USAID
FROM THE AMERICAN PEOPLE

LEVELS AND TRENDS IN MATERNAL AND CHILD HEALTH DISPARITIES BY WEALTH AND REGION IN ELEVEN COUNTRIES WITH DHS SURVEYS

DHS COMPARATIVE REPORTS 42

August 2016

This publication was produced for review by the United States Agency for International Development (USAID). The report was prepared by Shireen Assaf and Thomas Pullum.

DHS Comparative Reports No. 42

Levels and Trends in Maternal and Child Health Disparities by Wealth and Region in Eleven Countries with DHS Surveys

Shireen Assaf

Thomas Pullum

ICF International
Rockville, Maryland, USA

August 2016

Corresponding author: Shireen Assaf, International Health and Development, ICF International, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA; telephone: +1 301–407–6500; fax: +1 301–407–6501; email: Shireen.Assaf@icfi.com

Acknowledgment: The authors are grateful for the comments provided by Saifuddin Ahmed on a draft of this report.

Editor: Bryant Robey
Document Production: Natalie La Roche

This study was carried out with support provided by the United States Agency for International Development (USAID) through The DHS Program (#AIDOAA-C-13-00095). The views expressed are those of the authors and do not necessarily reflect the views of USAID or the United States Government.

The DHS Program assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. For additional information about the DHS Program contact: DHS Program, ICF International, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA. Phone: +1 301-407-6500; Fax: +1 301-407-6501; Email: reports@dhsprogram.com; Internet: www.dhsprogram.com.

Recommended citation:
Assaf, Shireen, and Thomas Pullum. 2016. *Levels and Trends in Maternal and Child Health Disparities by Wealth and Region in Eleven Countries with DHS Surveys.* DHS Comparative Reports No. 42. Rockville, Maryland, USA: ICF International.

Contents

Tables

Figures

Preface

The Demographic and Health Surveys (DHS) Program is one of the principal sources of international data on fertility, family planning, maternal and child health, nutrition, mortality, environmental health, HIV/AIDS, malaria, and provision of health services.

One of the objectives of The DHS Program is to provide policymakers and program managers in low- and middle-income countries with easily accessible data on levels and trends for a wide range of health and demographic indicators. DHS Comparative Reports provide such information, usually for a large number of countries in each report. These reports are largely descriptive, without multivariate methods, but when possible they include confidence intervals and/or statistical tests.

The topics in the DHS Comparative Reports series are selected by The DHS Program in consultation with the U.S. Agency for International Development.

It is hoped that the DHS Comparative Reports will be useful to researchers, policymakers, and survey specialists, particularly those engaged in work in low- and middle-income countries.

Sunita Kishor
Director, The DHS Program

Abstract

This report describes recent levels and trends in 11 maternal and child health (MCH) indicators in 11 countries, using the two most recent DHS surveys from each country. The emphasis is on within-country disparities by wealth quintile and region and how they may have changed. Six measures and a map are used to describe each indicator in each country. One measure is the overall prevalence of the indicator; four measures describe disparities by wealth; and one measure quantifies regional disparities. Maps show the prevalence of the indicator by region in the most recent survey. Wealth and regional inequality scores summarize the measures in the most recent survey. Nigeria, Mali, Haiti, and Pakistan have the highest wealth inequality scores for almost all indicators. Nigeria, Mali, and Pakistan also have high regional inequality scores. Inequality has declined in some countries for some certain indicators, but several other countries have consistently high levels of inequality and little improvement. According to the concentration index for wealth, Mali had significant deterioration for 7 indicators, followed Nigeria, with deterioration for 4 indicators. Most of the significant improvements were in Ghana, Indonesia, and Liberia, where 6 indicators improved significantly. Despite some limitations, this report may help in planning and focusing interventions to improve both the level and equality of maternal and child health. For each country, health care interventions could be prioritized by specific indicators, wealth quintiles, or regions identified as having the most need.

KEYWORDS: Maternal health, child health, wealth inequalities, regional inequalities, concentration index

Executive Summary

This report describes recent levels and trends in 11 maternal and child health (MCH) indicators in 11 countries, using the two most recent DHS surveys in each country. It has particular emphasis on within-country disparities by wealth quintile and region and how they may have changed between surveys. The indicators examined include: 1) having four or more visits for antenatal care (ANC); 2) the contraceptive prevalence rate for modern methods (mCPR); 3) delivery by a skilled birth attendant (SBA); 4) delivery in a health facility (DHF); 5) completing three doses of DPT vaccine (DPT3); 6) care seeking for symptoms of acute respiratory infection (ARI); 7) care seeking for fever; 8) care seeking for diarrhea; 9) exclusive breastfeeding; 10) stunting; and 11) wasting. The countries included in the analysis are the Democratic Republic of Congo (DRC), Ghana, Haiti, Indonesia, Kenya, Liberia, Mali, Nigeria, Pakistan, Senegal, and Zambia.

To assess the wealth and regional disparities for each MCH indicator, the study used six measures and one map: 1) overall prevalence of the indicator; 2) prevalence of the indicator for each wealth quintile; 3) the difference between the highest and lowest quintiles (q5-q1) compared with the overall level of the indicator; 4) coefficients from the logit regression of the indicator on the highest and lowest wealth quintiles, including 95% confidence intervals; 5) concentration indices, including one-sided tests between surveys to identify statistically significant improvements; 6) the lowest and highest regional estimates compared with the national estimate; 7) country maps for each indicator that show the prevalence of the indicator by region in the most recent survey.

We created wealth and regional inequality scores to summarize the measures in the most recent survey, with higher scores indicating greater inequality. Nigeria, Mali, Haiti, and Pakistan had the highest wealth inequality scores for almost all of the indicators. The only notable exceptions to this pattern are that Haiti had a lower wealth inequality score for the nutrition indicators (stunting and wasting) and Pakistan had a lower score for the maternal indicators (ANC, mCPR, SBA, and DHF). Nigeria, Mali, and Pakistan also had high regional inequality scores. Pakistan had the highest regional inequality score for the maternal and child indicators. Mali had a high inequality score for the maternal indicators. Nigeria, the DRC, and Senegal had high regional inequality scores for the child nutrition indicators (DPT3, ARI, and care seeking for fever and diarrhea).

Some countries showed improvements in certain indicators, but several others had consistently high levels of inequality and showed little improvement between surveys. According to the concentration index for wealth, which includes all five quintiles, not just the highest and lowest, significant deterioration was found for 7 of the 11 indicators for Mali, followed by deterioration for 4 indicators for Nigeria. Most of the significant improvements were found for Ghana, Indonesia, and Liberia, where 6 of the 11 indicators improved according to the concentration index. In addition, Ghana had a concentration index that was not significantly different from zero for 7 out of the 11 indicators, suggesting that by the time of the most recent survey Ghana had achieved equality for most of the indicators examined. Ghana was followed by Senegal and Zambia, which had achieved equality for 5 of the 11 indicators.

Despite some limitations, this report may help in planning and focusing interventions to improve both the level and equality of maternal and child health. For each country, health care interventions could be prioritized by specific indicators, wealth quintiles, or regions identified as having the most need.

1. Introduction

1.1. Background

This report describes recent levels and trends in major indicators of maternal and child health (MCH) in 11 countries, using the two most recent surveys in each country conducted as part of The Demographic and Health Surveys (DHS) Program. It has particular emphasis on within-country disparities and how they may have changed between surveys.

All countries, including the 11 in this report, give high priority to achieving and sustaining high levels of maternal and child health. Ambitious global targets were specified within the framework of the Millennium Development Goals (MDGs) for the period 1990-2015, and are being developed for the period 2015-2030 as part of the Sustainable Development Goals (SDGs). National Ministries of Health and related government offices, international agencies such as WHO and UNICEF, donors such as USAID, and NGOs have sought to expand access to services, sponsored new interventions, and developed action plans with specific indicators and targets for planning.

A primary mandate of The DHS Program is to monitor maternal and child health with repeated surveys in low- and middle-income countries. A strength of the DHS household surveys is in monitoring the use of services such as delivery in a health facility or care seeking for childhood illness. This report will include four indicators for mothers and seven for children. The indicators for the mother—which have strong implications for the health of children as well—are making four or more antenatal care visits; use of modern contraception; delivery by a skilled birth attendant; and delivery in a health facility. Three of these indicators pertain to the most recent childbirth in the five years before the survey. Contraceptive use is an indicator of reproductive health but is relevant here because it enables the avoidance of births that carry high risks for the mother and the child. The seven indicators for children include immunizations (specifically the third DPT immunization, which usually signals that the child has had all recommended immunizations); care seeking for symptoms of acute respiratory infection (ARI) or for fever or diarrhea in the past two weeks; whether a child under age 6 months meets the criteria for exclusive breastfeeding; and whether the child is stunted (short for age) or wasted (low weight for height).

Cross-sectional household surveys are not well suited for assessing the impact of interventions on the survival of mothers and children, and for that reason this report is mainly limited to the use of services and to health behaviors (process indicators). The exception is the inclusion of direct indicators of the nutritional status of children, stunting, and wasting. The DHS Program also conducts Service Provision Assessment (SPA) surveys, which provide information about the coverage and quality of services from the perspective of facilities. Analyses of SPA data on maternal and child health can supplement this report. Together, household surveys and SPA surveys can provide a complete picture of access, quality, and use of services.

In addition to overall improvement of maternal and child health, governments and agencies have a secondary goal of reducing disparities or inequalities. Typically, in every country some women and children are more likely than others to use services and interventions. Differences in use of health care services tend to be due to variations in knowledge and access rather than need or preferences, and to vary by socioeconomic status and location. The ideal pattern of change would be to observe improvements in indicators for all subpopulations in a country—here, improvements for all five wealth quintiles and in all regions. The amount of improvement would be greater as a percentage for subpopulations with lower initial levels of the indicator, and thus disparities would diminish and all subpopulations would converge toward the same level. This report includes several measures of disparity and convergence, as well as a synthesis of these measures.

Wealth quintiles and regions are not the only possible dimensions of inequality. Place of residence (urban and rural) and population density, for example, may influence access to services, but usually these factors are also associated statistically with relative wealth and/or region of residence. For that reason, as well as to keep this report of a manageable size, no covariates other than wealth quintiles and regions are included.

1.2. Previous Research

Reflecting the ambitious goal of eliminating global disparities, several studies have assessed equity in MCH indicators between and within countries. These studies vary somewhat in their selection of countries, data sources, outcomes, covariates, and measures. Rather than reviewing the empirical findings of these studies, the main emphasis in this brief review will be on their discussions of measurement.

No single measure of equality can capture all disparities. Comparisons between countries can be difficult, especially when there is great variation in the overall level of an indicator. Boerma et al. (2008) used data from 54 countries between 1990 and 2006 to compute a coverage index that combined eight MCH indicators. The index was then computed for each wealth quintile to identify gaps in coverage. The authors found large disparities in coverage by wealth, especially in South Asia and in eastern and southern African countries. A combined index is useful for assessing overall disparities in MCH coverage but, in order to plan targeted interventions, must be supplemented with information on the progress for each country and each indicator separately.

Barros et al. (2012) conducted an equity analysis of MCH in 54 countries, using several equality measures and surveys between 2000 and 2008. In addition to the coverage index, two indicators of *absolute* inequality—the difference between the top and bottom quintile and the slope—and two indicators of *relative* inequality—the ratio of the top to the bottom quintile and the concentration index—were also computed. The authors discussed the limitation of the coverage index in potentially masking different patterns of coverage and inequality for separate indicators. They also discussed the difficulty in combining different equality measures, since absolute and relative measures may lead to conflicting findings in certain situations. Their discussion of inequality mainly focused on one measure: the concentration index.

Houweling et al. (2007) showed that both absolute and relative measures can be useful for monitoring inequality, but only if the overall level of the outcome is taken into account. They also advocated the odds ratio of the richest category to the poorest category as preferable to a difference for measuring inequality. Hosseinpoor et al. (2016) used 11 absolute and relative measures to assess regional inequalities in four countries. The results showed that there were many similarities in the measures. The authors recommended using pairwise measures rather than complex measures because they lead to similar conclusions and are easier to convey to general audiences.

To summarize the methodology of these earlier studies, they generally recommend using more than one equality measure, as no single measure can be identified as the best measure, and especially when trends are being assessed, but they also recommend avoiding measures that are duplicative and distinguishing between absolute and relative measures (Barros and Victora 2013; Barros et al. 2012; Hosseinpoor et al. 2016; Houweling et al. 2007; Mackenbach and Kunst 1997).

2. Data and Methods

2.1. Data

The analysis presented here includes data from 11 high-priority USAID MCH countries with recent DHS surveys, focusing on the two most recent surveys in each country so that inferences can be made about trends as well as levels. Table 1 lists these countries and surveys along with the country codes and DHS phase numbers that appear in the graphics of this report.

Table 1. DHS surveys included in the analysis

Country	Country code	Survey 1 DHS phase: year	Survey 2 DHS phase: year
Democratic Republic of the Congo (DRC)	CD	5: 2007	6: 2013-14
Ghana	GH	5: 2008	7: 2014
Haiti	HT	5: 2005-6	6: 2012
Indonesia	ID	5: 2007	6: 2012
Kenya	KE	5: 2008-9	7: 2014
Liberia	LB	5: 2007	6: 2013
Mali	ML	5: 2006	6: 2012-13
Nigeria	NG	5: 2008	6: 2013
Pakistan	PK	5: 2006-7	6: 2012-13
Senegal	SN	6: 2012-13	7: 2014
Zambia	ZM	5: 2007	6: 2014

The 2012-13 survey conducted in Mali coincided with a security crisis that made the regions of Timbuktu (or Tombouctou), Gao, Kidal, and part of Mopti inaccessible. The survey covered the remaining five regions and the capital, Bamako, all located in the south of the country. Since the excluded regions represented less than 10% of the total sample, they were retained in the 2006 survey.

Almost all of the surveys have a gap of 5-7 years between the successive surveys in Table 1. The exception is Senegal which has a one year gap. The Senegal surveys in Table 1 are part of the Senegal Continuous survey project that began in 2012 and is expected to end in 2017 which performs a new DHS survey in each year or round of the project.

2.2. Measures

The report examines 11 indicators related to MCH outcomes. The indicators are listed and defined below.

Four or more visits for antenatal care (ANC):

The proportion of women age 15-49 who have attended at least four antenatal care visits for their most recent pregnancy in the five years before the survey.

Contraceptive prevalence rate for modern methods (mCPR):

The proportion of women age 15-49 who are currently in a union and are using a modern contraceptive method. Modern contraceptive methods include pills, IUD, injections, implants, diaphragm, female and male condoms, female and male sterilization, foam or jelly, and lactational amenorrhea method (LAM). The mCPR may also include other modern contraceptive methods that are country-specific or less common but were reported by the respondent and identified in the datasets as modern methods.

Delivery by a skilled birth attendant (SBA):

The proportion of women age 15-49 for whom the most recent birth in the five years before the survey was delivered by a skilled birth attendant. If more than one person assisted the delivery, the most qualified person is described. The definition of a skilled birth attendant is country-specific but commonly refers to a doctor, nurse, midwife, or auxiliary midwife. As an example of a country-specific variation, in Indonesia SBA also includes village midwife, which accounts for the highest proportion of assisted delivery in Indonesia. In other countries a village midwife may not be considered an SBA.

Delivery in a health facility (DHF):

The proportion of women age 15-49 for whom the most recent birth in the five years before the survey was delivered in a health facility. This indicator distinguishes between home deliveries and facility deliveries. Health facilities could be government, private, NGO, or another type such as a maternity clinic.

Completing three doses of DPT vaccine (DPT3):

The proportion of children age 12-23 months who have received the third dose of the DPT vaccine. The DPT3 immunization is selected for the indicator because children who receive this vaccine generally have received all of the other recommended immunizations.

Care seeking for symptoms of ARI:

The proportion of children under age 5 who had symptoms of ARI (Acute Respiratory Infection, possibly pneumonia) in the two weeks before the survey and for whom advice or treatment was sought from a health facility or provider. Symptoms of ARI are "short, rapid breaths" that are "due to a problem in the chest." These symptoms are not equivalent to a medical diagnosis. For all care seeking indicators, the analysis excludes treatment sought from pharmacies, shops, or traditional healers.

Care seeking for fever:

The proportion of children under age 5 who had symptoms of fever in the two weeks before the survey and for whom advice or treatment was sought from a health facility or provider.

Care seeking for diarrhea:

The proportion of children under age 5 who had diarrhea in the two weeks before the survey and for whom advice or treatment was sought from a health facility or provider.

Exclusive breastfeeding:

The proportion of children under age 6 months who are being breastfed and have not had any water, other liquids, or solids in the day or night before the survey. Limited to children who are living with the mother.

Stunting:

Proportion of de facto[1] children under age 5 who have a height-for-age z-score that is less than two standard deviations below the median of the WHO 2007 reference population. Both Indonesian DHS surveys and the Pakistan 2006-7 survey did not include height and weight measurements for children; therefore stunting and wasting could not be computed for these three surveys.

[1] Slept in the household the previous night before the survey

Wasting:

Proportion of de facto children under age 5 who have a weight-for-height z-score that is less than two standard deviations below the median of the WHO 2007 reference population.

2.3. Analysis

2.3.1. Wealth inequality measures

The DHS quintiles were used to describe inequalities by wealth for the MCH indicators. The DHS computes a continuous wealth index for each survey, based on the presence or absence of a large number of potential household assets. Cut points are then calculated, such that an equal number of weighted de jure[2] individuals in the household sample are in each of five quintiles. The wealth quintiles are labeled as follows: poorest (q1), poor (q2), middle (q3), rich (q4), and richest (q5).

Three indices were computed to describe inequities by wealth in the selected MCH indicators. These indices include:

1. The difference in prevalence for each indicator between the richest (or highest) wealth quintile (q5) and poorest (or lowest) wealth quintile (q1).

2. An index computed from the logit regression of each indicator on the wealth quintiles, as a categorical variable, using the coefficient for the difference between the richest category and the poorest category. These are unadjusted coefficients since the objective is to describe the level of inequality by wealth and not to provide an explanation of the process with a model. Coefficient estimates were used instead of odds ratios to have more comparable scales from one indicator to another.

3. the concentration index, which describes the extent to which the beneficiaries of MCH tend not to be distributed uniformly across the wealth quintiles

The concentration index is a relative measure of inequality with values that range from -1 to 1 (Barros et al. 2012; World Health Organization 2013), conveying both the magnitude and the direction of inequity. A value of zero represents perfect equality, that is, identical prevalence of an outcome in all five quintiles. Positive values indicate that the outcome is more concentrated in wealthier quintiles; negative values indicate that it is more concentrated in the poorer. For indicators that are bounded between zero and one, the amount of dispersion is related to the overall mean. That is, if the overall prevalence is near 0% or 100%, the amount of variation across categories such as wealth quintiles or regions is necessarily low, but if the overall prevalence is near 50%, the amount of potential variation across categories can be very large.

Corrections to the concentration index that take into account the mean of the outcome were first proposed by Wagstaff (2005) and more recently by Erreygers (2009). A correction is important because it allows for comparisons between countries with very different levels of the outcomes. Our analysis uses the Erreygers (2009) correction (previously published in a department paper in 2006), following other researchers who have studied health inequalities (Binnendijk, Koren, and Dror 2012; Monteiro et al. 2010; Van de Poel et al. 2007; Van de Poel et al. 2008; Van Malderen et al. 2013). The calculations are performed in Stata 14 with the conindex command (O'Donnell et al. 2016). In addition, a one-sided test was performed to determine whether the concentration index significantly improved from the first survey to the second. For indicators that are usually concentrated among the richer households, such as all the MCH indicators in this report apart from stunting and wasting, the concentration index is expected to be positive. For those

[2] Usual resident

indicators, improved equity will be implied if a positive concentration index in the first survey becomes less positive, and closer to zero, in the second survey. For stunting and wasting, the concentration index is expected to be negative since the outcome is concentrated among the poorer households; equity is improved if the concentration index becomes less negative, and closer to zero, from one survey to the next.

Plots on a graph will visually describe the inequalities of the outcome and the level in each wealth quintile. To produce a plot for the difference index, the adjustment for the mean of the outcome was used as suggested by Houweling et al. (2007). The adjustment improves comparability among countries. Plots were produced that show the difference index (percentage of indicator in richest minus percentage of indicator in the poorest) versus the prevalence of the outcome. Finally, coefficient plots were produced for each outcome with upper and lower 95% confidence bounds. Together, these four types of plots highlight the wealth inequalities between countries and also show whether there have been improvements by comparing between two consecutive surveys from the same country.

2.3.2. Mapping regional inequalities

Two figures were produced to describe disparities among regions for each health indicator. The first figure shows the national estimate for each indicator along with the estimates for the lowest and highest regions. This format was repeated for all the surveys in order to assess the inter-country inequalities and whether they decreased from one survey to the next, as well as the intra-country inequalities and the range of the indicators across regions. Appendices 4-6 identify the names of the lowest and highest regions for each indicator and survey. The second figure consists of prevalence maps for the most recent surveys for each country. The maps are produced for each indicator except care seeking for ARI symptoms due to the small sample sizes within each region. They show the prevalence of the indicator by region, which makes it possible to visually assess regional disparities between and within countries.

2.3.3. Assessing inequalities

To assess the level of inequality for each MCH indicator, we used six measures and a map: 1) Overall percentage or prevalence of the indicator; 2) a dot plot, or equiplot[3], of the prevalence of the indicator for each wealth quintile; 3) a plot of the difference (q5-q1) versus the overall level for the indicator with a line connecting the two surveys from the same country; 4) a coefficient plot with 95% confidence intervals; 5) concentration indices with one-sided tests between surveys to identify statistically significant improvements; 6) an equiplot of the lowest and highest regional estimates compared with the national estimate; and 7) a map of the most recent survey showing the prevalence of the indicator by region. The last section of the results is a summary to describe the overall worst-performing and best-performing countries. All analyses use sample weights, and the concentration index is adjusted for the cluster design of the samples. The logit regression estimates are also adjusted for the stratification of the samples.

[3] http://www.equidade.org/equiplot.php

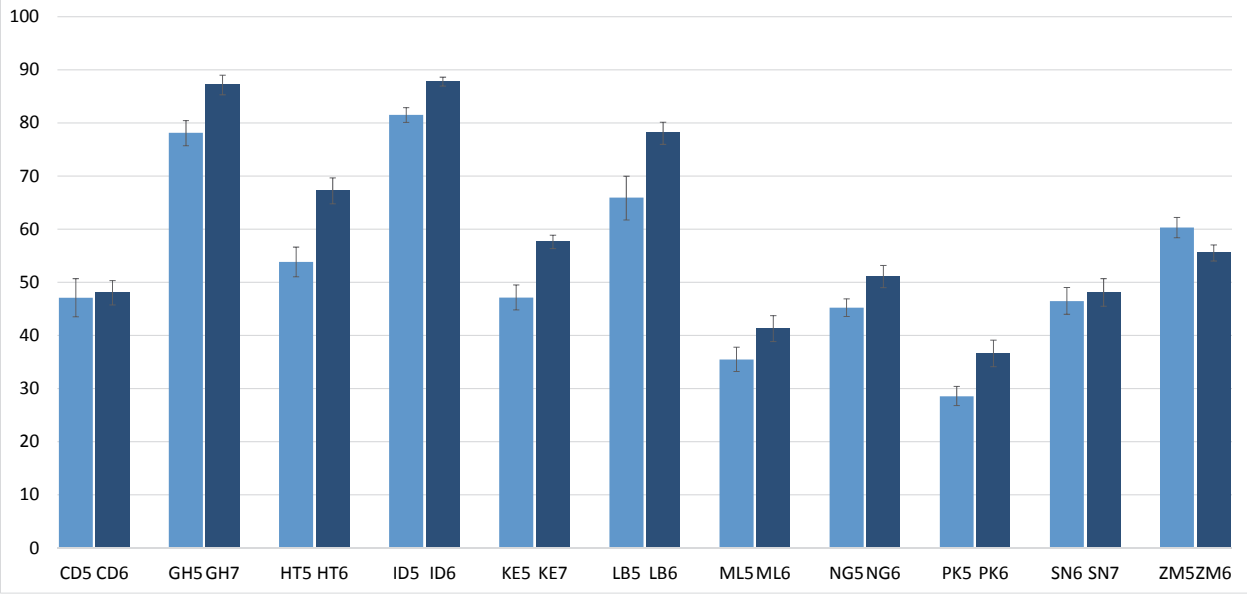
3. Results

For each MCH indicator, presentation of the results begins with summarizing the wealth inequalities as measured by the overall level of the indicator, the spread by wealth quintiles, the difference index, the coefficient index, and the concentration index. This summary is followed by a discussion of regional disparities as shown by the gaps between the regions with the lowest and highest values on the indicator as well as by maps of the level of the indicator by region for the most recent survey.

3.1. Four or More ANC Visits

Figure 1 shows the percentage of women age 15-49 who have attended four or more ANC visits for their most recent pregnancy, with confidence bands. The highest percentages were found in Ghana, Indonesia, and Liberia, with levels close to 80% or more for the most recent survey. Close to half of the women in the Democratic Republic of the Congo (DRC), Nigeria, and Senegal had attended four or more ANC visits. In Mali and Pakistan the level was approximately 40% or less. Almost all countries except Zambia improved in this indicator, with the greatest increases found in Haiti and Liberia. There was a small and non-significant increase for the DRC and Senegal. The intervals between the two consecutive surveys are not the same for all countries (Table 1).

