 2011 to 56 per cent in 2016. The figure also shows improvements in education, albeit smaller. Six percentage points fewer children were deprived in education in 2016 (50 per cent) than in 2011 (56 per cent).

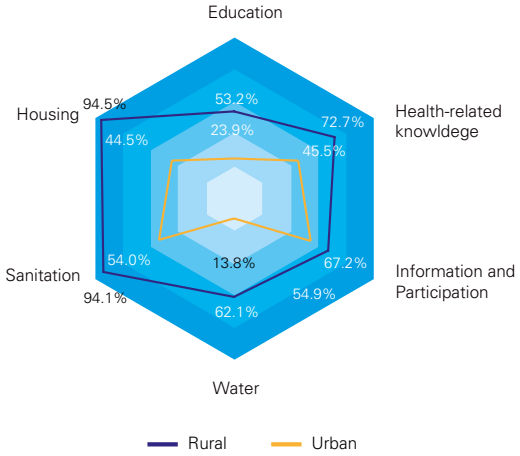
Figure 20: Deprivation rates by dimension, 5-17 years, 2011 and 2016



Source: Authors' calculations using EDHS 2016 data.

Disaggregation of dimension deprivation rates by children's area of residence in Figure 21 shows large discrepancies; a significantly larger share of children ages 5-17 years in rural areas are deprived of fulfilment of their basic needs and rights compared to their counterparts residing in urban areas. The inequality is drastically high for access to safe drinking water, adequate housing, adequate sanitation, and education.

Figure 21: Deprivation rates by dimension and area of residence, 5-17 years, 2016

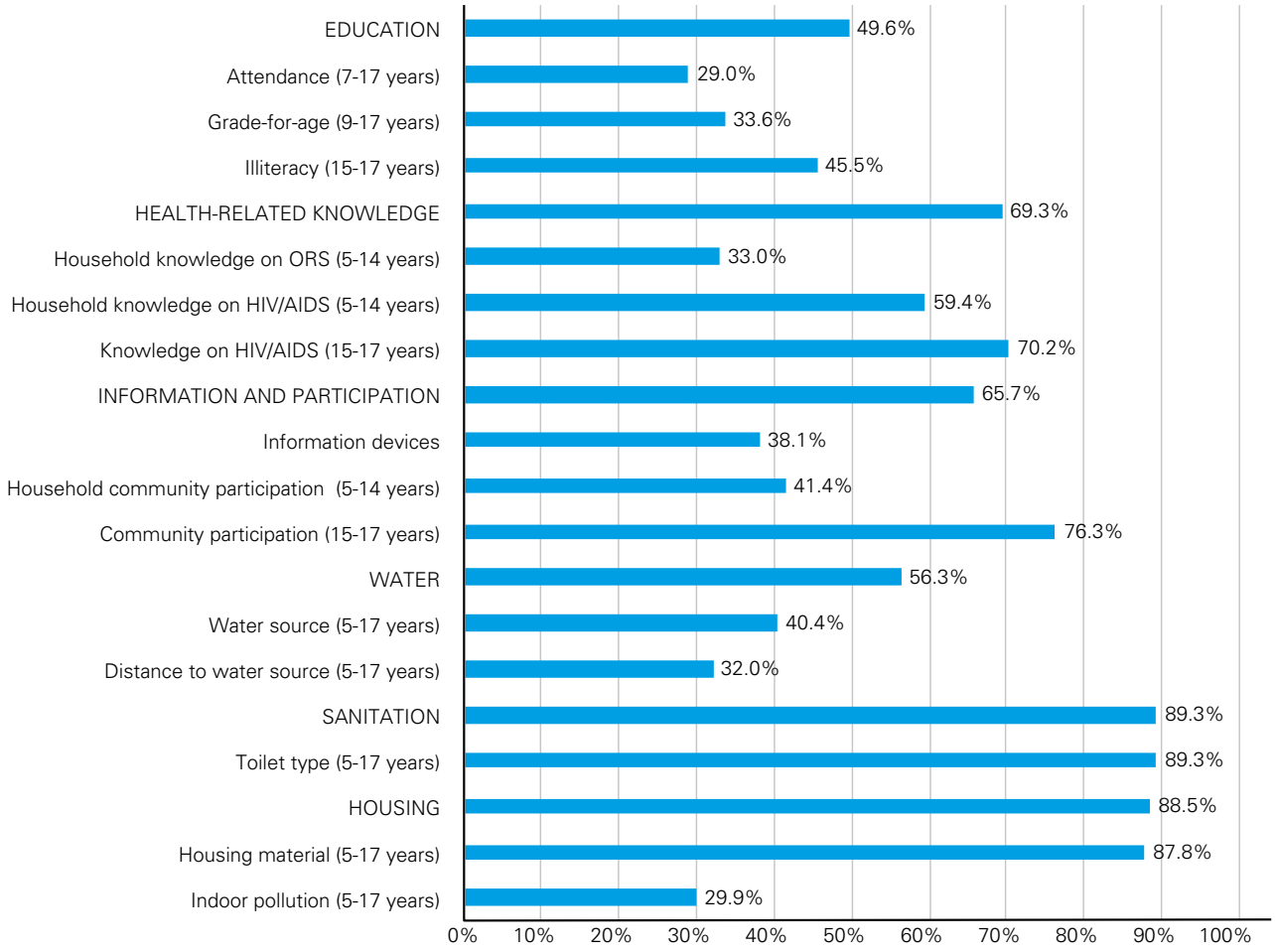


Source: Authors' calculations using EDHS 2016 data.

Disaggregation of dimension deprivation rates in Annex 9 highlights the disparities in realization of rights of children ages 5-17 years across regions. The data shows that a significantly higher percentage of children residing in Somali are deprived in education (58 per cent), health-related knowledge (93 per cent), information and participation (85 per cent), and water (72 per cent) compared to all the other regions. Benishangul-Gumuz notes the highest regional deprivation rate in sanitation (97 per cent) and housing (93 per cent along with Amhara). Addis Ababa on the other hand notes the lowest deprivation rates across all dimensions for children ages 5-17 years.

Figure 22 illustrates deprivation rates by indicator and dimension for children age 5-17 years, highlighting the main drivers of deprivation in age-specific dimensions. As shown in the figure, deprivation in education among children 15-17 years is mainly driven by the illiteracy rate, whereas among children 5-14 years by both attendance and delays in schooling (grade-for-age). The figure illustrates that deprivation in health-related knowledge among children age 5-14 years is driven by deprivation in HIV/AIDS knowledge, whereas among 5-17 year-olds it is deprivation of information from community participation. The figure points to another sector requiring special attention, that of community participation as an important source of different types of information that are crucial for the well-being of young children and adolescents in Ethiopia. Annex 10 illustrates trend analysis in indicator and dimension deprivation rates for children age 5-17 years.

Figure 22: Deprivation rates by dimension and indicator, 5-17 years, 2016



Source: Authors' calculations using EDHS 2016 data.

4.2.1. Education

The Constitution of the FDRE (1995) contains several provisions related to education. Article 41 Economic, Social, and Cultural Rights, paragraph 4 stipulates: "The State has the obligation to allocate ever-increasing resources to provide to the public health, education, and other social services"; Article 90 Social Objectives, paragraph 1 stipulates "To the extent the country's resources permit, policies shall aim to provide all Ethiopians access to public health and education, clean water, housing, food, and social security." Additionally, "ensuring effective and efficient education and training system that enhance quality, relevance, equity, and access at all levels," is the strategic objective of the education sector of the second Growth and Transformation Plan (GTP II) of the country (2015/16–2019/20) (Federal Democratic Republic of Ethiopia, 2016).[16]

Deprivation in education in Ethiopia is measured through three indicators: school attendance for children of the official school-going age (7-17 years); grade-for-age which measures delay in schooling (9-17 years), and literacy (15-17 years). Children under 7 years are considered non-deprived in education since compulsory education starts at age 7 in Ethiopia. Primary school-age children (7-14 years) are considered deprived in education if they are not attending school or if they are attending school with two or more years of delay. Secondary school-age children ages 15-17 years are considered deprived in education if they are not attending school, if they are attending school with three or more years of delay, or if they are illiterate.

Fifty per cent of children age 5-17 years in Ethiopia were deprived in education in 2016, showing a drop in deprivation from 56 per cent in 2011. The deprivation rate in education is higher for secondary school children (66 per cent) compared to those of primary school age 7-14 years (53 per cent). More than twice as many children residing in rural areas (53 per cent) are deprived in education compared to

16 Federal Democratic Republic of Ethiopia. May, 2016. Growth and Transformation Plan II (GTP (II) 2015/16-2019/200. Volume I: Main Text. Available at: https://europa.eu/capacity4dev/resilience_ethiopia/document/growth-and-transformation-plan-ii-gtp-ii-201516-201920

urban areas (24 per cent). Comparison of deprivation rates across regions in Annex 9 highlights disparities in access to education by children's residence, with Addis Ababa ranking the least deprived region (20 per cent) and Somali the most deprived (58 per cent).

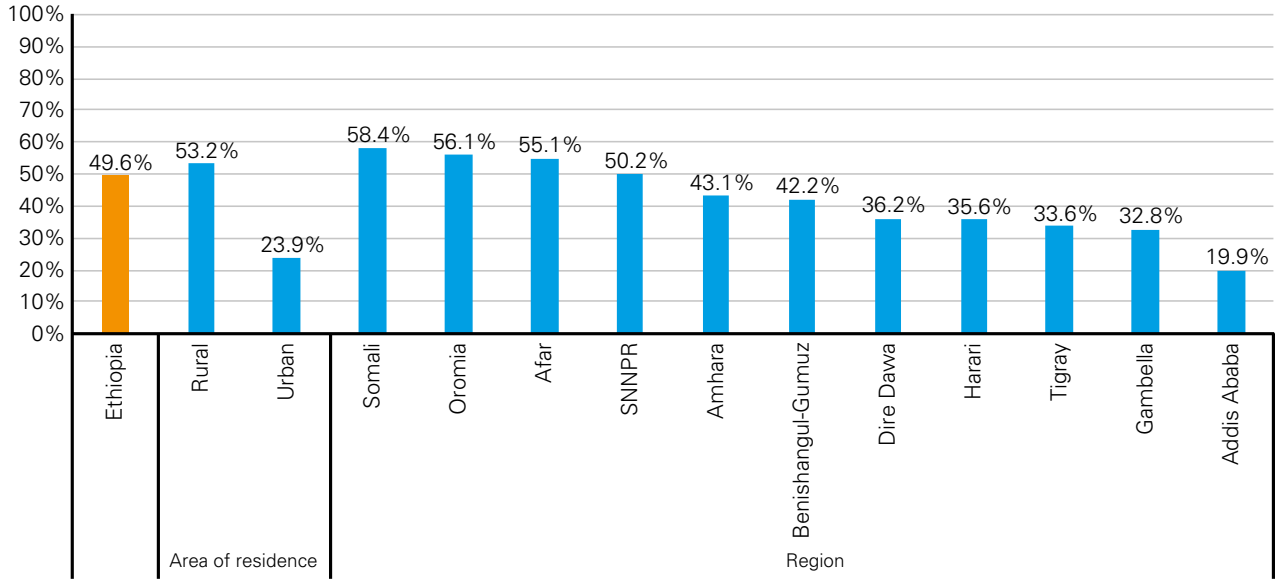
Disaggregation of education deprivation rates by gender shows no significant difference in deprivation of this basic right between girls (49 per cent) and boys (50 per cent) age 5-17 years. The same is the case when disaggregating the deprivation rates by primary and secondary school children, with 66 per cent of girls and boys of secondary school age deprived in education, while for girls and boys of compulsory school age the percentages are 45 per cent and 47 per cent, respectively. Annex 12 shows dimension deprivation rates by area of residence and region for both age sub-groups.

in urban areas (13 per cent). The deprivation rate in school attendance is the lowest in Addis Ababa (11 per cent) and the highest in Somali (41 per cent) (Annex 11).

Grade-for-age

This study uses two different thresholds to measure delay in schooling. Children ages 9-14 years are considered deprived if they are attending a grade that is two or more years below the one corresponding with their age.[17] For instance, a child who is 9 years-old and attending grade one of primary school is considered deprived in this indicator. Children ages 15-17 years are considered deprived if the grade they are attending is three or more years below the one corresponding with their age.

Figure 23: Per cent of children deprived in education, 5-17, by area and region of residence, 2016



Source: Authors' calculations using EDHS 2016 data.

School attendance

The proportion of children age 7-17 years in Ethiopia that were not attending school in 2016 (29 per cent) is lower compared to 2011 (35 per cent). A higher proportion of children age 15-17 years were not attending school compared to primary school-age children, 34 per cent and 28 per cent, respectively. The data shows no statistically significant differences in school attendance between girls and boys across both age sub-groups. Disaggregation of data in Annex 11 by children's area of residence and region unmasks the geographical disparities in school attendance. The proportion of children in rural areas age 7-17 years who are not attending school (31 per cent) is more than double that of children residing

More than one third (34 per cent) of children attending primary or secondary school were not in the right grade for their age in 2016, showing an insignificant decrease from 37 per cent in 2011 (Annex 11). The proportion of children attending school with delay is higher among secondary school-age children (38 per cent) compared to 33 per cent of children ages 9-14 (Annex 13). A slightly higher proportion of boys (35 per cent) compared to girls (32 per cent) is attending school with delay. The difference in the deprivation rate is more pronounced for children age 15-17 years, 35 per cent of girls compared to 41 per cent of boys.

17 The lower bound of age range is 9 years to allow for 2 years of delay considering that compulsory education begins at age 7.

Disaggregation of data by children's area and region of residence shows that there are large inequalities in the realization of this right. While 13 per cent of children ages 7-17 in urban areas were attending school with two or more years of delay in 2016, in rural areas this proportion is nearly three times higher (38 per cent). The regional deprivation rates in the indicator range from 11 per cent in Addis Ababa to 40 per cent in Oromia (See Annex 11 and Annex 13 for rates of delay in education for each age group by region and area of residence).

Literacy

Literacy has been included in the analysis to measure quality of primary education. The study uses a slightly different definition of literacy compared to the EDHS 2016 and EDHS 2011. A child between the ages of 15-17 years is considered illiterate if they could not read a whole or parts of a sentence provided during the survey data collection.[18] Using this indicator, data shows that nearly half of children ages 15-17 years in Ethiopia (46 per cent) are illiterate, showing an insignificant change in quality of primary education since 2011 (illiteracy rate of 45 per cent). The percentage of illiterate girls is higher than that of boys, 51 per cent compared to 40 per cent, respectively. Disaggregation of data by children's area of residence in Annex 13 shows that more than half, 53 per cent, of adolescents in rural areas are illiterate compared to 18 per cent of their peers residing in urban areas. The illiteracy rate is the lowest in Addis Ababa (16 per cent) and the highest in Afar (72 per cent).

4.2.2. Health-related knowledge

The Constitution of the FDRE (1995) contains two provisions that are related to the right to seek and receive knowledge on health-related issues that are paramount for children's survival and well-being. Article 35 Rights of Women, paragraph 9 stipulates "To prevent harm arising from pregnancy and childbirth and in order to safeguard their health, women have the right of access to family planning education, information, and policy," and Article 89 Economic Objectives stipulates "Government shall endeavour to protect and promote the health, welfare, and living standards of the working population of the country. The country's GTP II (2015/16–2019/20) also recognizes the importance of health-related knowledge in its strategic objective for the health sector development: "improve the health outcomes of citizens through provision of equitable, accessible and quality health services, enhance awareness of the public so that they protect themselves from various health hazards" (Federal Democratic Republic of Ethiopia, 2016).[19] Moreover, the strategic objective of the national HSTP 2015/2016–2019/2020, "improve equitable access to quality health services," incorporates a component of health-related knowledge: scaling up effective health interventions in prevention and control of major communicable and non-communicable diseases. The strategic objective "improve community participation and engagement" envisages empowering communities to gain control over their health and improved healthy behaviour (MOH, 2015).

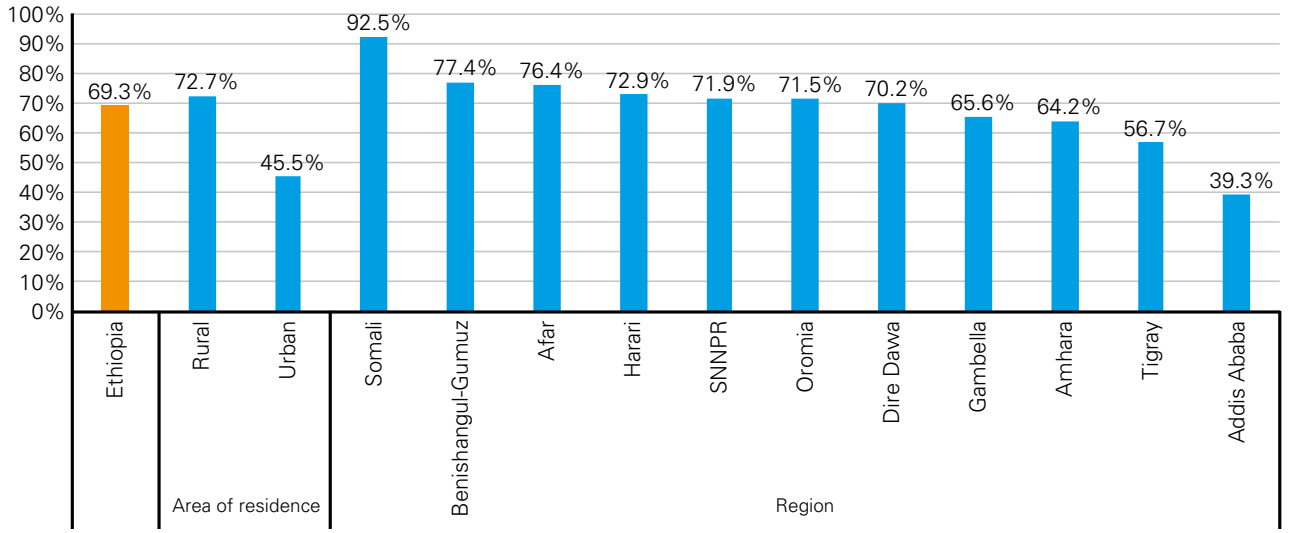
In absence of indicators that measure access to healthcare services, children's health status or health seeking behaviour in the EDHS in compliance with UNICEF MODA methodology, this study uses proxy indicators, health-related knowledge. Two indicators are used to measure deprivation in health-related knowledge among children age 5-14 years: 1. Household knowledge on using ORS for treating diarrhoea, which uses responses of all women respondents in the household age 15-49 years, and 2. Household knowledge on HIV/AIDS prevention and transmission, which uses responses of both women and men adults in the household ages 15-49 and 15-59, respectively. A child of this age is considered deprived in health-related knowledge if one is deprived in either of the two indicators. For children age 15-17 years, only the indicator of knowledge on HIV/AIDS prevention and transmission is used and it is measured at the child's level. In cases of missing individual data, household-level information is imputed.

Sixty nine per cent of children ages 5-17 in Ethiopia were deprived of health-related knowledge or lived in households deprived of health-related knowledge in 2016, showing no change since 2011. The percentage of young adolescents deprived in the dimension is nearly 2 percentage points higher compared to children age 5-14 years, but this difference is statistically insignificant. A significantly higher proportion of adolescent girls (76 per cent) are deprived of health-related knowledge compared to adolescent boys (64%).

18 EDHS2016 and EDHS2011 define illiteracy as not having completed secondary school or being unable to read a whole sentence.

19 Federal Democratic Republic of Ethiopia. May, 2016. Growth and Transformation Plan II (GTP (II) 2015/16-2019/200. Volume I: Main Text. Available at: https://europa.eu/capacity4dev/resilience_ethiopia/document/growth-and-transformation-plan-ii-gtp-ii-201516-201920

Figure 24: Per cent of children deprived in health-related knowledge, 5-17, by area and region of residence, 2016



Source: Authors' calculations using EDHS 2016 data.

Disaggregation of the deprivation rate by area and region of residence illustrated in Figure 24 highlights geographical disparities in availability, accessibility, and dissemination of health-related information and knowledge in Ethiopia. Nearly three-quarters (73 per cent) of children residing in rural areas are deprived of health-related knowledge compared to 46 per cent of children residing in urban areas. The deprivation rate is significantly higher in Somali (93 per cent), while the lowest is noted for Addis Ababa (39 per cent). Annex 12 disaggregates deprivation rates in health-related knowledge by area and region of residence for the two age sub-groups.

Household knowledge on ORS for treating diarrhoea

This indicator is measured at the household level, aggregating data from the Woman's Questionnaire. A child is considered deprived in the indicator if she or he lives in a household where none of the adolescent girls and women of age 15-49 years has knowledge that ORS can be used for treating diarrhoea. The rationale behind using this proxy indicator is that: i) Children who live in households that possess health-related knowledge are more likely to have access to preventive care and have a better health care seeking behaviour, and ii) Health-related knowledge is shared among household members, especially among the primary caregivers (i.e. women).

Overall, 33 per cent of children ages 5-14 years in Ethiopia live in a household where none of girls or women (ages 15-49 years) know that ORS can be used for treating diarrhoea, showing a slight, albeit insignificant increase in the deprivation rate from 31 per cent in 2011. The percentage of children deprived of this basic right in rural areas (36 per cent) is more than three times that of children living in urban areas (10 per cent). Disaggregation of data by region in Annex 13 shows even larger disparities, with the deprivation rate ranging from 4 per cent in Addis Ababa to 38 per cent in Oromia.

Knowledge on HIV/AIDS prevention and transmission

The indicator of knowledge on HIV/AIDS prevention and transmission has been constructed using several questions from EDHS Woman's (age 15-49 years) and Man's (age 15-59 years) Questionnaires. An adolescent or adult is considered to not have HIV/AIDS knowledge if she/he: i. Has never heard about HIV/AIDS; ii. Does not know that HIV/AIDS transmission can be prevented by having sex with one partner who has no other partners or by always using condoms during sex; iii. Does not reject any of the two most common misconceptions about HIV/AIDS transmission – that HIV can be spread by mosquito bites or by sharing food with an HIV-infected person; or iv. If one thinks that or doesn't know that a healthy-looking person can have HIV. Lack of knowledge in either one of the four HIV/AIDS knowledge-related questions above categorizes the adolescent or adult as deprived in the indicator. A child of 5-14 years is considered deprived in HIV/AIDS knowledge if none of his or her adolescent or adult household members (girls/women or boys/men) has knowledge on HIV/AIDS prevention and transmission. For children ages 15-17 years, their individual responses have

been used to measure deprivation. For observations with missing information, data from adult household members were imputed.

Change in deprivation in health-related knowledge has been insignificant between 2011 and 2016. In 2016, 59 per cent of children age 5-14 years lived in households where none of the adolescent or adult household members had HIV/AIDS knowledge, only 1 percentage point lower compared to 2011 (60 per cent). The decrease in deprivation was slightly higher but still insignificant for adolescents, from 73 per cent to 70 per cent. A significantly higher percentage of children residing in rural areas are deprived in health-related knowledge compared to their peers living in urban areas; 62 per cent compared to 39 per cent among children age 5-14 years, and 74 per cent compared to 55 per cent among children ages 15-17 years. Geographical disparities in deprivation are also evident when disaggregating the deprivation rate by regions in Annex 13, with Somali ranking the most deprived region and Addis Ababa the least deprived.

4.2.3. Information and Participation

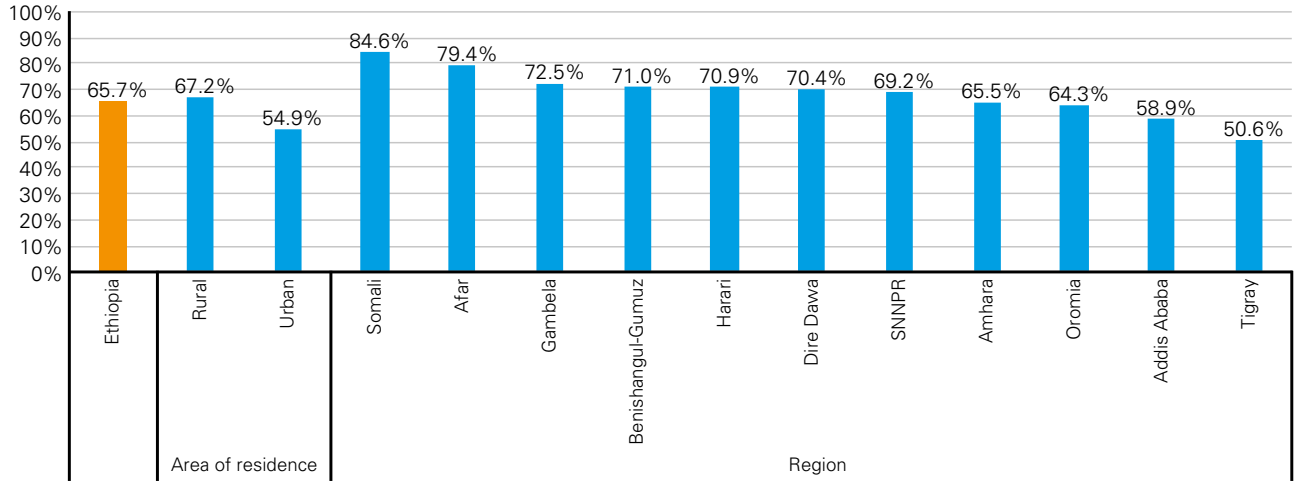
The Constitution of the FDRE (1995) contains several provisions related to the right of its citizens for information and participation. Article 29, Right of Thought, Opinion, and Expression, paragraph 2, stipulates that "everyone has the right to freedom of expression without any interference. This right shall include freedom to seek, receive and impart information and ideas of all kinds, regardless of frontiers, either orally, in writing or print, in the form of art, or through media of choice." Article 35, Rights of Women, paragraph 9, stipulates "to prevent harm arising from pregnancy and childbirth and in order to safeguard their health, women have the right of access to family planning education, information, and capacity." Article 89, Economic Objectives, paragraph 6 stipulates that "[the] Government shall at all times promote the participation of the People in the formulation of national development policies and programmes."

The GTP II (2015/16–2019/20) also recognizes the importance of information for human capital development and aims to enhance the ICT and its role in the economic, social and political activity, and places community engagement at the core of improving primary healthcare provision and the health status of its citizens (Federal Democratic Republic of Ethiopia, 2016). As mentioned earlier, the HSTP (2015) also recognizes the pivotal role of community engagement and participation improving the well-being in the communities, especially that of mothers and children (MOH, 2015).

This study uses two proxy indicators to measure children's deprivation in information and participation. The information devices indicator investigates whether households possess at least one of the four: radio, TV, phone, or mobile phone, as a proxy for their access to information. The community participation indicator has been constructed using Woman's and Man's Questionnaires, specifically the question on exposure to family planning information. For the latter, the study uses only one component: whether girls/women or boys/men (ages 15-49 years and ages 15-59 years, respectively) heard family planning messages through participation in community events or conversations during the last few months. This indicator was singled out by the Technical Working Group as a key source of different types of important information in the communities, and was considered a solid indicator of participation, hence it will be used as a proxy for "general" community participation of adolescents and adults. A child of 5-14 years is considered deprived in community participation if none of the adolescent/adult household members have heard about family planning through participation in a community events or conversations during the last few months, whereas for children ages 15-17 years, the individual responses of children were used. When missing, the information from adult household members was imputed for these children.

Overall, 66 per cent of children age 5-17 years were deprived in information and participation in 2016, showing a slight decrease from 70 per cent in 2011. The improvement is mainly attributes to expansion of information devices (especially mobile phones) over the last five years. The share of children deprived of this basic right is significantly larger among 15-17-year-olds 83 per cent, compared to 5-14 year-olds (67 per cent) (Annex 12). Geographical disparities are slightly narrower compared to the other dimensions: 67 per cent of children ages 5-17 years residing in rural areas are deprived in information and participation compared to 55 per cent of their peers in urban areas. The deprivation rates across regions range from 59 per cent in Addis Ababa to 85 per cent in Somali. Annex 9 disaggregates deprivation rates in information and participation by area and region of residence, while Annex 12 does the same for the two sub-groups of age.

Figure 25: Per cent of children deprived in information and participation, 5-17, by area and region of residence, 2016



Source: Authors' calculations using EDHS 2016 data.

Information devices

A child is considered deprived in the indicator of information devices if one lives in a household that does not possess any of the following: a TV, a radio, a phone, or a mobile phone. Thirty eight per cent of children ages 5-17 years were deprived in information devices in 2016, showing a significant drop in deprivation from 53 per cent in 2011. The percentage of children deprived of information devices in rural areas (42 per cent) is more than five-fold that in urban areas (8 per cent). The inequality between regions is drastic as shown in Annex 11, ranging from 1 per cent in Addis Ababa to 47 per cent in Amhara.

Community participation

Children ages 5-14 years are considered deprived of household community participation if none of their adolescent or adult household members have been exposed to family planning messages through participation in community conversations or events during the last few months. Children age 15-17 years are considered deprived in the indicator if they have not participated in such events themselves.

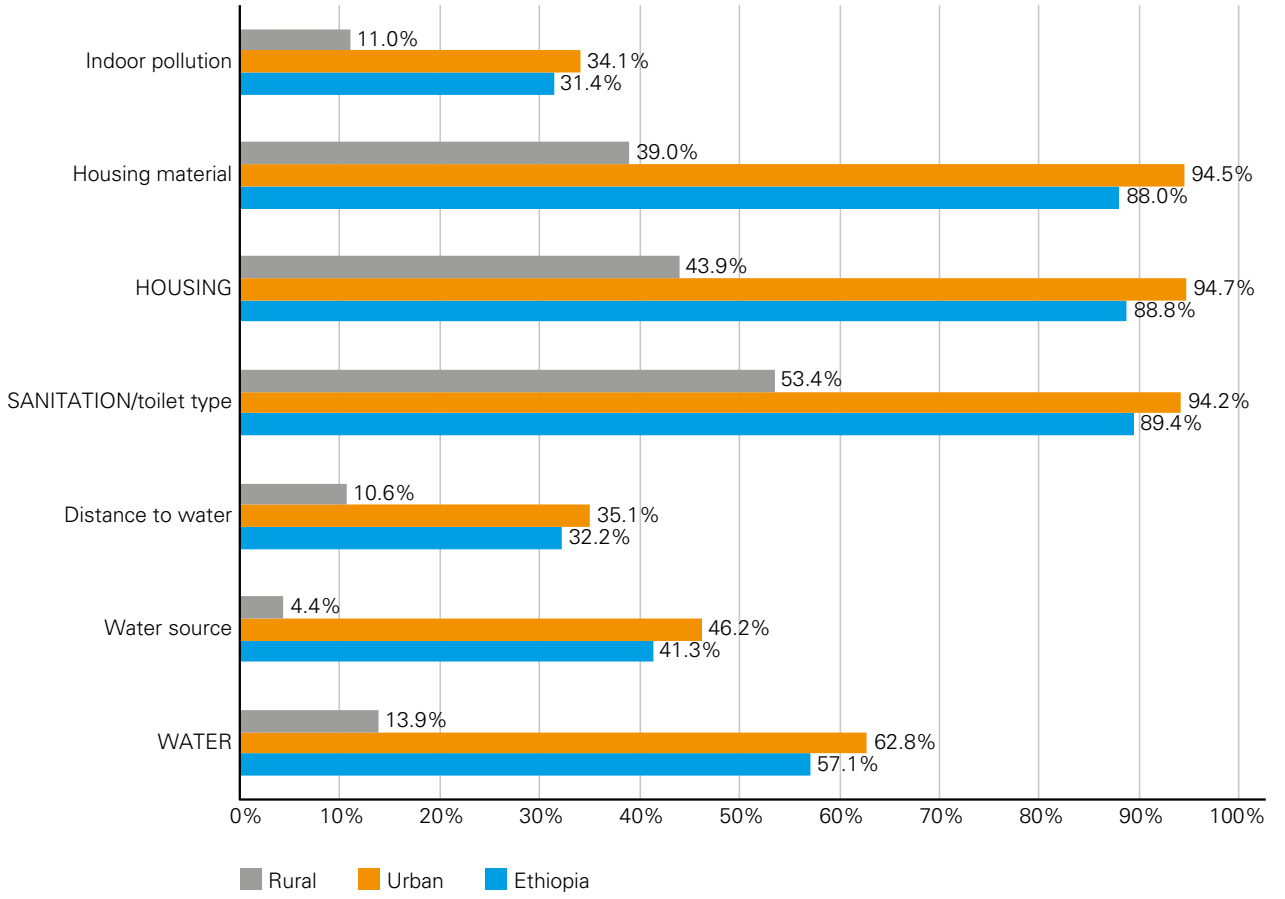
Community participation is the only indicator that showed significant deterioration between 2011 and 2016, implying reduction in coverage of related programmes and/or activities by development partners and the government of Ethiopia. The percentage of children ages 5-14 years deprived in this indicator increased from 35 per cent in 2011 to 41 per cent in 2016, whereas among 15-17 year-olds it increased from 69 per cent to 76 per cent. Girls were slightly less deprived than boys in the case of community participation in 2016 with 74 per cent compared to 79 per cent, respectively.

Geographical inequalities are also significantly narrower compared to all the other indicators and dimensions, differing by between 1 percentage point for 5-14 year-olds (higher in urban areas), and less than 1 percentage point for 15-17 year-olds. Annex 13 disaggregates deprivation rates in community participation by area and region of residence for both age sub-groups.

4.3. Single dimension deprivation analysis for children 0-17 years

This section presents the findings on water, sanitation, and housing deprivations for all children under 18. The Constitution of the FDRE (1995), Article 90 Social Objectives, paragraph 1 stipulates "To the extent the country's resources permit, policies shall aim to provide all Ethiopians access to public health and education, clean water, housing, food, and social security," while Article 92, Environmental Objectives, paragraph 1 stipulates "[the] Government shall endeavour to ensure that all Ethiopians live in a clean and health environment." Both GTP II and the HSTP (2015/16–2019/20) also incorporate investments into improving access to safe drinking water and improving waste disposal and sewerage systems considering their paramount importance especially for children's health (Federal Democratic Republic of Ethiopia, 2015).

Figure 26: Per cent of children deprived in water, sanitation, and housing, 0-17 years, by area of residence, 2016



Source: Authors' calculations using EDHS 2016 data.

4.3.1. Water

Children are considered deprived in water if the household's main source of drinking water is unimproved (EDHS 2016 definition) or it takes more than 30 minutes to fetch water and return to the dwelling. Fifty seven per cent of children in Ethiopia are deprived of safe drinking water, showing a notable decrease in deprivation from 2011 (70 per cent). Inequalities are evident by both area of residence and region. In rural areas, 63 per cent of children are deprived of safe drinking water compared to 14 per cent of their peers residing in urban areas. Across regions, the deprivation rate ranges from 2 per cent in Addis Ababa to 73 per cent in Somali (See Annex 14).

Water source

Children are considered deprived of safe drinking water if their households use an unimproved water source (EDHS 2016 definition).[20] Across Ethiopia, 41 per cent of children under 18 do not have access to an improved water source, showing a decrease in the deprivation rate in this basic need from 52 per cent in 2011. The percentage of deprived children of this basic need in rural areas is more than 11 times higher than in urban areas, 46 per cent compared to 4 per cent. Regional inequality is vast as shown in Annex 14, ranging from a deprivation rate of 1 per cent in Addis Ababa to 59 per cent in Somali.

Distance to water

A child is considered deprived of safe drinking water if the main water source that the household uses is located more than 30 minutes away round trip from the dwelling. The deprivation rate in this indicator shows a decline from 41 per cent in 2011 to 32 per cent in 2016. Children in rural areas are more likely to be deprived in this indicator than their peers in urban areas with deprivation rates of 35 per cent compared to 11 per cent, respectively. In terms of regions, for more than half (55 per cent) of children residing in Afar the water source is located further than an average of 30 minutes necessary to fetch water and return compared to 2 per cent of their peers residing in Addis Ababa (see Annex 14).

20 Unimproved water sources include: unprotected dug well, unprotected spring, surface water, tanker truck, cart with small tank, bottled water (if non-drinking water is also from an unimproved water source), and other sources.

4.3.2. Sanitation

Children are considered deprived in sanitation if their households use an unimproved toilet facility (EDHS 2016 definition).[21] Trend analysis shows that deprivation in sanitation has not experienced any statistically significant change between 2011 and 2016, with the percentage of children deprived of this basic right increasing from 87 per cent to 89 per cent. Geographical disaggregation of deprivation rates reveals great inequalities. Most children residing in rural areas (94 per cent) are deprived of adequate sanitation compared to 53 per cent of children in urban areas. The deprivation rates across regions range from 19 per cent in Addis Ababa to 97 per cent in Benishangul-Gumuz (see Annex 14).

4.3.3. Housing

Children are considered deprived in housing if their dwellings are built of natural, non-permanent material or if they are exposed to indoor pollution from the usage of solid fuels for cooking inside the house. In Ethiopia, 89 per cent of children under 18 are deprived in housing, only 3 percentage points less than in 2011. The percentage of children deprived of this basic need in rural areas is 95 per cent, more than twice that in urban areas (44 per cent). Annex 14 shows that geographical inequalities are wide also by region, ranging from 19 per cent in Addis Ababa to 93 per cent in Amhara and Benishangul-Gumuz.

Housing material

UN HABITAT considers housing as adequate if it is built on a non-hazardous location and its building materials are of permanent structure to protect the inhabitants from extreme weather conditions. Among other factors, the permanent structure includes permanent building material for the roof, walls, and floor,[22] which were available in EDHS 2016 dataset. A child is considered deprived in housing material if either the floor, walls, or roof of the dwelling are built of non-permanent material or if the walls or roof are non-existent. In Ethiopia, 88 per cent of children under 18 live in dwellings built with inadequate material, an insignificant decrease in deprivation from 91 per cent in 2011. The percentage of children deprived of this basic need is significantly higher in rural areas (95 per cent) compared to urban areas (39 per cent). The deprivation rate in the indicator ranges from 5 per cent in Addis Ababa to 93 per cent in Amhara and Benishangul-Gumuz (see Annex 14).

Indoor pollution

Indoor pollution is a measure of children's deprivation from a safe environment necessary for their survival, health, and development. To assess the extent to which children are exposed to a concentration of health-damaging pollutants present in the household, this study uses the WHO proxy indicator. A child is considered deprived if solid fuel is used for cooking inside the house and the dwelling where the child resides has no separate room for cooking.[23] There has been a significant decrease in the percentage of children exposed to indoor pollution in Ethiopia between 2011 (44 per cent) and 2016 (31 per cent). The discrepancies between areas and regions of residence are nonetheless large as shown in Annex 14. In rural areas, 34 per cent of children are exposed to health risks from indoor pollution compared to 11 per cent of their peers living in urban areas. The deprivation rate in this basic right ranges from 5 per cent in Harari to 59 per cent in Afar.

21 Unimproved toilet types include: flush to somewhere else; flush don't know where; pit latrine without slab/open pit; no facility/ bush/field; bucket toilet; hanging toilet or latrine; other. EDHS 2016 uses also toilet sharing to calculate access to adequate sanitation, however, because of too many missing values the condition could not be used in constructing the indicator because it would yield underestimated results in multiple deprivation analysis where missing values are replaced with "non-deprived" as per UNICEF MODA methodology.

22 United Nations Human Settlements Program (UN-Habitat). January, 2018. Goal 11: Make cities and human settlements inclusive, safe, resilient, and sustainable – Concepts and definitions. Available at: https://unstats.un.org/sdgs/metadata/files/Metadata-11-01-01.pdf

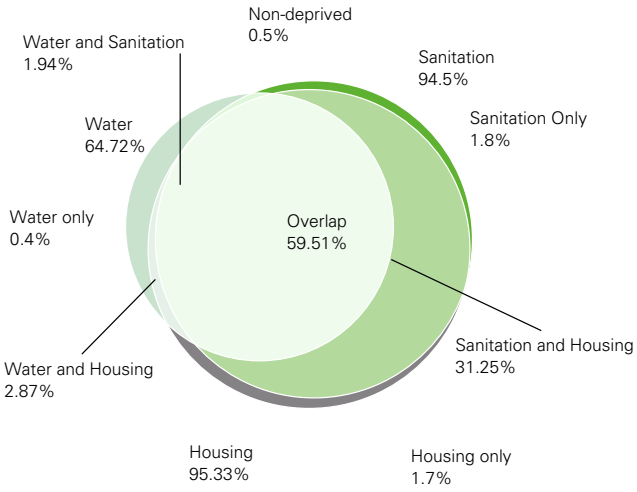
23 WHO. 2018. Exposure to household air pollution. Available at: http://www.who.int/gho/phe/indoor_air_pollution/exposure_text/en/

5. Deprivation overlap analysis

5.1. Deprivation overlap analysis for children under 5 years

To understand the severity of deprivation it is necessary to examine to what extent do deprivations relate to each other and identify how many simultaneous deprivations children experience. The following section contains deprivation overlap analysis for two or three selected dimensions at a time for children under 5 years.

Figure 27: Deprivation overlap between water, sanitation, and housing, under 5, rural areas

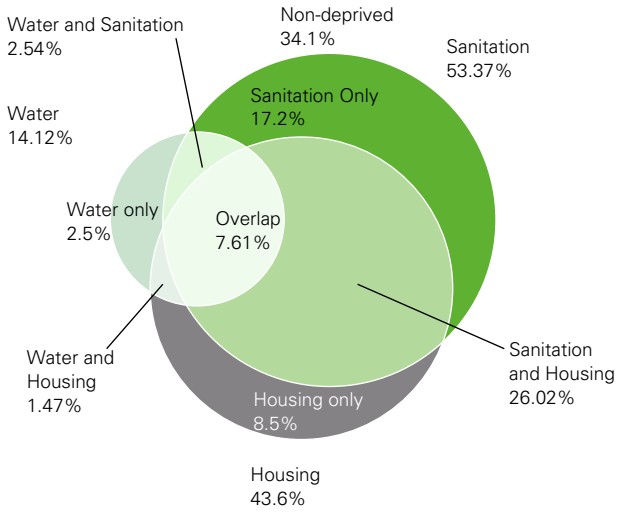


Source: Authors' calculations using EDHS 2016 data.

Figure 27 illustrates the overlap analysis for deprivation in water, housing, and sanitation for children under 5 residing in rural areas. The figure shows that less than 1 per cent of these children are not deprived in either of the three dimensions analysed. More importantly, the figure shows that 60 per cent of children under 5 in Ethiopia who reside in rural areas are deprived in water, sanitation, and housing simultaneously, while an additional 31 per cent are deprived in sanitation and housing at the same time. Just 2 per cent of these children are deprived only in sanitation or housing and none of the other two dimensions, while only for 0.4 per cent of children is access to safe drinking water a stand-alone problem. These results suggest that multisectoral interventions are necessary to tackle multidimensional child deprivation in rural areas.

Figure 28 depicts the same analysis for children under 5 residing in urban areas, showing that the percentage of children deprived in all three dimensions simultaneously is significantly lower than in rural areas, only 8 per cent. The overlap nonetheless is large for deprivations in sanitation and housing (26 per cent) providing useful insight for policymaking. The relatively high percentage of children not deprived in either of the three dimensions – 34 per cent – suggests that priorities in tackling multidimensional child deprivation among 5 year-olds is different from rural areas.

Figure 28: Deprivation overlap between water, sanitation, and housing, under 5, urban areas



Source: Authors' calculations using EDHS 2016 data.

Figure 29 illustrates the deprivation overlap analysis between physical development (stunting), nutrition, and health for children belonging to the poorest two wealth quintiles, providing useful insights for policymaking. As may be observed, 26 per cent of children under 5 belonging to this category are simultaneously deprived in all the three dimensions analysed, while 6 per cent are not deprived in either of them. The percentage of children who are deprived in both health and nutrition at the same time is also high, 33 per cent, while only 8 per cent of children are deprived only in nutrition and 12 per cent only in health and none of the two other dimensions. The percentage of children who are deprived only in physical development and not in nutrition or health is very low – 3 per cent – indicating that programmes that aim to tackle chronic malnutrition should include interventions in the sectors of both nutrition and health.

Figure 30 illustrates the same analysis for children under 5 belonging to households in the richest three wealth quintiles. Even though the percentage

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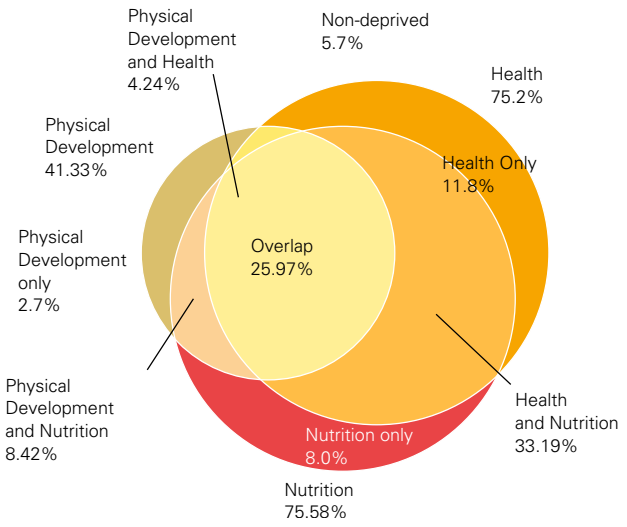
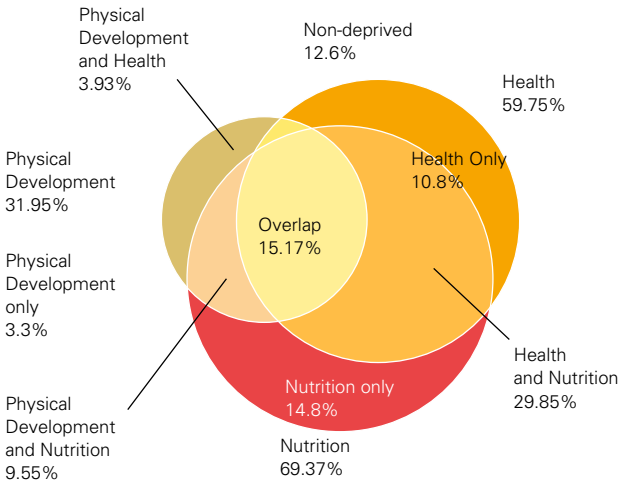
Figure 29: Deprivation overlap between physical development, nutrition, and health, under 5, poorest two wealth quintiles



Source: Authors' calculations using EDHS 2016 data.

Figure 30: Deprivation overlap between physical development, nutrition, and health, under 5, richest three wealth quintiles

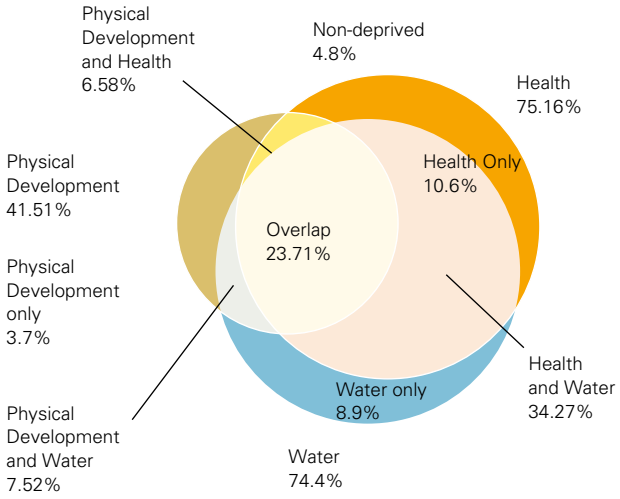


Source: Authors' calculations using EDHS 2016 data.

of children deprived in all of these dimensions simultaneously is lower, 15 per cent, it shows that the issues with food security and deprivation in health are widespread in the country regardless of households' financial means. Some 30 per cent of these children are simultaneously deprived in health and nutrition, and only 13 per cent are not deprived in either of the three dimensions analysed.