Figure 1. Percentage of women age 15-49 who have attended at least four ANC visits for their most recent pregnancy



In Figure 2 we see that in every survey the percentage of women with four or more ANC visits was greater in higher wealth quintiles. The amount of spread across wealth quintiles identifies wealth-related disparities. The greatest disparities were found in Nigeria and Pakistan and the lowest in Zambia. Comparing the two Zambian surveys we can see that the disparities slightly increased from the first survey to the second, but even at the second survey there was less inequality than in any other country.

Figure 2. Percentage of women age 15-49 who have attended at least four ANC visits for their most recent pregnancy by wealth quintiles q1-q5

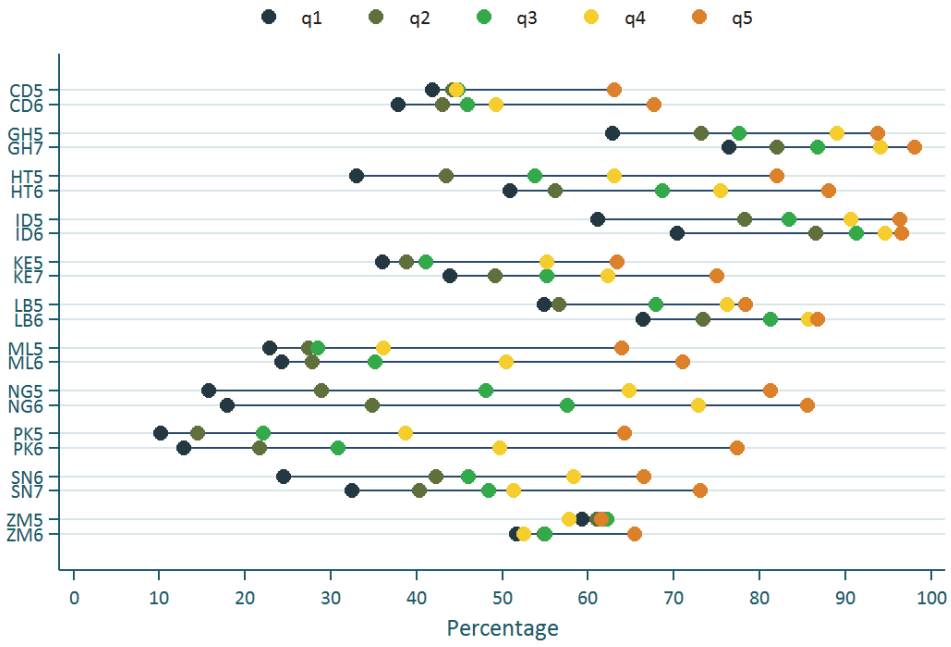


Figure 3 shows the difference in the percentage of the ANC indicator for the richest wealth quintile (q5) minus the poorest (q1) wealth quintile plotted versus the overall level or prevalence of the ANC indicator. The two surveys from each country were connected by a line to show the trend. A red dot at one end of the line identifies the first survey and an orange dot at the other end identifies the second survey. Ideally, we would see a decrease in the difference between wealth quintiles and an increase in the overall prevalence from one survey to the next (that is, a line with the orange dot below and to the right of the red dot). Ghana, Indonesia, and Haiti, as well as Liberia to a slight degree, exhibit this pattern, with a decreasing differences and increasing percentages from one survey to the next. The prevalence of ANC visits improved in Nigeria, Pakistan, Mali, and Liberia but with an increase in the difference, implying that the improvements were concentrated among women with greater wealth. Zambia was the only country to have both a decrease in the prevalence and an increase in the difference. Despite the move to less equality for the ANC indicator, Figure 3 shows that, as in Figure 2, Zambia has the least disparity of all 11 countries.

Figure 3. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of women age 15-49 who attended at least four ANC visits for their most recent pregnancy

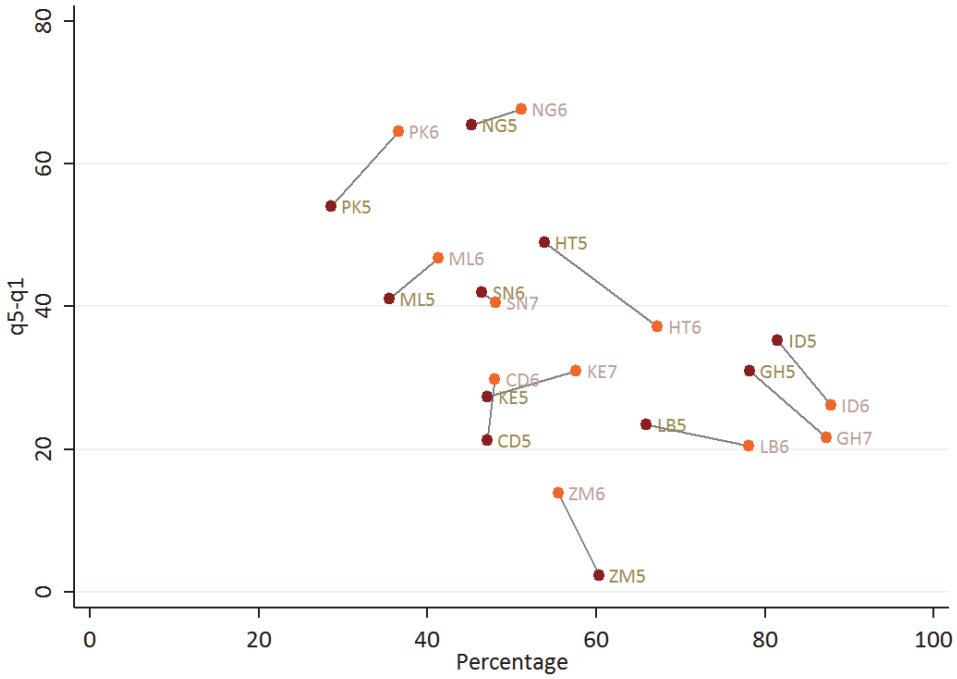
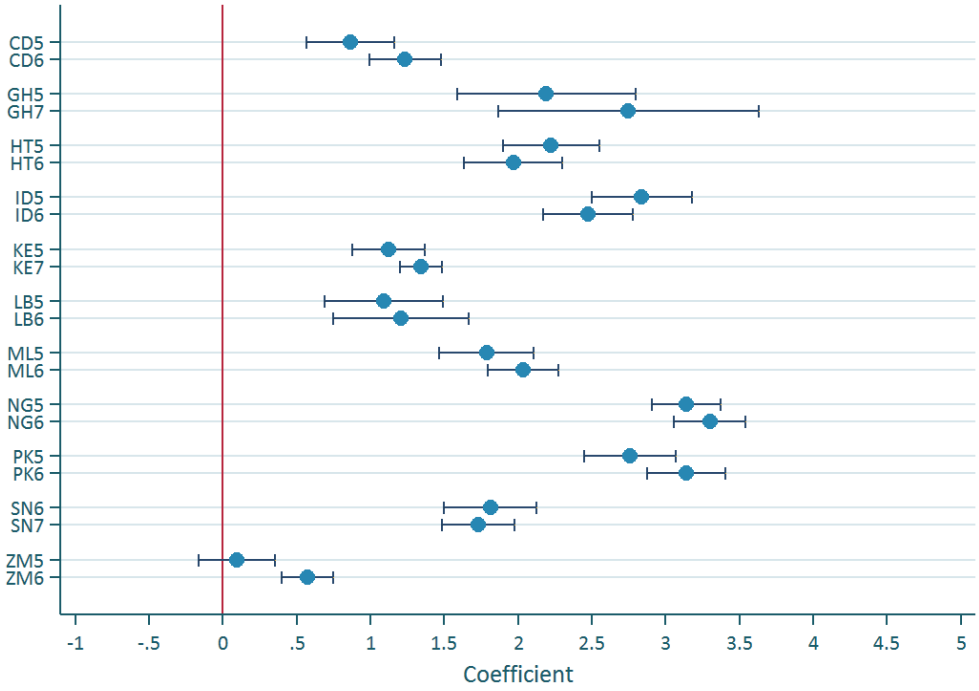


Figure 4 provides a third perspective on trends with the ANC indicator. It graphically presents, for each survey in each country, the logit regression coefficient for the richest wealth quintile, with the poorest quintile as the reference category. This coefficient is the log of an odds ratio. It takes the value zero (shown in the figure with a vertical line) if the odds ratio is one, that is, if both quintiles have the same prevalence. In contrast with Figures 2 and 3, Figure 4 focuses exclusively on equality of ANC visits by wealth quintile, separately from prevalence, and it includes confidence intervals, which were not provided in Figures 2 and 3. Ideally, we would see coefficients close to zero, with confidence intervals overlapping the zero reference line. This would indicate that there is no significant difference between the extreme wealth categories in terms of the outcome of interest. Figure 4 shows that only the Zambia 2007 survey (ZM5) had a non-significant coefficient for the richest wealth category compared with the poorest. The coefficient was small and close to zero. However, in the most recent Zambian survey the coefficient increased and became significant, indicating a significant increase in inequality between the extreme wealth quintiles. One or both surveys in Ghana, Indonesia, Nigeria, and Pakistan had coefficients that were near three or greater than three (a coefficient that translates to an odds ratio of about 20 or even more).

Figure 4. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of attending at least four ANC visits with the wealth quintile as a categorical predictor



Finally, for the ANC indicator, Table 2 provides the concentration indices for each survey. The concentration index summarizes the disparities across all wealth quintiles, not just the first and the fifth, and changes in the index can be tested for statistical significance. Table 2 includes a one-sided p-value from a test of whether, in the population, the concentration index decreased between the two consecutive surveys. Ideally, the concentration index should be close to zero and the difference of the concentration index in survey 2 minus survey 1 should be negative with a large magnitude. Since these concentration indices were corrected for binary outcomes that also take into account the mean of the outcome (Erreygers 2009; O'Donnell et al. 2016), comparisons can be made across countries. All the concentration indices in the table are positive, indicating that the ANC indicator was concentrated in the richer households. Table 2 shows that Nigeria had the highest concentration index, indicating the highest inequality, and Zambia had the lowest index. Significant improvements were only found in Ghana, Haiti, and Indonesia, with a significant reduction in the concentration index in the most recent survey. The concentration index significantly increased in the DRC, Mali, Pakistan, and Zambia. None of the concentration indices in the most recent surveys were significantly different from zero, indicating that inequalities remain for these countries.

Table 2. Concentration index (CI) estimates with tests of difference between two surveys for each country for the ANC indicator

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	0.122 (0.03)	5441	0.202 (0.02)	11288	0.079	0.974*
GH	0.247 (0.02)	2147	0.177 (0.02)	4294	-0.069	**0.020**
HT	0.365 (0.02)	4237	0.288 (0.02)	5414	-0.077	**0.009**
ID	0.270 (0.01)	15334	0.195 (0.01)	15260	-0.075	**<0.001**
KE	0.233 (0.02)	4082	0.250 (0.01)	14945	0.017	0.750
LB	0.209 (0.03)	3996	0.172 (0.02)	5348	-0.037	0.174
ML	0.283 (0.02)	9018	0.363 (0.02)	6723	0.080	0.995*
NG	0.532 (0.01)	17882	0.559 (0.01)	20192	0.027	0.902
PK	0.411 (0.02)	5697	0.485 (0.02)	7461	0.073	0.998*
SN	0.322 (0.03)	4470	0.287 (0.02)	4484	-0.035	0.163
ZM	0.003 (0.02)	4148	0.074 (0.02)	9344	0.071	0.996

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.
* Indicates that the p-value was significant in the opposite direction.

The formats of Figures 2-4 and Table 2 are repeated for each indicator in this report for the analysis of inequality by wealth quintiles. The analysis in inequality by regions is summarized differently, in a dotplot and a set of maps. Figures 5 and 6, respectively, describe inequality in ANC by region.

Figure 5 shows the regional spread in the ANC indicator by comparing the lowest and highest regional estimates with the national estimate. This figure is analogous to Figure 2, except that each survey in Figure 2 had five dots on a line, for the five wealth quintiles; Figure 5 has three dots on a line. Zambia, Haiti, Ghana, and Liberia showed relatively small differences between the highest and lowest regions (differences of less than 25 percentage points). The highest differences were found in the most recent surveys of Pakistan and Nigeria (differences of more than 60 percentage points). The difference between the lowest and highest regions increased the most from one survey to the next in Indonesia and Pakistan and increased to a lesser degree in Kenya and Mali.

Figure 5. Percentage of women age 15-49 who have attended four or more ANC visits with the national estimates and lowest and highest region estimates

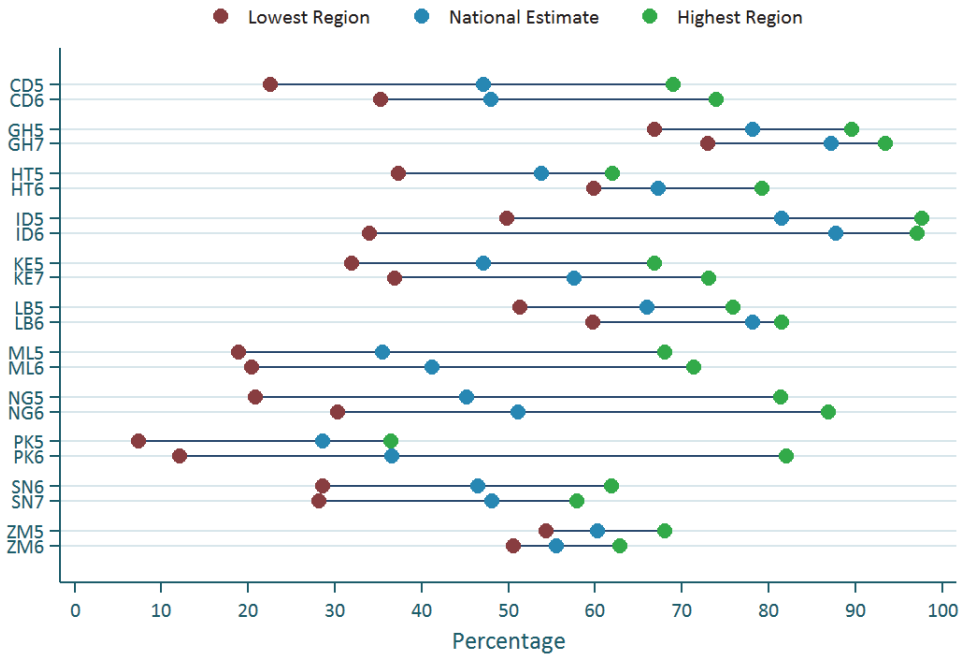
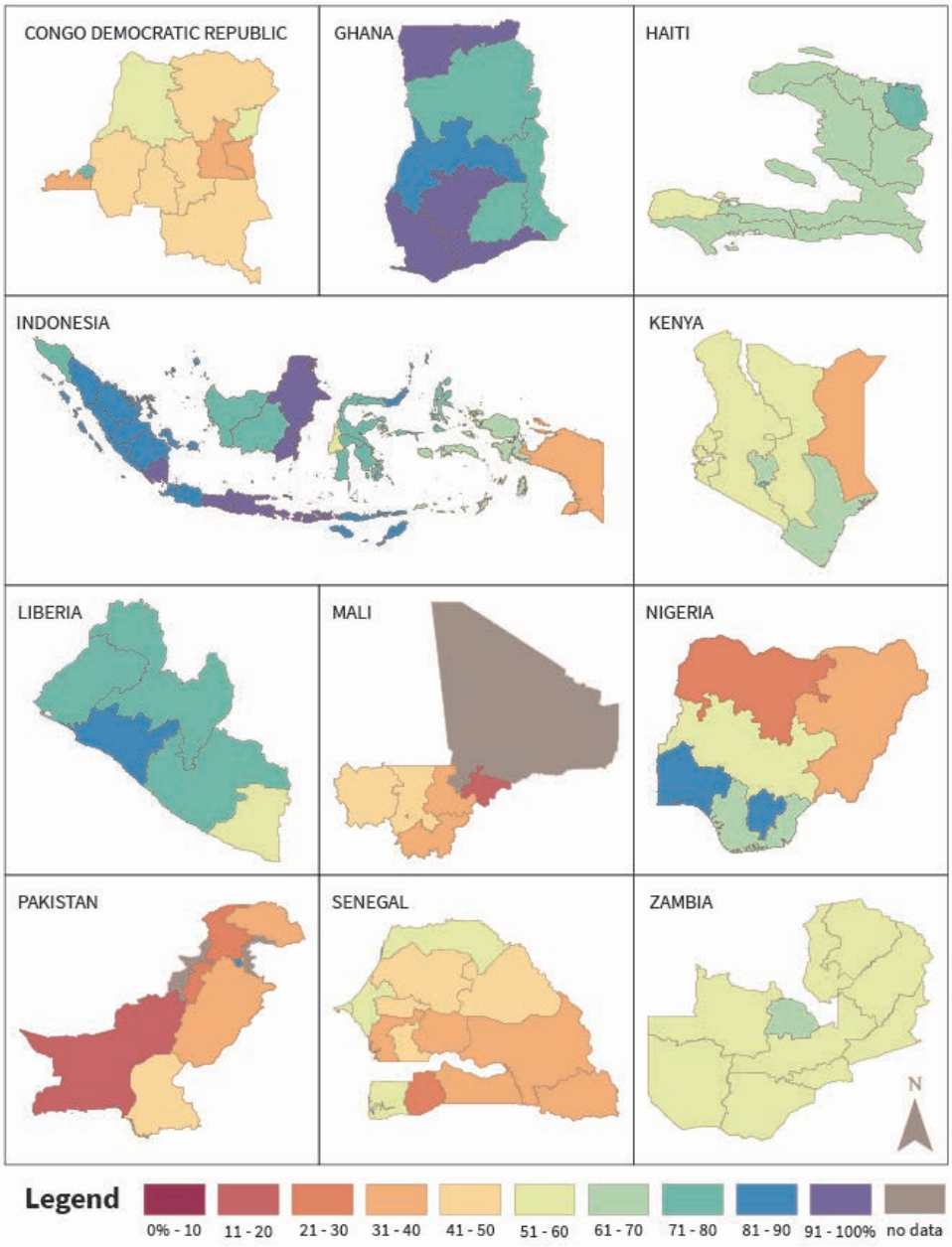


Figure 6 provides maps of the regional estimates for the most recent survey in each country. Prevalence is highest in regions colored purple and lowest in regions colored red. Regional disparities are large in several countries, especially in Nigeria. Zambia and Haiti have the fewest regional disparities, with almost all the regions in Zambia between 51% and 60%, and in Haiti between 71% and 80%.

Figure 6. Regional map for the most recent survey of women age 15-49 who have attended at least four ANC visits for their most recent pregnancy



Summary:

In order to summarize the levels and disparities in the ANC indicator according to wealth and region, Table 3 uses a different format that identifies the three most extreme countries using five criteria. These criteria, shown in the columns, are the lowest prevalence, the largest difference between the fifth and first quintiles, the largest coefficient from the logit regression on the fifth and first quintiles, the highest concentration index by wealth quintiles, and the highest difference between the highest and lowest region for the ANC indicator. Thus the first criterion refers to the overall level (shown in Figure 1), the next three criteria refer to disparities by wealth (shown in Figures 2-4), and the final criterion refers to disparity by region (described in Figures 5 and 6). Pakistan is the only country that is in the bottom three for all five criteria. Nigeria is in the bottom three for all four of the criteria that measure inequality. Mali is in the bottom three for three criteria. Ghana is in the bottom three for one of the measures of wealth disparity (the logit regression coefficient). Indonesia is in the bottom three for regional disparity. The DRC is in the bottom three for low overall prevalence but not for any of the measures of disparity. The remaining five countries in this analysis are not in the bottom three for any of these criteria.

Table 3. Summary table for the ANC indicator showing the top three countries with the following measures for the most recent survey

	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6	■				
GH7			■		
HT6					
ID6					■
KE7					
LB6					
ML6	■	■		■	
NG6		■	■	■	■
PK6	■	■	■	■	■
SN7					
ZM6					

3.2. Modern Contraceptive Rate (mCPR)

We now turn to the second indicator, the use of modern contraception. The mCPR is the percentage of women age 15-49 in a union who are currently using a modern contraceptive method. Figure 7 shows that the mCPR ranged from less than 10% in the DRC, Mali, and Nigeria to approximately 50% in Indonesia in both surveys and Kenya in the most recent survey. Significant increases in prevalence occurred between surveys in most countries except the DRC, Indonesia, and Nigeria.

Figure 7. Percentage of women age 15-49 in a union currently using a modern contraceptive method

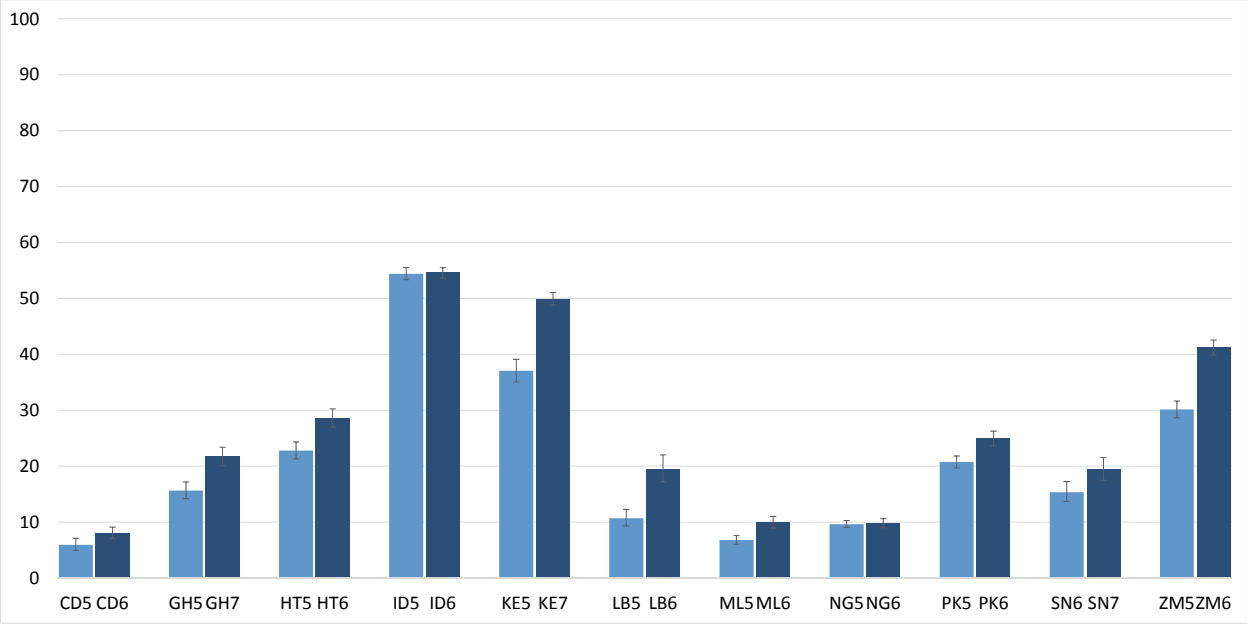


Figure 8 shows that the largest spread across wealth quintiles is in Kenya and Zambia. The gaps between the wealth quintiles decreased for some countries, particularly Ghana, Haiti, and Liberia. The mCPR often increases monotonically with wealth, but not always. Exceptions to this pattern were found in one or both surveys in Ghana, Haiti, Indonesia, Kenya, Liberia, Senegal, and Zambia. However, the departures from this pattern were mostly small and may not be statistically significant (tests of significance were not performed).

Figure 8. Percentage of women age 15-49 in a union currently using a modern contraceptive method by wealth quintiles q1-q5

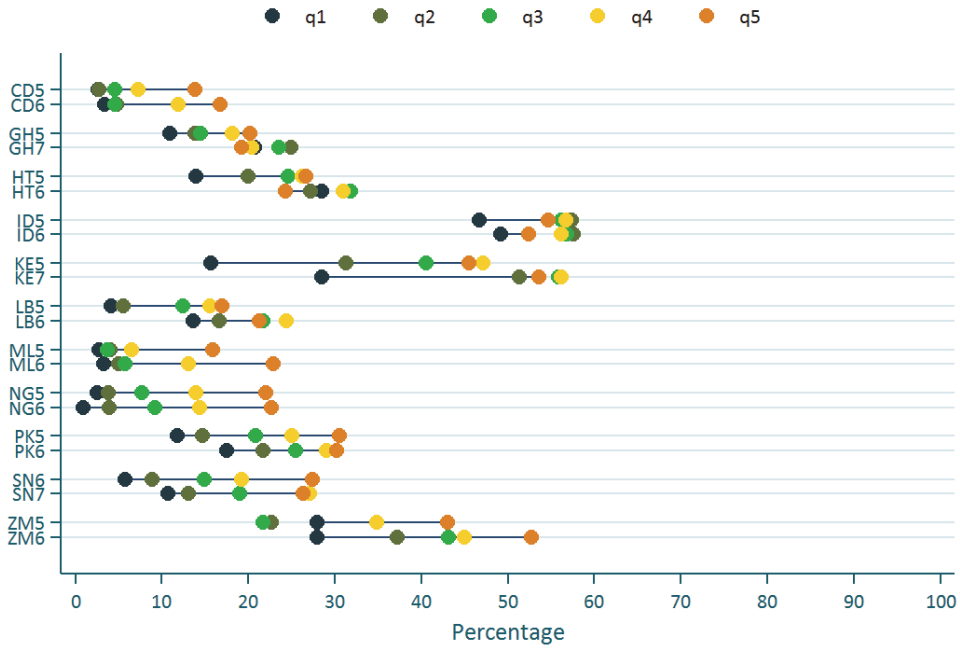


Figure 9 shows that modern contraceptive prevalence increased in almost all countries (the second survey is to the right of the first survey) and in almost all countries the difference between richest and poorest wealth categories was reduced (the second survey is lower than the first survey). The greatest improvements were found for Ghana and Haiti, where the difference in the most recent survey was close to zero or moved slightly in the opposite direction (that is, the mCPR was higher in the poorest wealth quintile than in the richest). The disparity increased for Zambia, Mali, Nigeria, and the DRC. In Zambia and Mali the overall level of the mCPR increased significantly but the disparity also increased, whereas in Nigeria and the DRC neither the levels nor the disparities changed in the desired direction.