Figure 31 depicts overlap in deprivation in physical development, health and water among children under 5 residing in rural areas. The results highlight key findings for programming interventions to tackle multidimensional child deprivation in rural areas. To

Figure 31: Deprivation overlap between physical development, health, and water, under 5, rural areas

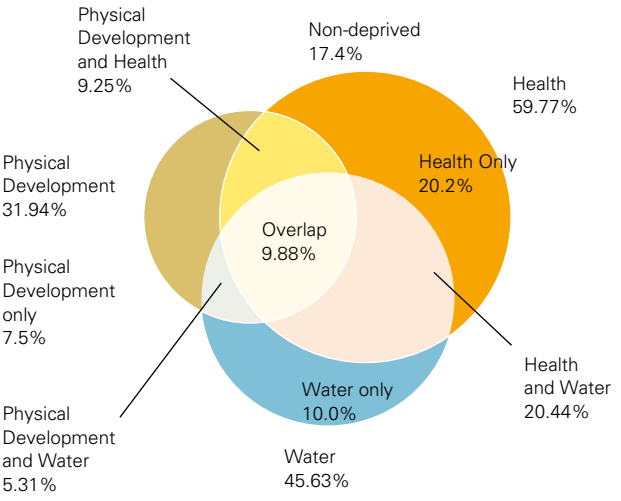


Source: Authors' calculations using EDHS 2016 data.

begin with, the diagram shows that only 5 per cent of children under 5 in rural areas are not deprived in either of the three dimensions. Secondly, the diagram shows that 24 per cent of children under 5 from these areas are simultaneously deprived in health, physical development, and water, while 34 per cent are deprived in both water and health at the same time. These results imply that interventions aiming to tackle chronic malnutrition and health outcomes among young children must also include interventions to improve access to safe drinking water.

Figure 32 shows that a significantly smaller proportion of children under 5 residing in urban areas are

Figure 32: Deprivation overlap between physical development, health, and water, under 5, urban areas



Source: Authors' calculations using EDHS 2016 data.

simultaneously deprived in physical development, water and health, 10 per cent. However, the percentage of children deprived in just health and water is higher – 20 per cent – suggesting that neither of the two are standalone issues. The percentage of children who are not deprived in either of the three dimensions is higher than in rural areas (17 per cent).

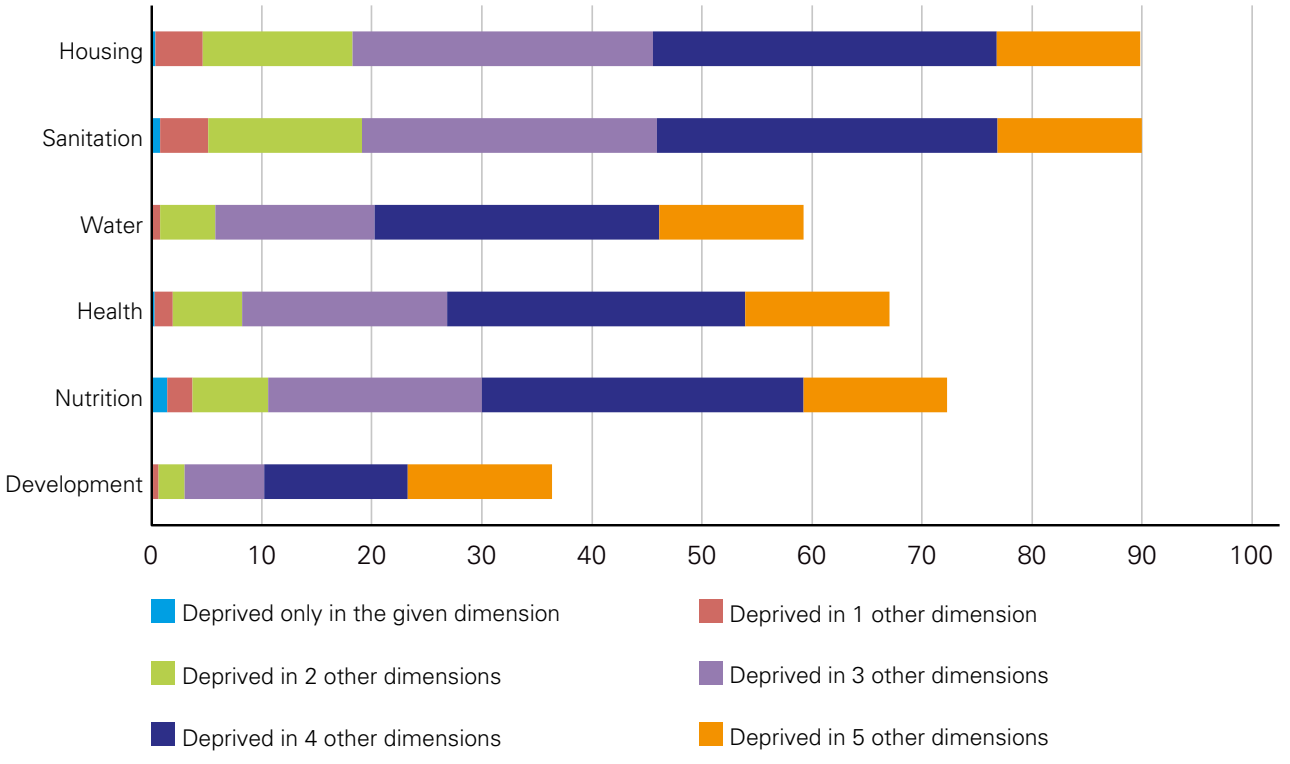
The section below adds information to the overlap analyses in Venn Diagrams – which showed overlap in deprivation between a combination of three dimensions – by showing the number of other dimensional deprivations that each given dimension overlaps with. Figure 33 captures two indicators: i) The proportion of children deprived in each dimension; and ii) The extent to which these children are deprived in 1 to 5 other dimensions analysed. Taking the dimension of nutrition as an example, the figure first depicts the overall deprivation rate, 72 per cent. A closer look at deprivation in nutrition shows that 2 per cent of children under 5 are deprived only in nutrition and none of the other five dimensions analysed, 3 per cent are deprived in one additional dimension besides nutrition, and 10 per cent are deprived in nutrition and two additional dimensions. In other words, 15 per cent of children under 5 are deprived in nutrition and up to two additional dimensions, while the majority – 85 per cent - are deprived in nutrition and three or more dimensions.

Figure 33 shows that overall, the number of children under 5 who are deprived in 3 to 6 dimensions simultaneously is high for all six dimensions analysed. Particularly, children deprived in development, water, and health are more likely to be deprived in several additional dimensions. Ninety per cent of children deprived in water, 92 per cent of children deprived in development, and 88 per cent of children deprived in health were deprived in three to five other dimensions.

The figure also shows that the percentage of children who are deprived only in one dimension is below 1 per cent for all dimensions except for nutrition (2 per cent).

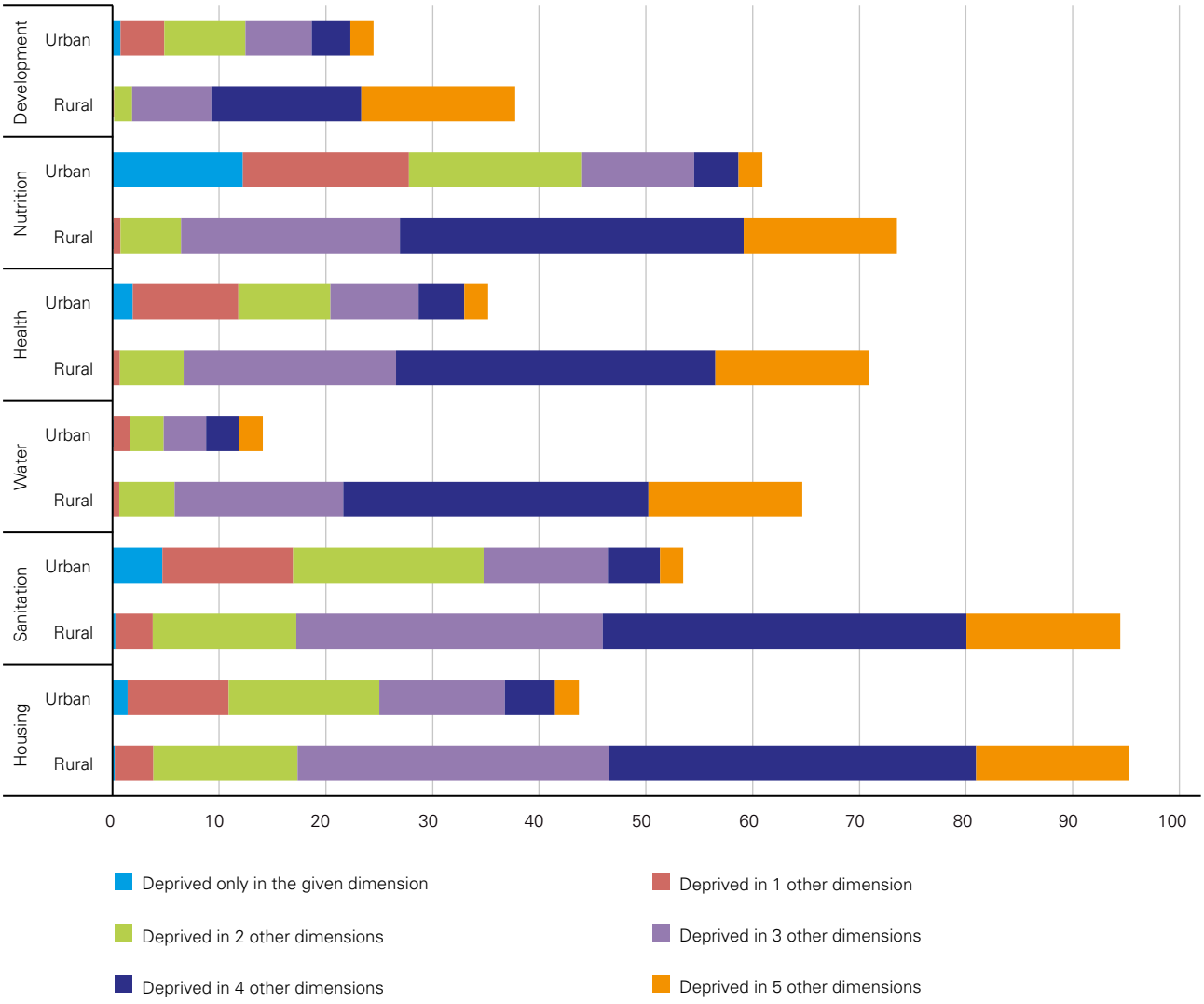
Figure 34 which displays dimension deprivation overlaps by area of residence shows that the deprivation overlap is much higher in rural areas, that is, children in rural areas are more likely to be deprived of multiple basic needs and rights. On the other hand, most children residing in urban areas who are deprived in any given dimension are more likely to be deprived in only one or two additional dimensions. For instance, the deprivation rate in nutrition in urban areas is 61 per cent, and overall 72 per cent of children under 5 were deprived in nutrition and up to two additional dimensions. Deprivation in water and development are an exception: 66 per cent

Figure 33: Deprivation overlap by dimension, under 5



Source: Authors' calculations using EDHS 2016 data.

Figure 34: Deprivation overlap by dimension and area of residence, under 5



Source: Authors' calculations using EDHS 2016 data.

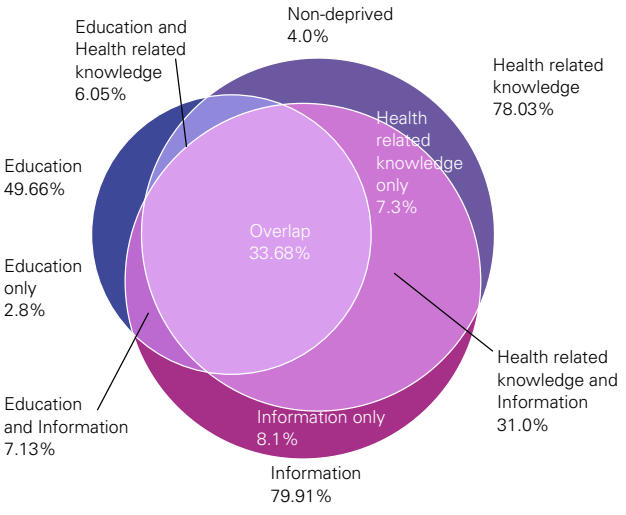
of children under 5 are deprived in water and three to five other dimensions and 49 per cent of children deprived in development are deprived in three to five other dimensions.

5.2. Deprivation overlap analysis for children age 5-17 years

The following section contains deprivation overlap analysis for two to three selected dimensions at a time for children age 5-17 years.

Figure 35 illustrates deprivation overlap analysis for dimensions of education, health-related knowledge, and information and participation for children age 5-17 years belonging to the poorest two wealth quintiles. The figure shows that 4 per cent of children of this group are not deprived in either of the three dimensions analysed. More importantly, the figure shows that 34 per cent of these children are simultaneously deprived in all the three dimensions

Figure 35: Deprivation overlap between education, health-related knowledge, and information and participation, age 5-17 years, poorest two wealth quintiles

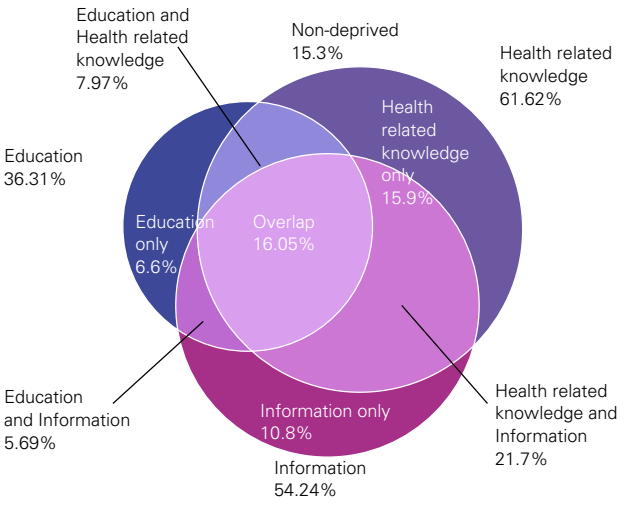


Source: Authors' calculations using EDHS 2016 data.

and 31 per cent are deprived in health-related knowledge and information and participation at the same time, indicating that a multisectoral approach is necessary for tackling poverty among children age 5-17 years. The figure also indicates that particularly education is not a standalone issue in Ethiopia as only 3 out of 50 per cent of children deprived in it are not deprived in any of the two other dimensions.

Figure 36 depicts the same deprivation overlap analysis but for children belonging to the richest three wealth quintiles. The percentage of these children who are simultaneously deprived in all three – education, health-related knowledge, and information and participation – is significantly lower, 16 per cent. Health-related knowledge and information and participation show a higher overlap (22 per cent) which is reasonable considering that information devices and community participation serve as sources of health-related information. The figure also shows that only 7 per cent of children are deprived in education and none of the other two dimensions, suggesting that deprivation in this dimension is not a standalone issue.

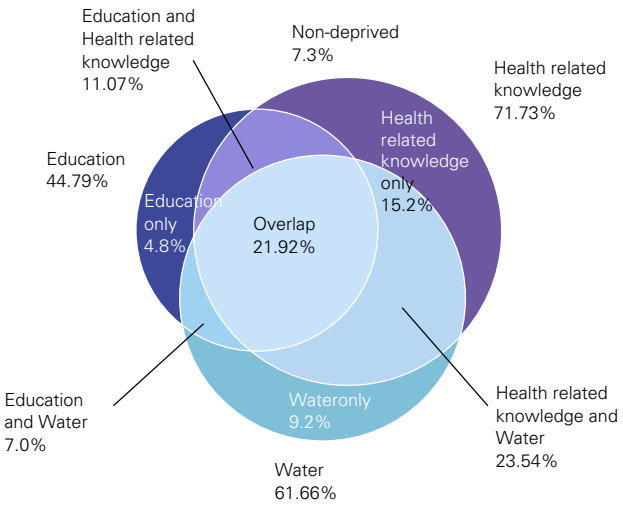
Figure 36: Deprivation overlap between education, health-related knowledge, and information and participation, age 5-17 years, richest three wealth quintiles



Source: Authors' calculations using EDHS 2016 data.

Figure 37 depicts deprivation overlap analysis for dimensions of education, health-related knowledge and water for children age 5-17 years residing in rural areas. The results show that 22 per cent of these children are deprived in all three dimensions simultaneously, and an additional 24 per cent are deprived in both health-related knowledge and water. The percentage of children who are not deprived in either of the three dimensions – 7 per cent – is very

Figure 37: Deprivation overlap between education, health-related knowledge, and water, age 5-17 years, rural areas

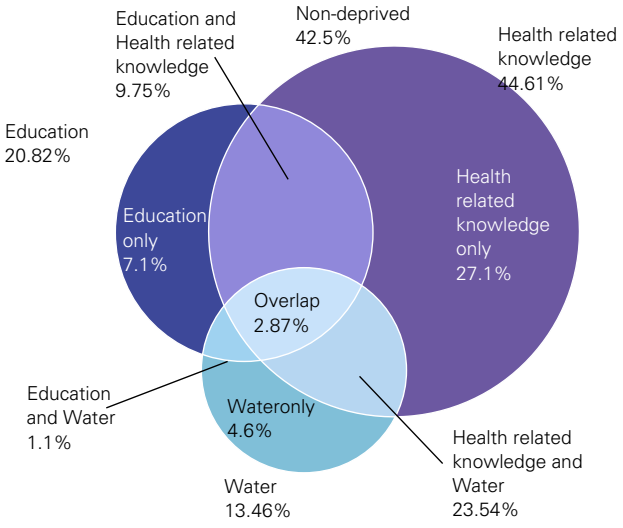


Source: Authors' calculations using EDHS 2016 data.

low, highlighting the need for multisectoral approach for tackling poverty in rural areas. Only 5 per cent of children analysed are deprived in education and neither of the two other dimensions, whereas 9 per cent are deprived only in water and neither of the two other dimensions, suggesting that neither of these sectors are isolated issues of deprivation.

Repetition of the same analysis for children residing in urban areas in Figure 38 shows very little overlap; only 3 per cent of children age 5-17 years residing in urban areas are simultaneously deprived in education, water, and health-related knowledge. Additionally, the percentage of children who are not deprived

Figure 38: Deprivation overlap between education, health-related knowledge, and water, age 5-17 years, urban areas

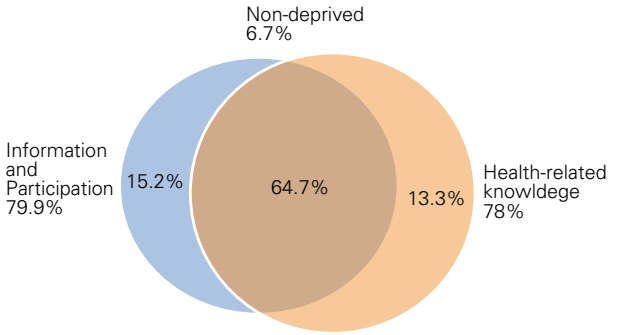


Source: Authors' calculations using EDHS 2016 data.

in either of the three dimensions is very high, 43 per cent. Overlaps between either two-dimension combinations are higher only for education and health-related knowledge (10 per cent).

Figure 39 illustrates the overlap in deprivation between health-related knowledge and information and participation for children age 5-17 years who belong to the poorest quintiles of wealth distribution. As shown, only 7 per cent of these children are not deprived in either of the two dimensions, whereas 65 per cent are deprived in both.

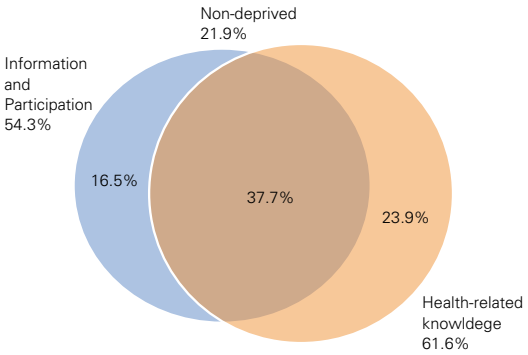
Figure 39: Deprivation overlap between health-related knowledge and information and participation, age 5-17 years, poorest two wealth quintiles



Source: Authors' calculations using EDHS 2016 data.

Figure 40 depicts the same deprivation overlap analysis for children belonging to the richest three quintiles of wealth distribution, showing that the differences are significant. For the children ages 5-17 belonging to this category, 22 per cent are not deprived in either of the two dimensions. Additionally, the proportion of children who are deprived in both health-related knowledge and information and participation is significantly smaller, 38 per cent, compared to children belonging to the poorest wealth quintiles. Twenty-four per cent of children in this group are deprived in health-related knowledge and not in information and participation.

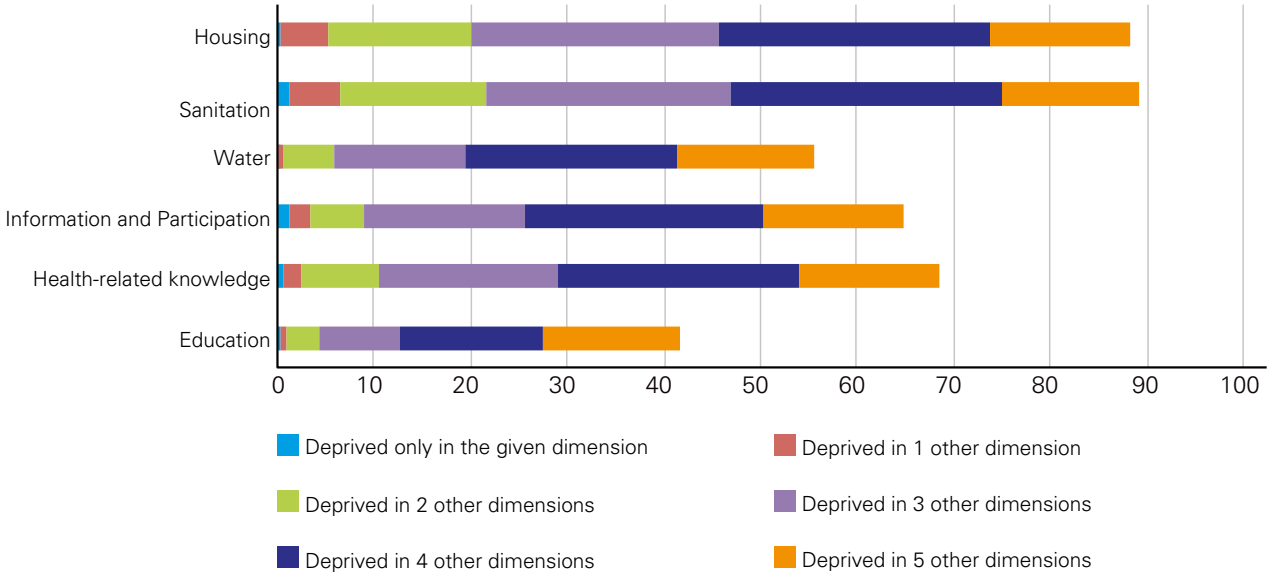
Figure 40: Deprivation overlap between health-related knowledge and information and participation, age 5-17 years, richest three wealth quintiles



Source: Authors' calculations using EDHS 2016 data.

The section below adds information to the overlap analyses in Venn Diagrams – which showed overlap in deprivation between a combination of three dimensions – by showing the number of other dimensions that each given dimension overlaps with. Figure 41 captures two indicators: i) The proportion of children deprived in each dimension; and ii) The extent to which these children are deprived in 1 to 5 other dimensions analysed.