Figure 9. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of women age 15-49 in a union currently using a modern contraceptive method

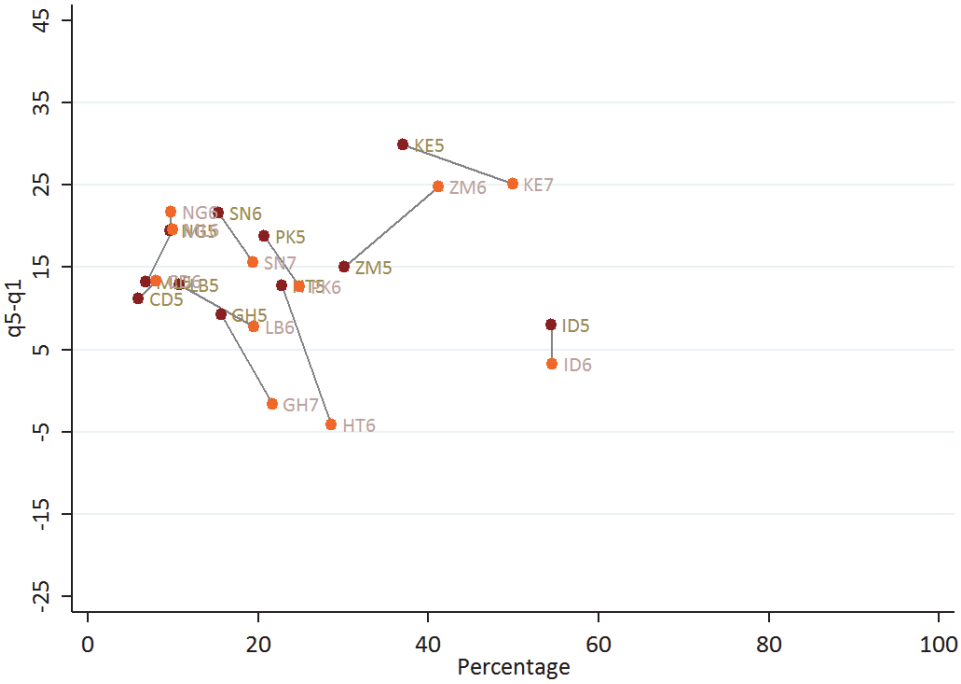


Figure 10 shows the logit regression coefficient (the log of the odds ratio) for the use of modern contraception and wealth quintile. We see that for the most recent surveys in Ghana and Haiti, the coefficient for the richest wealth category was small and not significant, indicating that the difference between the extreme wealth quintiles was not statistically significant. The most recent survey for Indonesia had a very small coefficient but it was still significant. Larger disparities were found in the DRC, Mali, and Nigeria, with a great increase in the coefficient for Nigeria. Most surveys showed an improvement between the two surveys as their coefficients became smaller.

Figure 10. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of using a modern contraceptive method with the wealth quintile as a categorical predictor.

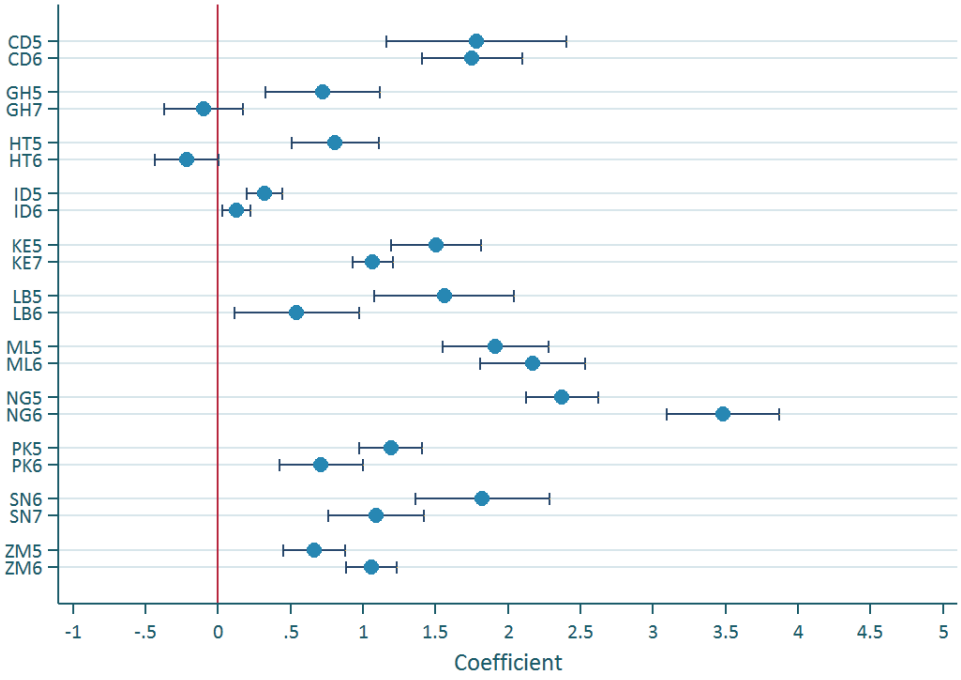


Table 4 gives the concentration index for every survey for use of modern contraception. All the indices are positive, indicating that richer households use modern contraception more than poorer households. In the most recent Ghana, Haiti, and Indonesia surveys, however, the concentration index was not significantly different from zero (p-value not shown in table), indicating that these countries have reached equality in mCPR according to this measure. There were significant improvements in the concentration index in Indonesia, Kenya, and Pakistan. In Mali, Nigeria, and Zambia the concentration index significantly increased, implying more disparity and less equality.

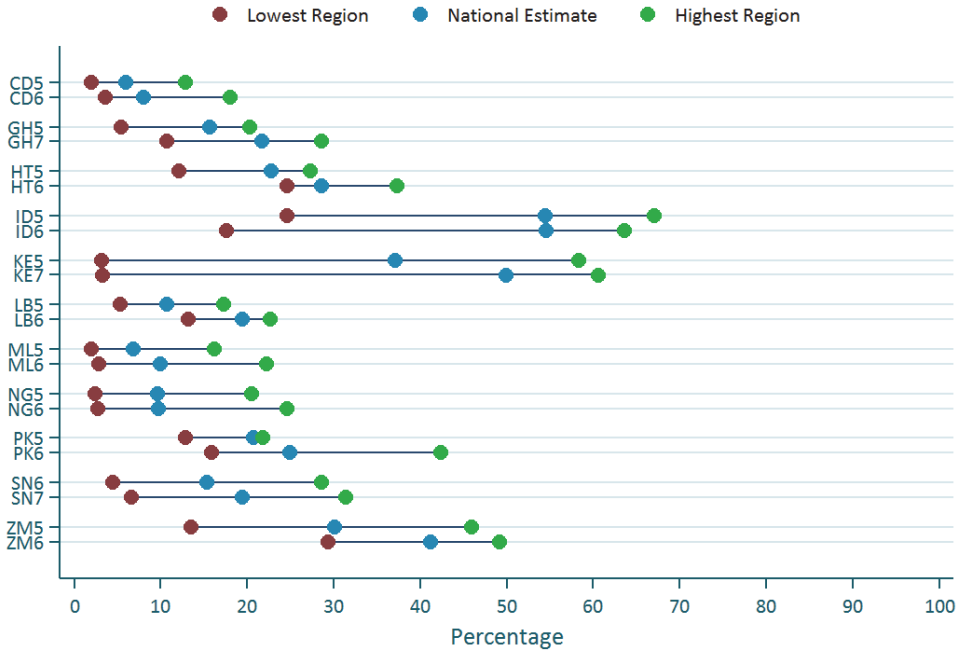
Table 4. Concentration index (CI) estimates with tests of difference between two surveys for each country for the mCPR indicator

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	0.082 (0.01)	7520	0.105 (0.01)	14282	0.024	0.949
GH	0.072 (0.02)	3370	-0.028 (0.02)	6355	-0.100	**<0.001**
HT	0.096 (0.02)	7358	-0.021 (0.02)	9041	-0.117	**<0.001**
ID	0.046 (0.01)	32895	0.012 (0.01)	34865	-0.035	**0.016**
KE	0.230 (0.02)	5904	0.155 (0.01)	22504	-0.075	**0.001**
LB	0.114 (0.01)	5186	0.076 (0.02)	6834	-0.038	0.086
ML	0.096 (0.01)	12838	0.150 (0.01)	8943	0.055	1.000*
NG	0.156 (0.01)	25364	0.173 (0.01)	29128	0.018	0.963*
PK	0.154 (0.01)	10023	0.104 (0.02)	13558	-0.050	**0.006**
SN	0.173 (0.02)	6163	0.145 (0.02)	6218	-0.028	0.183
ZM	0.136 (0.02)	5205	0.182 (0.01)	11658	0.047	0.961*

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.
* Indicates that the p-value was significant in the opposite direction.

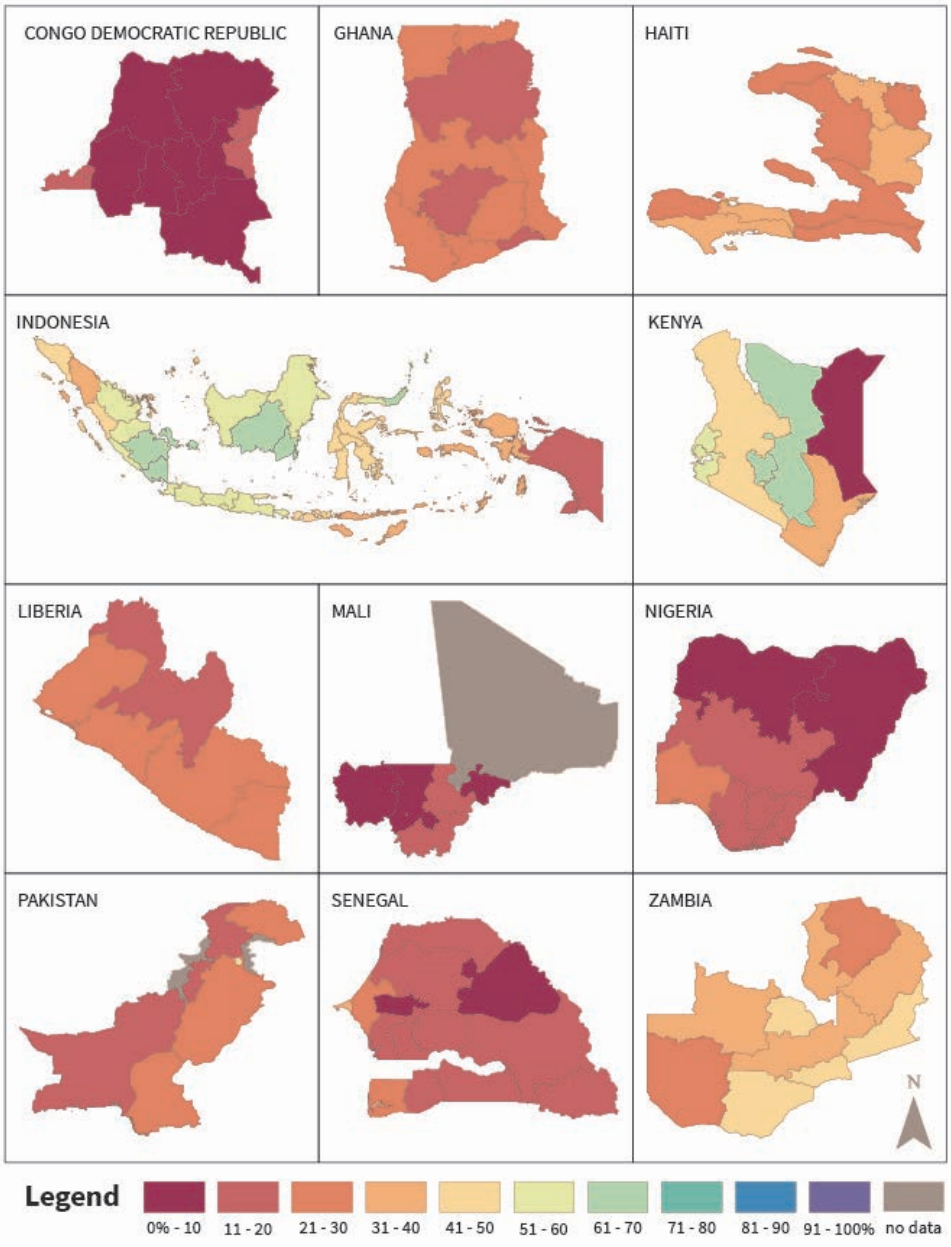
Figure 11 shows that Indonesia and Kenya have the greatest regional disparities between the lowest and highest regions in both of their surveys. Haiti showed an improvement in the lowest and highest regions. Improvements were only found for the lowest region in Zambia and for the highest region in Pakistan.

Figure 11. Percentage of women age 15-49 in a union currently using a modern contraceptive method with the national estimates and lowest and highest region estimates



The map of the recent surveys in Figure 12 shows relatively little regional disparity for many countries, especially the DRC, where in almost all regions the mCPR was below 10%. Of course, a uniformly low level is not a desirable form of equality. As Figure 7 indicated, the level of mCPR was higher in Indonesia and Kenya than in the other countries, but the maps indicate some regional disparities within these two countries. In some regions mCPR is below 20%, while in other regions the range is 61-70%.

Figure 12. Regional map for the most recent survey of women age 15-49 in a union currently using a modern contraceptive method



Summary:

Table 5 provides the summary of equality-related measures for the mCPR indicator. Nigeria is one of the three most disparate countries for all five measures except regional difference. Kenya shows relatively high inequality on three of the measures.

Table 5. Summary table for the mCPR indicator showing the top three countries with the following measures for the most recent survey

	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6	■		■		
GH7					
HT6					
ID6					■
KE7		■		■	■
LB6					
ML6	■		■		
NG6	■	■	■	■	
PK6					■
SN7					
ZM6		■		■	

3.3. Delivery by an SBA

Figures 13 shows the overall level of assistance by a skilled birth attendant (SBA) for the last birth. In most countries more than half of women had their most recent delivery assisted by an SBA. The highest levels are in the DRC, Ghana, Indonesia, and Zambia. In these four countries the level was approximately 70% or more, for both surveys or the most recent one. Significant increases in the level of SBA assistance were found for all the countries except the DRC, Nigeria, and Senegal. The lowest levels were found in Haiti and Nigeria, with a level of 40% for the most recent surveys. All countries except Nigeria had an increase in SBA coverage between the two most recent surveys.

Figure 13. Percentage of women age 15-49 who had their most recent birth assisted by an SBA

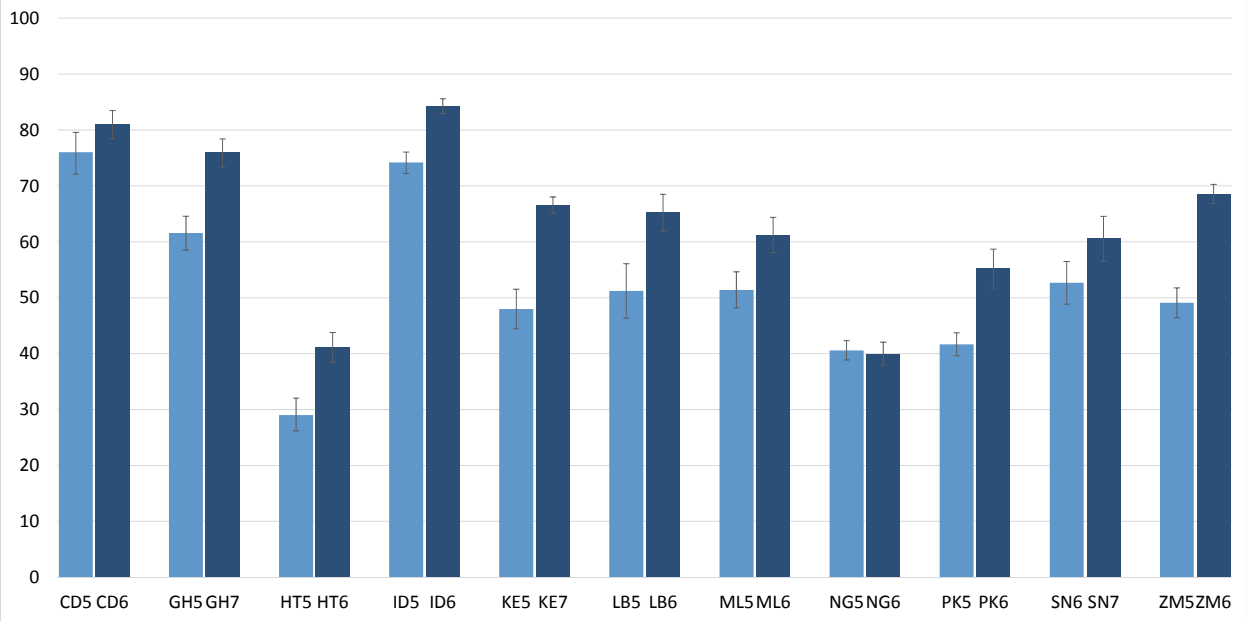


Figure 14 indicates large gaps in the prevalence of SBA assistance by wealth quintiles in almost all the countries. Nigeria exhibited the largest spread across the wealth quintiles with a range of 80 percentage points between the poorest and richest quintiles, but most countries had a gap of at least 50 percentage points. Most countries showed some reduction of these gaps. Figure 15, which focuses on the lowest and highest quintiles, shows this pattern clearly. Ghana greatly reduced the difference between the extreme wealth quintiles (by 23 percentage points) while increasing the overall level of the indicator. The same trend was observed in Zambia, Indonesia, and Senegal and to a lesser degree in Liberia, Pakistan, and the DRC. Haiti and Mali showed an increase in prevalence but also an increase in the difference by wealth.

Figure 14. Percentage of women age 15-49 who had their most recent birth assisted by an SBA by wealth quintiles q1-q5

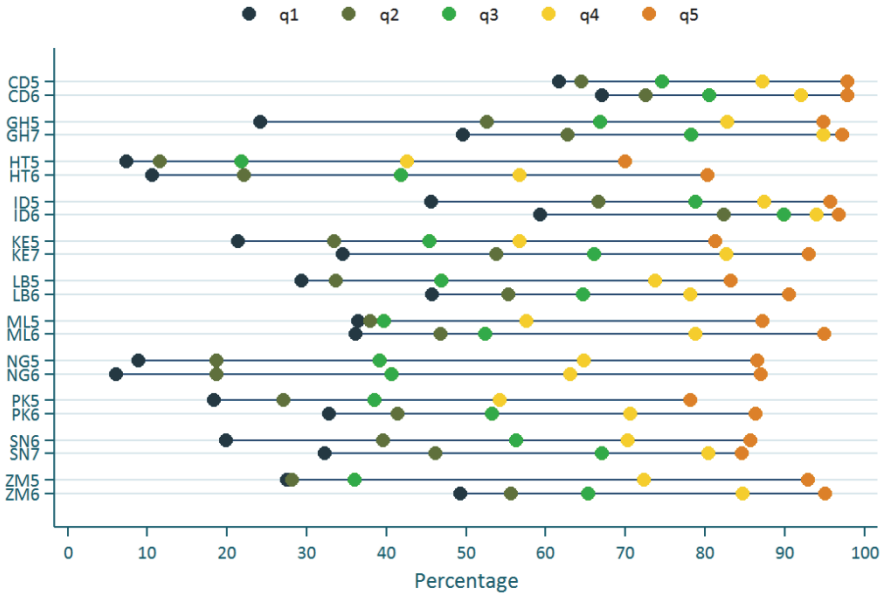


Figure 15. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of women age 15-49 who had their most recent birth assisted by an SBA

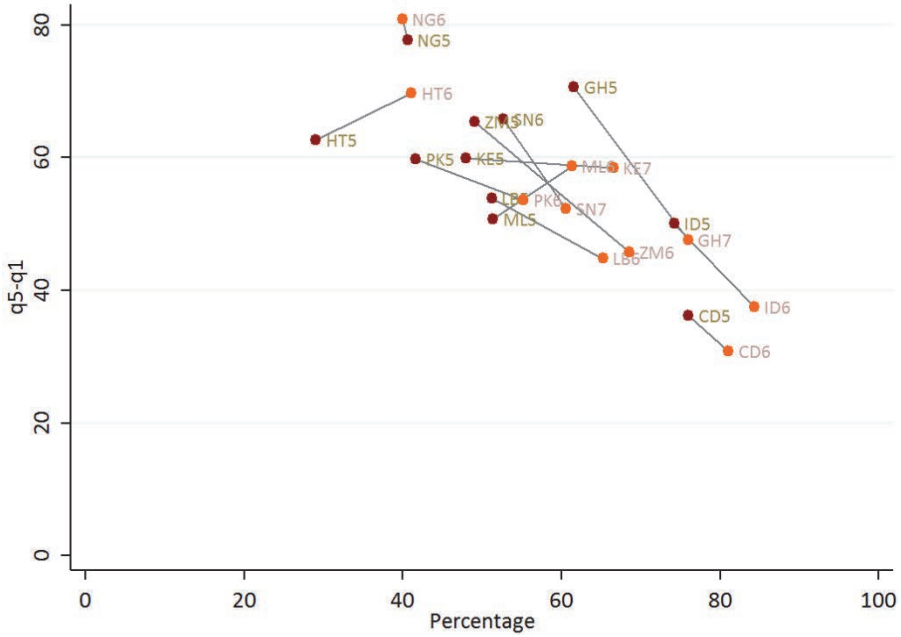


Figure 16 shows that all the countries had large and significant logit regression coefficients with small and non-significant improvements between surveys. In Kenya, Mali, and Nigeria the coefficients increased between surveys, indicating that the inequalities between the extreme wealth groups grew larger.

Figure 16. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of assisted by SBA with the wealth quintile as a categorical predictor.

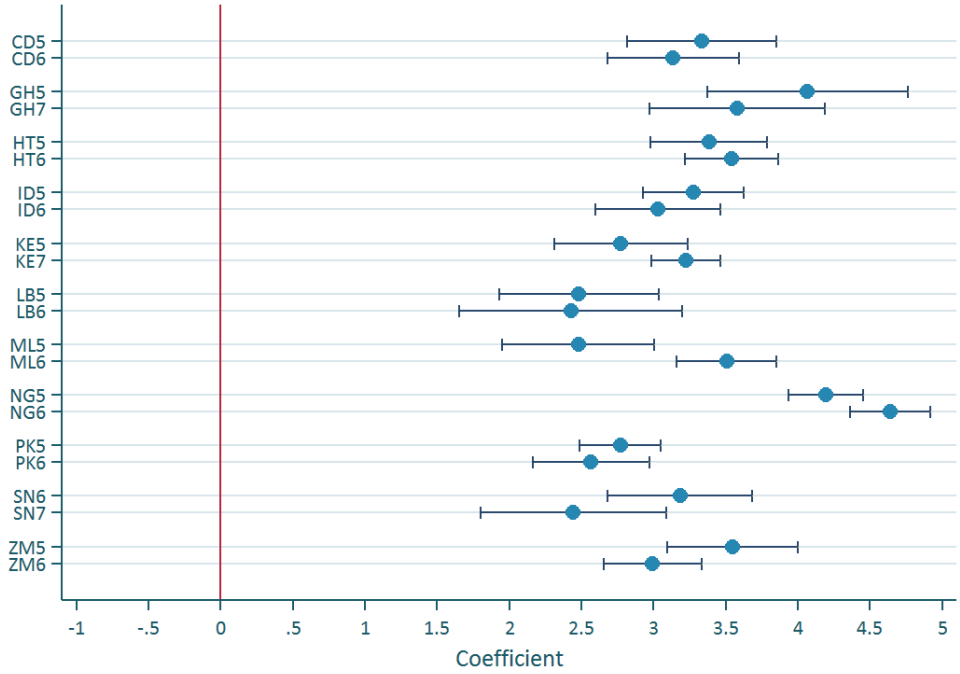


Table 6, which includes all wealth quintiles, not just the lowest and highest, shows relatively high concentration indices, with the highest indices found in the most recent Nigeria survey. Significant decreases in the concentration index, implying movement toward more equality, were found for Ghana, Indonesia, Liberia, Senegal, and Zambia. Haiti and Mali had significant increases in the concentration index, implying movement toward more inequality. None of the concentration indices in the most recent surveys were significantly different from zero, indicating that inequalities in delivery by an SBA persist in all these countries.