Figure 41: Deprivation overlap by dimension, age 5-17 years



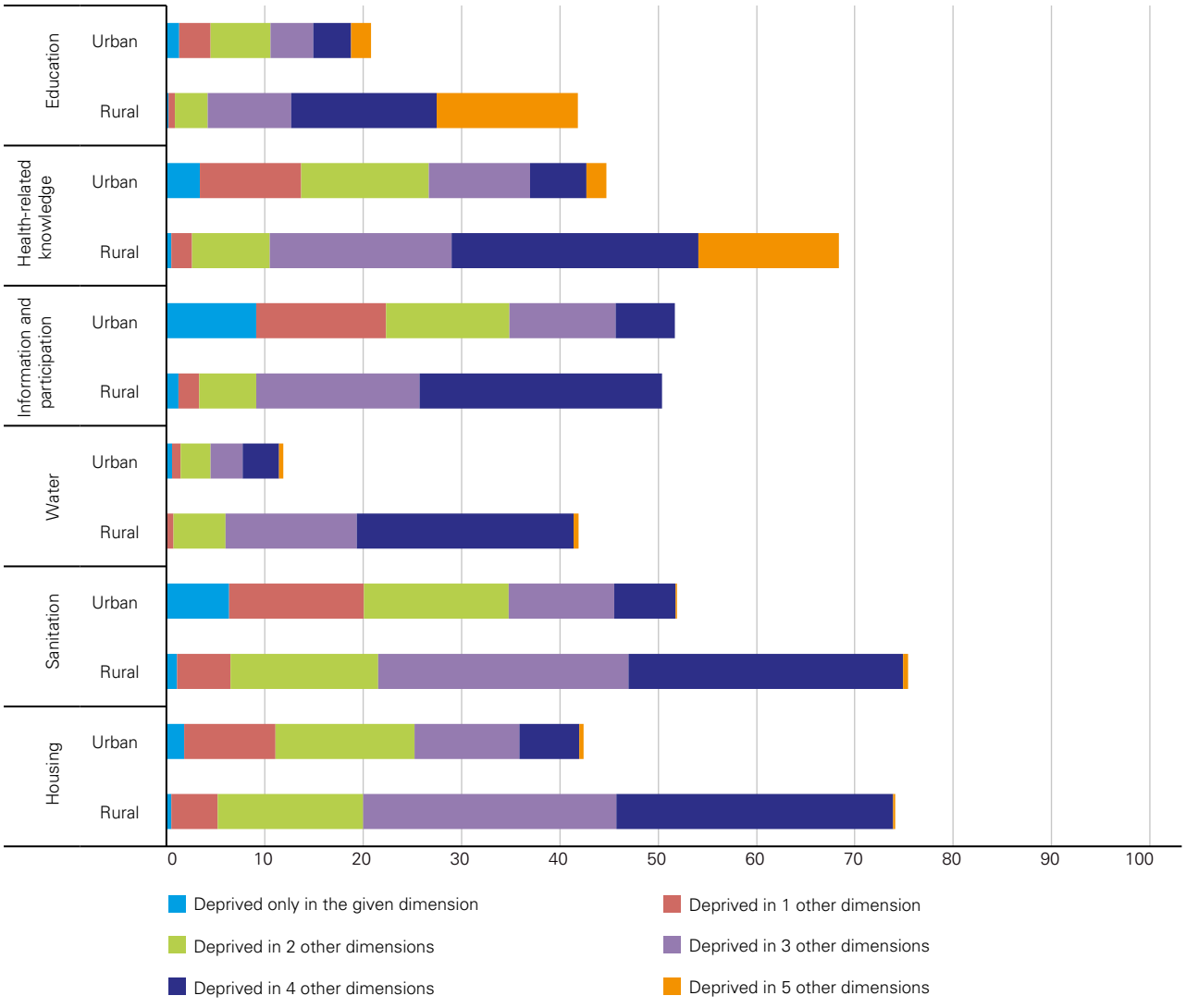
Source: Authors' calculations using EDHS 2016 data.

The figure shows that overall, the percentage of children who are deprived in 3 to 6 dimensions simultaneously is high for all six dimensions analysed, above 76 per cent. Particularly, children deprived in education and water are more likely to be deprived in several additional dimensions. Ninety per cent of children deprived in education and 89 per cent of children deprived in water were deprived in three to five other dimensions.

The figure also shows that the percentage of children who are deprived only in one dimension is below 1 per cent for all dimensions except for information and participation and sanitation (2 per cent each).

Figure 42 which displays dimension deprivation overlaps by area of residence shows that the overlap in deprivation is much higher in rural areas, that is, children in rural areas are more likely to be deprived of more basic needs and rights at the same time. This is especially the case for children deprived in education and water, more than 89 per cent of whom are deprived in three to five other dimensions. On the other hand, most children residing in urban areas who are deprived in any given dimension are more likely to be deprived in only one or two additional dimensions. For instance, the deprivation rate in information and participation in urban areas is 54 per cent, and overall 65 per cent of children deprived of this basic right were deprived in up to two additional dimensions. Sixty five percent of children in urban areas deprived in sanitation are deprived in up to two additional dimensions. Deprivation in water is an exception as 67 per cent of children ages 5-17 years in urban areas who are deprived of this basic need are deprived of an additional three to five other dimensions.

Figure 42: Deprivation overlap by dimension and area of residence, age 5-17 years



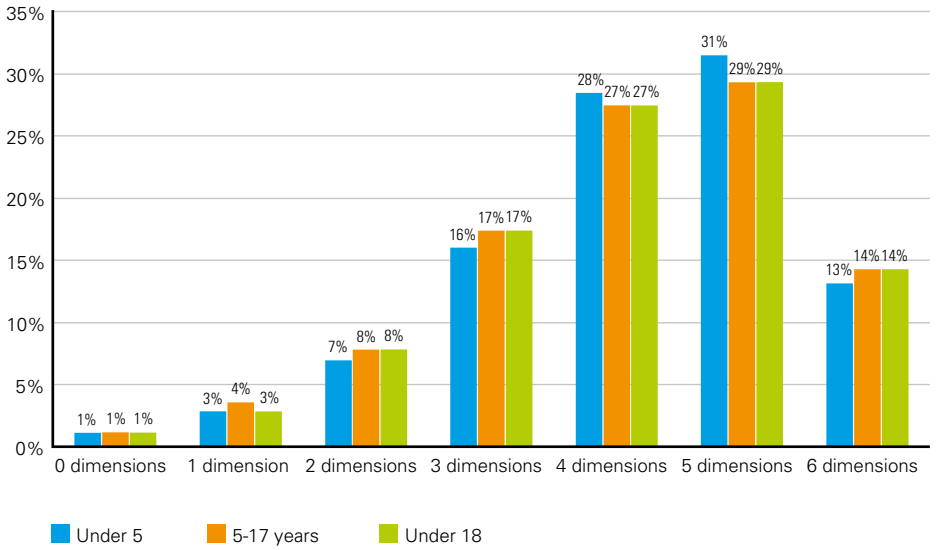
Source: Authors' calculations using EDHS 2016 data.

6. Multiple deprivation analysis

6.1. Deprivation count and distribution

The multiple deprivation analysis moves from viewing specific sectors towards a child-focused view by counting how many deprivations children experience simultaneously. The deprivation distribution in Figure 43 shows that 97 per cent of children in Ethiopia experience deprivation in at least 1 out of the 6 dimensions analysed, whereas 89 percent of children under 5 and 87 per cent of 5-17 year-olds experience at least two deprivations simultaneously. Deprivations in all six dimensions at the same time are experienced by 13 per cent of children under 5 and 14 per cent of children ages 5-17 years. The distribution is skewed to the right for all age groups, peaking at five dimensional deprivations.

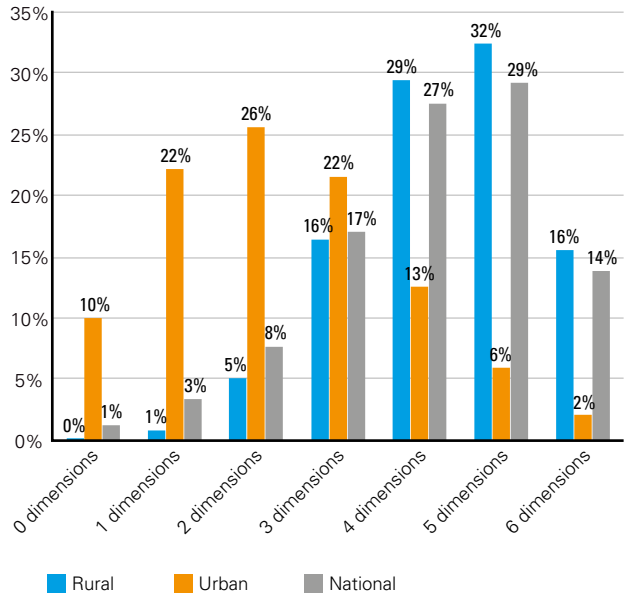
Figure 43: Deprivation count and distribution, by age group



Source: Authors' calculations using EDHS 2016 data.

Disaggregation of deprivation count and distribution by children's area of residence in Figure 44 highlights the large inequality in fulfilment of basic needs and rights of children across rural and urban areas. While in urban areas the distribution is skewed to the left, towards fewer simultaneous deprivations, in rural areas the opposite is the case. Ten per cent of children under 18 in urban areas do not experience deprivation in any of the six dimensions analysed, while in rural areas only 0.1 per cent. Additionally, in urban areas the distribution peaks at three dimensions, with 57 per cent of children deprived in two or

Figure 44: Deprivation count and distribution, children under 18, by area of residence

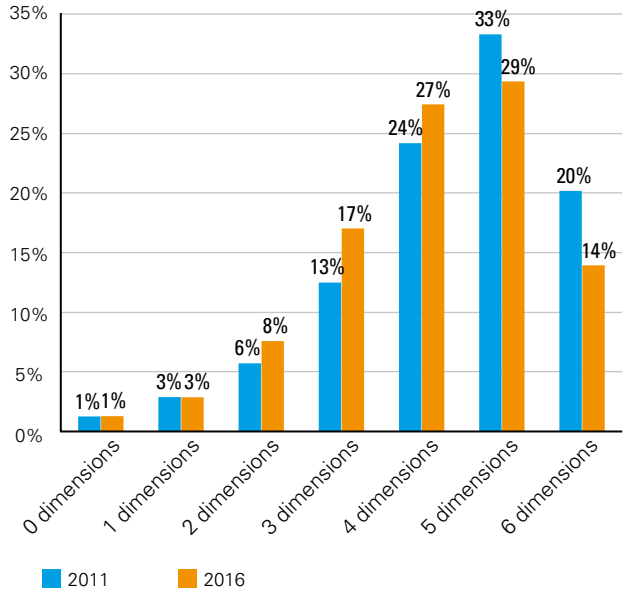


Source: Authors' calculations using EDHS 2016 data.

fewer dimensions at the same time. In rural areas on the other hand, 78 per cent of children are deprived of four or more basic needs and services or rights at the same time.

Trend analysis in deprivation count and distribution between 2011 and 2016 depicted in Figure 45 shows that the distribution curve has shifted slightly to the left towards a fewer number of deprivations, mainly because a smaller share of children are deprived in five or more dimensions, and a higher percentage of children are deprived in fewer dimensions. The

Figure 45: Deprivation count and distribution, children under 18, 2011 and 2016



Source: Authors' calculations using EDHS 2016 and 2011 data.

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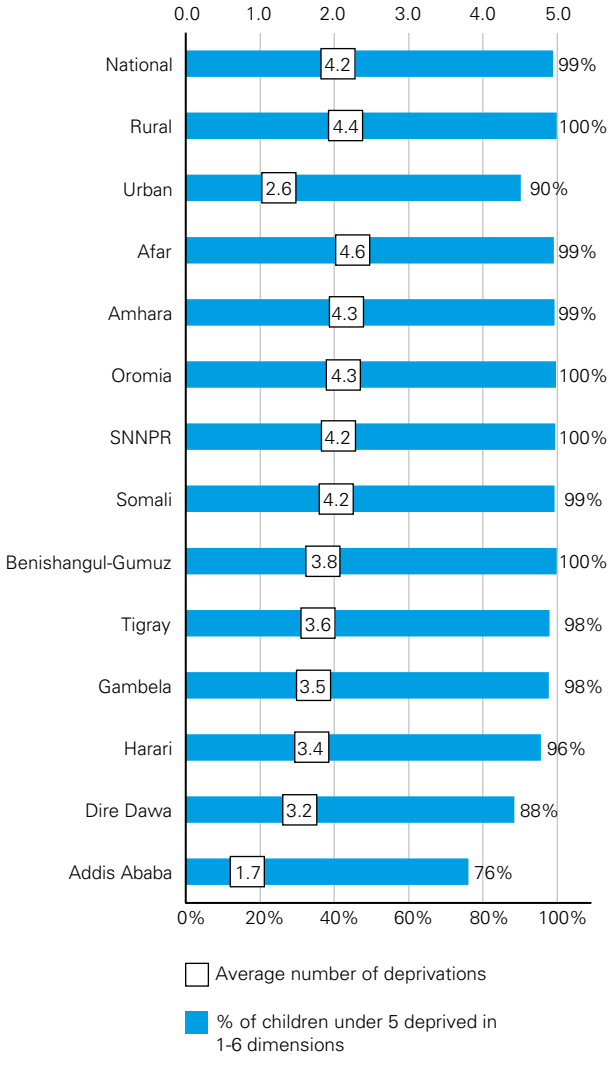
percentage of children who are deprived in five to six dimensions decreased from 53 per cent in 2011 to 43 per cent in 2016. Simultaneously, among other changes, the percentage of children deprived in three or more dimensions increased from 12 per cent to 17 per cent between 2011 and 2016, respectively.

6.2. Deprivation Intensity

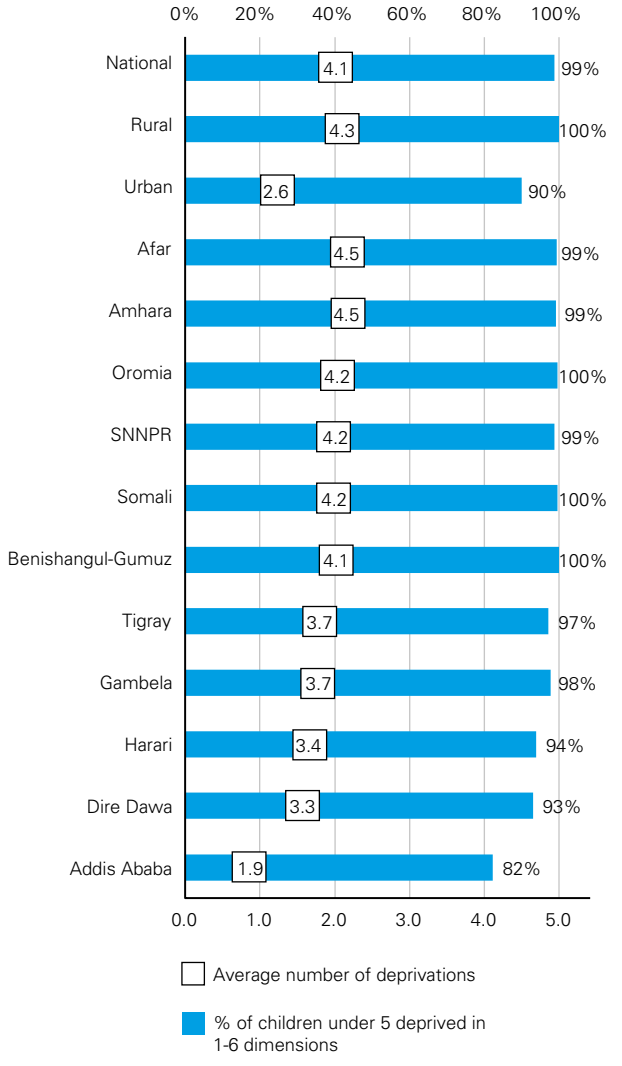
This section attempts to identify deprivation intensity that children deprived in any of the six dimensions analysed experience by using at threshold of one dimension (K=1). The results are presented separately for the two age groups – children under 5 and 5-17 year-olds. The purpose of this approach is to analyse all the dimensions included in MCD measurement as each dimension represents a separate child right. The blue bars in Figure 46 and Figure 47 show the percentage of children deprived in 1 to 6 dimensions by area and region of residence, whereas the figures inside the white squares show the average number of deprivations that these children experience. The figures show that 99 per cent of children under 5 and 5-17 year-olds experience at least one deprivation. On average, children under 5 experience 4.2 deprivations, whereas children ages 5-17 years 4.1. Children in rural areas experience a significantly greater multidimensional deprivation intensity for both age groups compared to children residing in urban areas, who are deprived of an average of 2.6 dimensions simultaneously. The figures highlight the inequality in deprivation intensity also among regions. Children residing in Addis Ababa experience the lowest number of deprivations, an average of 1.7 and 1.9, among children under 5 and ages 5-17 years, respectively. Children under 5 residing in Afar experience the highest deprivation intensity, 4.6 dimensions on average, while deprivation intensity among 5-17 year-olds is the highest in Afar and Somali, 4.5 dimensions on average.

Figure 46: Deprivation intensity, children under 5 deprived in 1-6 dimensions



Source: Authors' calculations using EDHS 2016 data.

Figure 47: Deprivation intensity, children age 5-17 deprived in 1-6 dimensions



Source: Authors' calculations using EDHS 2016 data.

6.3. Multidimensional Child Deprivation Incidence, Intensity, and Index

Three measures were used to report the overall incidence and intensity of deprivation in this section. The MCD rate (H) shows the percentage of deprived children based on each chosen cut-off; the average deprivation intensity (A) (equivalent to poverty gap in monetary poverty analysis) measures the average number of dimensional deprivations that deprived children for each cut-off experience; and the adjusted MCD index (M_0) is a composite index that combines MCD rate (H) and the average intensity of deprivation (A).

As shown in Table 5, using three or more dimensions of deprivation as a multidimensional child deprivation threshold/cut-off (K=3), 88 per cent or 36.2 million children under 18 in Ethiopia are multidimensionally deprived. These children are deprived of an average of 4.5 deprivations simultaneously.

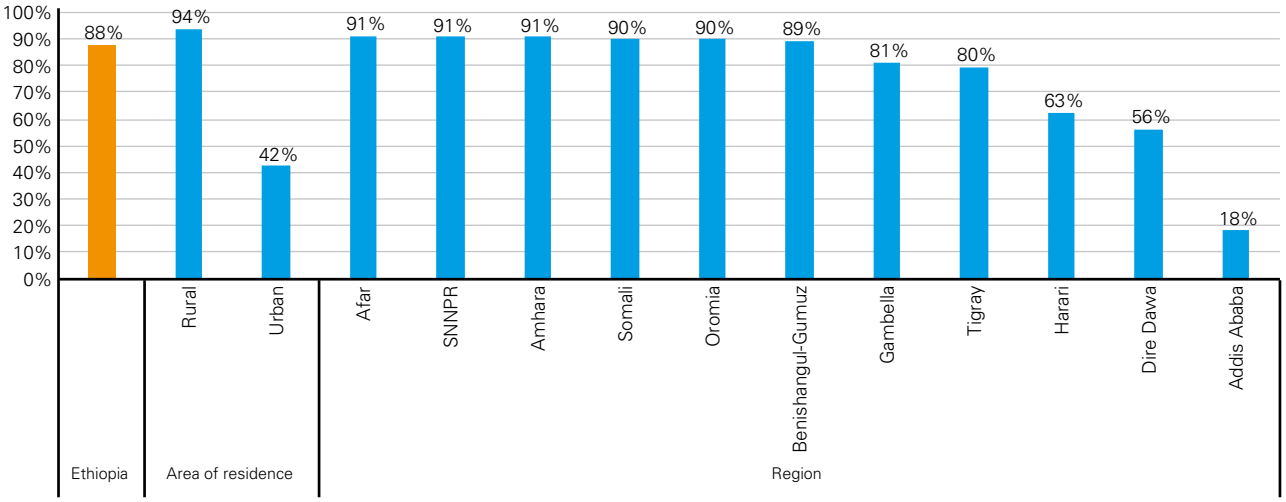
Figure 48 presents MCD by children's area and region of residence using a threshold of 3 to 6 dimensions. The findings point to large disparities in realization of children's basic rights and fulfilment of basic needs for goods and services. Ninety-four percent of children residing in rural areas are deprived in three to six dimensions, more than twice the percentage of multidimensionally deprived children residing in

Table 5: Multidimensional child deprivation incidence, intensity, and Adjusted MCD Index by dimensional cut-off, all children under 18

Cut-off K (dimensions)	Multidimensional Child Deprivation Rate (H), %	Multidimensionally deprived children (in absolute numbers)	Average deprivation intensity (A) (in number)	Average intensity among the deprived (A) (in %)	Adjusted Multidimensional Child Deprivation Index (M_0)
1-6 deprivations	99%	40,756,046	4.2	69%	0.68
2-6 deprivations	95%	39,364,157	4.3	71.0%	0.68
3-6 deprivations	88%	36,224,341	4.5	74.3%	0.65
4-6 deprivations	71%	29,204,517	4.8	80.2%	0.57
5-6 deprivations	43%	17,872,091	5.3	88.7%	0.38
6 deprivations	14%	5,762,233	6.0	100%	0.14
Total number of children: 41,285,822					

Source: Authors' calculations using EDHS 2016 data and CSA population projections for 2016.

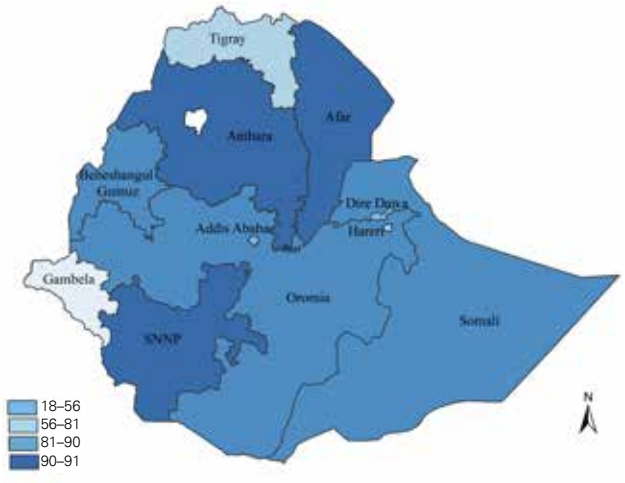
Figure 48: Incidence of multidimensional child deprivation, under 18, by area and region of residence



Source: Authors' calculations using EDHS 2016 data.

urban areas (42 per cent). As shown in the figure and Map 1 there are large disparities in the MCD rate across regions. The incidence ranges from 18 per cent in Addis Ababa to 91 per cent in Afar, SNNPR, and Amhara. The map highlights that incidence of poverty is very high and above the national average also in Somali, Oromia, and Benishangul-Gumuz.

Map 1: MCD rate by region, children deprived in 3-6 dimensions



Map 2 shows that the average number of deprivations that multidimensionally deprived children experience varies significantly across regions. While on average multidimensionally deprived children in Ethiopia experience 4.5 deprivations, the deprivation intensity among children ranges from 3.2 in Addis Ababa to 4.8 in Afar. Comparison of Map 1 and Map 2 shows that ranking of regions based on the MCD headcount rate and average deprivation intensity differs depending on the measure used. Nonetheless, both measures are important for evidence-based policymaking

Map 2: Average deprivation intensity, children deprived in 3-6 dimensions, by region

in eradication of child poverty; one can be used to calculate the percentage of multidimensionally deprived children, whereas the other to gain an insight on the extent of deprivation that children experience, i.e. the number of basic needs and services they are deprived of. See Annex 15 MCD indices by area and region of residence.

The Adjusted Multidimensional Child Deprivation Index (M_0) combines the MCD headcount rate and average deprivation intensity to capture both incidence and intensity of multidimensional child deprivation. The index ranges from a minimum of 0 signifying that no children experience multidimensional child deprivation to 1 signifying that all the children in the country are deprived in all six dimensions analysed. The MCD Index in Ethiopia is 0.65.

Map 3 depicts the Adjusted MCD Index by region of residence, with regions shaded the darkest blue noting the highest index, Afar (0.72) and Somali (0.70).