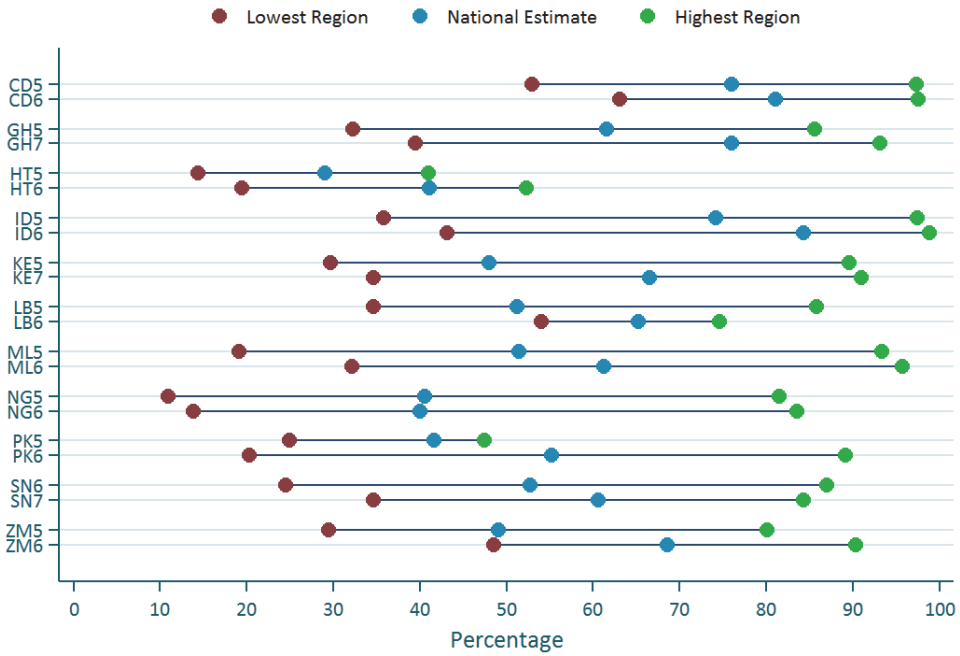
Table 6. Concentration index (CI) estimates with tests of difference between two surveys for each country for the SBA indicator

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	0.292 (0.03)	5483	0.256 (0.02)	11293	-0.036	0.143
GH	0.552 (0.02)	2147	0.410 (0.03)	4294	-0.141	**<0.001**
HT	0.476 (0.02)	4237	0.534 (0.02)	5414	0.058	0.976*
ID	0.393 (0.02)	15334	0.279 (0.01)	15262	-0.113	**<0.001**
KE	0.472 (0.03)	4082	0.476 (0.01)	14949	0.005	0.556
LB	0.451 (0.04)	3996	0.346 (0.03)	5348	-0.105	**0.024**
ML	0.380 (0.03)	9036	0.472 (0.02)	6723	0.092	0.995*
NG	0.634 (0.01)	18028	0.652 (0.01)	20192	0.018	0.838
PK	0.462 (0.02)	5724	0.428 (0.03)	7461	-0.034	0.147
SN	0.520 (0.03)	4470	0.450 (0.03)	4484	0.071	**0.048**
ZM	0.530 (0.02)	4148	0.377 (0.02)	9353	-0.153	**<0.001**

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.
* Indicates that the p-value was significant in the opposite direction.

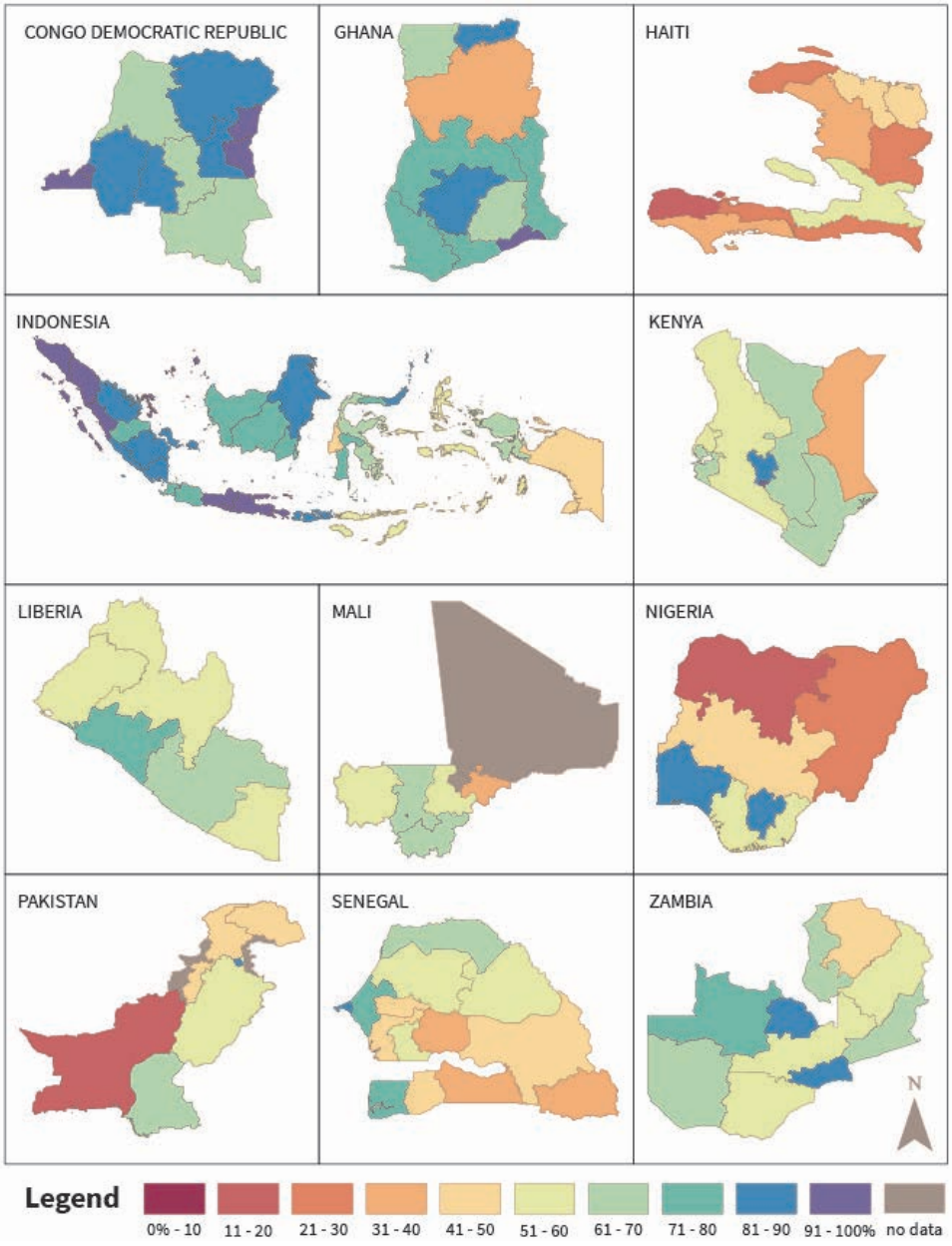
Figure 17 shows large gaps in SBA coverage between the lowest and highest regions for most countries. The regional disparities increased significantly in Pakistan, from a gap of approximately 23 percentage points between the lowest and highest regions in the first survey to a gap of 69 percentage points in the second survey. In contrast, Liberia greatly reduced its regional disparities between the two surveys.

Figure 17. Percentage of women age 15-49 who had their most recent birth assisted by an SBA with the national estimates and lowest and highest region estimates



The maps in Figure 18 show many regional disparities in all the countries. In Pakistan for instance, SBA coverage ranged from 0-10% in one region to 61-70% in a neighboring region. Indonesia had relatively low regional disparities for almost all regions except Papua, where SBA prevalence was much lower than in the other regions.

Figure 18. Regional map for the most recent survey of women age 15-49 who had their most recent birth assisted by an SBA



Summary:

In the summary shown in Table 7, Nigeria consistently appears among the three countries with greatest inequality for all five measures. Haiti appears among the most extreme three countries for all measures other than regional difference. Nigeria and Haiti were among the most extreme three countries for the three wealth inequality measures. With the exception of Nigeria, the regional inequality measure was not consistent with the wealth inequality measures.

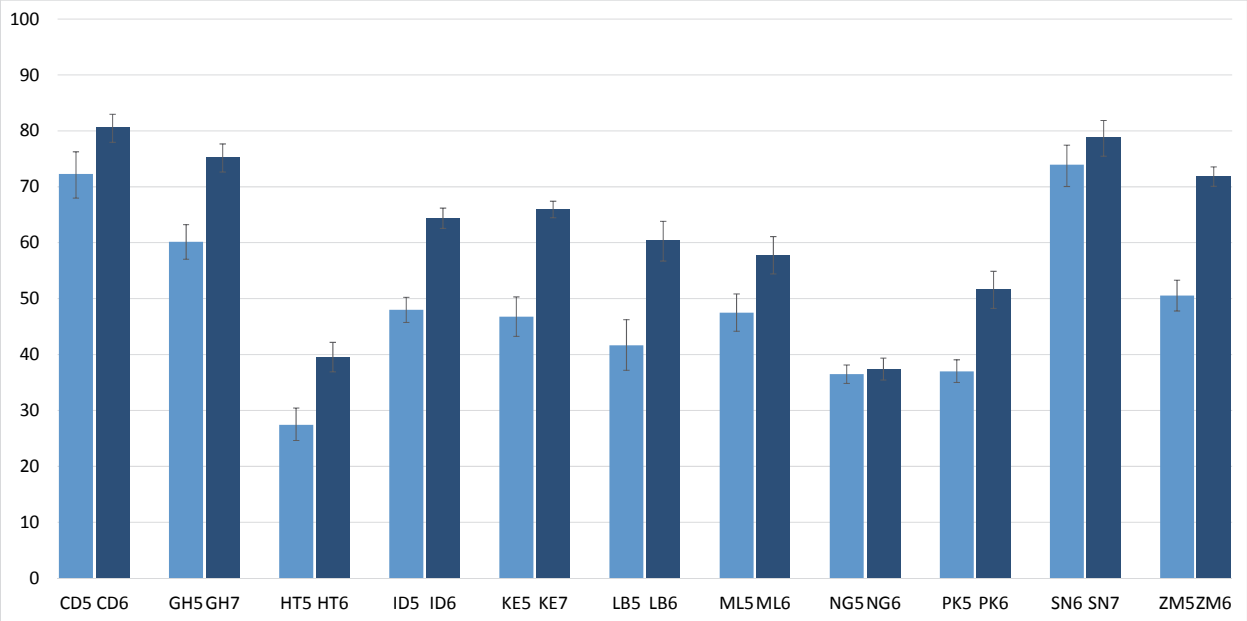
Table 7. Summary table for the SBA indicator showing the top three countries with the following measures for the most recent survey.

	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6					
GH7					
HT6					
ID6					
KE7					
LB6					
ML6					
NG6					
PK6					
SN7					
ZM6					

3.4. Delivery in a Health Facility (DHF)

More than half of women age 15-49 had their most recent delivery in a health facility for the most recent surveys except for Haiti and Nigeria (Figure 19). In the DRC, Ghana, Senegal, and Zambia the level was above 70%. DHF prevalence significantly increased between surveys in all countries except Nigeria and Senegal.

Figure 19. Percentage of women age 15-49 who delivered their most recent birth in a health facility



As Figure 20 shows, similar to the SBA results in Figure 14, large gaps (almost all over 50 percentage points) were found between the wealth quintiles for the DHF indicator. Figure 21, however, shows that these gaps tended to diminish between surveys. As with the SBA difference plot, the differences between the extreme quintiles (q5-q1) decreased along with increasing prevalence in Ghana, Zambia, Indonesia, Liberia, Senegal, the DRC, and (very slightly) in Pakistan and Kenya (Figure 21 lists the countries in decreasing order of the difference between the two surveys). Overall prevalence of delivery in a health facility increased in Haiti and Mali, but the inequality by wealth also increased.

Figure 20. Percentage of women age 15-49 who delivered their most recent birth in a health facility by wealth quintiles q1-q5

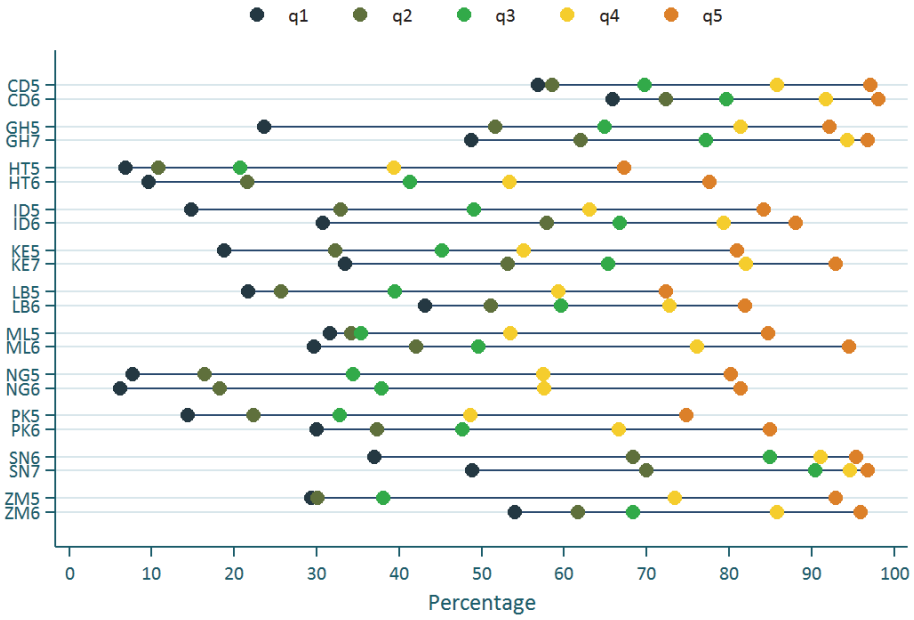
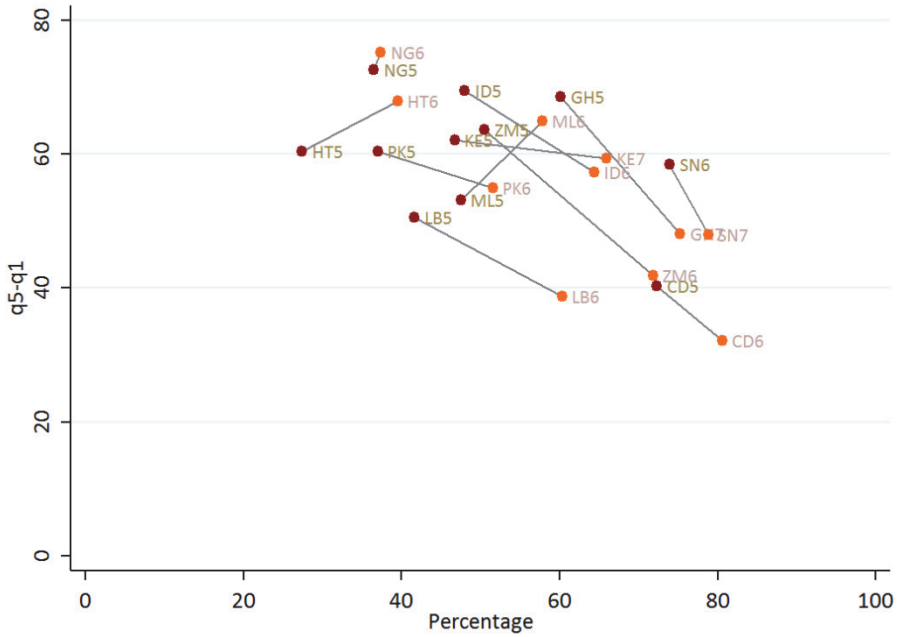
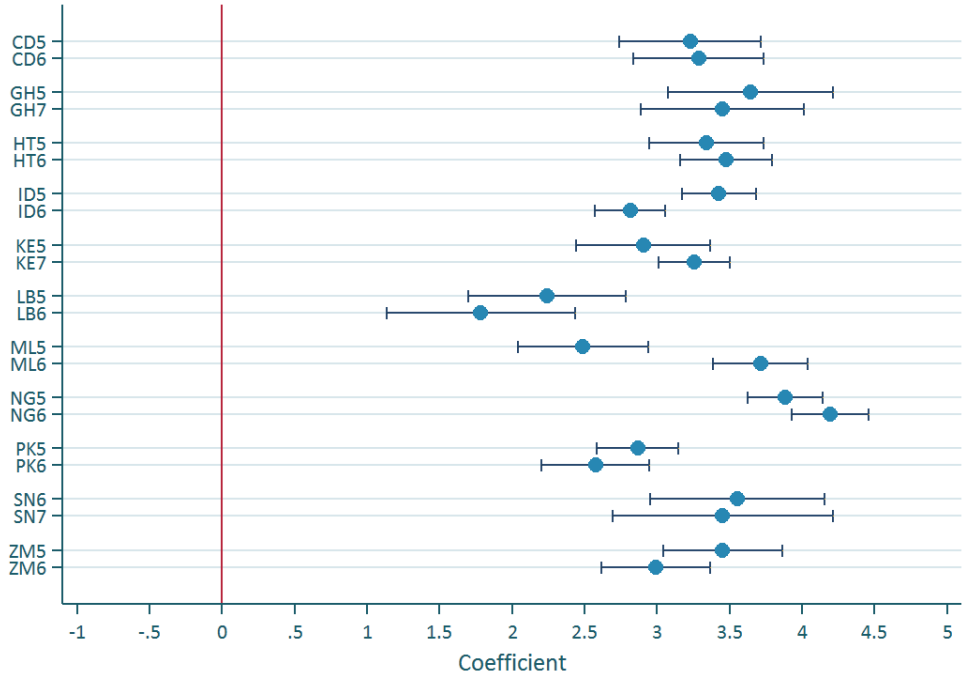


Figure 21. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of women age 15-49 who delivered their most recent birth in a health facility



The coefficient plot in Figure 22 shows large and significant logit regression coefficients for DHF, similar to those for SBA, with increasing coefficients in Kenya, Mali, and Nigeria between surveys.

Figure 22. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of delivery in a health facility with the wealth quintile as a categorical predictor.



In Table 8 the concentration indices are over 0.4 for almost all the surveys, indicating a large level of inequality with the indicator concentrated by wealth. In the DRC, Ghana, Indonesia, Liberia, and Zambia the concentration index significantly decreased, showing movement toward more equality. In contrast, in Haiti and Mali the concentration index significantly increased, moving toward more inequality. None of the concentration indices in the most recent surveys were significantly different from zero, indicating that inequalities in health facility delivery persist in all these countries.

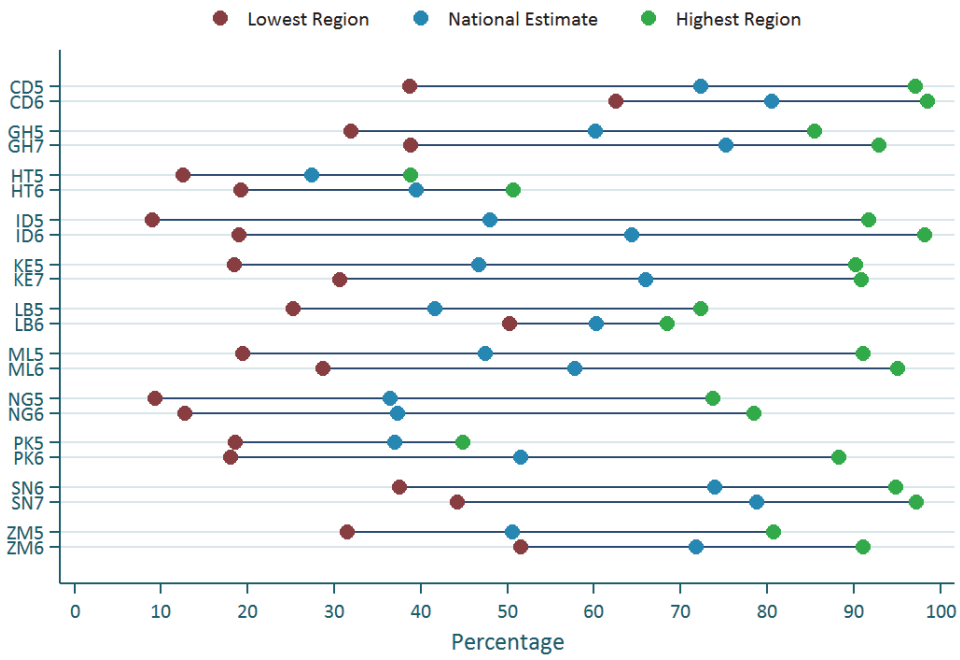
Table 8. Concentration index (CI) estimates with tests of difference between two surveys for each country for the DHF indicator

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	0.332 (0.03)	5483	0.264 (0.02)	11293	-0.068	**0.033**
GH	0.537 (0.02)	2147	0.413 (0.03)	4294	-0.124	**<0.001**
HT	0.454 (0.02)	4237	0.513 (0.02)	5414	0.059	0.979*
ID	0.542 (0.02)	15334	0.437 (0.01)	15262	-0.105	**<0.001**
KE	0.485 (0.03)	4082	0.483 (0.01)	14949	-0.002	0.473
LB	0.406 (0.04)	3996	0.306 (0.04)	5348	-0.100	**0.036**
ML	0.393 (0.03)	9036	0.516 (0.02)	6723	0.123	1.00*
NG	0.584 (0.01)	18028	0.599 (0.01)	20192	0.015	0.787
PK	0.461 (0.02)	5724	0.433 (0.03)	7461	-0.028	0.184
SN	0.461 (0.03)	4470	0.399 (0.03)	4484	-0.062	0.066
ZM	0.516 (0.02)	4148	0.336 (0.02)	9353	-0.180	**<0.001**

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.
* Indicates that the p-value was significant in the opposite direction.

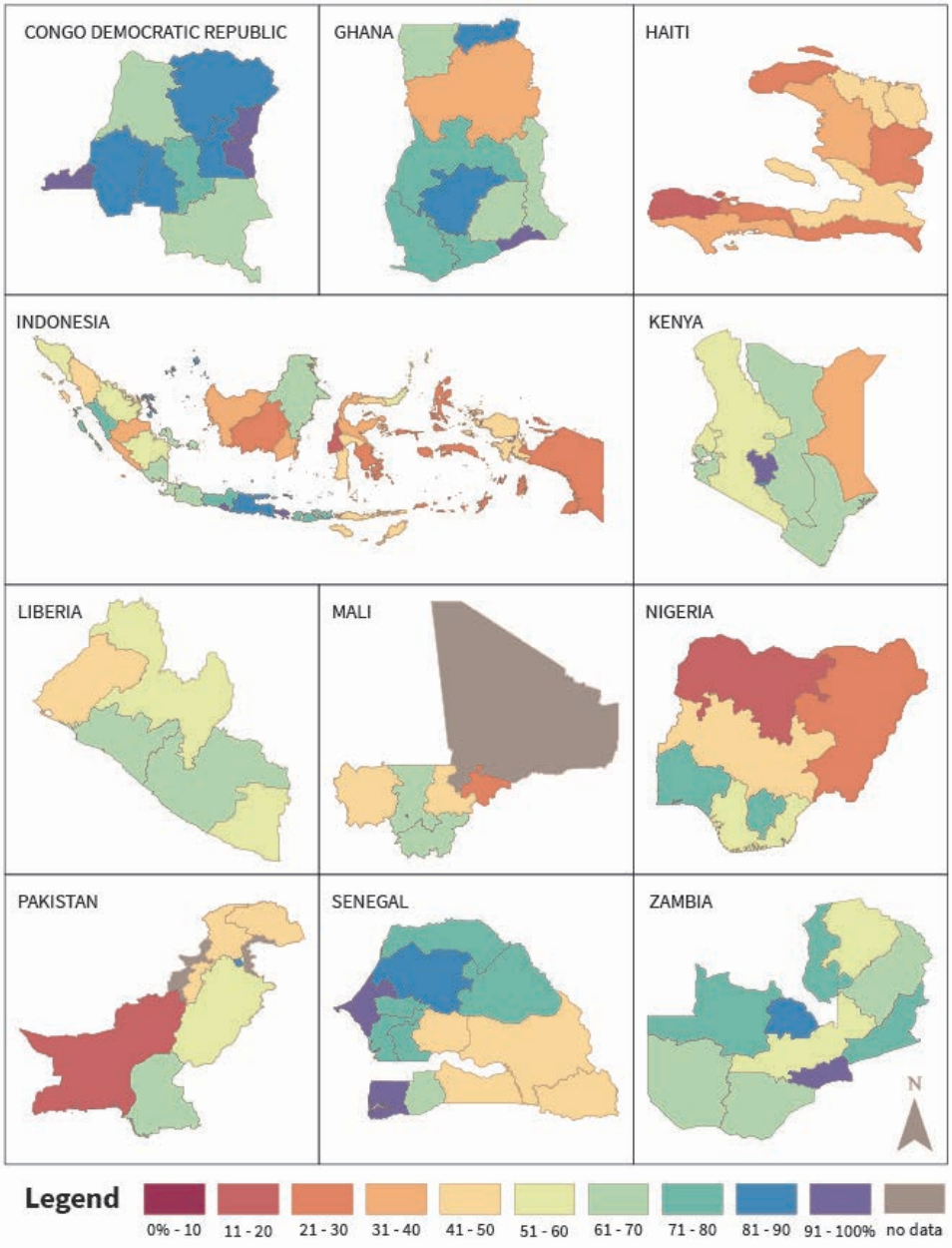
Figure 23 shows very large gaps in DHF between the lowest and highest regions for most countries, as Figure 17 showed for the SBA regional disparities. Also as with the SBA indicator, regional disparities in the DHF indicator increased substantially between surveys in Pakistan but decreased in Liberia.