Map 3: Adjusted MCD Index by region, children deprived in 3-6 dimensions, by region

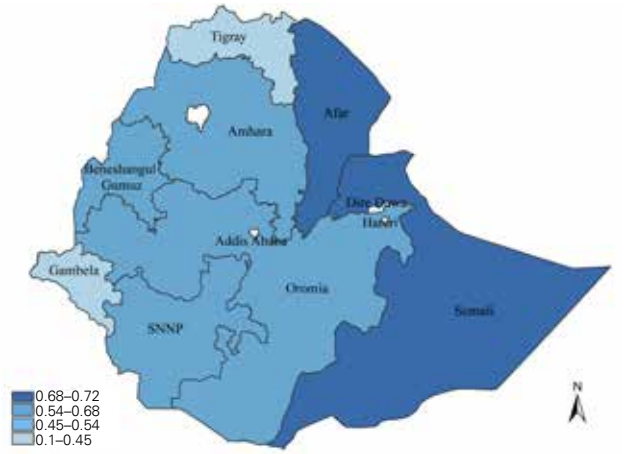
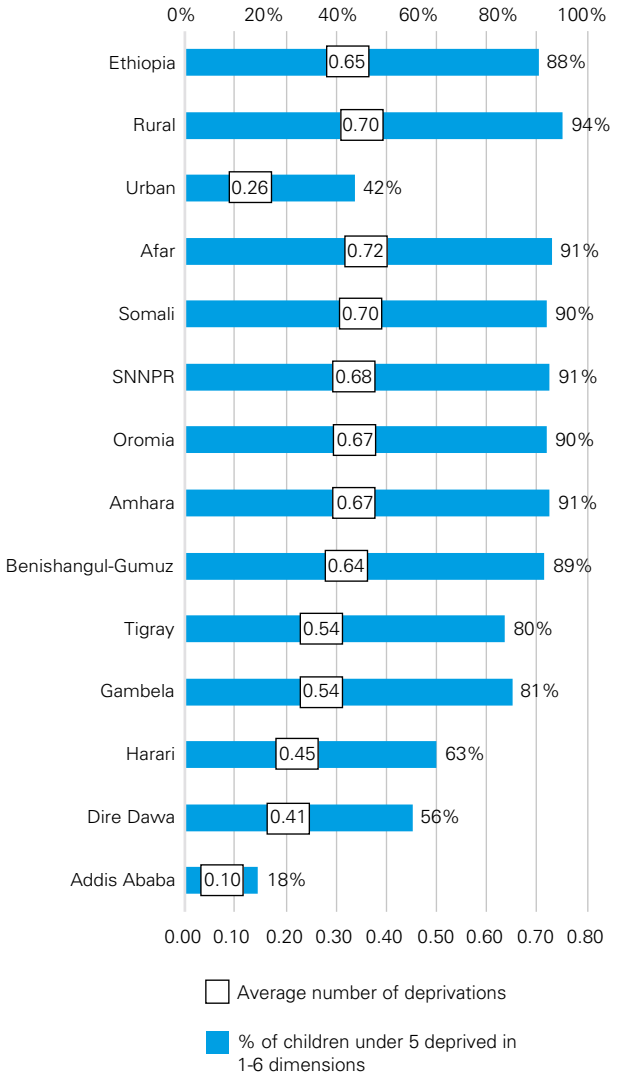


Figure 49 depicts Adjusted MCD Index (in white squares) but also adds the MCD headcount rate (blue bars). The regions in the figure are ranked using the Adjusted MCD Index. The figure shows that the Adjusted MCD Index is nearly three times as high in rural areas (0.70) compared to urban areas (0.26), and ranges from 0.10 in Addis Abba to 0.72 in Afar, underlining once again inequalities in MCD distribution across regions in the country.

Figure 49 also shows that a different ranking in MCD distribution when the index is used. As may be observed, the regions that have equal MCD rates but higher Adjusted MCD Index rank as worse off. For instance, Afar, Amhara, and SNNPR have the same MCD incidence of 91 per cent, but Afar ranks as the

Figure 49: Adjusted MCD Index (M0) and MCD rate by area and region of residence



Source: Authors' calculations using EDHS 2016 data.

most deprived region with an Adjusted MCD Index of 0.70, whereas Amhara ranks as the fifth most deprived (index of 0.67). This difference stems from differences in average deprivation intensity between the two regions – 4.8 in Afar and 4.5 in Amhara – used to construct the composite index of Adjusted MCD.

6.3.1. Changes in multidimensional child deprivation between 2011 and 2016

Table 6 shows trends in multidimensional child deprivation incidence, intensity, and Adjusted MCD Index by different thresholds – from 1 to 6 dimensions – between 2011 and 2016. As may be observed, there have been significant drops in incidence of multidimensional child deprivation for children experiencing 4 to 6 deprivations simultaneously. The incidence remains relatively the same for children who are deprived in one or more to three or more simultaneous deprivations. On the other hand, the drop in deprivation intensity is higher for children who experienced fewer simultaneous deprivations. The average deprivation intensity for children who are deprived in three or more dimensions decreased from an average of 4.7 to 4.5 deprivations between 2011 and 2016, respectively. As a composite measure, the Adjusted MCD Index shows a drop for all thresholds affected by accounting for either the drop in the MCD rate or average deprivation intensity between 2011 and 2016.

Trend analysis using a threshold of 3 to 6 dimensions shows multidimensional child deprivation incidence has not experienced a significant change over the last five years. In fact, Ninety per cent of children under 18 were multidimensionally deprived in 2011 compared to 88 per cent in 2016.

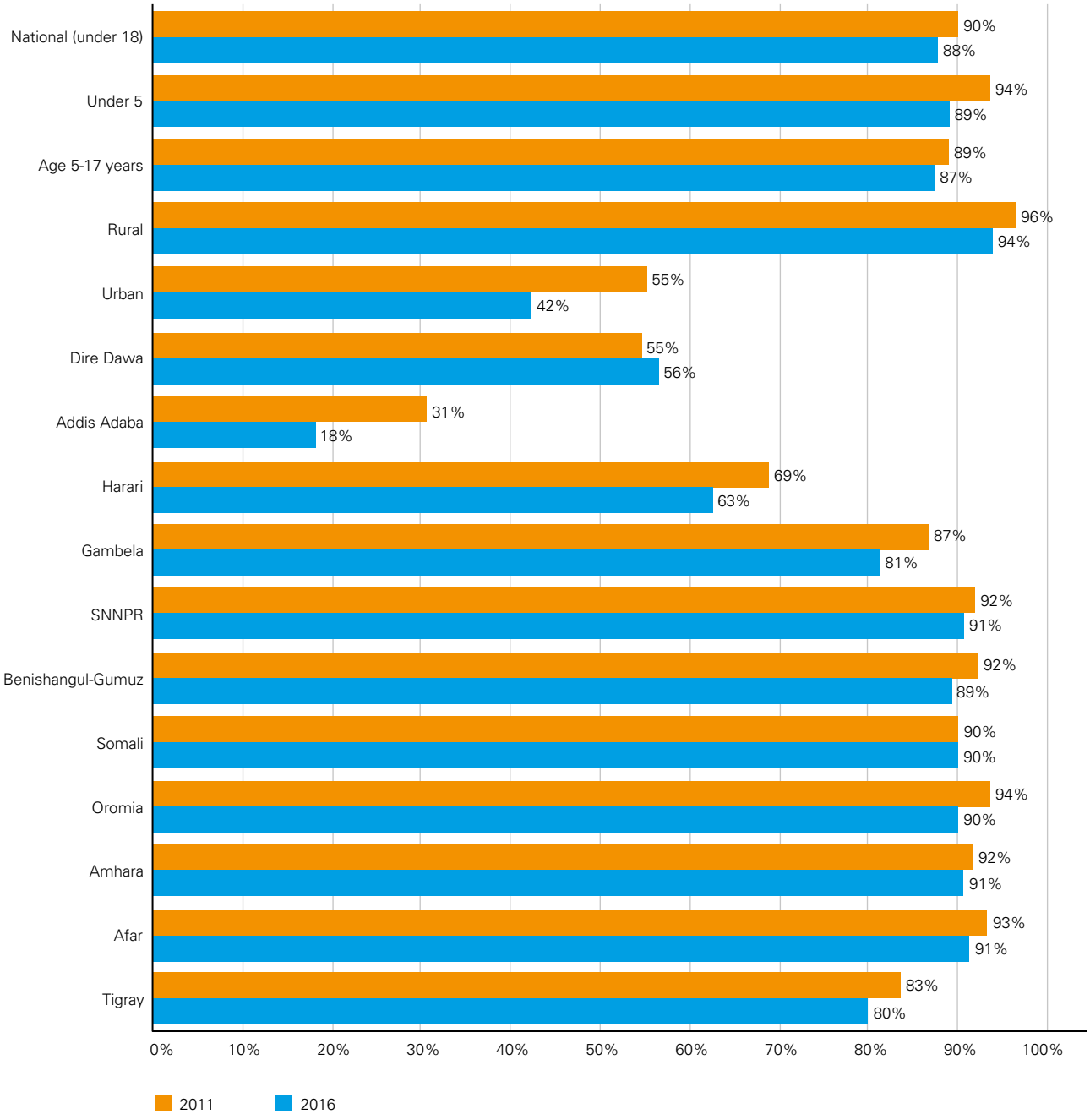
Disaggregation of results by children's age group shows a significant, albeit small drop in MCD incidence for children under 5, from 94 per cent in 2011 to 89 per cent in 2016. As described in single

Table 6: Multidimensional child deprivation incidence and intensity by threshold, children under 18, 2011 and 2016

Threshold (number of deprivations)	Multidimensional Child Deprivation Rate (H), %		Average deprivation intensity (A) (in number)		Adjusted Multidimensional Child Deprivation Index (M_0)	
	2011	2016	2011	2016	2011	2016
1-6 deprivations	98.8%	98.7%	4.4	4.2	0.73	0.68
2-6 deprivations	95.9%	95.3%	4.5	4.3	0.72	0.68
3-6 deprivations	90.2%	87.7%	4.7	4.5	0.70	0.65
4-6 deprivations	77.7%	70.7%	4.9	4.8	0.64	0.57
5-6 deprivations	53.5%	43.3%	5.4	5.3	0.48	0.38
6 deprivations	20.2%	14.0%	6.0	6.0	0.20	0.14

Source: Authors' calculations using EDHS 2016 data.

Figure 50: MCD rate, by age group, area, and region of residence, 2011 and 2016



Source: Authors' calculations using EDHS 2016 data.

dimension deprivation analysis, this decrease has been driven mainly by the significant decreases in deprivation in health, water, and to some extent housing and physical development. MCD incidence for children ages 5-17 years has experienced an insignificant 2-percentage-point drop between 2011 and 2016, driven by the decrease in deprivation rates in education and water, and to a lesser extent in information and participation and housing.

Disaggregation of MCD incidence by children's area of residence shows no significant change for children residing in rural areas, while in urban areas the MCD rate decreased from 55 per cent in 2011 to 42 per cent in 2016. Across regions, MCD incidence has decreased significantly in Addis Ababa (from 31 per cent in 2011 to 18 per cent in 2016). The percentage of multidimensionally deprived children has also decreased slightly in Gambella, Oromia and the Harari region over the five year period.

6.4. Decomposition of multidimensional child deprivation

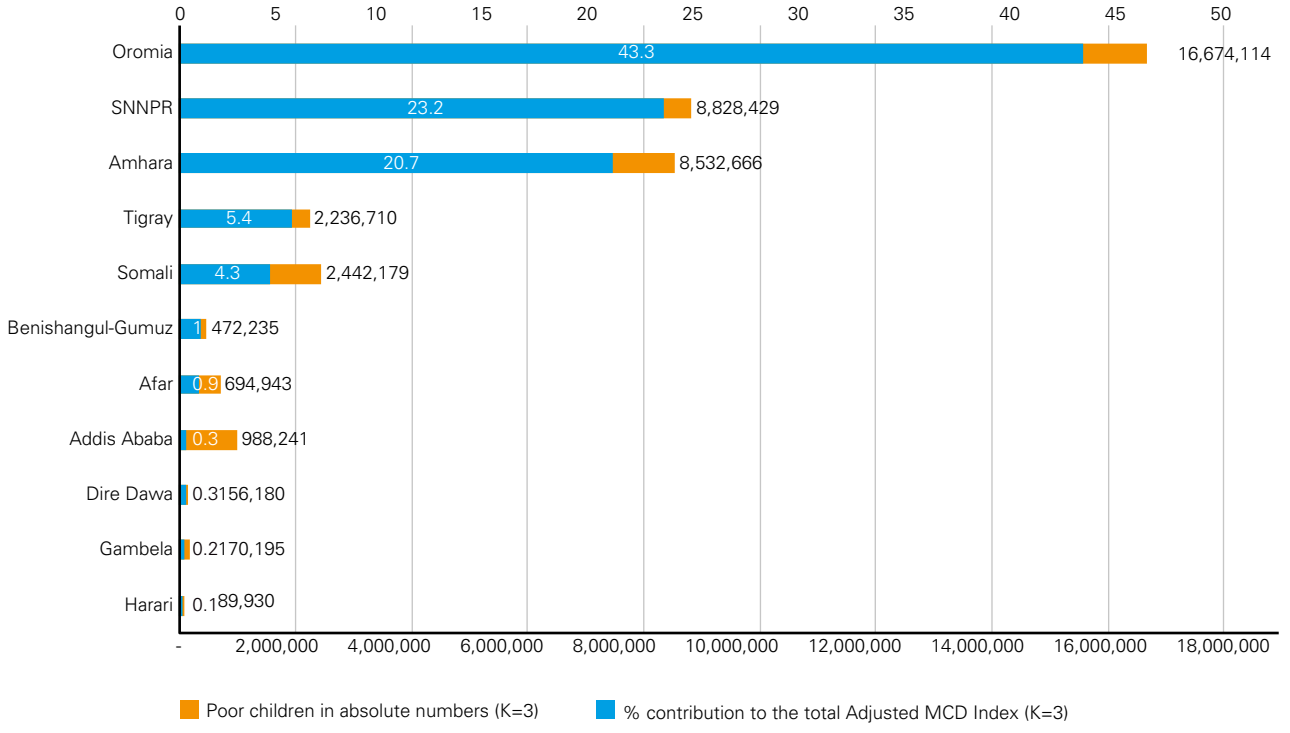
6.4.1. Decomposition of multidimensional child deprivation by region

This section presents multidimensional child deprivation in absolute numbers and shows the contribution of each region to the total MCD Index. In 2016, a total of 36.2 million children under 18 in Ethiopia were multidimensionally deprived. As shown in Figure 51, regions with the largest numbers of multidimensionally deprived children were Oromia with 16.7 million, followed by SNNPR with 8.8 million, and Amhara with 8.5 million. Regions with the lowest number of poor children were Harari with nearly 90,000, Dire Dawa with 156,000, and Gambella with 170,000.

Figure 51 ranks regions by relative contribution to the overall Adjusted MCD Index in Ethiopia and displays the total number of multidimensionally deprived children in each. As illustrated, the order of each region's rank by relative contribution is slightly different from the total number of multidimensionally deprived children since the contribution to the Adjusted MCD Index does not only represent the absolute number of multidimensionally deprived children in each region but also the deprivation intensity that they experience. The figure unfolds that Oromia, SNNPR, and Amhara jointly account for 87.2 per cent of the Adjusted MCD Index in Ethiopia, with a relative contribution of 43.3 per cent, 23.2 per cent, and 20.7 per cent, respectively. In other words, 87 per cent of MCD incidence and intensity is in these three regions.

It must also be noted that the rankings in Figure 51 are different from the others presented in maps and figures earlier in this section because it takes into consideration the population size in regions. For instance, Afar ranks among the most deprived regions (along with SNNPR and Amhara) when ranking the regions with the MCD rate, and the most deprived when using the Adjusted MCD Index (0.72). However, because of its small child population – nearly 695,000 – it ranks as a significantly smaller contributor to MCD in the country. See Annex 15 for figures on multidimensional child deprivation measures and for total and multidimensionally deprived child population in absolute numbers across regions.

Figure 51: Contribution of regions to the total Adjusted MCD Index



Source: Authors' calculations using EDHS 2016 data.

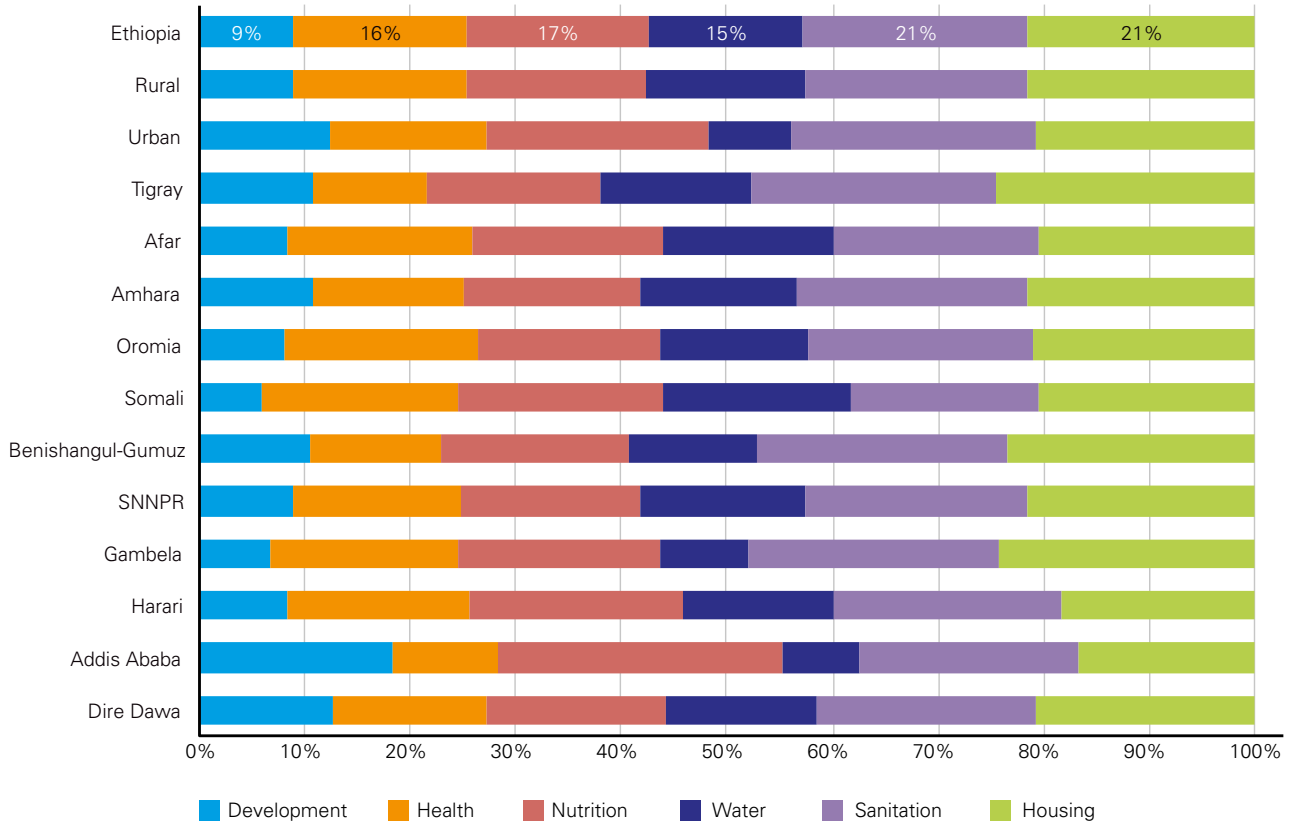
6.4.2. Decomposition of multidimensional child deprivation by dimension

Figure 52 and Figure 53 illustrate the contribution of each dimension to the overall sum of deprivations for each age-group among children deprived in 3 to 6 dimensions. The findings are presented at the national level and by area and region of residence.

Figure 52 illustrates that for children under 5 who are multidimensionally deprived (3 to 6 dimensions), deprivation in sanitation, housing, and nutrition make the highest contribution to the total number of deprivations experienced: 21 per cent for both housing and sanitation and 17 per cent for nutrition. Contribution of each dimension varies greatly depending on where the children reside. Among children under 5 residing in urban areas, deprivation in water makes the lowest contribution across all dimensions (8 per cent), whereas for children residing in rural areas the contribution of physical development is the lowest (9 per cent). In Addis Ababa, the largest contributors are nutrition (27 per cent), sanitation (21 per cent), and development (18 per cent), whereas in Somali, housing (21 per cent), nutrition (19 percent), and health (19 per cent).

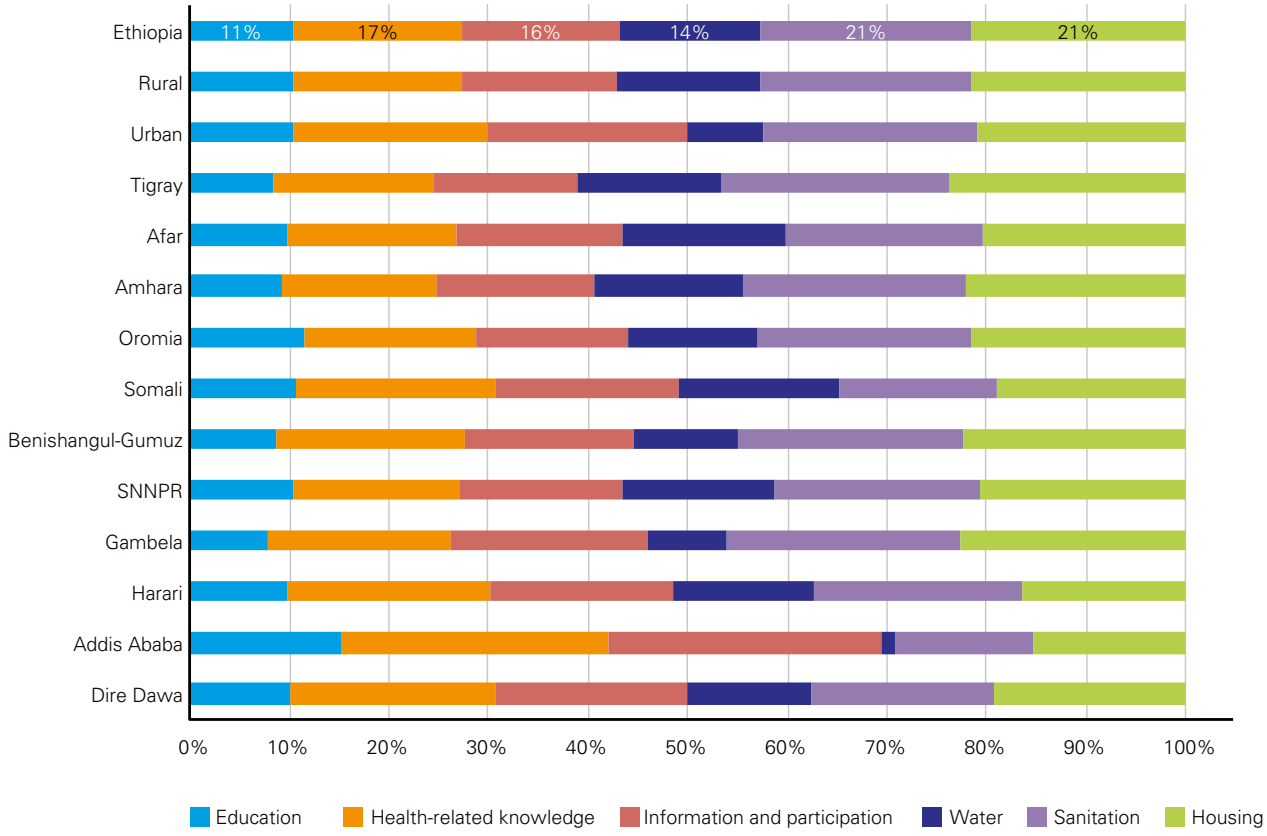
Figure 53 illustrates that for children ages 5-17 years who are multidimensionally deprived (in 3 to 6 dimensions), deprivation in sanitation, housing, and health-related knowledge make the highest contribution to the total number of deprivations experienced: 21 per cent for both housing and sanitation, and 17 per cent for health-related knowledge. Contribution of each dimension varies greatly depending on where the children reside. Among children residing in urban areas, along with housing and sanitation, dimensions of health-related knowledge and information and participation make an equal contribution (of 20 per cent), whereas in rural areas the third largest contributor is health-related knowledge (17 per cent). It must also be highlighted that the contribution of water in urban areas is slightly less than half that in rural areas, 8 per cent compared to 15 per cent, respectively. In Addis Ababa, the highest contributors are the dimensions of information and participation, health-related knowledge, education and housing, whereas in Gambella, sanitation, housing, and information and participation.

Figure 52: Deprivation composition among children under 5 deprived in 3-6 dimensions



Source: Authors' calculations using EDHS 2016 data.

Figure 53: Deprivation composition among children age 5-17 years deprived in 3-6 dimensions



Source: Authors' calculations using EDHS 2016 data.

6.5. Factors associated with multidimensional child poverty

This section lists some of the factors associated with multidimensional child deprivation in Ethiopia. Descriptive statistics are used to disaggregate the MCD rate by individual characteristics of children and of their households and household members, whereas the multivariate analysis using logistic regression analysis attempts to identify which of these factors are associated with being multidimensionally deprived.

As depicted in Figure 54, the MCD rate is slightly higher among children under 5 compared to 5-17 year-olds, 89 per cent and 87 per cent, respectively, even though the difference is statistically insignificant.

The area of residence is highly important; the percentage of multidimensionally deprived children in rural areas (94 per cent) is more than double that in urban areas (42%).

Education attainment of adult household members is also very important. The MCD rate is 56 per cent among children whose household head has completed secondary or higher education, whereas 91 per cent among children whose household head has completed no education or only primary school. The same is the case for mother's education attainment albeit the difference is narrower: 74 per cent of children whose mother has completed secondary or higher education are multidimensionally deprived compared to 94 per cent of children whose mother has not completed education or only primary school.