Figure 23. Percentage of women age 15-49 who delivered their most recent birth in a health facility with the national estimates and lowest and highest region estimates



The DHF map in Figure 24 appears similar to the SBA map in Figure 18, with the exception of Indonesia. This difference between the DHF and SBA indicators in Indonesia is due to the classification of a village midwife as an SBA in Indonesia, but village midwives do not usually perform deliveries in a health facility.

Figure 24. Regional map for the most recent survey of women age 15-49 who delivered their most recent birth in a health facility



Summary:

As Table 9 shows, Haiti, Mali, and Nigeria are consistently the three most extreme countries according to the five measures, and especially according to the wealth inequality measures. The only other countries identified as extreme in Table 9 are Indonesia, in terms of extreme regional disparity, and Pakistan, in terms of both extreme regional disparity and low overall prevalence of DHF.

Table 9. Summary table for the DHF indicator showing the top three countries with the following measures for the most recent survey

	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6					
GH7					
HT6	■	■	■	■	
ID6					■
KE7					
LB6					
ML6		■	■	■	■
NG6	■	■	■	■	
PK6	■				■
SN7					
ZM6					

3.5. Three Doses of DPT Vaccine (DPT3)

Figure 25 shows the level of completion of three doses of DPT vaccine among children age 12-23 months. Ghana, Kenya, Senegal, and Zambia reached a level of about 90% for this indicator in their most recent surveys. The lowest levels were found in Nigeria, at approximately 40% coverage, followed by the DRC and Haiti, both at about 60% for the most recent survey. Liberia showed the greatest improvement, from DPT3 coverage of 50% in the first survey to 70% in the most recent survey.

Figure 25. Percentage of children age 12-23 months who completed three doses of the DPT vaccine

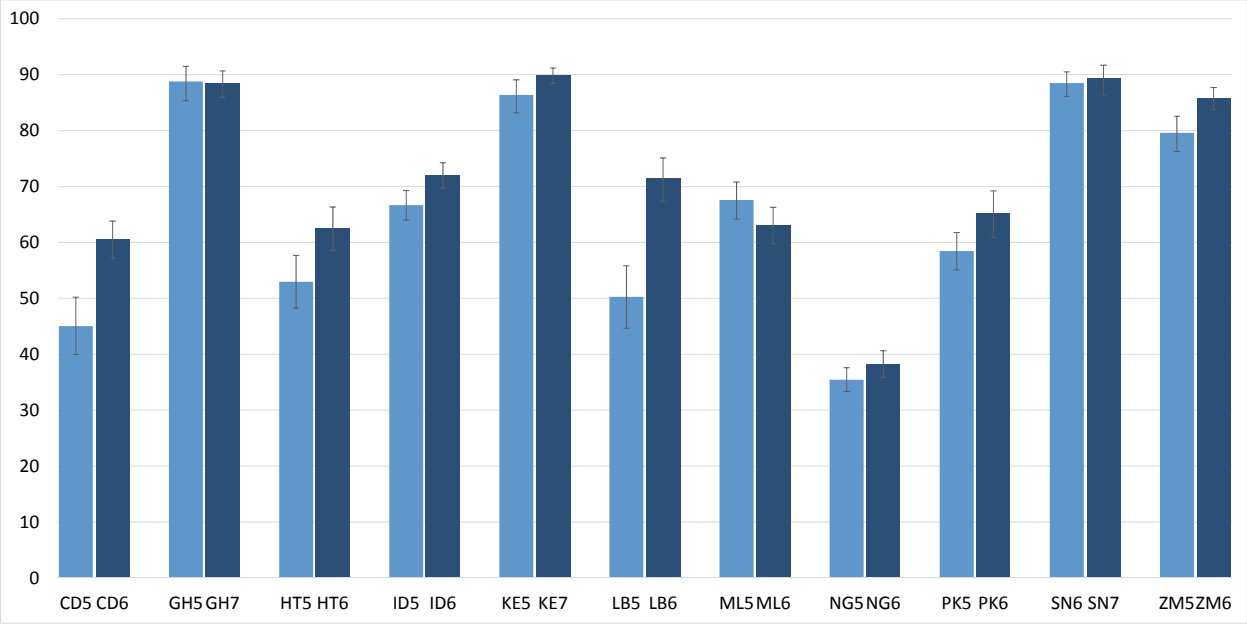


Figure 26 shows the large spread across wealth quintiles in Nigeria and Pakistan. Ghana had the lowest spread for the most recent survey, followed by Senegal, Kenya, and Zambia. Liberia showed the most improvement in reducing the gaps between the wealth quintiles, but in Mali the gaps increased from the first survey to the second.

Figure 26. Percentage of children age 12-23 months who completed three doses of the DPT vaccine by wealth quintiles q1-q5

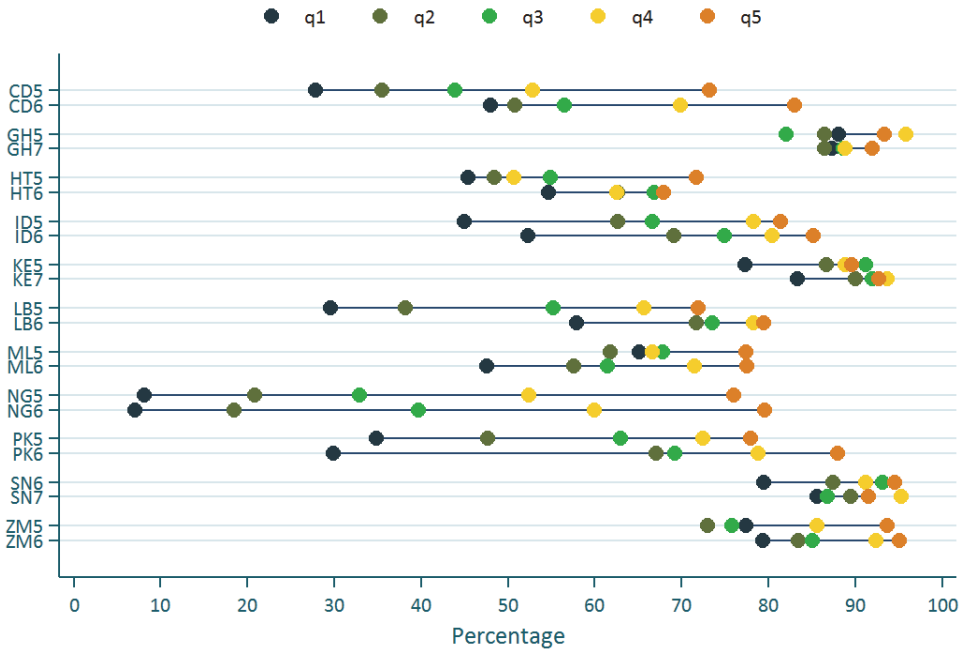
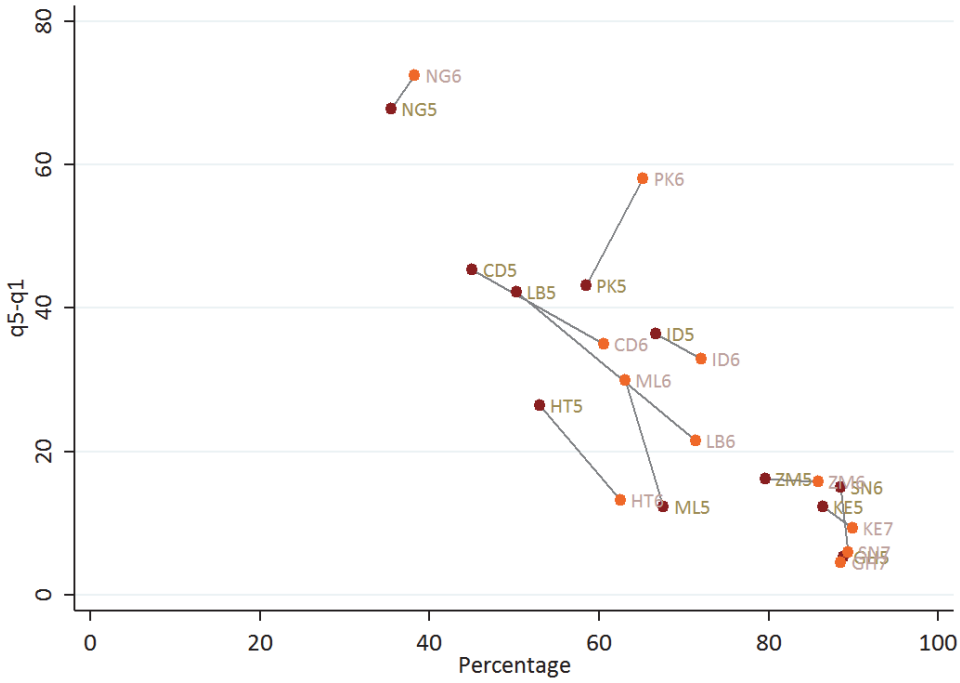


Figure 27 shows a clustering of Ghana, Kenya, Senegal, and Zambia in the lower right corner of the plot. These countries have the smallest differences between the richest and poorest wealth quintiles and the highest levels of DPT3. Nigeria stands out as the country with the highest wealth difference and the lowest prevalence of DPT3. Improvements were found for the DRC, Liberia, Haiti, and Indonesia, where differences by wealth decreased and prevalence of DPT3 increased from one survey to the next. For Pakistan and Mali, however, the differences increased.

Figure 27. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of children age 12-23 months who completed three doses of the DPT vaccine



In Figure 28 the logit regression coefficient plot shows that only Ghana, Haiti, and Senegal had non-significant coefficients for the comparison of the richest wealth category with the poorest. Nigeria had the largest coefficients in both surveys, indicating the highest level of inequality for DPT3. The coefficients increased in Mali and Pakistan but the increase was not significant.

Figure 28. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of receiving three doses of DPT vaccine with the wealth quintile as a categorical predictor.

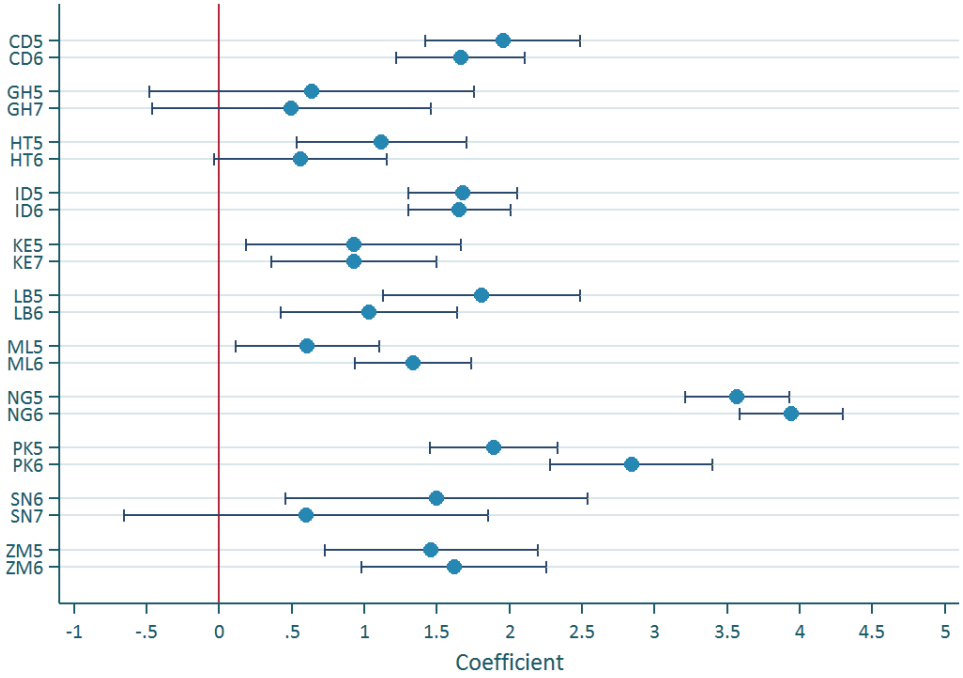


Table 10 shows that Liberia was the only country with a significant decrease in the concentration index. Nigeria and Pakistan had the highest concentration indices for DPT3, in both their first and second surveys. The concentration index increased significantly in Nigeria and Mali. The concentration index for Ghana, Haiti, and Senegal in the most recent survey were not significantly different from zero, indicating that equality was reached for the DPT3 indicator according to this measure.

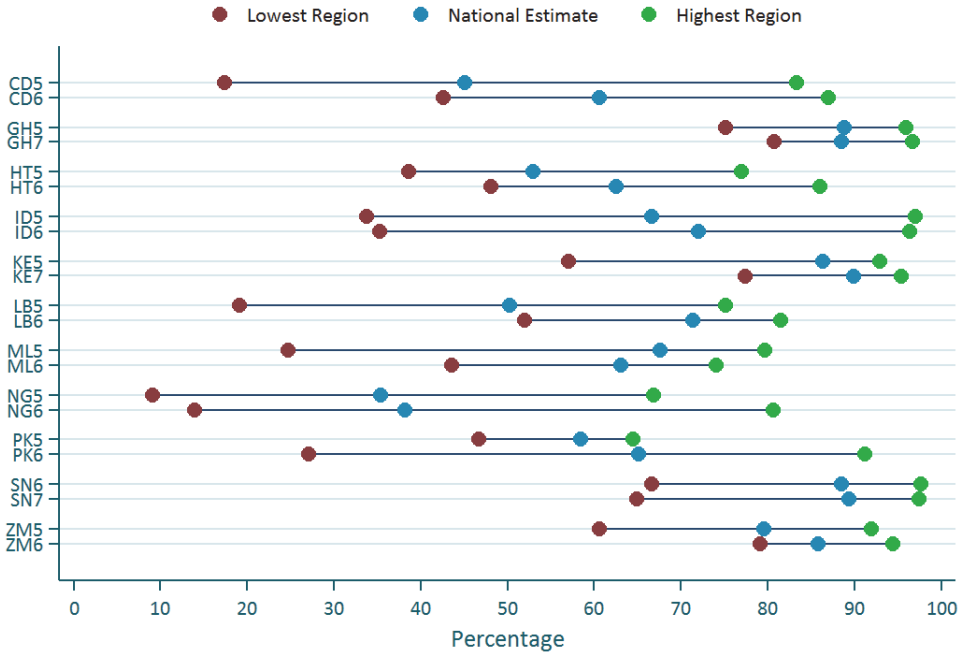
Table 10. Concentration index (CI) estimates with tests of difference between two surveys for each country for the DPT3 indicator

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	0.336 (0.05)	1632	0.276 (0.03)	3443	-0.059	0.141
GH	0.056 (0.03)	569	0.035 (0.03)	1128	-0.021	0.312
HT	0.156 (0.05)	1186	0.081 (0.05)	1370	-0.075	0.129
ID	0.285 (0.03)	3487	0.246 (0.02)	3502	-0.039	0.135
KE	0.092 (0.04)	1119	0.079 (0.02)	4052	-0.013	0.375
LB	0.348 (0.05)	996	0.168 (0.04)	1433	-0.181	**0.004**
ML	0.090 (0.03)	2562	0.232 (0.03)	1844	0.142	0.999*
NG	0.524 (0.02)	5022	0.593 (0.02)	5834	0.069	0.996*
PK	0.357 (0.03)	1541	0.416 (0.04)	2039	0.059	0.872
SN	0.118 (0.03)	1329	0.058 (0.03)	1333	-0.060	0.082
ZM	0.116 (0.03)	1266	0.124 (0.02)	2580	0.009	0.600

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.
* Indicates that the p-value was significant in the opposite direction.

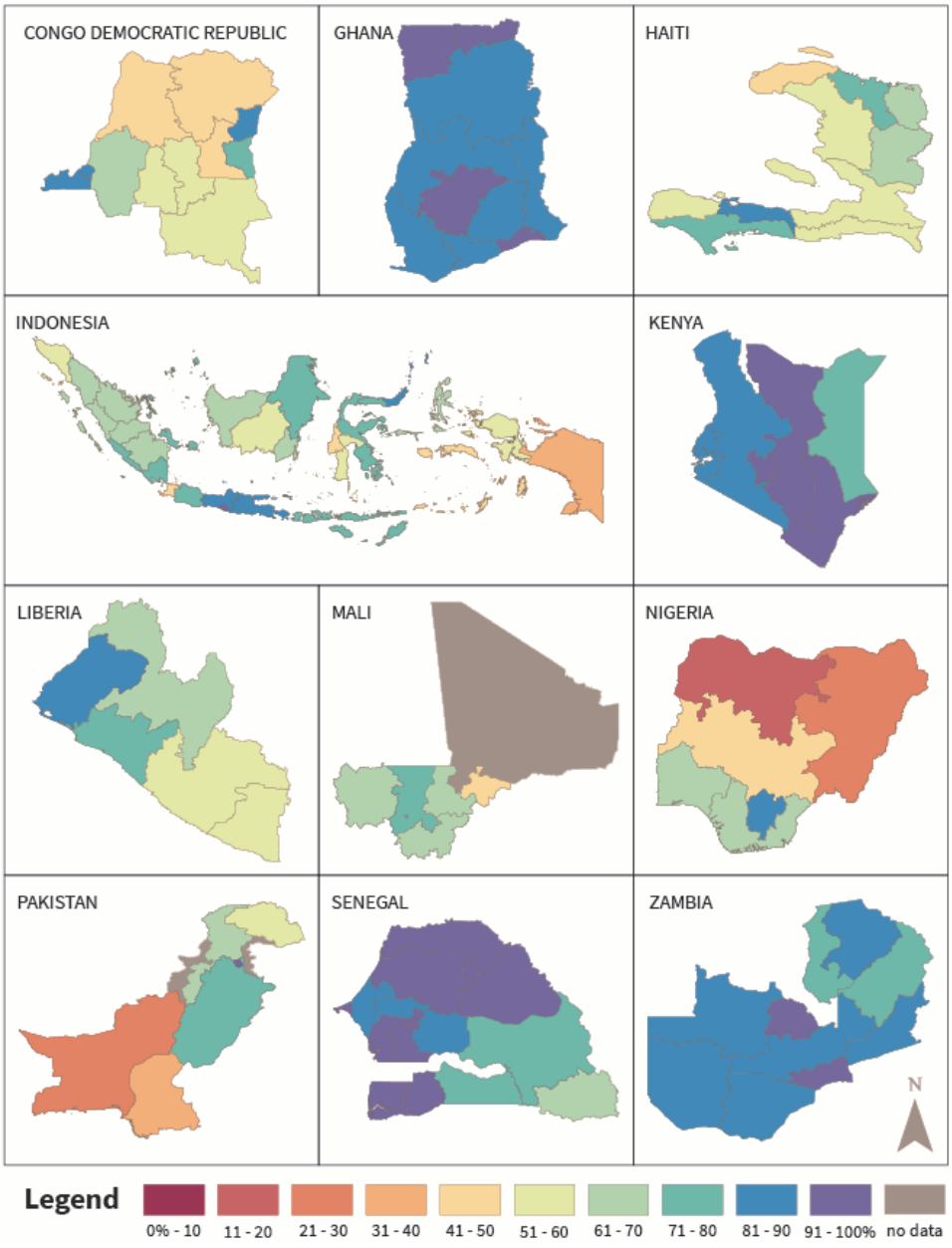
The regional disparities shown in Figure 29 indicate that Indonesia and Nigeria had the largest spread in DPT3 estimates between the highest and lowest regions. Ghana, Kenya, and Zambia had the lowest regional disparities in the most recent surveys. Liberia showed the greatest improvement in decreasing the regional gap, followed by the DRC, Mali, Kenya, and Zambia. The widening regional disparity in Pakistan was due to a large increase in the level of DPT3 for the highest region.

Figure 29. Percentage of children age 12-23 months who completed three doses of the DPT vaccine with the national estimates and lowest and highest region estimates



Consistent with Figure 29, Figure 30 shows that several countries have achieved high national levels of DPT3 and low regional disparities. Most of the countries with lower national levels of DPT3 show substantial regional disparities. In Nigeria a large regional spread was found, from 81% in the South East region to 14% in the North West region. In Indonesia a large regional spread was due mainly to the low levels found in Papua region.

Figure 30. Regional map for the most recent survey of children age 12-23 months who completed three doses of the DPT vaccine



Summary:

In Table 11, Nigeria, Pakistan, and the DRC consistently appear as the most extreme countries according to the five measures, and especially according to the wealth inequality measures. High regional inequality corresponds with high wealth inequality in Nigeria and Pakistan but not the DRC. The only other countries highlighted in Table 11 are Haiti, with low coverage of DPT3, and Indonesia, with high regional inequality because of low coverage in Papua.

Table 11. Summary table for the DPT3 indicator showing the top three countries with the following measures for the most recent survey

	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6					
GH7					
HT6					
ID6					
KE7					
LB6					
ML6					
NG6					
PK6					
SN7					
ZM6					

3.6. Care Seeking for ARI

Treatment for the symptoms of Acute Respiratory Infection (ARI) in the two weeks before the survey was sought for more than half of children in Ghana, Indonesia, Kenya, Liberia, Pakistan, and Zambia (Figure 31). Nigeria and Mali had the lowest level of care seeking for ARI symptoms, at approximately 30% in the most recent survey. Although some countries showed improvements for this indicator, the improvements were not significant. As mentioned earlier, the number of children included in the denominator for this indicator is relatively small, and as a result the confidence intervals are relatively wide.

Figure 31. Percentage of children under age 5 with care seeking for ARI symptoms

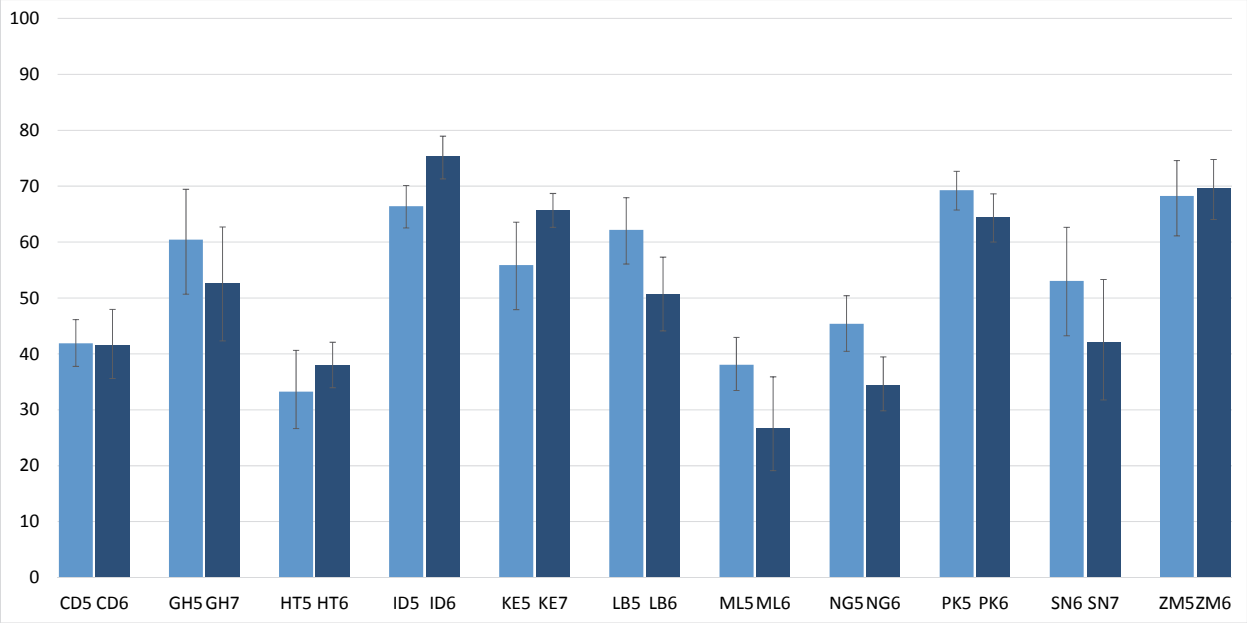
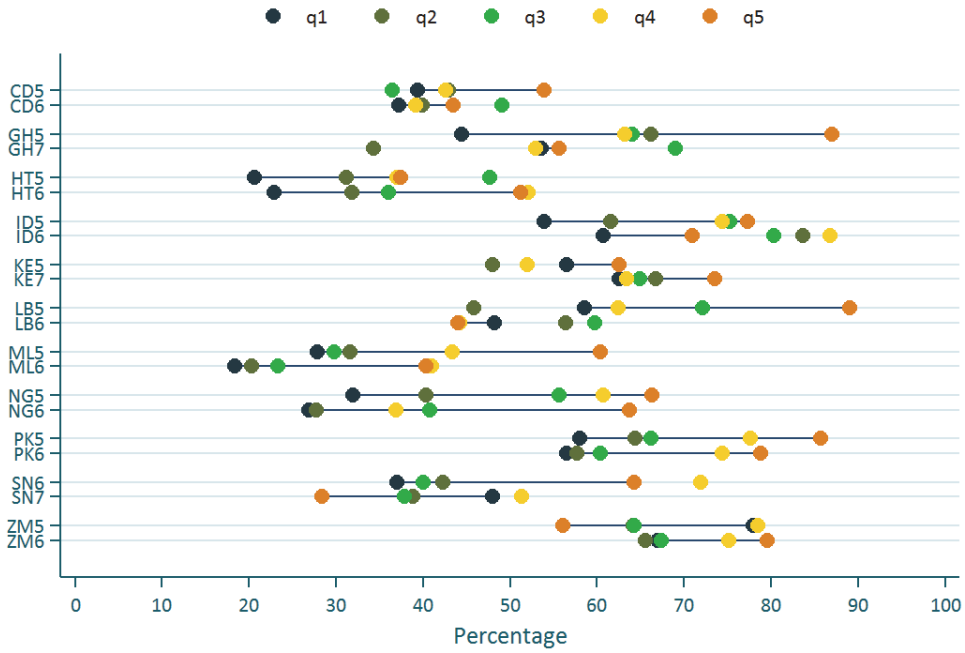


Figure 32 shows that the level of care seeking for ARI does not always increase with increasing household wealth. In Kenya and Zambia the spread across the wealth quintiles decreased as prevalence increased. The spread also decreased in Ghana, Liberia, and Senegal but this was due to a reduction in the level of care seeking for the richest wealth category—an unfavorable pattern. Ideally, a reduction in the gaps between the wealth quintiles should occur from an increase in prevalence of care seeking among the lowest wealth groups rather than from a decrease among the wealthiest.

Figure 32. Percentage of children under age 5 with care seeking for ARI symptoms by wealth quintiles q1-q5



In Figure 33, only Indonesia exhibited the desired trend of decreasing difference by wealth and increasing prevalence of care seeking for ARI between the two surveys. Figure 32, above, however, showed that the difference between the first and fourth quintile in the most recent Indonesia survey was almost as large as the difference between the first and fifth quintile in the previous survey. In Ghana and Liberia there was a large decrease in the difference accompanied by an increase in overall prevalence. In Senegal the difference became negative in the most recent survey due to a decrease in care seeking for the richest wealth category, as noted above. This was also true for Zambia in the first survey, but in the most recent survey the level of care seeking for ARI symptoms increased for the richest wealth category.

Figure 33. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of children under age 5 with care seeking for ARI symptoms

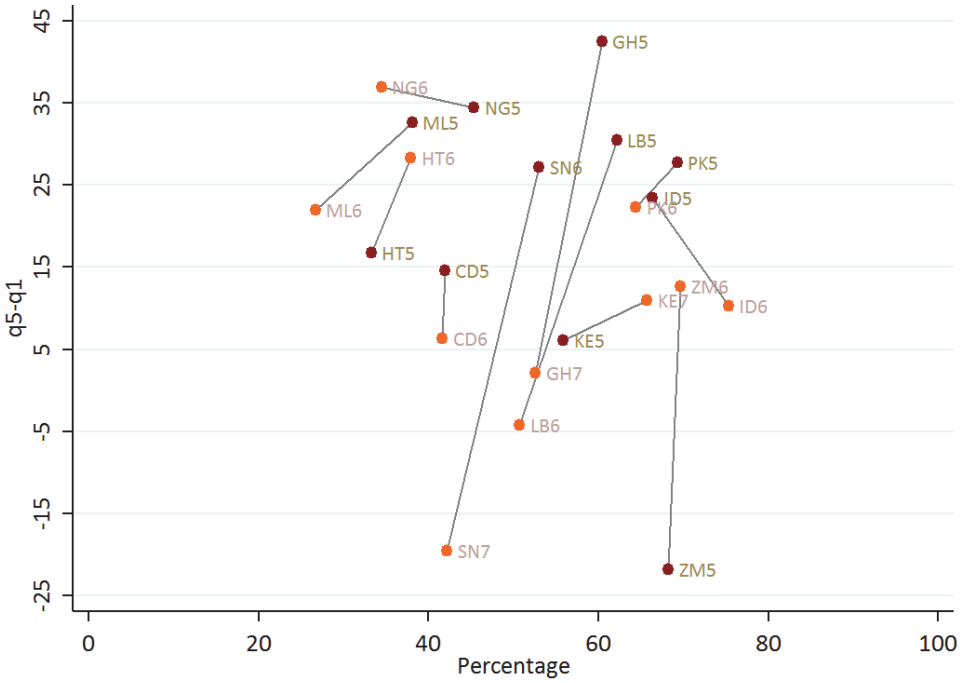


Figure 34 shows that the logit regression coefficient for the richest wealth quintile compared with the poorest quintile is small and not significantly different from zero in the recent surveys of the DRC, Ghana, Indonesia, Liberia, Senegal, and Zambia, implying equality between the richest and poorest wealth categories. The wide confidence intervals found for Ghana and Senegal are due to the small sample sizes of children with ARI symptoms, as Table 12 shows. In Haiti and Kenya the coefficient was significant in the most recent survey but was not significant in the previous survey.

Figure 34. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of care seeking for ARI symptoms with the wealth quintile as a categorical predictor.

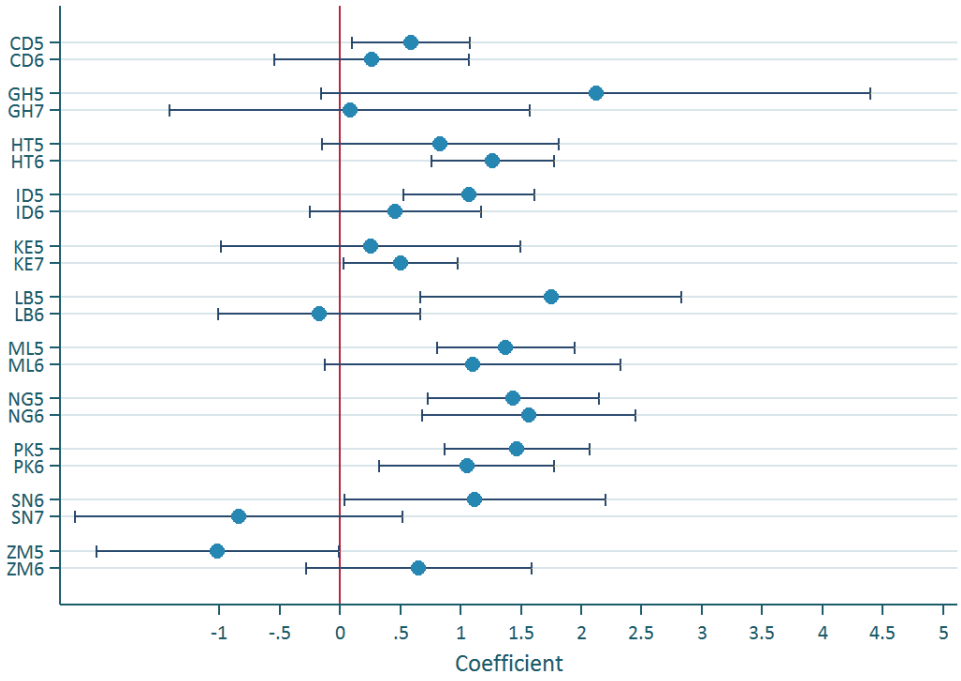


Table 12, which takes into account all five wealth quintiles, not just the highest and lowest, shows that only Liberia and Senegal significantly reduced the concentration index for care seeking for ARI symptoms. The concentration index significantly changed in Liberia, Senegal, and Zambia to a value that is not significantly different from zero. The concentration index for the most recent survey was also not statistically different from zero in the DRC, Ghana, and Kenya.

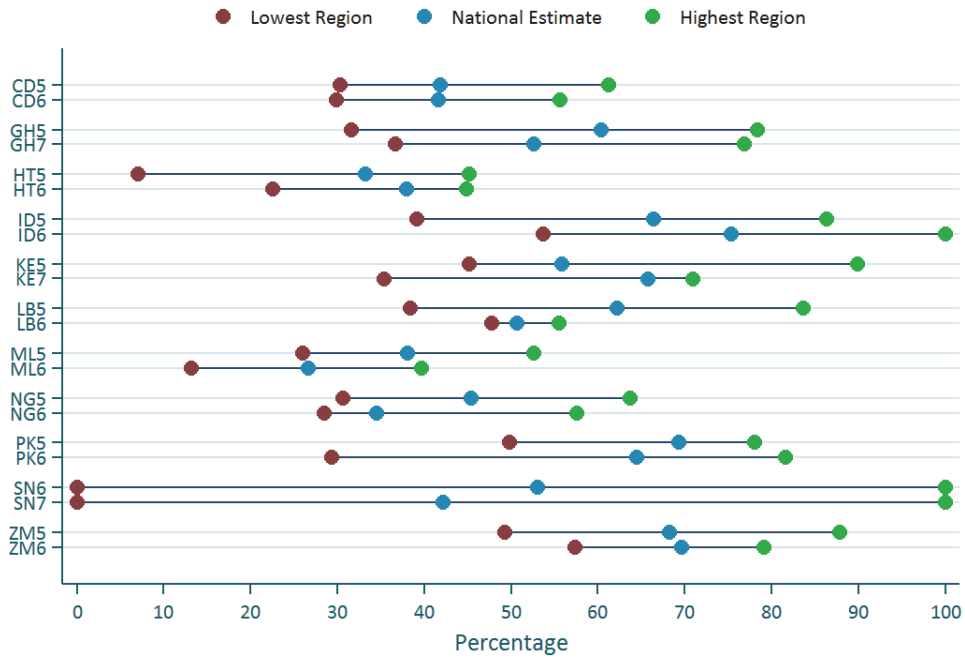
Table 12. Concentration index (CI) estimates with tests of difference between two surveys for each country for care seeking for ARI symptoms

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	0.062 (0.03)	1224	0.044 (0.06)	1075	-0.018	0.392
GH	0.214 (0.11)	154	0.13 (0.11)	189	-0.084	0.291
HT	0.171 (0.07)	457	0.243 (0.04)	1008	0.072	0.825
ID	0.206 (0.04)	2175	0.134 (0.05)	975	-0.072	0.127
KE	0.025 (0.10)	432	0.05 (0.03)	1722	0.024	0.593
LB	0.213 (0.06)	503	-0.035 (0.07)	499	-0.248	**0.005**
ML	0.237 (0.05)	699	0.197 (0.09)	158	-0.040	0.349
NG	0.272 (0.05)	724	0.194 (0.05)	608	-0.078	0.141
PK	0.214 (0.04)	1167	0.182 (0.05)	1610	-0.033	0.297
SN	0.276 (0.10)	218	-0.100 (0.11)	133	-0.376	**0.006**
ZM	-0.084 (0.07)	298	0.092 (0.06)	455	0.176	0.994*

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.
* Indicates that the p-value was significant in the opposite direction.

Figure 35 describes the regional spread of care seeking for ARI. In Senegal the range is due to the presence of some regions with no cases of care seeking for ARI and other regions in which all children with symptoms are reported to have been taken for treatment, as shown in Appendix 5. This is a problem of sample size because some regions had very few cases of children under age 5 with ARI symptoms in the two weeks before the survey. The greatest improvement in regional inequality was found in Haiti due to an increase in prevalence of care seeking for ARI in the lowest region. In Liberia the gap decreased significantly, but this was due to a decline in the prevalence in the highest region. There was an increase in the regional gap in Pakistan due to a decline in the prevalence in the lowest region—which was not the same region in both surveys (see Appendix 5). Due to the small sample sizes of children with ARI symptoms within each region, no map was produced for the ARI indicator.

Figure 35. Percentage of children under age 5 with care seeking for ARI symptoms with the national estimates and lowest and highest region estimates



Summary:

As Table 13 shows, Haiti and Nigeria consistently appeared among the three most extreme countries according to the measures identified in the table. Mali is among the most extreme three countries for three of the five measures. The wealth and regional disparity measures did not correspond.

Table 13. Summary table for the ARI indicator showing the top three countries with the following measure for the most recent survey

	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6					
GH7					
HT6	■	■	■	■	
ID6					■
KE7					
LB6					
ML6	■		■	■	
NG6	■	■	■	■	
PK6		■			■
SN7					■
ZM6					

Note: While Senegal did have the largest regional difference as shown in Figure 35, this was mainly a sample size problem and was not considered a true estimate.

3.7. Care Seeking for Fever

As with care seeking for ARI symptoms, the prevalence of care seeking for fever in the two weeks before the survey was above 50% for Ghana, Indonesia, Kenya, Liberia, Pakistan, and Zambia (Figure 36). The only countries in which the prevalence significantly increased between surveys were Kenya and Zambia. It declined significantly in Nigeria, from above 50% to approximately 30%.

Figure 36. Percentage of children under age 5 with care seeking for fever symptoms

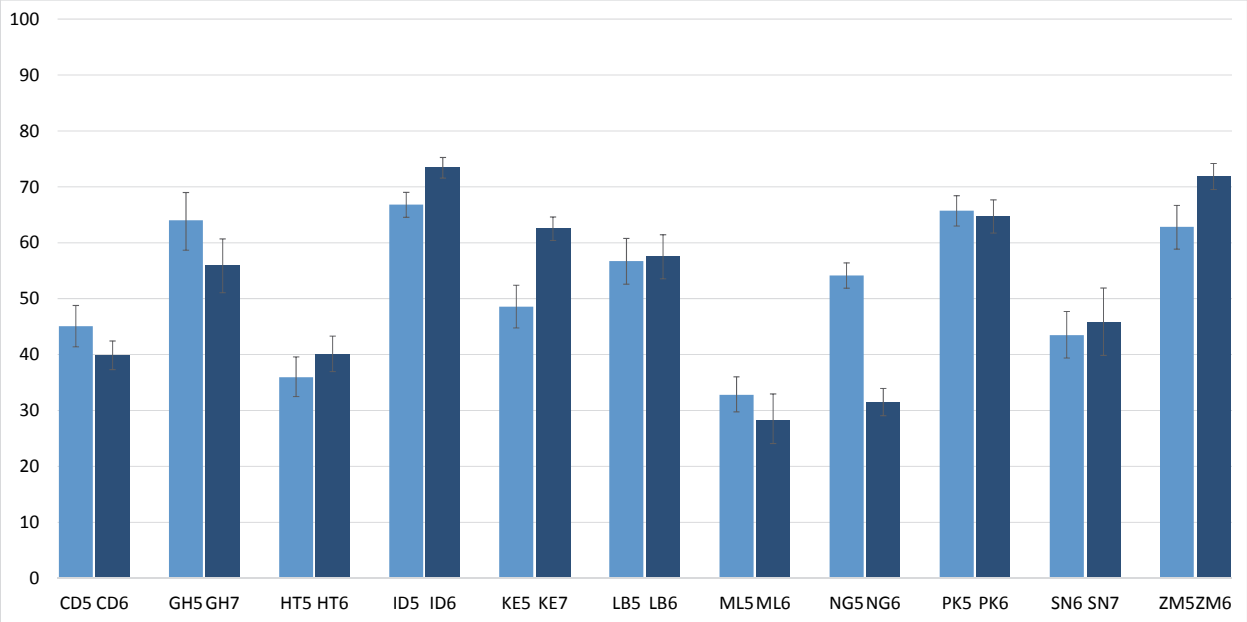


Figure 37 shows reductions in the spread across the wealth quintiles in the DRC, Ghana, Indonesia, Liberia, and Zambia. Only in Zambia and Indonesia was this reduction accompanied by an increase in prevalence of care seeking for fever for all the quintile groups. In Kenya the prevalence increased in all quintiles but the spread remained approximately the same. In Haiti and Mali the wealth gaps increased and in Nigeria the gaps diminished but with a significant decline in overall prevalence.

Figure 37. Percentage of children under age 5 with care seeking for fever symptoms by wealth quintiles q1-q5

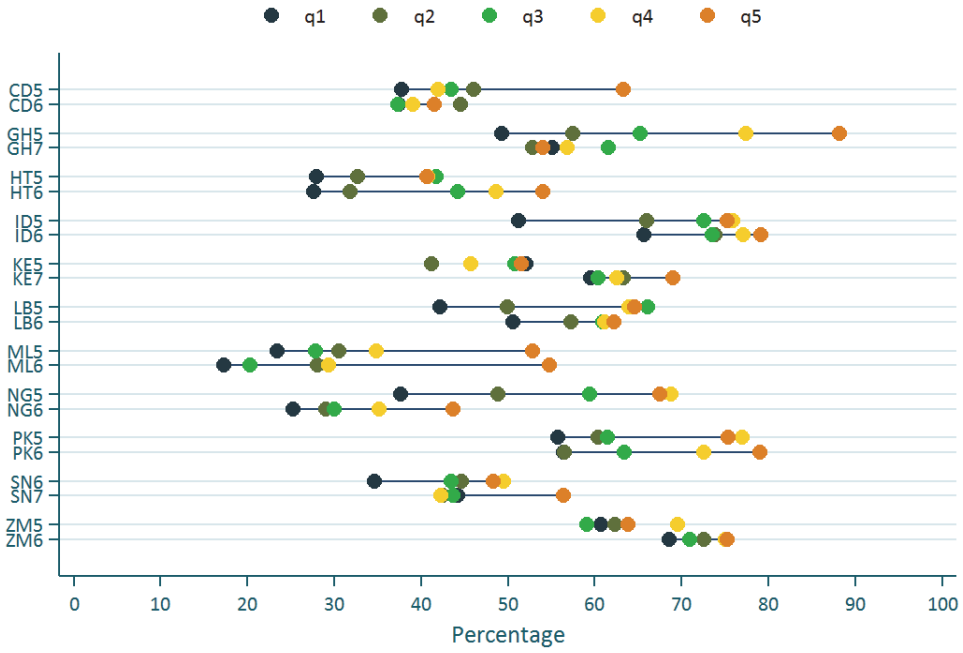
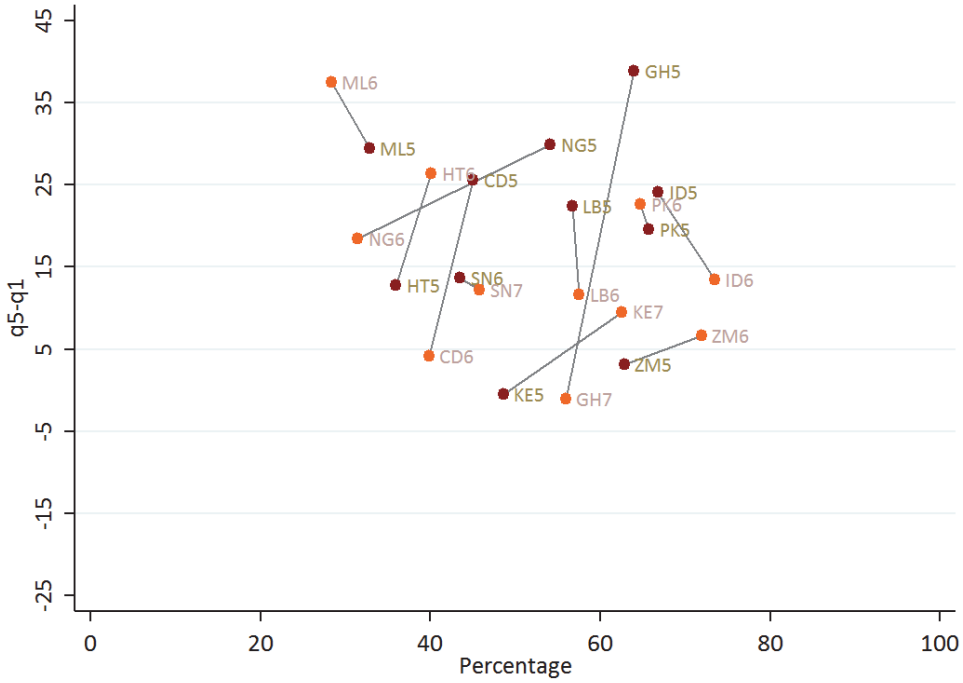


Figure 38 shows that primarily Indonesia, followed by Liberia and Senegal, exhibited the desired trend of a reduction in the difference between wealth quintiles with an increase in prevalence of care seeking. The difference decreased significantly for Ghana and the DRC but overall prevalence decreased slightly, rather than improving. The difference between the highest and lowest wealth quintiles increased in Mali, Haiti, Kenya, Zambia, and Pakistan.

Figure 38. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of children under age 5 with care seeking for fever symptoms



In Figure 39 the logit regression coefficients for the most recent surveys in the DRC, Ghana, Liberia, Senegal, and Zambia are not significantly different from zero, indicating that there is no significant inequality between the richest and poorest wealth categories in care seeking for fever. The coefficients increased for Haiti, Kenya, and Mali but the increase was not significant.

Figure 39. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of care seeking for fever symptoms with the wealth quintile as a categorical predictor.

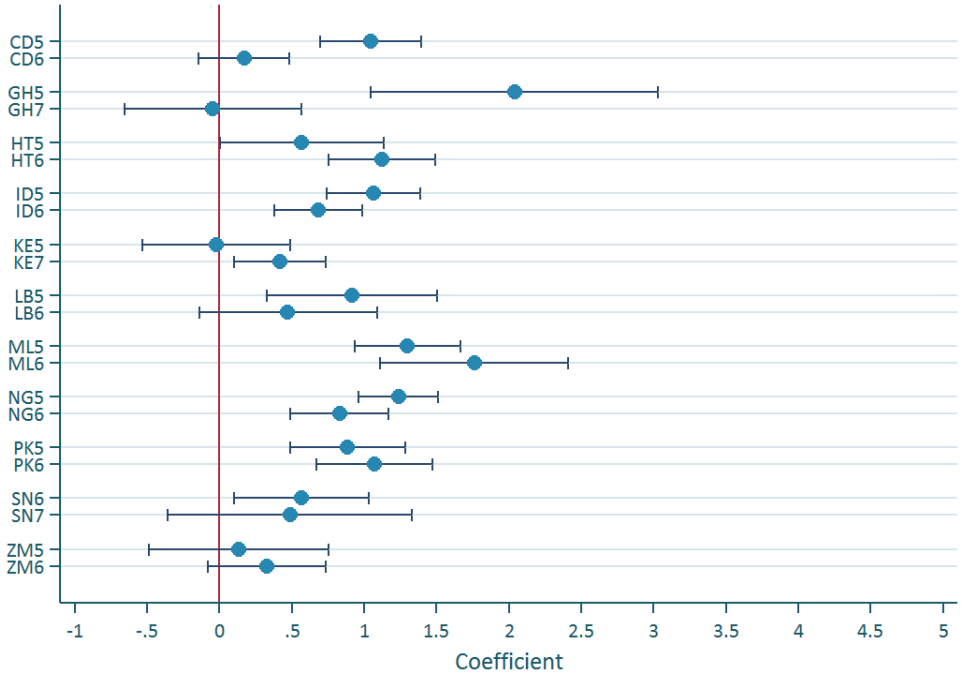


Table 14 shows that the concentration index for care seeking for fever symptoms decreased significantly toward more equality across all five wealth quintiles in the DRC, Ghana, Indonesia, and Nigeria. Haiti exhibited a significant increase in the concentration index, making it the country with the highest concentration index for the most recent survey. In the DRC, Ghana, Senegal, and Zambia the concentration index was not significantly different from zero for the most recent survey.

Table 14. Concentration index (CI) estimates with tests of difference between two surveys for each country for care seeking for fever symptoms

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	0.120 (0.04)	2556	0.007 (0.03)	5234	-0.113	**0.006**
GH	0.280 (0.05)	551	0.016 (0.06)	824	-0.264	**<0.001**
HT	0.117 (0.05)	1430	0.215 (0.03)	1882	0.099	0.961*
ID	0.203 (0.02)	5802	0.098 (0.02)	5405	-0.104	**<0.001**
KE	-0.007 (0.05)	1385	0.051 (0.02)	4764	0.058	0.865
LB	0.192 (0.05)	1673	0.095 (0.04)	2203	-0.097	0.065
ML	0.176 (0.03)	2094	0.208 (0.04)	809	0.032	0.731
NG	0.265 (0.02)	3965	0.124 (0.03)	3691	-0.141	**<0.001**
PK	0.181 (0.03)	2495	0.188 (0.03)	3930	0.007	0.563
SN	0.113 (0.04)	1146	0.073 (0.07)	761	-0.039	0.322
ZM	0.047 (0.04)	1034	0.048 (0.03)	2745	0.001	0.505

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.
* Indicates that the p-value was significant in the opposite direction.

As Figure 40 shows, the largest regional spreads for the most recent survey were found for Ghana, Mali, and Pakistan. Regional gaps decreased in most countries, but only Kenya exhibited a decrease in the gap accompanied by an increase in prevalence of care seeking in both the lowest and the highest regions. Liberia had the greatest reduction in regional gaps but this was due to the combination of an increase in the prevalence of care seeking for fever symptoms in the lowest region and a decrease in the highest region. The second largest reduction was in Haiti, mainly due to increased prevalence in the lowest region.