The father's working status and occupation also seem to correlate with MCD; the incidence of MCD among children whose father is in paid continuous employment is 78 per cent compared to 92 per cent among children whose father is either not employed continuously or not paid for his work. Further, the MCD rate is the highest among children whose father works in agriculture (93 per cent) or is employed as an unskilled manual labourer (82 per cent). MCD incidence is significantly lower among children whose father holds a professional/technical/managerial job position (52 per cent), works as skilled manual labourer (60 per cent), or in sales (59 per cent). Likewise, MCD incidence is higher among children that live in labour-constrained households (93 per cent) compared to those who do not (87 per cent).

The findings show that MCD is also associated with under-5 mortality in the household during the last five years, which may be understood as a proxy for access to basic maternal and children's services and food insecurity. The MCD rate among children that live in households where a child younger than 5 years died during the last five years is 93 per cent compared to 87 per cent for children where no such occurrence has taken place.

Another useful result for child protection is disaggregation of MCD incidence by justification of gender-based violence (GBV) by adults in the household. Figure 54 shows that the MCD rate is 95 per cent among children who live in households where GBV is justified compared to 85 per cent where it is not.

Disaggregation of the MCD rate by gender and mother's age at first birth shows no statistically significant differences. The same is the case with MCD rates by mother's marital status and child's status (being an orphan) which are different than would be assumed. Incidence of MCD is slightly higher among children whose mother is married rather than single/divorced/widowed, as it is for children both of whose parents are alive compared to orphans. Both results need further investigation.

Another result that needs further in-depth investigation is child's living arrangements. Figure 54 shows that 88 per cent of children who live with one or both parents are multidimensionally deprived compared to 80 per cent of children who live without parents.

Table 7 presents the results of multivariate logistic regression analysis showing the main household and demographic characteristics associated with the probability of a child to be multidimensionally deprived. The results show marginal effects expressed as a percentage point difference in the probability to be multidimensionally deprived between the listed groups and reference categories. The table reveals that the following groups of children have a higher likelihood of being multidimensionally deprived: living in rural areas, the head of household has not completed any education or only primary education, living in a labour constrained household, being an orphan, living without parents even if they are alive, belonging to the younger age group (under 5), and residing in Afar, Amhara, Somali, Benishangul-Gumuz, SNNPR or Harari regions as opposed to Tigray.

The results show that holding all other factors constant, living in rural areas is associated with a higher probability of multidimensional deprivation. Children living in rural areas have a 38-percentage-point higher probability to be multidimensionally deprived compared to children living in urban areas.

Multidimensional child deprivation is also highly correlated with household head's education attainment. Children that belong to households where the head has not completed education or has completed only primary education have an 11-percentage-point higher probability to be multidimensionally deprived compared to children living in households where the head has completed secondary or higher education.

Child's status and living arrangements are also correlated with multidimensional deprivation. Holding other factors constant, living without parents even if they are alive or being an orphan increases the probability of being multidimensionally deprived by 2 and 1 percentage points, respectively. Child's age also plays a role; 5-17 year-olds have a 1 percentage point lower probability to be multidimensionally deprived compared to children under 5.

All else being equal, living in a labour constrained household increases the probability to be multidimensionally deprived by 3 percentage points.

Children's region of residence also influences their probability to be multidimensionally deprived. Children residing in Afar have a 10-percentage-point higher probability to be multidimensionally deprived compared to children residing in Tigray. Similarly, children residing in Amhara, Oromia, Somali, Benishangul-Gumuz, SNNPR, and Gambella as opposed to their peers living in Tigray have a 6 to 10-percentage-point higher probability of being multidimensionally deprived. On the other hand, children residing in Addis Ababa have a 7-percentage-point lower likelihood to be multidimensionally deprived compared to their peers residing in Tigray.

The regression analysis also controlled for factors such as the child's gender and gender of the household head, but none of these variables show a statistically significant relationship with the likelihood of being multidimensionally deprived.

Figure 54: MCD rates by individual and household characteristics (K=3)

Source: Authors' calculations using EDHS 2016 data.

Table 7: Marginal effects associated with a change in probability in multidimensional child deprivation (K=3)

Variable	Probability change
Child is 5-17 years old (ref.children under 5)	(-0.0203) ***
Child is a girl (ref.boy)	(-0.00252)
Child is a single or double orphan (ref.children with one or both parents alive)	0.0118**
Child lives without parents even though parents alive (ref.children living with both parents)	0.0150***
Household head has no or primary education (ref.household head has secondary or higher education)	0.111***
The household head is a woman (ref. man household head)	(-0.00288)
Child lives in a labour constrained household (ref.non labour-constrained household)	0.0264***
Number of children in the household	0.00360***
Child lives in a rural area (ref.urban)	0.375***
Child lives in Afar (ref.Tigray)	0.0994***
Child lives in Amhara (ref.Tigray)	0.0889***
Child lives in Oromia (ref.Tigray)	0.0577***
Child lives in Somali (ref.Tigray)	0.0810***
Child lives in Benishangul-Gumuz (ref.Tigray)	0.0612***
Child lives in SNNPR (ref.Tigray)	0.0750***
Child lives in Gambella (ref.Tigray)	0.103***
Child lives in Harari (ref.Tigray)	(-0.0416)
Child lives in Addis Ababa (ref.Tigray)	(-0.0733)***
Child lives in Dire Dawa (ref.Tigray)	(-0.0302)
Observations	35,065
Significance levels: *** p<0.01, ** p<0.05, * p<0.1	
Sample: children age 0-17 years	

Source: authors' calculations using EDHS2016 data.

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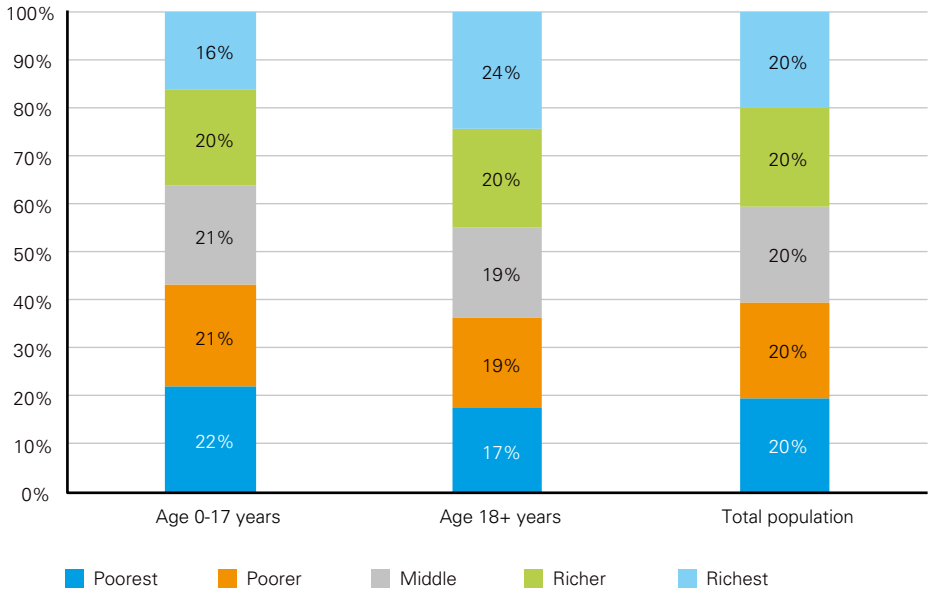
7. Multidimensional child poverty and household wealth index

Since EDHS 2016 does not collect data on income or consumption but uses the Wealth Index as a proxy measure of well-being, this section investigates the relationship between Wealth Index and MCD. According to the EDHS 2016 report, the Wealth Index is constructed by assigning scores to housing conditions (e.g. source of drinking water, toilet facilities, and flooring materials) and the number and types of goods that the households own (e.g. television, bicycle, car). The scores are derived by using principal component analysis. The wealth quintiles at the national level are then constructed by assigning the household wealth score to each de jure household member, ranking all the household members, and dividing the distribution into five equal shares, each constituting 20 per cent of the population (EDHS, 2016, p.11).

7.1. Population distribution by wealth quintile

Population distribution by age and wealth quintile illustrated in Figure 55 shows that a higher proportion of children belong to households in the lowest two wealth quintiles compared to adults. Specifically, 43 per cent of children under 18 in Ethiopia belong to such households compared to 36 per cent of adults.

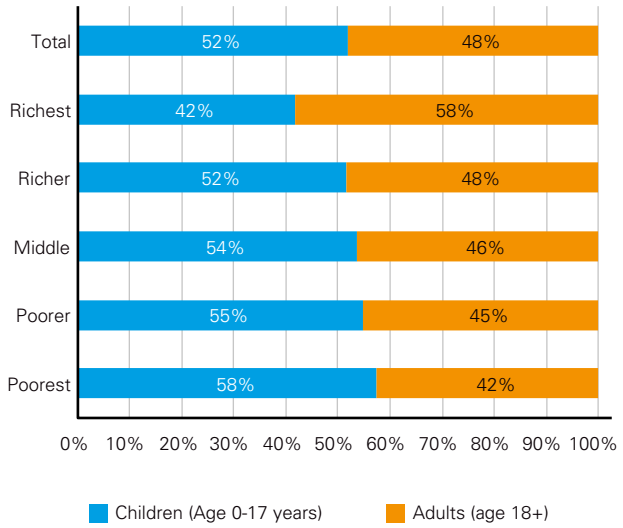
Figure 55: Population distribution by wealth quintile, 2016



Source: Authors' calculations using EDHS 2016 data.

Figure 56 shows that children comprise 52 per cent of the population in Ethiopia. However, disaggregation of population distribution across wealth quintiles by age group shows that children under 18 constituted a disproportionately higher share of the lowest two wealth quintiles, 58 per cent of the poorest and 55 per cent of the poorer wealth quintile.

Figure 56: Population distribution by age and wealth quintile

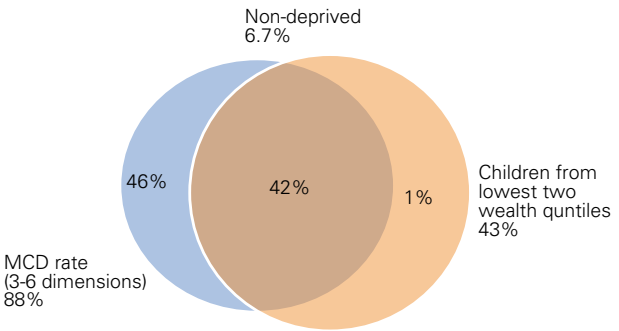


Source: Authors' calculations using EDHS 2016 data.

7.2. Overlap between MCD and lowest two wealth quintiles

Figure 57 depicts the overlap analysis between MCD and the two lowest wealth quintiles. The analysis reveals that 42 per cent of children in Ethiopia are both multidimensionally deprived and belong to the lowest two wealth quintiles. This large overlap is explained by the usage of similar indicators for calculation of the two measures, such as housing conditions, sanitation, source of drinking water, and information devices. The figure also shows that 46 per cent of the multidimensionally deprived children

Figure 57: Overlap between MCD and children in the lowest two wealth quintiles



Source: Authors' calculations using EDHS 2016 data.

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belong to the remaining three wealth quintiles (middle, richer, and richest), implying that MCD in Ethiopia is affected by other factors – accessibility and availability of goods and services among others – in addition to household wealth.

Overlap analyses between MCD and the lowest two wealth quintiles by area of residence demonstrate that the overlap is very high regardless of where the children live. Figure 58 and Figure 59 show that only 1 per cent of children in rural and urban areas each who belong to the poorest two wealth quintiles are not multidimensionally deprived. The overlap also shows that while household wealth is correlated with multidimensional deprivation, other factors also influence the latter. Among the 42 per cent of children who are multidimensionally deprived, 35 per cent belong to the three upper wealth quintiles, middle, richer, or richest. Likewise, 47 per cent of multidimensionally deprived children residing in rural areas belong to the upper three wealth quintiles.

Figure 58: Overlap between MCD and children in the lowest two wealth quintiles, rural areas

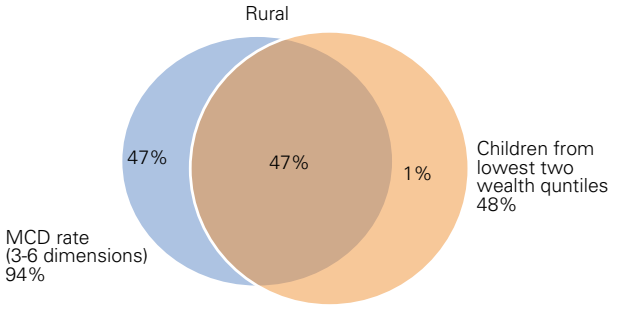
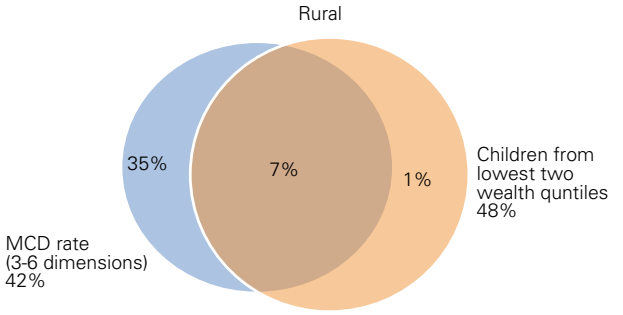


Figure 59: Overlap between MCD and children in the lowest two wealth quintiles, urban areas



Source: Authors' calculations using EDHS 2016 data.

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8. Summary conclusions and recommendations

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This study calculated the first national MCD estimates for Ethiopia, which will be used to set the SDG 1.2 target and monitor progress of the Government in its achievement. The study also assessed children's deprivation in fulfilment of their rights and needs for basic goods and services, assessed the overlap between different deprivations, and attempted to identify factors associated with MCD. The report identifies the most vulnerable/deprived children, where they live, and their characteristics. Disaggregation of results by children's area and region of residence provides an insight on the multisectoral intervention priorities necessary to tackle child poverty and deprivation across different geographical areas in Ethiopia. The report also indirectly assessed progress in interventions in different sectors over the last five years and the country's progress in MCD reduction by carrying out a trend analysis with 2011 data. The findings of the analyses are intended to feed into Ethiopia's efforts in other SDG measurement and monitoring, including SDG 10.

Some of the key results emerging from applying MODA are:

- In 2016, **88 per cent of children under the age of 18, or a total of 36.2 million children in Ethiopia were severely deprived,** that is, deprived in 3 to 6 basic needs, services, and rights.
- **There has been meagre progress in MCD incidence and intensity reduction over the last five years.** The percentage of multidimensionally deprived children decreased from 90 per cent in 2011 to 88 per cent in 2016, while the average deprivation intensity that these children experience dropped from 4.7 to 4.5 deprivations.
- **There are large geographical inequalities in fulfilment of children's basic needs and rights.** Differences in indicator and dimension deprivation rates across children's areas and regions of residence are drastic. Further, the MCD rate ranges from 18 per cent in Addis Ababa to 91 per cent in Afar, Amhara, and SNNPR. The MCD incidence is also very high in Oromia and Somali (90 per cent each) and Benishangul-Gumuz (89 per cent). The percentage of multidimensionally deprived children in rural areas (94 per cent) is more than double that of children residing in urban areas (42 per cent).
- **Disparities in deprivation intensity are also very high across areas and regions of residence.** Multidimensionally deprived children residing in Addis Ababa are deprived of an average of 3.2 dimensions whereas their peers residing in Afar and Somali – experiencing an average of 4.8 and 4.7 simultaneous deprivations respectively – are the most severely deprived in Ethiopia. The differences in deprivation intensity between rural and urban

areas are drastic; multidimensionally deprived children residing in rural areas experienced 4.5 deprivations on average, whereas their peers in urban areas 3.2.

- **In 2016, deprivation in housing and sanitation were the largest contributors to multidimensional child deprivation in Ethiopia for all children under the age of 18.** Multidimensional child deprivation rate among children under 5 years was also highly driven by deprivation in nutrition, whereas among 5-17 year-olds by deprivation in health-related knowledge.
- **Gender disparities in deprivation are significant for the older age group.** A higher percentage of adolescent girls compared to boys are illiterate (51 per cent compared to 40 per cent) and are deprived of comprehensive knowledge of HIV/AIDS prevention and transmission (76 per cent compared to 64 per cent). Conversely, the percentage of school-age girls (8-17 years) who attend school with delay is lower compared to their male peers (35 per cent compared to 41 per cent), as is the percentage of adolescent girls versus boys who are deprived in community participation (74 per cent compared to 79 per cent).
- **Most children in Ethiopia face multiple and overlapping deprivations.** Ninety-five per cent of children are deprived of 2 to 6 basic needs and services. The deprivation overlaps between dimensions are very high in rural areas and among children belonging to the poorest two wealth quintiles.
- **Multidimensional child deprivation in Ethiopia is associated with the child's area of residence, education attainment of adult family members, economic activity and occupation of the father, access to services, and child protection indicators.** The MCD rate is the highest among children residing in rural areas, children who live in households the head of which has completed no or only primary education, children whose mother has completed no or only primary education, among children whose father is either not employed continuously throughout the year or not paid, among children whose father works in agriculture or unskilled manual labour, among children that live in households that have experienced mortality of a child under 5 recently, and among children that live in households where gender-based violence is justified.
- **Multidimensional child deprivation is also associated with wealth.** In Ethiopia, 42 per cent of multidimensionally deprived children belong to the poorest two wealth quintiles, whereas

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another 46 per cent to the richer three wealth quintiles, suggesting that **MCD is associated on service availability and accessibility.**

Based on the comprehensive findings of this study, the following recommendations are made to address issues with the measurement and monitoring of child deprivation as well as the reduction of MCD:

- **Mainstream single and multidimensional child deprivation indicators in national development plans and/or strategies.** The national development plans and strategies set the roadmap for legislative and policy reforms and resource allocation priorities in the country. Therefore, it is imperative that children are incorporated in such documents as a separate group requiring dedicated attention. The findings of this study including the MCD incidence and intensity rates by area and region, deprivation rates by sector (dimension), and factors associated with MCD are all very relevant indicators for drafting of such documents, policies and programmes, and related results-based monitoring plans.
- **Child-sensitive budgeting at the national and regional level to enhance equality and equity.** Prioritization of budget allocation to poverty reduction is key to enhancing equality and equity and making progress in child poverty reduction. This study contains a myriad of indicators useful for child-sensitive budgeting at the national and regional level which point to geographical discrepancies in service availability and accessibility. The findings are also readily usable for sectoral budget briefs and other advocacy tools aimed at mobilizing efforts and allocating resources for child poverty reduction interventions and policies.
- **Promote multisectoral approach in programme and policy design for effective poverty reduction.** This study finds that 95 per cent of children in Ethiopia are deprived in 2 to 6 dimensions and that the deprivation overlap is high for most of the dimensions analysed. Hence, integrated approach across sectors is essential for effective and efficient poverty and deprivation reduction. Coordination of sectors and different levels of governance, ensuring sustainability of implementation and administration structures, and collaboration of service providers by design of policies are therefore very important. These integrated/comprehensive packages of service provision should be combined with cash transfers – "cash plus" programmes – which have already proven successful.
- **Enhance evidence-based policymaking in the area of child poverty and deprivation reduction through continuous support of data collection activities and improvements to the existing tools.** The single indicator and dimension deprivation and MCD estimates would not have been possible without the rich EDHS survey datasets. To ensure that the Government of FDRE monitors progress in achievement of SDG 1.2. and other SDG goals, provision of support for data collection is essential. Additional support is also necessary to enrich the existing tools with additional modules that enable collection of data on other important issues of child protection such as violence, child labour, social protection, harmful practices and early child development. The commonly established modules of health, education, WASH, nutrition and housing could be further expanded to capture differences in needs and risks between children residing in urban and rural areas. Adding an additional stratum to the sampling frame that allows disaggregation of data by different urban settlements would provide very useful insights on differences in deprivation and enable in-depth analysis. Harmonizing the existing data collection tools to allow overlap analysis between multidimensionally deprived children and monetarily poor children would be very useful to help identify the most vulnerable children in the country and design the appropriate interventions. Collection of data on child-specific indicators should include all the sampled children rather than sub-samples to enable inclusion of the most important dimensions and indicators in calculation of the MCD rate and other indicators.

Annexes

Annex 1: Dimensions selected for multidimensional child deprivation analysis

Child rights	Source	Dimension name and age-group (in years)
Right to adequate food, nutrition	CRC Article 24 COFDRE Article 36, Article 90	Nutrition, Development (under 5)
Right to healthcare	CRC Article 24, COFDRE Article 36, Article 41, Article 90	Health (under 5)
Right to education	CRC Article 28 COFDRE Article 41, Article 90	Education (5-17)
Right to basic knowledge on health and nutrition	CRC Article 24	Health-related knowledge (5-17)
Right to freedom to seek, receive, and impart information; Right to access to information, media	CRC Article 13, CRC Article 17 COFDRE Article 29, Article 35, Article 89	Information and participation (5-17)
Right to drinking water	CRC Article 24 COFDRE Article 90, Article 92	Water (0-17)
Right to sanitation and hygiene	CRC Article 24 COFDRE Article 90, Article 92	Sanitation (0-17)
Right to adequate housing and standard of living adequate for child's physical, mental, spiritual, moral, and social development	CRC Article 27 COFDRE Article 90, Article 92	Housing (0-17)

Annex 2: Rights base for definition of parameters

Articles from the Constitution of the Federal Democratic Republic of Ethiopia (1995) and UN Convention on the Rights of the Child (1989) used as basis for defining parameters of MCD

Constitution of the Federal Democratic Republic of Ethiopia (1995)	
Article 29	1. Everyone has the right to hold opinions without interference. 2. Everyone has the right to freedom of expression without any interference. This right shall include freedom to seek, receive and impart information and ideas of all kinds, regardless of frontiers, either orally, in writing or in print, in the form of art, or through any media of his choice. 3. Freedom of the press and other mass media and freedom of artistic creativity is guaranteed. Freedom of the press shall specifically include the following elements: a. Prohibition of any form of censorship. b. Access to information of public interest. 4. In the interest of the free flow of information, ideas and opinions which are essential to the functioning of a democratic order, the press shall, as an institution, enjoy legal protection to ensure its operational independence and its capacity to entertain diverse opinions. 5. Any media financed by or under the control of the State shall be operated in a manner ensuring its capacity to entertain diversity in the expression of opinion. 6. These rights can be limited only through laws which are guided by the principle that freedom of expression and information cannot be limited on account of the content or effect of the point of view expressed. Legal limitations can be laid down in order to protect the well-being of the youth, and the honour and reputation of individuals. Any propaganda for war as well as the public expression of opinion intended to injure human dignity shall be prohibited by law. 7. Any citizen who violates any legal limitations on the exercise of these rights may be held liable under the law.
Article 35	1. Women shall, in the enjoyment of rights and protections provided for by this Constitution, have equal right with men. 2. Women have equal rights with men in marriage as prescribed by this Constitution. 3. The historical legacy of inequality and discrimination suffered by women in Ethiopia taken into account, women, in order to remedy this legacy, are entitled to affirmative measures. The purpose of such measures shall be to provide special attention to women so as to enable them to compete and participate on the basis of equality with men in political, social and economic life as well as in public and private institutions. 4. The State shall enforce the right of women to eliminate the influences of harmful customs. Laws, customs and practices that oppress or cause bodily or mental harm to women are prohibited. 5. (a) Women have the right to maternity leave with full pay. The duration of maternity leave shall be determined by law taking into account the nature of the work, the health of the mother and the well-being of the child and family. (b) Maternity leave may, in accordance with the provisions of law, include prenatal leave with full pay. 6. Women have the right to full consultation in the formulation of national development policies, the designing and execution of projects, and particularly in the case of projects affecting the interests of women. 7. Women have the right to acquire, administer, control, use and transfer property. In particular, they have equal rights with men with respect to use, transfer, administration and control of land. They shall also enjoy equal treatment in the inheritance of property. 8. Women shall have a right to equality in employment, promotion, pay, and the transfer of pension entitlements. 9. To prevent harm arising from pregnancy and childbirth and in order to safeguard their health, women have the right of access to family planning education, information and capacity.
Article 36	1. Every child has the right: a. To life; b. To a name and nationality; c. To know and be cared for by his or her parents or legal guardians; d. Not to be subject to exploitative practices, neither to be required nor permitted to perform work which may be hazardous or harmful to his or her education, health or well-being; e. To be free of corporal punishment or cruel and inhumane treatment in schools and other institutions responsible for the care of children. 2. In all actions concerning children undertaken by public and private welfare institutions, courts of law, administrative authorities or legislative bodies, the primary consideration shall be the best interest of the child. 3. Juvenile offenders admitted to corrective or rehabilitative institutions, and juveniles who become wards of the State or who are placed in public or private orphanages, shall be kept separately from adults. 4. Children born out of wedlock shall have the same rights as children born of wedlock. 5. The State shall accord special protection to orphans and shall encourage the establishment of institutions which ensure and promote their adoption and advance their welfare, and education.

Article 41	1. Every Ethiopian has the right to engage freely in economic activity and to pursue a livelihood of his choice anywhere within the national territory. 2. Every Ethiopian has the right to choose his or her means of livelihood, occupation and profession. 3. Every Ethiopian national has the right to equal access to publicly funded social services. 4. The State has the obligation to allocate an ever increasing resources to provide to the public health, education and other social services. 5. The State shall, within available means, allocate resources to provide rehabilitation and assistance to the physically and mentally disabled, the aged, and to children who are left without parents or guardian. 6. The State shall pursue policies which aim to expand job opportunities for the unemployed and the poor and shall accordingly undertake programmes and public works projects. 7. The State shall undertake all measures necessary to increase opportunities for citizens to find gainful employment. 8. Ethiopian farmers and pastoralists have the right to receive fair price for their products, that would lead to improvement in their conditions of life and to enable them to obtain an equitable share of the national wealth commensurate with their contribution. This objective shall guide the State in the formulation of economic, social and development policies. 9. The State has the responsibility to protect and preserve historical and cultural legacies, and to contribute to the promotion of the arts and sports.
Article 89	1. Government shall have the duty to formulate policies which ensure that all Ethiopians can benefit from the country's legacy of intellectual and material resources. 2. Government has the duty to ensure that all Ethiopians get equal opportunity to improve their economic condition and to promote equitable distribution of wealth among them. 3. Government shall take measures to avert any natural and man-made disasters, and, in the event of disasters, to provide timely assistance to the victims. 4. Government shall provide special assistance to Nations, Nationalities, and Peoples least advantaged in economic and social development. 5. Government has the duty to hold, on behalf of the People, land and other natural resources and to deploy them for their common benefit and development. 6. Government shall at all times promote the participation of the People in the formulation of national development policies and programmes; it shall also have the duty to support the initiatives of the People in their development endeavours. 7. Government shall ensure the participation of women in equality with men in all economic and social development endeavours. 8. Government shall endeavour to protect and promote the health, welfare and living standards of the working population of the country.
Article 90	1. To the extent the country's resources permit, policies shall aim to provide all Ethiopians access to public health and education, clean water, housing, food and social security. 2. Education shall be provided in a manner that is free from any religious influence, political partisanship or cultural prejudices.
Article 92	1. Government shall endeavour to ensure that all Ethiopians live in a clean and healthy environment. 2. The design and implementation of programmes and projects of development shall not damage or destroy the environment. 3. People have the right to full consultation and to the expression of views in the planning and implementations of environmental policies and projects that affect them directly. 4. Government and citizens shall have the duty to protect the environment.
Convention on the Rights of the Child (CRC) (1989)	
Article 13	1. The child shall have the right to freedom of expression; this right shall include freedom to seek, receive and impart information and ideas of all kinds, regardless of frontiers, either orally, in writing or in print, in the form of art, or through any other media of the child's choice.2. The exercise of this right may be subject to certain restrictions, but these shall only be such as are provided by law and are necessary: (a) For respect of the rights or reputations of others; or (b) For the protection of national security or of public order, or of public health or morals.
Article 17	1. States Parties recognize the important function performed by the mass media and shall ensure that the child has access to information and material from a diversity of national and international sources, especially those aimed at the promotion of his or her social, spiritual, and moral well-being and physical and mental health. To this end, States Parties shall: (a) Encourage the mass media to disseminate information and material of social and cultural benefit to the child and in accordance with the spirit of article 29; (b) Encourage international co-operation in the production, exchange and dissemination of such information and material from a diversity of cultural, national and international sources; (c) Encourage the production and dissemination of children's books; (d) Encourage the mass media to have particular regard to the linguistic needs of the child who belongs to a minority group or who is indigenous; (e) Encourage the development of appropriate guidelines for the protection of the child from information and material injurious to his or her well-being, bearing in mind the provisions of articles 13 and 18.

Article 24	1. States Parties recognize the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health. States Parties shall strive to ensure that no child is deprived of his or her right of access to such health care services. 2. States Parties shall pursue full implementation of this right and, in particular, shall take appropriate measures: (a) To diminish infant and child mortality; (b) To ensure the provision of necessary medical assistance and health care to all children with emphasis on the development of primary health care; (c) To combat disease and malnutrition, including within the framework of primary health care, through, inter alia, the application of readily available technology and through the provision of adequate nutritious foods and clean drinking-water, taking into consideration the dangers and risks of environmental pollution;(d) To ensure appropriate pre-natal and post-natal health care for mothers; (e) To ensure that all segments of society, in particular parents and children, are informed, have access to education and are supported in the use of basic knowledge of child health and nutrition, the advantages of breastfeeding, hygiene and environmental sanitation and the prevention of accidents; (f) To develop preventive health care, guidance for parents and family planning education and services. 3. States Parties shall take all effective and appropriate measures with a view to abolishing traditional practices prejudicial to the health of children. 4. States Parties undertake to promote and encourage international co-operation with a view to achieving progressively the full realization of the right recognized in the present article. In this regard, particular account shall be taken of the needs of developing countries.
Article 27	1. States Parties recognize the right of every child to a standard of living adequate for the child's physical, mental, spiritual, moral, and social development. 2. The parent(s) or others responsible for the child have the primary responsibility to secure, within their abilities and financial capacities, the conditions of living necessary for the child's development. 3. States Parties, in accordance with national conditions and within their means, shall take appropriate measures to assist parents and others responsible for the child to implement this right and shall in case of need provide material assistance and support programmes, particularly with regard to nutrition, clothing and housing. 4. States Parties shall take all appropriate measures to secure the recovery of maintenance for the child from the parents or other persons having financial responsibility for the child, both within the State Party and from abroad. In particular, where the person having financial responsibility for the child lives in a State different from that of the child, States Parties shall promote the accession to international agreements or the conclusion of such agreements, as well as the making of other appropriate arrangements.
Article 28	1. States Parties recognize the right of the child to education, and with a view to achieving this right progressively and on the basis of equal opportunity, they shall, in particular: (a) Make primary education compulsory and available free to all; (b) Encourage the development of different forms of secondary education, including general and vocational education, make them available and accessible to every child, and take appropriate measures such as the introduction of free education and offering financial assistance in case of need; (c) Make higher education accessible to all on the basis of capacity by every appropriate means; (d) Make educational and vocational information and guidance available and accessible to all children; (e) Take measures to encourage regular attendance at schools and the reduction of drop-out rates. 2. States Parties shall take all appropriate measures to ensure that school discipline is administered in a manner consistent with the child's human dignity and in conformity with the present Convention. 3. States Parties shall promote and encourage international cooperation in matters relating to education, in particular with a view to contributing to the elimination of ignorance and illiteracy throughout the world and facilitating access to scientific and technical knowledge and modern teaching methods. In this regard, particular account shall be taken of the needs of developing countries.

Annex 3: Variables and thresholds used to define deprivation indicators

Dimension	Indicator and threshold	Under 5 years	5-14 years	15-17 years
Development (stunting)	**Stunting:** child's height-for-age is below -2SD from reference population	X		
Health	**Skilled birth attendance:** child is deprived if she/he was delivered with no assistance or with the assistance of persons other than: doctor, nurse, midwife, HEW, or other health personnel	0-11 months		
	Adequacy of ANC: child is deprived if her/his mother had less than 4 ANC visits during pregnancy or 4+ performed by a person other than: doctor, nurse, midwife, HEW, or other health personnel	0-11 months		
	Vaccination: child is deprived in immunization if she/he has not received vaccination according to the national immunization schedule (children under 11 months), or if she/he is not fully immunized (age 11-59 months). Following the national vaccination schedule and allowing for 1 month flexibility in getting vaccinated, for children younger than 11 months, the applied thresholds were as follows: BCG (1 month); DPT-HepB-Hib dose 1 and Polio dose 1 (3 months); DPT-HepB-Hib dose 2 and Polio dose 2 (4 months);DPT-HepB-Hib dose 3 and Polio dose 3 (5 months); Measles (10 months). Children age 11-59 months are considered deprived in immunization if they have not received all the vaccines listed above. Due to the large portion of missing values, the data have been imputed for children 3-4 years using information from their younger siblings.	X		
	Mother's knowledge on ORS for treatment of diarrhoea: child is deprived if her/his mother has never used ORS for treatment of diarrhoea or does not know that ORS can be used for treatment of diarrhoea	12-59 months		
Nutrition	**Exclusive breastfeeding:** child is deprived if fed anything other than breastmilk	0-5 months		
	IYCF: child is deprived if she/he is not fed a minimum acceptable diet, i.e. minimum dietary diversity (MMD) or minimum meal frequency (MMF). The threshold applied depends on age of child and whether she/he is being breastfed. Children of age 6-23 months are considered deprived of MDD if their food intake includes less than 4 out of 7 food groups which include: 1. Grains, roots, and tubers; 2. Legumes and nuts; 3. Dairy products (milk, yogurt, cheese); 4. Flesh foods (meat, fish, poultry, and liver/organ meat); 5. Eggs; 6. Vitamin A-rich fruits and vegetables; and 7. Other fruits and vegetables. In terms of MMF, children who are breastfed are considered to receive MMF if they are fed solid, semi-solid or soft foods at least twice a day (age 6-8 months) and at least three times a day (age 9-23 months). Children who are not breastfed are considered to meet the minimum MMF if they are fed solid, semi-solid or soft foods at least four times a day.	6-23 months		
	Wasting: child's weight-for-height is below -2SD from the median of the reference population	X		
	Underweight: child's weight-for-age is below -2SD from the median of the reference population	X		
	Vitamin A supplement: child has not received a vitamin A supplement during the last six months	7-59 months		
Education	**School attendance:** child is deprived if she/he is of school-going age (both compulsory and secondary school age) 7-17 years and is currently not attending school (children under 7 are included in the analysis but considered non-deprived in multidimensional deprivation analysis as pre-primary education is not mandatory in Ethiopia)		X	X

Dimension	Indicator and threshold	Under 5 years	5-14 years	15-17 years
	Grade-for-age: child is deprived if she/he is attending school but with delay compared to appropriate grade for one's age. For children 9-14 years, they are deprived if child is attending school with two or more years of delay; for children 15-17 years, they are deprived if child is attending school with three or more years of delay		X	X
	Literacy: deprived if one cannot read or can read only parts of the sentence of the survey reading test card (unless with disabilities)			X
Health-related knowledge	**Household knowledge about ORS for treating diarrhoea:** child aged 5-14 years lives in a household where none of the women members (ages 15-49) have used ORS for treating diarrhoea or know that ORS can be used for treating diarrhoea		X	
	Household/individual knowledge about HIV/AIDS: child aged 5-14 years is deprived if none of the household members has knowledge about HIV/AIDS transmission and prevention; whereas a child aged 15-17 is deprived if she/he does not have knowledge on HIV/AIDS transmission and prevention. When individual information is not available, information from adult household members is imputed. The child is deprived if she/he or none of household members: i. Has never heard about HIV/AIDS; ii. Does not know that HIV/AIDS transmission can be prevented by having sex with one partner who has no other partners or by always using condoms during sex; iii. Does not reject any of the two most common misconceptions about HIV/AIDS transmission – that HIV can be spread by mosquito bites or by sharing food with an HIV-infected person; or iv. If one thinks that or doesn't know that a healthy-looking person can have HIV.		X	X
Information and participation	**Information devices:** child is deprived if she/he lives in a household that does not possess any of the following: TV, radio, phone or mobile phone		X	X
	Household/individual community participation: child age 5-14 years is deprived if none of the household members has heard about family planning messages through participation in community events or conversations over the last few months; whereas child age 15-17 years is deprived if she/he has not heard family planning messages through own participation in community events or conversations. When data on individual children is missing, information from adult household members is imputed.		X	X
Water	**Source of drinking water:** child is deprived if the main source of drinking water is unimproved: unprotected dug well, unprotected spring, surface water, tanker truck, cart with small tank, bottled water (if non-drinking water is also from an unimproved water source), and other sources	X	X	X
	Distance to water: child is deprived if the main drinking water source of the household is located more than 30 minutes away than what is necessary to fetch water and return to the dwelling	X	X	X
Sanitation	**Toilet type:** child is deprived if living in a household that uses an unimproved toilet type: flush to somewhere else; flush don't know where; pit latrine without slab/open pit; no facility/bush/field; bucket toilet; hanging toilet or latrine; other	X	X	X
Housing	**Housing material of floor, walls, and roof:** child is deprived if the floor of the dwelling where she/he resides is built with earth/sand/dung; if the dwelling has no walls, if it was built with thatch/mud, or sod; or the dwelling where one resides has no roof or the roof is built of thatch/mud/sod	X	X	X
	Indoor pollution: child is deprived if living in a dwelling that has no separate room for cooking, cooking is done inside the house, and the household uses solid fuels for cooking (charcoal, wood, straw/shrubs/grass, agricultural crops, animal dung, other).	X	X	X

Annex 4: Treatment of missing values – children under 5

Differences between children under age 5 whose mothers have or have not completed the Woman's Questionnaire

Characteristic/ indicator	Child's mother has answered Woman's Questionnaire			Child's mother has not answered Woman's Questionnaire			Difference	
	Mean	SD	Observations	Mean	SD	Observations	Mean difference	p-value
Household/individual characteristics								
Child's age	1.97	1.44	9,601	2.6	1.36	1,400	(-1.15)	0.00*
Child lives in rural area	0.81	0.39	9,601	0.81	0.39	1,400	0.42	0.68
Number of children under 5 in the household	1.89	0.82	9,601	1.79	0.86	1,400	4.39	0.00*
Number of children age 6-12 in the household	1.45	1.26	9,601	1.42	1.26	1,400	0.89	0.37
Number of children age 13-17 in the household	0.45	0.72	9,601	0.58	0.78	1,400	(-6.20)	0.00*
Number of working age adults (15-59 years)	2.08	0.74	9,601	2.05	1.01	1,400	1.54	0.12
Number of household members age 60+	0.14	0.39	9,601	0.30	0.55	1,400	(-13.52)	0.00*
No working age adult in the household	0.00	0.03	9,601	0.04	0.19	1,400	(-18.10)	0.00*
Dependency ratio	2.11	1.38	9,593	2.24	1.47	1,345	(-3.30)	0.00*
Child lives in a labour constrained household	0.15	0.35	9,601	0.20	0.40	1,400	(-5.59)	0.00*
Child lives without parents	0.00	0.00	9,601	0.28	0.45	1,400	(-60.90)	0.00*
Child is a single/ double orphan	0.02	0.12	9,601	0.07	0.26	1,399	(-13.60)	0.00*
Household head is a woman	0.21	0.41	9,601	0.28	0.45	1,400	(-6.20)	0.00*
Age of household head	37.7	11.6	9,599	43.69	14.87	1,400	(-17.43)	0.00*
Household head has not completed education	0.51	0.50	9,514	0.58	0.49	1,390	(-4.64)	0.00*
Household head has completed primary education	0.34	0.47	9,514	0.27	0.45	1,390	4.74	0.00*
Household head has completed secondary education	0.09	0.29	9,514	0.08	0.27	1,390	1.06	0.29

Characteristic/ indicator	Child's mother has answered Woman's Questionnaire			Child's mother has not answered Woman's Questionnaire			Difference	
	Mean	SD	Observations	Mean	SD	Observations	Mean difference	p-value
Household head has completed higher education	0.06	0.24	9,514	0.07	0.25	1,390	(-0.85)	0.40
Household's wealth index score	-29124	80297	9,601	-30510	86118	1,400	0.60	0.55
Household belongs to the lowest two wealth quintiles	0.54	0.50	9,601	0.59	0.49	1,400	(-3.51)	0.00*
Indicators								
Stunting	0.36	0.48	8,892	0.35	0.48	716	0.28	0.78
Underweight	0.25	0.43	8,959	0.24	0.43	717	0.88	0.38
Wasting	0.12	0.32	8,978	0.10	0.30	781	1.62	0.11
Unimproved water	0.39	0.49	9,601	0.38	0.49	1,400	0.56	0.58
Distance to water	0.35	0.48	9,558	0.32	0.47	1,397	2.33	0.02
Unimproved toilet type	0.83	0.38	9,601	0.82	0.38	1,400	0.64	0.53
Floor, walls, or roof made of natural material	0.83	0.39	9,601	0.82	0.38	1,400	0.10	0.94
Indoor pollution	0.28	0.45	9,601	0.28	0.45	1,400	0.23	0.82

* Difference between the two groups is statistically significant at 99 per cent confidence level.
Note: Calculated using two-sample t-test with equal variances.
Source: Authors' calculations using EDHS 2016.

Annex 5: Treatment of missing values – children ages 5-17 years

Differences between children ages 5-17 years with and without eligible adult household members for the Woman's/Man's Questionnaire

Characteristic/ indicator	At least one household member eligible for the Women's or Men's Questionnaire			No household member eligible for the Women's or Men's Questionnaire			Difference	
	Mean	SD	Observa-tions	Mean	SD	Observa-tions	Mean difference	p-value
Household/individual characteristics								
Child's age	10.40	3.51	25,439	10.30	3.71	1,423	2.04	0.04
Child lives in rural area	0.80	0.40	25,439	0.88	0.33	1,423	(-7.07)	0.00*
Number of children under 5 in the household	1.08	1.01	25,439	0.25	0.61	1,423	30.69	0.00*
Number of children age 6-12 in the household	2.03	1.20	25,439	1.69	1.13	1,423	10.49	0.00*
Number of children age 13-17 in the household	1.02	0.89	25,439	0.55	0.59	1,423	19.56	0.00*
Number of working age adults (15-59 years)	2.13	0.95	25,439	0.71	0.62	1,423	55.83	0.00*
Number of household members age 60+	0.24	0.49	25,439	0.81	0.62	1,423	(-42.47)	0.00*
No working age adult in the household	0.01	0.10	25,439	0.37	0.48	1,423	(-87.95)	0.00*
Dependency ratio	2.40	1.52	25,165	3.03	1.52	897	(-12.16)	0.00*
Child lives in a labour constrained household	0.21	0.40	25,439	0.57	0.50	1,423	(-32.49)	0.00*
Child lives without parents	0.11	0.31	25,439	0.49	0.50	1,423	(-43.85)	0.00*
Child is a single/double orphan	0.10	0.30	25,435	0.20	0.40	1,423	(-11.58)	0.00*
Household head is a woman	0.25	0.43	25,439	0.51	0.50	1,423	(-21.39)	0.00*
Age of household head	44.50	12.60	25,435	61.90	12.74	1,423	(-50.71)	0.00*
Household head has not completed education	0.58	0.49	25,239	0.87	0.33	1,422	(-22.27)	0.00*
Household head has completed primary education	0.30	0.46	25,239	0.10	0.30	1,422	16.19	0.00*
Household head has completed secondary education	0.07	0.26	25,239	0.01	0.12	1,422	8.12	0.00*
Household head has completed higher education	0.05	0.22	25,239	0.01	0.10	1,422	6.98	0.00*

Characteristic/ indicator	At least one household member eligible for the Women's or Men's Questionnaire			No household member eligible for the Women's or Men's Questionnaire			Difference	
	Mean	SD	Observa-tions	Mean	SD	Observa-tions	Mean difference	p-value
Household's wealth index score	-23131	83872	25,439	-50401	59006	1,423	12.10	0.00*
Household belongs to the lowest two wealth quintiles	0.49	0.50	25,439	0.65	0.48	1,423	(-12.00)	0.00*
Indicators								
School attendance	0.28	0.45	21,384	0.32	0.47	1,280	(-3.22)	0.00*
Delay in schooling (grade-for-age)	0.29	0.45	12,241	0.32	0.47	709	(-2.16)	0.03
Information devices	0.34	0.47	25,439	0.66	0.47	1,423	(-25.00)	0.00*
Unimproved water	0.36	0.48	25,439	0.43	0.50	1,423	(-5.64)	0.00*
Distance to water	0.33	0.47	25,360	0.36	0.48	1,422	(-2.13)	0.03
Unimproved toilet type	0.82	0.39	25,439	0.87	0.33	1,423	(-5.33)	0.00*
Floor, walls, or roof made of natural material	0.81	0.39	25,439	0.90	0.30	1,423	(-8.43)	0.00*
Indoor pollution	0.25	0.43	25,439	0.34	0.47	1,423	(-7.84)	0.00*

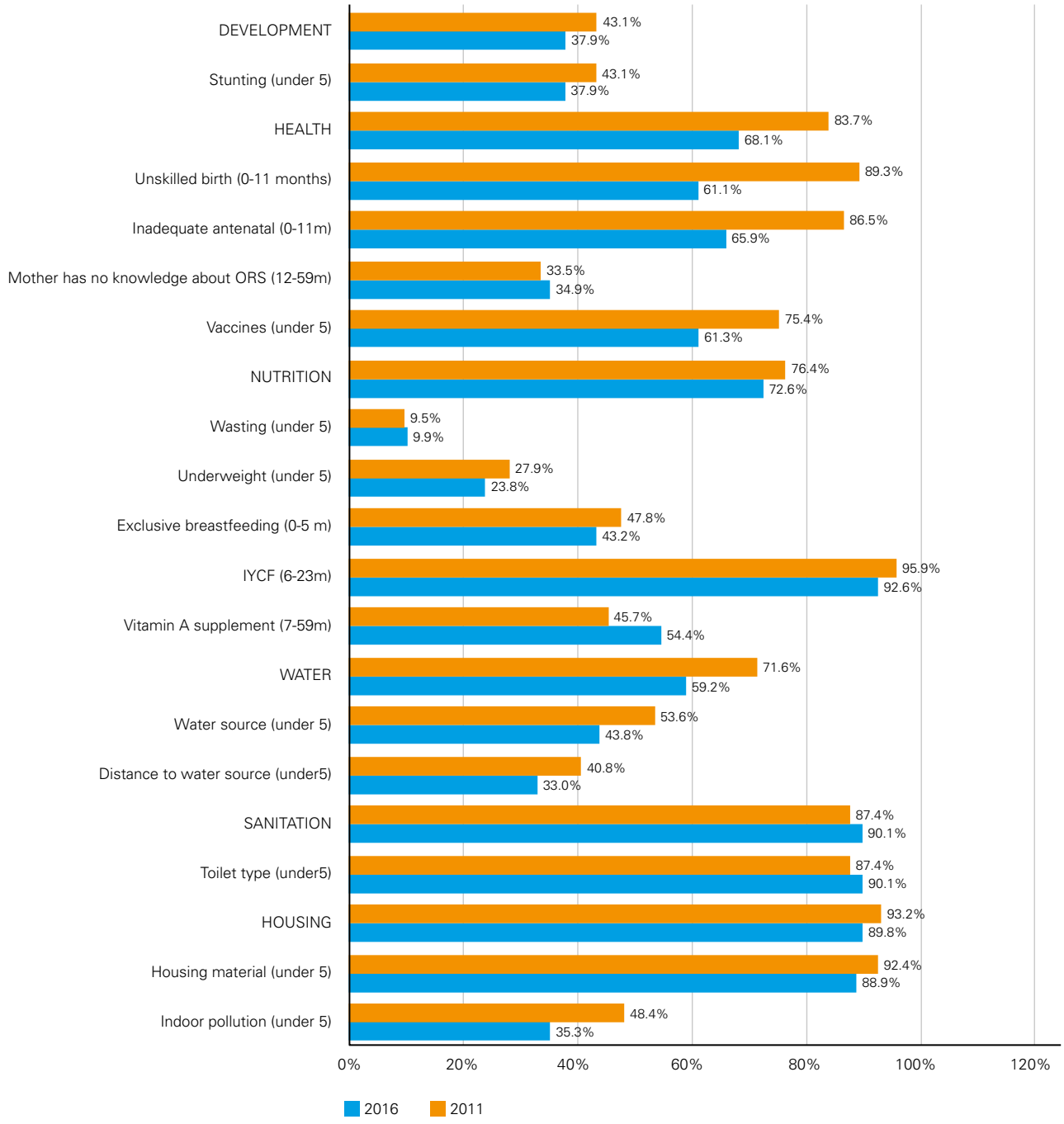
* Difference between the two groups is statistically significant at 99 per cent confidence level.
Note: Calculated using two-sample t-test with equal variances.
Source: Authors' calculations using EDHS 2016.