Figure 40. Percentage of children under age 5 with care seeking for fever symptoms with the national estimates and lowest and highest region estimates

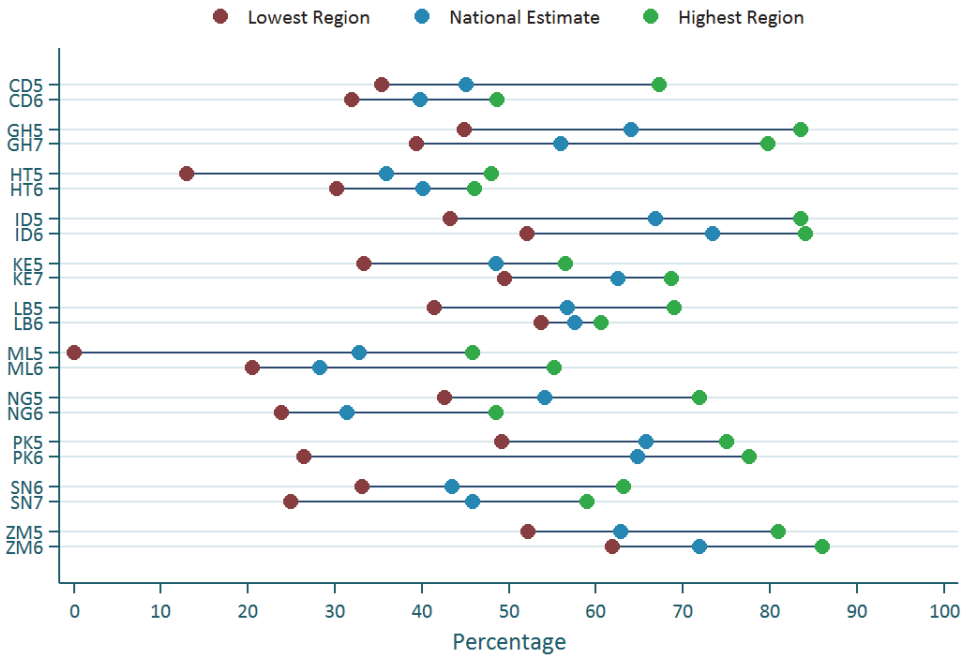
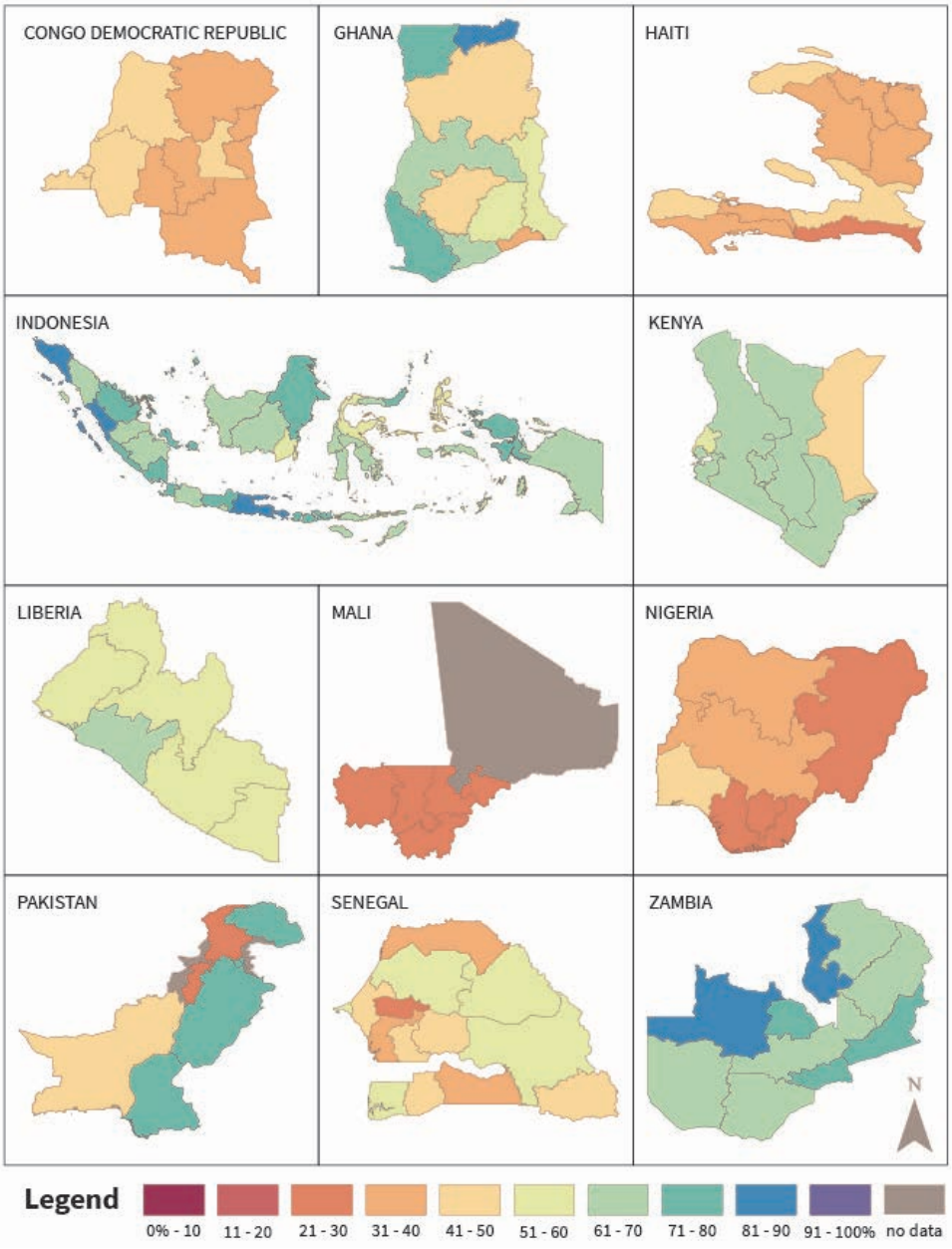


Figure 41 shows large regional disparities in care seeking for fever symptoms for Ghana and Pakistan. The high regional spread shown above in Figure 40 for Malawi was due to the high level of care seeking in the capital, Bamako, compared with the other regions. Kenya and Liberia appear to have the lowest level of regional disparities, with almost all their regions having the same level of care seeking for fever.

Figure 41. Regional map for the most recent survey of children under age 5 with care seeking for fever symptoms



Summary:

In Table 15, Haiti, Mali, and Pakistan are consistently the three countries with the most extreme values of the wealth inequality measures. Pakistan and Mali are also among the three countries with the highest regional differences. Mali, Nigeria, and CDR are the three countries with lowest prevalence of care seeking for fever symptoms in the most recent survey.

Table 15. Summary table for the fever indicator showing the top three countries with the following measures for the most recent survey

	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6					
GH7					
HT6					
ID6					
KE7					
LB6					
ML6					
NG6					
PK6					
SN7					
ZM6					

3.8. Care Seeking for Diarrhea

Figure 42 shows that treatment for diarrhea in the two weeks before the most recent survey was sought for more than half of the children in Indonesia, Kenya, Pakistan, and Zambia. Nigeria, Mali, and Senegal had the lowest prevalence of care seeking for diarrhea, at approximately 30% in the most recent survey. The prevalence significantly increased in Indonesia, Kenya, and Mali and significantly decreased in Ghana and Nigeria.

Figure 42. Percentage of children under age 5 with care seeking for diarrhea

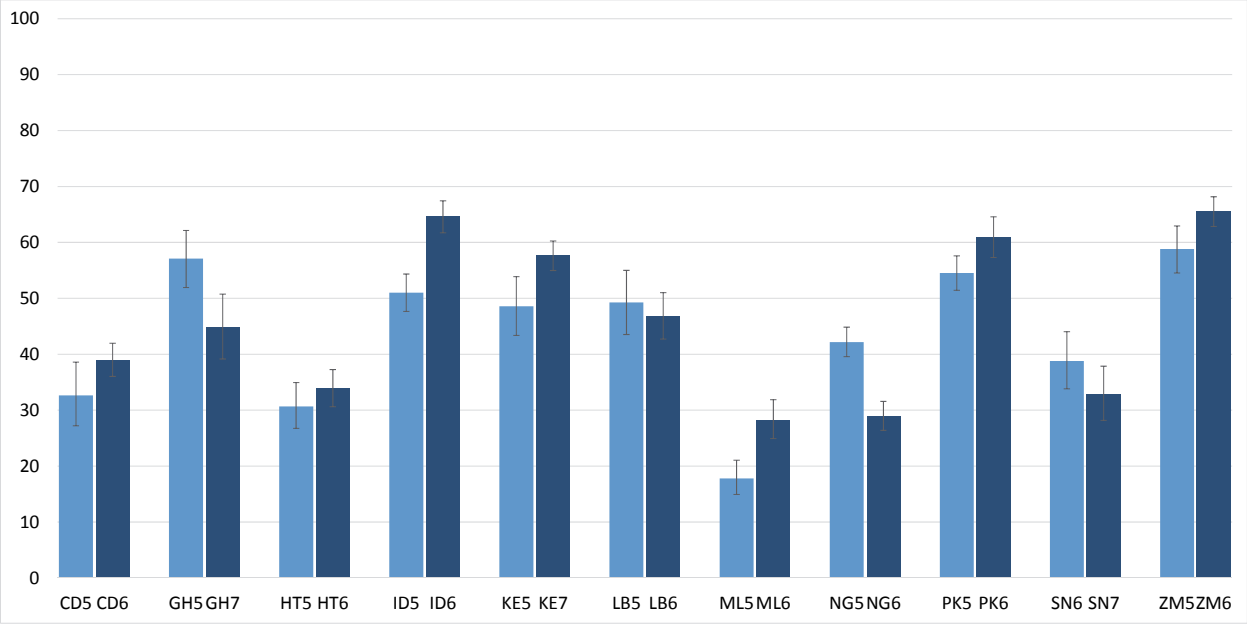
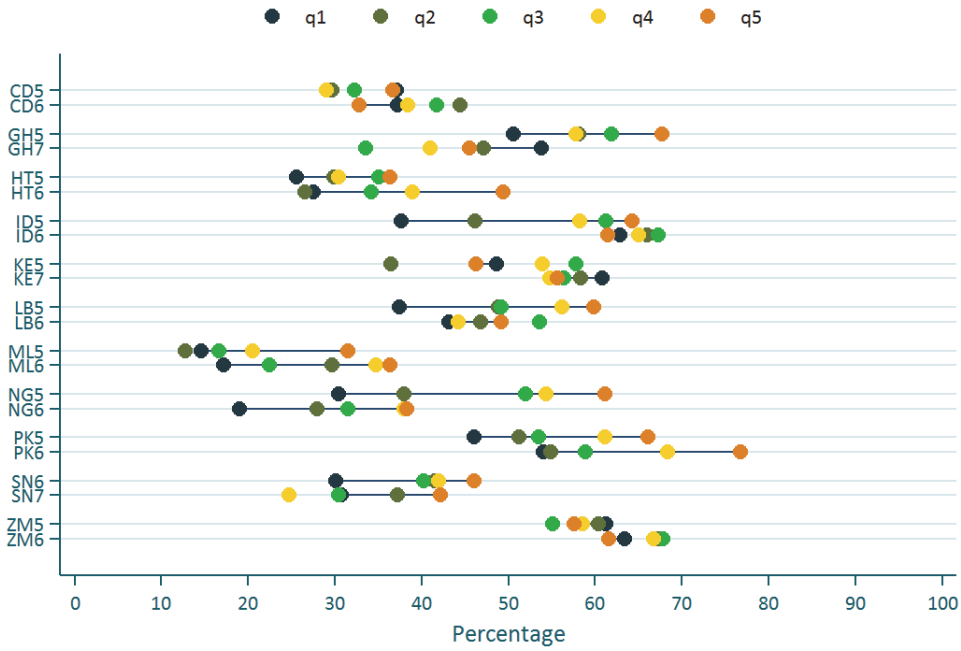


Figure 43 shows that the spread across the wealth quintiles decreased most in Indonesia and Kenya. Zambia also exhibited a relatively small spread that persisted from one survey to the next. Pakistan, Nigeria, and Haiti had the largest gaps by wealth in the most recent survey. The prevalence of care seeking increased between the surveys in all the wealth quintiles in Pakistan, however, while in Haiti the increase was only in the fourth and fifth wealth quintiles. In Nigeria there was a decrease in the prevalence in all wealth quintiles.

Figure 43. Percentage of children under age 5 with care seeking for diarrhea by wealth quintiles q1-q5



In Figure 44 we see that, although the difference in prevalence of care seeking for diarrhea between the highest and lowest quintiles decreased in Nigeria, Senegal, Liberia, and Ghana, this reduction of inequality was not accompanied by an increase in prevalence. For the most recent surveys in Ghana, the DRC, Kenya, and Zambia, the differences were negative (that is, the level of care seeking was higher in the poorest quintile than in the richest quintile) but close to zero. Only Indonesia exhibited the desired trend of a reduction in the difference in care seeking between the two extreme wealth quintiles (in absolute value) with an increase in the overall prevalence of care seeking for diarrhea.

Figure 44. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of children under age 5 with care seeking for diarrhea

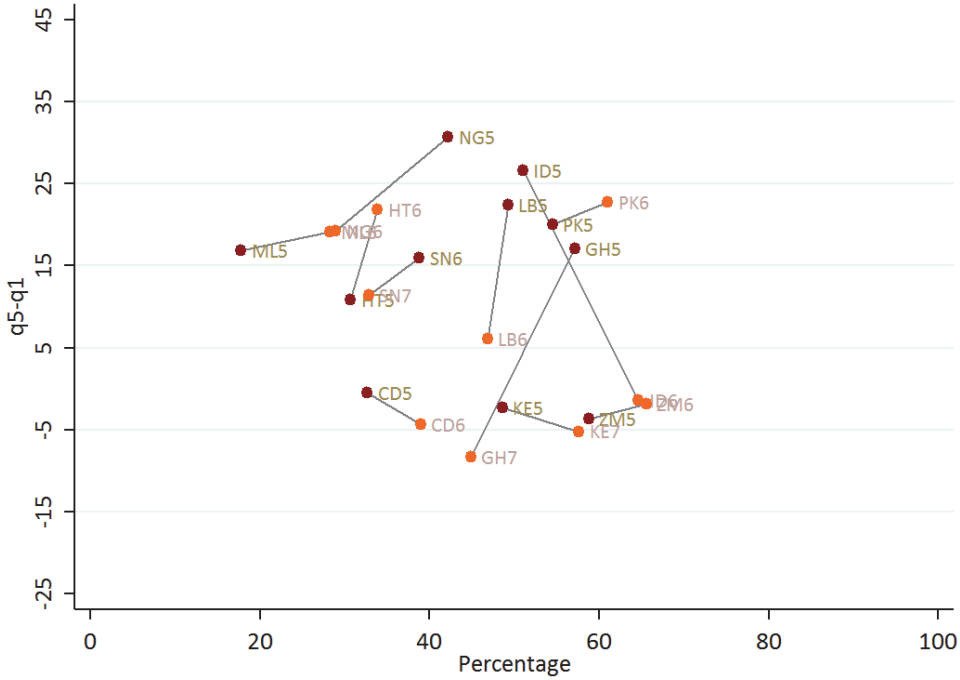
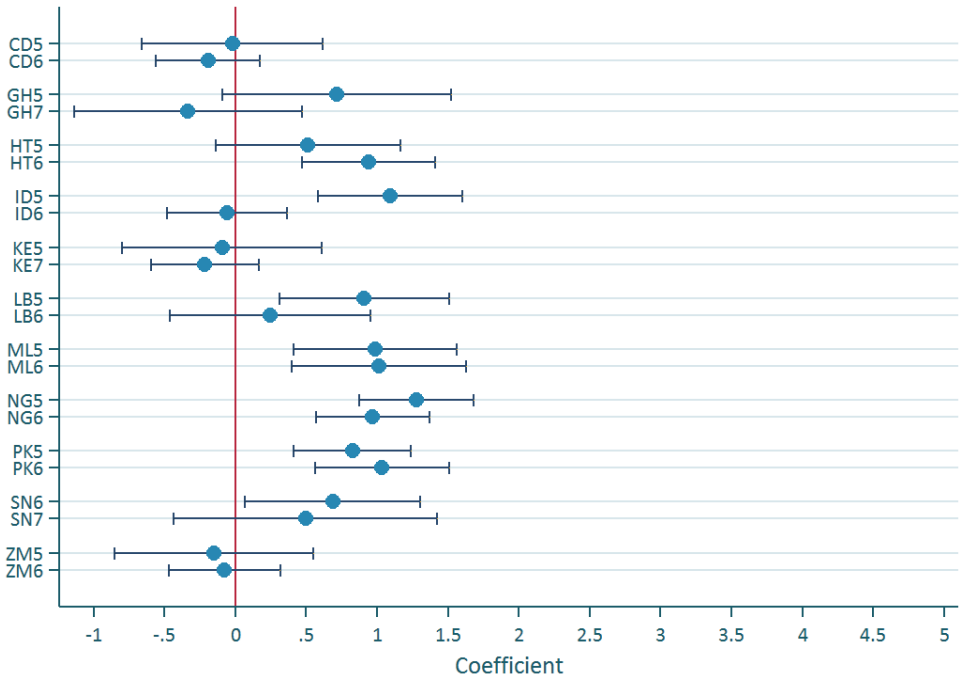


Figure 45 shows that the most recent surveys in the DRC, Ghana, Indonesia, Kenya, Liberia, Senegal, and Zambia all exhibit the desired pattern of equality, with a logit regression coefficient that is small and not significantly different from zero. In Haiti the coefficient was not significant in the earlier survey but increased and became significant in the later survey. Mali, Nigeria, and Pakistan had the highest coefficients, which are significantly different from zero, indicating a significant difference between the richest and poorest wealth groups in care seeking for diarrhea.

Figure 45. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of care seeking for diarrhea with the wealth quintile as a categorical predictor.



As Table 16 shows, the concentration index, our most comprehensive measure of inequality by wealth, moved significantly toward more equality for care seeking for diarrhea in Ghana, Indonesia, Liberia, and Nigeria. In addition, the concentration indices were not significantly different from zero in the most recent surveys of the DRC, Ghana, Indonesia, Kenya, Liberia, Senegal, and Zambia (p-values are not shown in Table 16, but the test statistic is the ratio of the coefficient to its standard error). The concentration index increased for the DRC, Haiti, Mali, and Pakistan but the increase was not statistically significant.

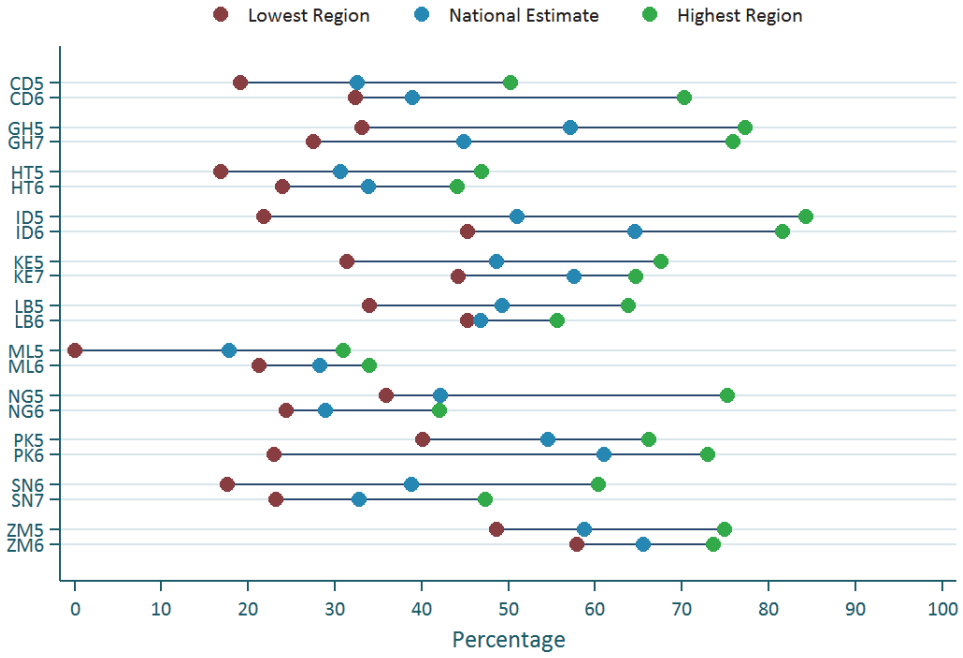
Table 16. Concentration index (CI) estimates with tests of difference between two surveys for each country for care seeking for diarrhea

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	-0.018 (0.05)	1287	-0.042 (0.03)	2818	-0.024	0.338
GH	0.101 (0.06)	553	-0.111 (0.07)	671	-0.212	**0.008**
HT	0.068 (0.04)	1217	0.154 (0.04)	1415	0.086	0.935
ID	0.224 (0.04)	2536	0.000 (0.03)	2505	-0.224	**<0.001**
KE	0.041 (0.05)	946	-0.049 (0.03)	2953	-0.089	0.076
LB	0.157 (0.05)	1072	0.038 (0.05)	1675	-0.119	**0.038**
ML	0.103 (0.03)	1450	0.136 (0.04)	844	0.033	0.742
NG	0.237 (0.03)	2645	0.160 (0.03)	2968	-0.077	**0.025**
PK	0.155 (0.03)	1877	0.166 (0.04)	2298	0.012	0.591
SN	0.119 (0.05)	972	0.026 (0.07)	1272	0.092	0.152
ZM	-0.031 (0.05)	909	-0.003 (0.03)	2045	0.028	0.679

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.

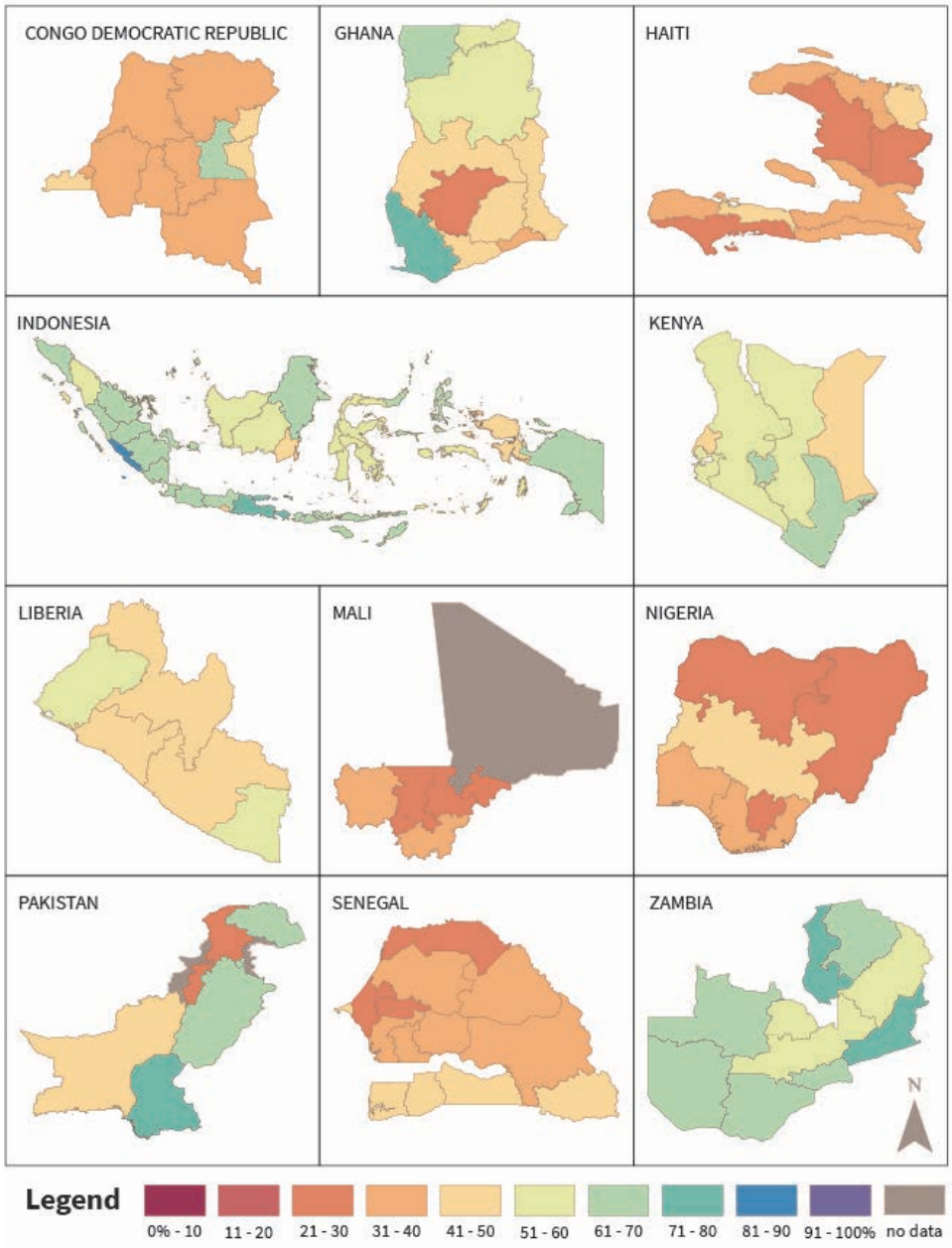
The largest regional disparities in the most recent surveys were found for the DRC, Ghana, and Pakistan (Figure 46). In the DRC, regional disparities increased between the surveys, but prevalence of care seeking for diarrhea in the lowest and highest regions increased as well. The regional gaps also increased for Pakistan but mainly due to a decrease in the prevalence for the lowest region. The largest reductions in regional disparities were found for Indonesia followed by Nigeria, Liberia, Senegal, Kenya, Zambia, and Haiti. For all of these countries other than Nigeria the decrease in the regional gap was partially due to an increase in the prevalence of care seeking for diarrhea for the lowest region, a desirable pattern. In Nigeria, however, the prevalence for both the lowest and highest regions decreased, an undesirable pattern.