Annex 6: Dimension deprivation rates by region, children under 5

Dimensions	Development	Health	Nutrition	Water	Sanitation	Housing
Dire Dawa	39.8%	43.0%	64.2%	34.4%	51.3%	54.5%
Addis Ababa	14.7%	13.5%	62.5%	3.3%	18.7%	19.3%
Harari Region	31.6%	57.8%	78.7%	41.2%	69.4%	54.5%
Gambella	23.1%	59.0%	65.9%	26.7%	87.1%	84.9%
SNNPR	38.4%	65.7%	71.1%	64.2%	90.7%	90.8%
Benishangul-Gumuz	42.5%	45.5%	66.4%	43.6%	96.8%	93.2%
Somali Region	26.5%	78.1%	82.4%	73.9%	71.4%	85.0%
Oromia	35.7%	78.6%	74.5%	59.1%	94.0%	92.2%
Amhara	47.0%	62.2%	73.3%	62.5%	95.6%	92.7%
Afar	40.0%	80.1%	84.6%	70.6%	88.2%	93.0%
Tigray	38.3%	37.2%	59.8%	47.3%	83.4%	90.5%
Ethiopia	37.9%	68.1%	72.6%	59.2%	90.1%	89.8%

Source: Authors' calculations using EDHS 2016.

Annex 7: Trend analysis in indicator and dimension deprivation rates, children under 5



Source: Authors' calculations using EDHS 2016 and EDHS 2011.

Annex 8: Indicator deprivation rates by area and region, children under 5

Indicator	Stunting	Unskilled birth	Inadequate antenatal care	Mother's knowledge on ORS for treatment of diarrhoea	Vaccines	Exclusive breastfeeding	IYCF	Wasting	Underweight	Vitamin A supplement
Age	0-59 months	0-11 months	0-11 months	12-59 months	0-59 months	0-5 months	6-23 months	0-59 months	0-59 months	7-59 months
Ethiopia	37.9%	61.1%	65.9%	34.9%	61.3%	43.2%	92.6%	9.9%	23.8%	54.4%
Rural	39.3%	68.4%	70.5%	37.9%	64.3%	43.4%	94.3%	10.0%	24.9%	56.1%
Urban	26.2%	8.8%	32.8%	8.6%	34.5%	41.5%	79.7%	9.1%	13.8%	40.3%
Dire Dawa	39.8%	31.2%	31.1%	17.7%	32.8%	34.0%	93.2%	10.3%	27.1%	29.8%
Addis Ababa	14.7%	2.0%	12.7%	4.3%	10.0%	41.9%	69.4%	3.7%	5.0%	48.4%
Harari Region	31.6%	45.3%	72.6%	5.3%	57.8%	58.2%	90.3%	10.8%	20.1%	61.8%
Gambella	23.1%	50.4%	62.4%	19.6%	58.8%	49.5%	89.1%	13.8%	18.1%	42.1%
SNNPR	38.4%	55.4%	56.9%	38.8%	54.6%	44.2%	93.2%	6.1%	21.8%	52.8%
Benishangul-Gumuz	42.5%	60.7%	53.1%	15.9%	36.1%	33.3%	83.6%	10.7%	34.5%	34.8%
Somali	26.5%	74.0%	85.4%	13.4%	78.4%	61.6%	97.1%	22.6%	27.8%	63.2%
Oromia	35.7%	73.5%	77.8%	39.9%	73.2%	46.0%	91.0%	10.4%	22.6%	61.1%
Amhara	47.0%	55.3%	59.1%	38.8%	51.8%	36.6%	97.2%	9.9%	29.1%	50.9%
Afar	40.0%	75.0%	75.5%	14.5%	84.5%	46.0%	98.5%	17.8%	36.2%	65.6%
Tigray	38.3%	24.3%	39.4%	10.0%	30.4%	28.2%	94.4%	11.3%	22.4%	26.9%

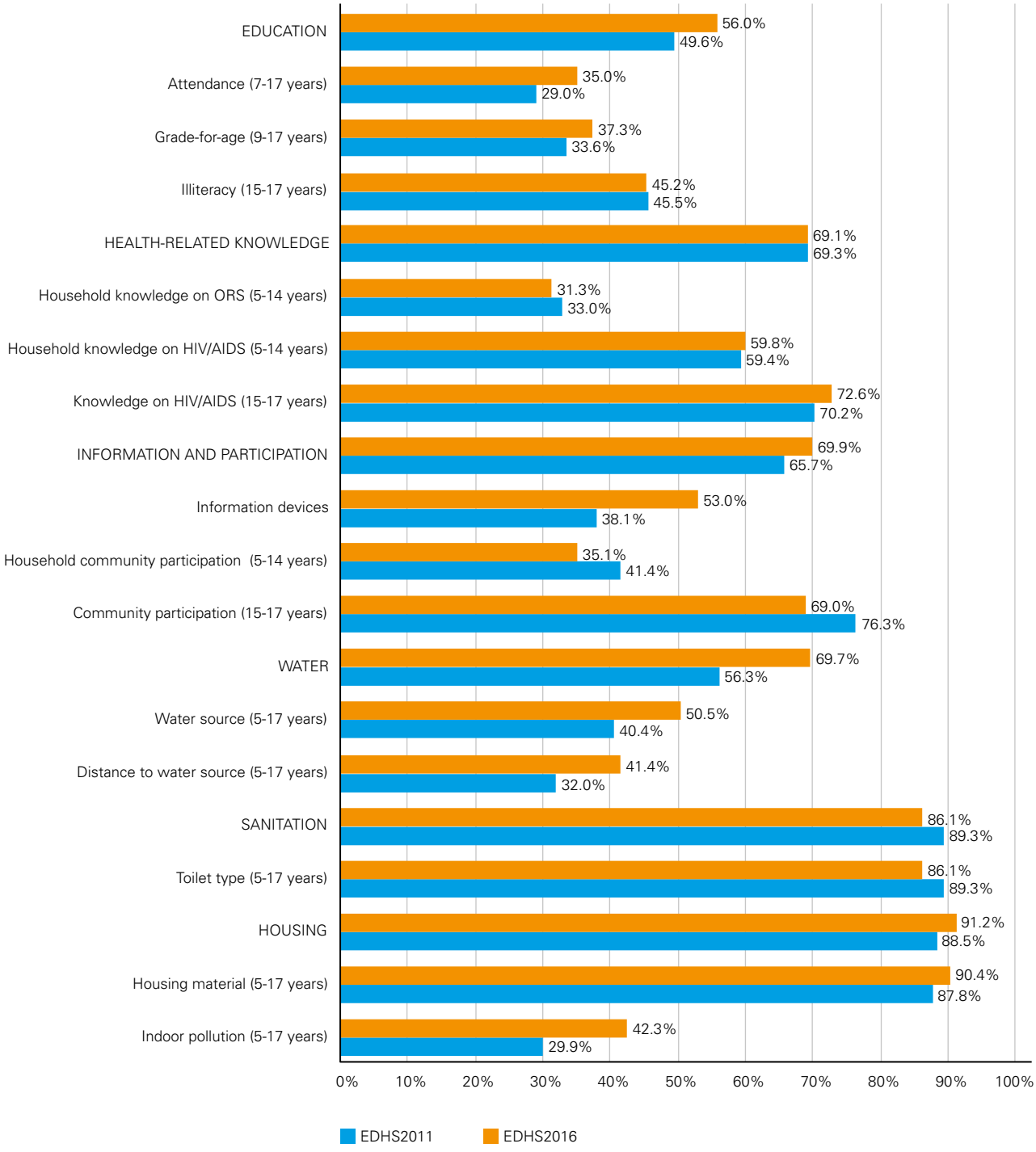
Source: Authors' calculations using EDHS 2016.

Annex 9: Dimension deprivation rates by area and region, children age 5-17 years

Dimensions	Education	Health-related knowledge	Information and Participation	Water	Sanitation	Housing
Ethiopia	49.6%	69.3%	65.7%	56.3%	89.3%	88.5%
Rural	53.2%	72.7%	67.2%	62.1%	94.1%	94.5%
Urban	23.9%	45.5%	54.9%	13.8%	54.0%	44.5%
Dire Dawa	36.2%	70.2%	70.4%	32.2%	50.0%	52.0%
Addis Ababa	19.9%	39.3%	58.9%	2.1%	18.7%	19.8%
Harari Region	35.6%	72.9%	70.9%	38.1%	67.2%	49.7%
Gambella	32.8%	65.6%	72.5%	26.7%	89.2%	85.0%
SNNPR	50.2%	71.9%	69.2%	63.7%	89.3%	88.7%
Benishangul-Gumuz	42.2%	77.4%	71.0%	41.5%	97.4%	93.4%
Somali Region	58.4%	92.5%	84.6%	72.1%	70.1%	85.1%
Oromia	56.1%	71.5%	64.3%	53.1%	92.8%	89.7%
Amhara	43.1%	64.2%	65.5%	60.5%	95.5%	93.2%
Afar	55.1%	76.4%	79.4%	70.2%	88.1%	91.0%
Tigray	33.6%	56.7%	50.6%	48.0%	84.4%	91.3%

Source: Authors' calculations using EDHS 2016.

Annex 10: Trend analysis in indicator and dimensions deprivation rates, children ages 5-17 years



Source: Authors' calculations using EDHS 2016 and EDHS2011.

Annex 11: Indicator deprivation rates by area and region of residence, children age 5-17 years

Indicators	Attend-ance	Grade for age	Infor-mation devices	Water source	Water Distance	Toilet type	Housing material	Indoor pollution
Ethiopia	29.0%	33.6%	38.1%	40.4%	32.1%	89.3%	87.8%	29.9%
Rural	31.4%	37.5%	42.2%	45.3%	35.0%	94.1%	94.3%	32.6%
Urban	12.6%	13.4%	7.8%	4.3%	10.6%	54.0%	40.1%	10.4%
Dire Dawa	22.8%	19.9%	26.5%	16.3%	29.3%	50.0%	50.3%	13.7%
Addis Ababa	11.4%	11.0%	1.0%	0.4%	1.7%	18.7%	5.7%	15.7%
Harari Region	23.6%	20.7%	21.5%	25.0%	27.8%	67.2%	48.4%	4.6%
Gambella	12.7%	23.9%	33.5%	18.0%	13.7%	89.2%	84.8%	19.7%
SNNPR	24.5%	37.5%	39.8%	44.3%	35.9%	89.3%	88.2%	41.6%
Benishangul-Gumuz	23.5%	28.6%	41.3%	19.2%	27.0%	97.4%	93.3%	26.3%
Somali Region	40.7%	35.2%	33.4%	59.0%	44.4%	70.1%	84.9%	4.7%
Oromia	34.1%	39.8%	36.3%	40.5%	27.5%	92.8%	89.5%	31.2%
Amhara	26.1%	27.3%	47.2%	41.9%	37.0%	95.5%	92.9%	25.6%
Afar	38.9%	32.2%	37.7%	50.9%	54.9%	88.1%	89.7%	58.9%
Tigray	22.0%	17.3%	30.2%	26.7%	33.3%	84.4%	90.1%	12.6%

Source: Authors' calculations using EDHS 2016.

Annex 12: Dimension deprivation rates by area and region of residence, children ages 5-14 years and 15-17 years

Dimension deprivation rates by area and region of residence, children ages 5-14 years

Dimensions	Education	Health-related Knowledge	Information & Participation	Water	Sanitation	Housing
Ethiopia	52.8%	68.3%	67.2%	70.6%	86.7%	91.7%
Rural	57.6%	72.3%	71.4%	78.9%	91.2%	97.2%
Urban	24.5%	45.5%	42.7%	21.2%	59.6%	59.3%
Dire Dawa	35.5%	58.4%	57.0%	40.2%	53.6%	50.3%
Addis Ababa	19.6%	41.8%	53.3%	8.0%	29.5%	32.6%
Harari Region	33.5%	68.8%	57.6%	47.1%	71.3%	68.2%
Gambella	38.4%	72.9%	74.1%	48.1%	83.2%	90.5%
SNNPR	57.6%	63.2%	68.5%	78.4%	91.9%	91.1%
Benishangul-Gumuz	49.2%	66.2%	68.6%	55.4%	89.8%	96.1%
Somali Region	62.4%	91.2%	78.8%	79.7%	68.4%	82.0%
Oromia	57.9%	71.0%	65.8%	76.5%	90.9%	93.3%
Amhara	47.4%	71.2%	69.1%	63.3%	83.9%	97.2%
Afar	61.8%	84.1%	86.0%	80.5%	89.8%	94.4%
Tigray	34.0%	59.4%	61.7%	57.0%	82.1%	91.8%

Source: Authors' calculations using EDHS 2016.

Dimension deprivation rates by area and region of residence, children ages 15-17 years

Dimensions	Education	Health-related Knowledge	Information & Participation	Water	Sanitation	Housing
Ethiopia	66.2%	70.2%	83.2%	48.8%	84.9%	82.6%
Rural	73.8%	74.1%	84.9%	59.1%	93.2%	93.3%
Urban	36.1%	55.3%	76.5%	8.2%	51.9%	40.3%
Dire Dawa	49.6%	68.7%	85.1%	21.2%	33.9%	34.4%
Addis Ababa	37.2%	54.9%	80.3%	1.3%	17.5%	18.1%
Harari Region	46.9%	76.3%	83.7%	25.9%	54.5%	32.9%
Gambella	58.4%	69.4%	85.2%	20.4%	86.2%	81.0%
SNNPR	75.8%	75.5%	81.8%	58.5%	87.2%	83.9%
Benishangul-Gumuz	60.4%	80.5%	85.7%	40.1%	96.5%	90.8%
Somali Region	68.6%	94.4%	92.0%	68.9%	62.1%	79.4%
Oromia	68.2%	69.8%	84.7%	45.8%	88.8%	83.0%
Amhara	62.4%	65.7%	85.6%	54.4%	93.3%	91.6%
Afar	81.9%	83.8%	89.4%	63.3%	83.6%	87.7%
Tigray	56.1%	66.6%	68.9%	40.1%	82.4%	89.5%

Source: Authors' calculations using EDHS 2016.

Annex 13: Indicator deprivation rates by area and region of residence, children ages 5-14 years and 15-17 years

Indicator deprivation rates by area and region of residence, children age 5-14 years

Indicator	School attendance (7-14 years)	Grade-for-age (2+ years of delay (9-14 years)	Household knowledge on ORS	Household HIV/AIDS knowledge	Information devices	Household community participation	Water source	Distance to water	Toilet type	Housing material	Indoor pollution
Ethiopia	27.9%	32.7%	33.0%	59.4%	39.7%	41.4%	41.5%	32.6%	90.1%	88.9%	31.0%
Rural	30.1%	35.7%	35.8%	61.9%	43.4%	41.3%	45.8%	35.1%	94.3%	94.5%	33.5%
Urban	9.5%	13.7%	9.6%	38.6%	8.7%	42.4%	4.9%	12.0%	54.7%	41.6%	10.8%
Dire Dawa	21.2%	20.7%	19.4%	67.2%	29.3%	54.7%	17.1%	31.3%	53.2%	54.0%	14.4%
Addis Ababa	4.7%	8.7%	4.4%	31.6%	1.5%	49.3%	0.6%	1.8%	19.1%	6.3%	16.0%
Harari Region	21.6%	21.3%	9.4%	71.5%	23.1%	64.6%	26.5%	29.4%	69.3%	51.1%	4.8%
Gambella	11.7%	23.3%	19.7%	59.8%	35.7%	59.0%	19.0%	14.2%	89.8%	85.7%	19.6%
SNNPR	23.9%	36.8%	35.3%	60.8%	41.7%	45.4%	45.1%	36.2%	89.6%	89.0%	43.0%
Benishangul-Gumuz	22.8%	28.5%	15.2%	73.7%	42.8%	50.4%	19.3%	27.1%	97.5%	93.7%	27.5%
Somali Region	41.1%	34.6%	12.9%	91.3%	34.3%	78.0%	59.2%	45.4%	71.2%	85.6%	4.8%
Oromia	33.6%	39.4%	37.8%	61.0%	37.3%	43.9%	41.6%	27.8%	93.4%	90.6%	32.4%
Amhara	23.5%	25.0%	36.8%	51.4%	49.4%	27.3%	42.8%	37.7%	95.9%	93.3%	26.3%
Afar	36.8%	29.6%	12.5%	74.1%	39.5%	68.6%	52.0%	55.8%	88.8%	90.4%	59.2%
Tigray	18.1%	15.4%	8.9%	51.9%	31.1%	23.5%	27.6%	34.4%	84.8%	90.6%	12.3%

Source: Authors' calculations using EDHS 2016.

Indicator deprivation rates by area and region of residence, children age 15-17 years

Indicators	Attendance	Grade-for-age (3+ years of delay)	Illiteracy	HIV/AIDS knowledge	Information devices	Community participation	Water source	Distance to water	Toilet type	Housing material	Indoor pollution
Ethiopia	34.3%	37.5%	45.5%	70.2%	28.8%	76.3%	34.0%	28.7%	84.9%	81.4%	23.4%
Rural	37.8%	45.4%	52.5%	74.1%	34.8%	76.6%	42.1%	34.4%	93.2%	93.0%	27.1%
Urban	20.6%	12.9%	18.2%	55.3%	5.0%	75.0%	2.2%	6.2%	51.9%	35.7%	9.1%
Dire Dawa	29.2%	17.2%	38.4%	68.7%	12.7%	82.9%	12.1%	19.7%	33.9%	32.2%	10.3%
Addis Ababa	24.9%	15.8%	15.7%	54.9%	0.0%	80.3%	0.0%	1.3%	17.5%	4.3%	15.0%
Harari Region	33.5%	18.2%	33.2%	76.3%	11.5%	83.2%	16.1%	18.1%	54.5%	32.3%	3.8%
Gambella	17.0%	25.9%	51.6%	69.4%	21.6%	80.8%	12.8%	10.9%	86.2%	80.0%	20.2%
SNNPR	27.6%	40.3%	69.1%	75.5%	27.2%	75.2%	39.5%	33.8%	87.2%	83.2%	32.6%
Benishangul-Gumuz	27.4%	29.2%	47.7%	80.5%	31.4%	80.5%	18.7%	26.4%	96.5%	90.8%	17.4%
Somali Region	38.5%	37.8%	58.4%	94.4%	27.4%	88.4%	57.8%	37.5%	62.1%	79.4%	3.9%
Oromia	36.4%	41.7%	47.6%	69.8%	29.6%	79.5%	33.7%	25.4%	88.8%	82.7%	23.5%
Amhara	37.5%	37.2%	29.2%	65.7%	35.9%	75.0%	37.4%	33.3%	93.3%	90.8%	22.0%
Afar	49.2%	43.1%	71.6%	83.8%	26.5%	85.6%	44.0%	49.5%	83.6%	85.2%	57.5%
Tigray	36.7%	24.1%	30.1%	66.6%	25.9%	56.8%	22.2%	28.0%	82.4%	87.6%	14.0%

Source: Authors' calculations using EDHS 2016.

Annex 14: Indicator and dimension deprivation rates by area and region of residence, ages 0-17 years

	Water	Water source	Distance to water	Sanitation/ toilet type	Housing	Housing material	Indoor pollution
Ethiopia	57.1%	41.3%	32.2%	89.4%	88.8%	88.0%	31.4%
Rural	62.8%	46.2%	35.1%	94.2%	94.7%	94.5%	34.1%
Urban	13.9%	4.4%	10.6%	53.4%	43.9%	39.0%	11.0%
Dire Dawa	32.8%	17.4%	29.5%	50.0%	52.3%	50.9%	13.7%
Addis Ababa	2.3%	0.5%	1.9%	18.5%	19.4%	5.3%	15.3%
Harari Region	38.7%	26.2%	27.5%	67.7%	50.8%	49.3%	4.9%
Gambella	26.9%	19.0%	13.2%	89.2%	85.6%	85.2%	20.6%
SNNPR	63.8%	44.4%	35.8%	89.5%	89.2%	88.7%	43.3%
Benishangul-Gumuz	42.2%	19.6%	27.2%	97.2%	93.3%	93.3%	27.3%
Somali Region	72.5%	59.4%	44.7%	70.4%	85.1%	84.8%	4.8%
Oromia	54.8%	42.2%	28.0%	93.1%	90.4%	90.0%	33.2%
Amhara	60.9%	42.6%	37.0%	95.4%	93.0%	92.7%	27.1%
Afar	70.3%	51.1%	54.9%	88.3%	91.7%	90.4%	59.1%
Tigray	47.8%	26.5%	33.3%	84.1%	91.2%	89.6%	13.4%

Source: Authors' calculations using EDHS 2016.

Annex 15: Multidimensional child deprivation in Ethiopia

	Multidimensional child deprivation rate (K = 3)	Average deprivation intensity (K = 3)	MCD Index (K = 3)	Contribution to the total MD Index	Total number of children	Total number of multidimensionally deprived children (K = 3)
Ethiopia	88%	4.5	0.65		41,285,820	36,224,341
Rural	94%	4.5	0.70	95.2%	N/A	N/A
Urban	42%	3.7	0.26	4.8%	N/A	N/A
Dire Dawa	56%	4.3	0.41	0.3%	156,180	88,046
Addis Ababa	18%	3.2	0.10	0.3%	988,241	180,831
Harari Region	63%	4.4	0.45	0.1%	89,930	56,257
Gambella	81%	4.0	0.54	0.2%	170,195	138,090
SNNPR	91%	4.5	0.68	23.2%	8,828,429	8,004,575
Benishangul-Gumuz	89%	4.3	0.64	1.0%	472,235	422,072
Somali Region	90%	4.7	0.70	4.3%	2,442,179	2,195,159
Oromia	90%	4.5	0.67	43.3%	16,674,114	14,979,114
Amhara	91%	4.5	0.67	20.7%	8,532,666	7,731,018
Afar	91%	4.8	0.72	0.9%	694,943	633,194
Tigray	80%	4.1	0.54	5.4%	2,236,710	1,778,257

Source: Authors' calculations using EDHS 2016 and CSA population projects for 2016.

Annex 16: Participants during Preliminary Findings Consultation Workshop

Name/ Institution	Name/ Institution	Name/ Institution
Central Statistical Agency	**Ministry of Women and Children Affaires**	**National Planning Commission**
Alemayehu Teferi	Alemu Wolde	Abas Mohammed
Asnakech Habtamu	Ashenafi Feyissa	Aster Tadege
Bethel Abera	Aynalem Ayalew	Bazezew Berihune
Damtew Berhanu	Behailu Teshome	Habtamu Getachew
Dawit Berhanu	Emebet Tesfaye	Sisay Alemayehu
Endashaw Feleke	Eyerusalem Hadush	**Federal Ministry of Health**
Esayas Muleta	Fanos Dereje	Ermias Dessie
Kassu Gebeyehu	Kalkidan Shimelis	Eyerusalem Animut
Mengistu Abebe	Kura Jemaneh	Tsedeke Matheos
Mengistu Belay	Mentwab Geday	**Young Lives**
Salah Yusuf	Nejmiya Sultan	Alula Pankhurst (Pr.)
Sehin Merawi	Yodit Tesfaye	Agazi Tiumelissan
Seid Jemal	Zebulanche Dessie	**Ministry of Education**
Sisay Endale	Zekarias Desalegn	Mesfin Tesfaye
Sultan Ahmed	**UNICEF**	**Ministry of Water and Energy, National WASH Program**
Yirga Nigusse	Ellen Alem	Getachew Tikuye
Zenaslase Siyum	Ephrem Belay	**Ethiopian Public Health Institute**
Ethiopian Centre for Child Research/ EDRI	Eyob Getachew	Habtamu Teklie
Yisak Tafere (Dr.)	Getachew Hailemichael	Theodros Getachew
Ministry of Labour and Social Affaires	Hiwot Gebeyehu	**Addis Ababa University**
Tamrat Worku	Martha Kibur	Dinkineh Hailu
EPRI/SPRI	Mekiya Feki	
Chris De Neubourg (Pr.)	Remy Pigois	
Erëblina Elezaj	Vincenzo Vinci	
	Yejimmawork Ayalew	

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