Figure 46. Percentage of children under age 5 with care seeking for diarrhea with the national estimates and lowest and highest region estimates



As with the maps presented earlier for care seeking for fever, the maps in Figure 47 for care seeking for diarrhea show the largest regional disparities in Ghana and Pakistan. Most regions of the DRC had a level of 31-40%, but one region reached 71-80%.

Figure 47. Regional map for the most recent survey of children under age 5 with care seeking for diarrhea



Summary:

In Table 17, Nigeria and Pakistan consistently appear among the three most extreme countries in the five measures of wealth inequality. Pakistan is also one of the three countries with the most extreme regional differences, along with Ghana and the DRC.

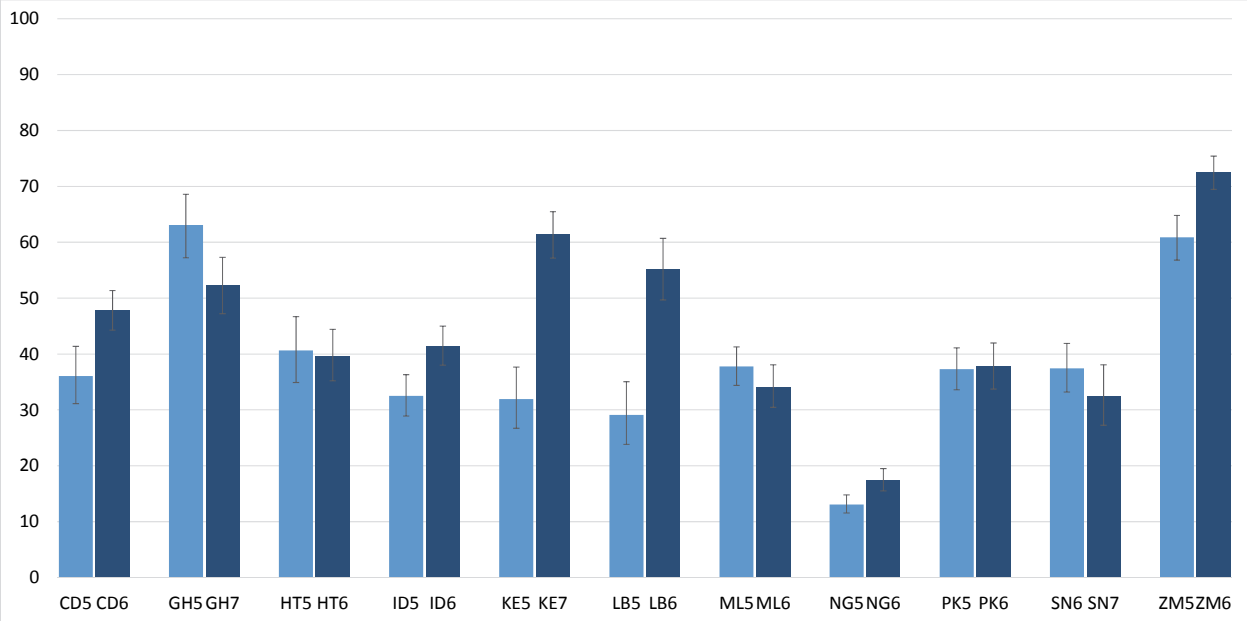
Table 17. Summary table for the diarrhea indicator showing the top three countries with the following measure for the most recent survey

	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6					■
GH7					■
HT6		■		■	
ID6					
KE7					
LB6					
ML6	■		■		
NG6	■	■	■	■	
PK6		■	■	■	■
SN7	■				
ZM6					

3.9. Exclusive Breastfeeding (EBF)

The level of exclusive breastfeeding was over 50% only for the most recent surveys in Ghana, Kenya, Liberia, and Zambia. It was below 20% for the two Nigeria surveys. Significant improvements in prevalence of exclusive breastfeeding were found for the DRC, Indonesia, Kenya, Liberia, Nigeria, and Zambia. The confidence intervals are relatively wide because the denominator is limited to children who are alive and living with the mother and are under age 6 months.

Figure 48. Percentage of youngest children under age 6 months who were exclusively breastfed



In Figure 49 we see that the spread across the wealth quintiles increased most in Ghana, Liberia, and Nigeria. While in Ghana and Nigeria this resulted in a decrease in the prevalence of exclusive breastfeeding for some wealth quintiles, in Liberia the prevalence increased for all wealth quintiles. The figure also shows that the prevalence does not always increase with increasing wealth. In fact, the highest wealth quintiles often have the lowest or second lowest prevalence of exclusive breastfeeding, because many women prefer to use powdered milk, and women who are better off can more easily afford it.

Figures 50 and 51 also show many negative differences. Liberia and Ghana exhibit the largest negative difference in the most recent survey, with the level of exclusive breastfeeding highest in the poorest wealth category. The difference moved toward zero for Haiti, Indonesia, Mali, Pakistan, Senegal, and Zambia (see Appendix 3). However, as noted in Figure 50, this shift did not always translate to a narrower gap between the wealth quintiles. For instance, while in Senegal the difference between the fifth and first wealth quintiles decreased between surveys, the gap between the first and fourth quintiles remained large, as Figure 49 shows.

Figure 49. Percentage of youngest children under age 6 months who were exclusively breastfed by wealth quintiles q1-q5

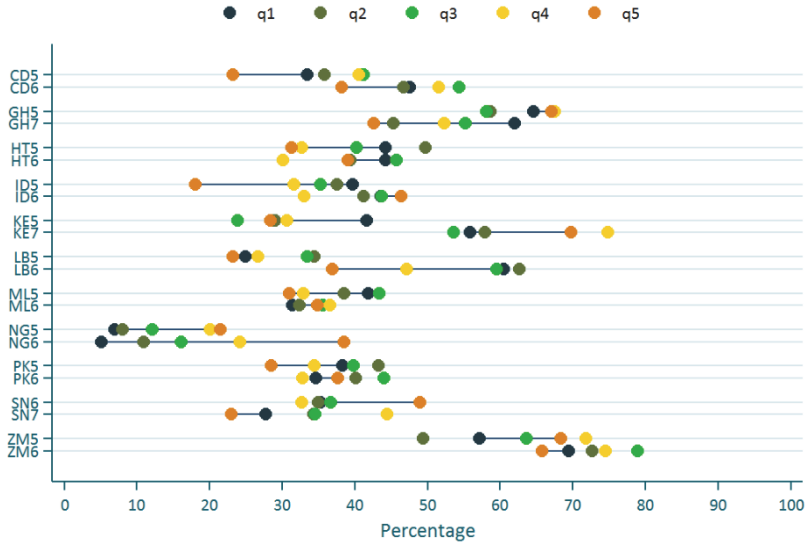
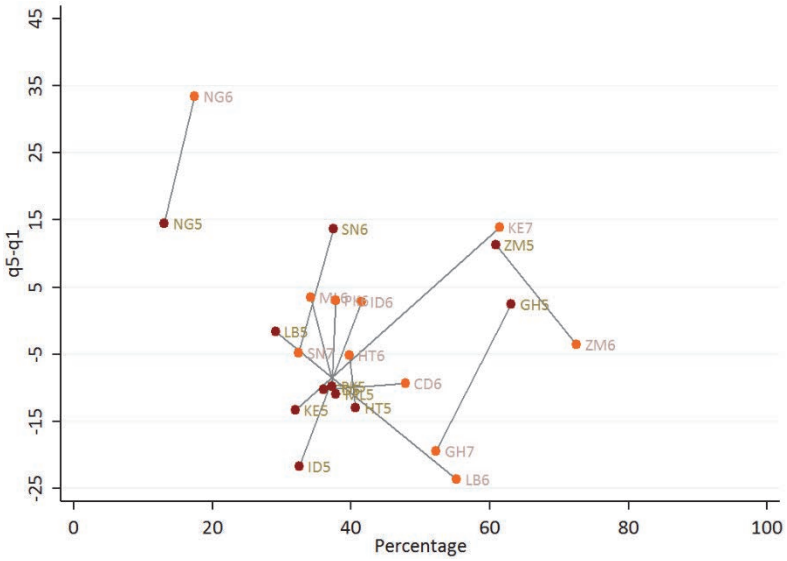


Figure 50. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of youngest children under age 6 months who were exclusively breastfed



In Figure 51 shows small and non-significant logit regression coefficients for almost all countries in the most recent survey. The exceptions were Ghana, Liberia, and Nigeria. In Ghana and Liberia the coefficient was non-significant in the earlier survey but then moved below zero and became significantly negative in the most recent survey. This indicates that in these two countries children in the richest wealth quintile were less likely than children in the poorest quintile to be exclusively breastfed. In Nigeria the coefficient was positive and relatively large, and it increased between the surveys. It was the only country to show such a pattern.

Figure 51. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of being exclusively breastfed with the wealth quintile as a categorical predictor.

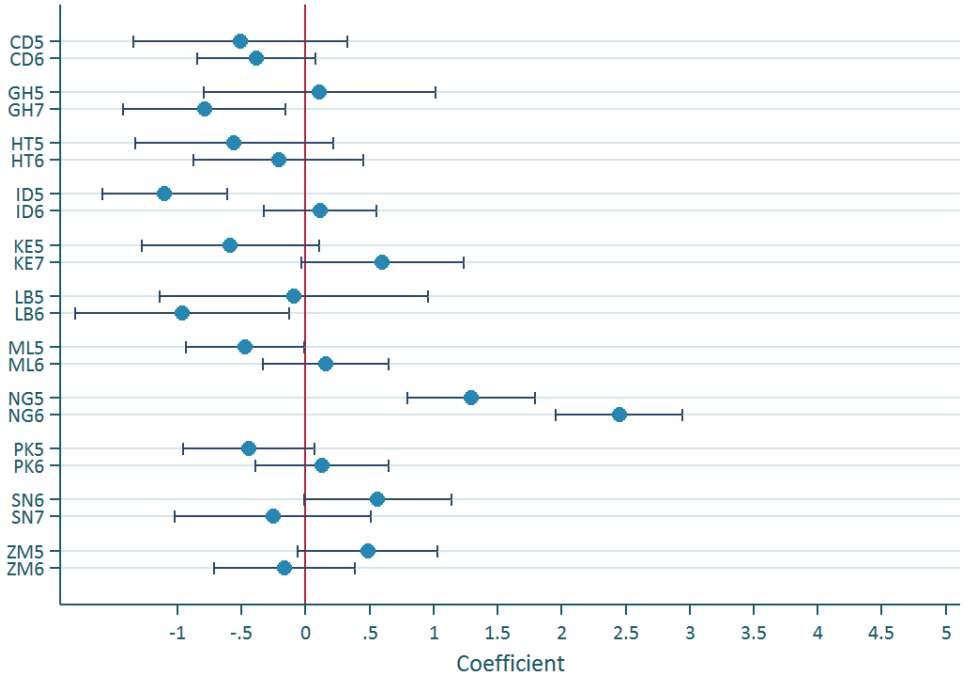


Table 18 shows relatively low concentration indices for EBF, especially for the most recent surveys. The concentration indices were not statistically different from zero for any countries other than Liberia, Kenya, and Nigeria. Thus according to this measure most countries have reached equality in EBF. In Nigeria the concentration index significantly increased toward a larger level of inequality.

Table 18. Concentration index (CI) estimates with tests of difference between two surveys for each country for the exclusive breastfeeding indicator

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	-0.016 (0.06)	907	-0.037 (0.04)	1934	-0.021	0.379
GH	0.037 (0.07)	317	-0.107 (0.06)	606	-0.144	0.052
HT	-0.123 (0.06)	598	-0.062 (0.06)	726	0.061	0.763
ID	-0.159 (0.04)	1799	-0.014 (0.04)	1686	0.144	0.997*
KE	-0.105 (0.06)	587	0.134 (0.05)	856	0.240	0.999
LB	-0.018 (0.06)	504	-0.168 (0.06)	717	-0.150	**0.040**
ML	-0.084 (0.04)	1420	0.037 (0.04)	999	0.122	0.985*
NG	0.130 (0.02)	2886	0.245 (0.02)	2928	0.115	1.00*
PK	-0.082 (0.04)	947	-0.002 (0.04)	1075	0.080	0.907
SN	0.073 (0.05)	671	0.006 (0.06)	611	-0.067	0.195
ZM	0.140 (0.05)	618	0.008 (0.04)	1189	-0.131	**0.013**

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.
* Indicates that the p-value was significant in the opposite direction.

Figure 52 shows that the largest regional disparity for the most recent survey was found for Ghana, followed by Senegal, Indonesia, the DRC, and Pakistan. The largest increases in the regional gaps were found for Pakistan followed by Nigeria and Ghana. Mali had the largest decrease in the regional gap but this was due to a decrease in the prevalence of exclusive breastfeeding for the highest region. The regional gap also decreased in Kenya, with increases in prevalence for the lowest and highest regions.

Figure 52. Percentage of youngest children under age 6 months who were exclusively breastfed with the national estimates and lowest and highest region estimates

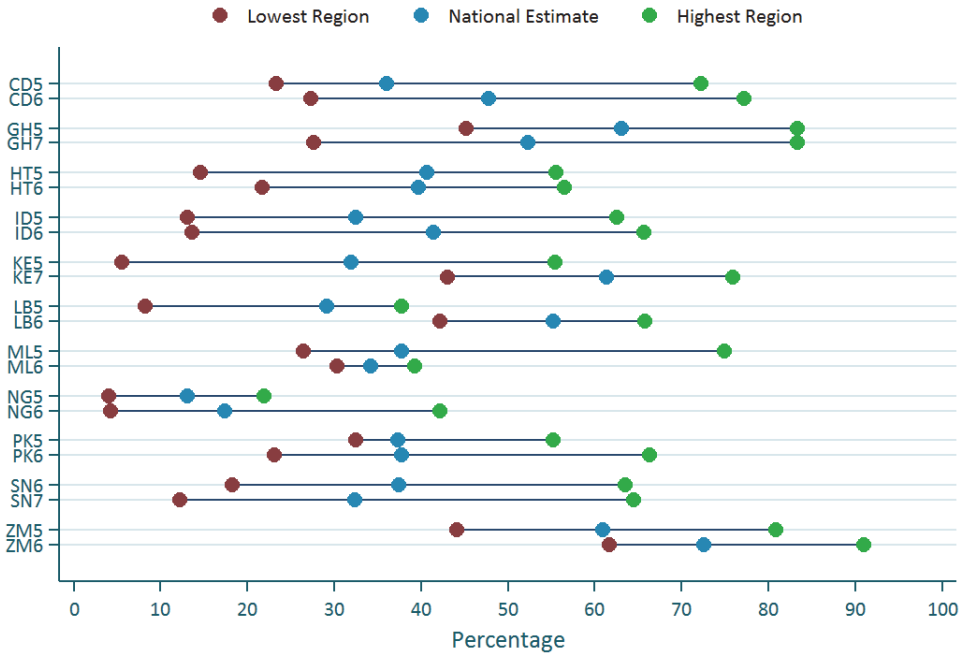
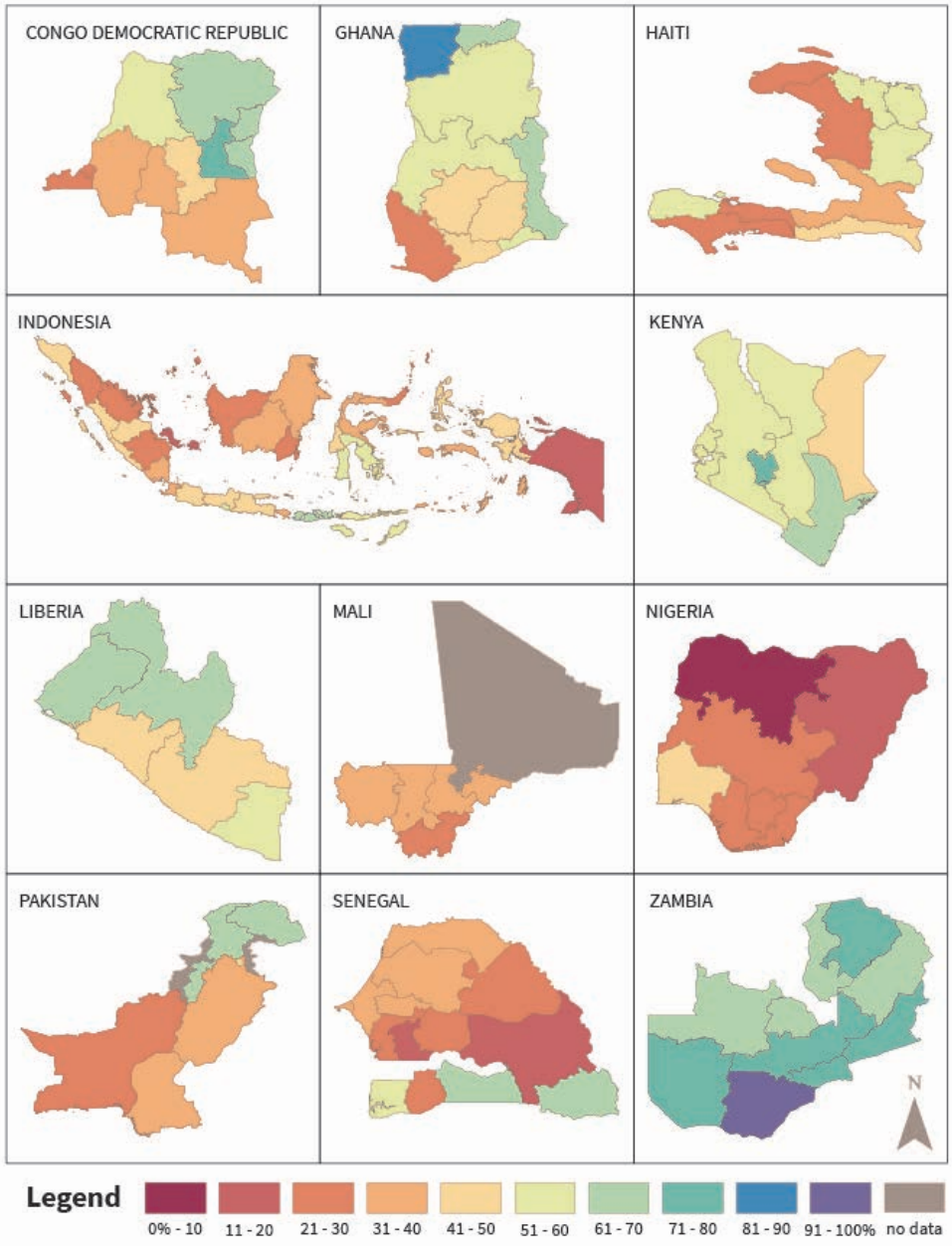


Figure 53 shows that most countries appear to have regional disparities for the EBF indicator. High and low levels of exclusive breastfeeding were found in Ghana, Senegal, Indonesia, the DRC, and Pakistan, with some regions within the same country reaching over 60% and others remaining below 20%.

Figure 53. Regional map for the most recent survey of youngest children under age 6 months who were exclusively breastfed



Summary:

In Table 19, Kenya, Mali, and Nigeria consistently appear as the three most extreme countries according to the wealth inequality measures. Mali and Nigeria also had the lowest prevalence of exclusive breastfeeding. The regional disparity measure did not correspond with the wealth disparity measures. Three other countries—Ghana, Indonesia, and Senegal—have the greatest regional disparities, with no overlap in the measures.

Table 19. Summary table for the EBF indicator showing the top three countries with the following measures for the most recent survey

	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6					
GH7					■
HT6					
ID6					■
KE7		■	■	■	
LB6					
ML6	■	■	■	■	
NG6	■	■	■	■	
PK6					
SN7	■				■
ZM6					

3.10. Stunting

The desired trends for stunting and wasting are in the opposite direction compared with the MCH indicators previously discussed. This is because stunting and wasting are negative outcomes; we would like their prevalence to move toward lower levels, rather than higher levels. Figure 54 shows that the lowest levels of stunting were found in Senegal, Ghana, and Haiti. The highest levels were found in DRC, Pakistan, and Zambia, where they reached approximately 40-45%. Significant declines in the prevalence of stunting were observed in Ghana, Haiti, Kenya, Liberia, Nigeria, and Zambia. Pakistan did not measure height and weight in the next-to-last survey, and neither of the surveys in Indonesia included those measurements. Therefore these surveys are not included in the analysis of stunting and wasting.

Figure 54. Percentage of de facto children under age 5 who were stunted

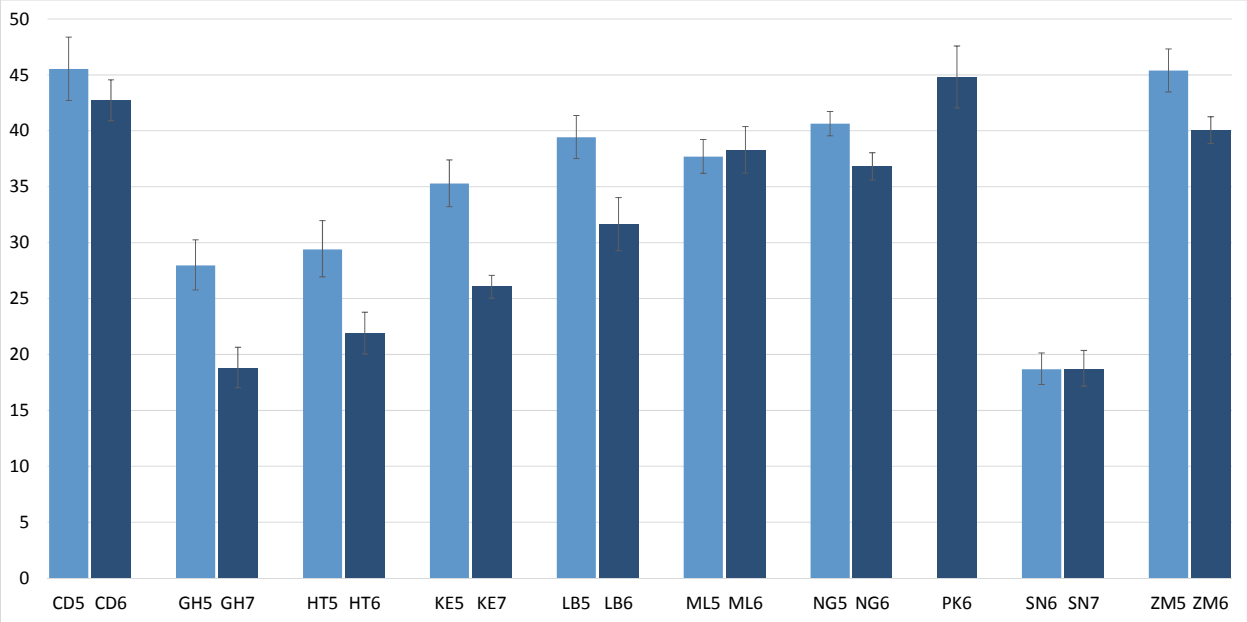
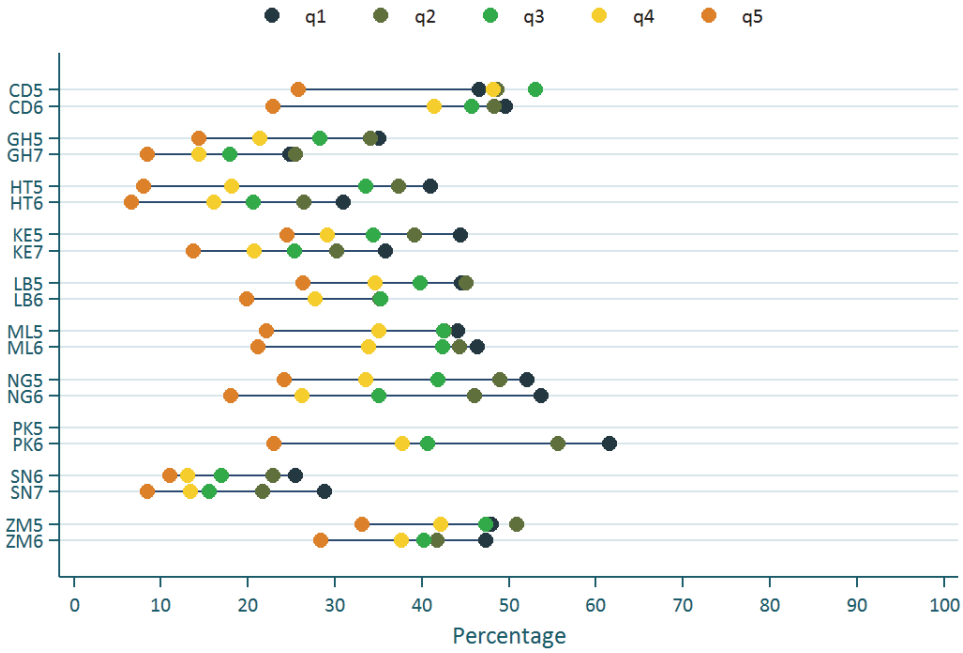


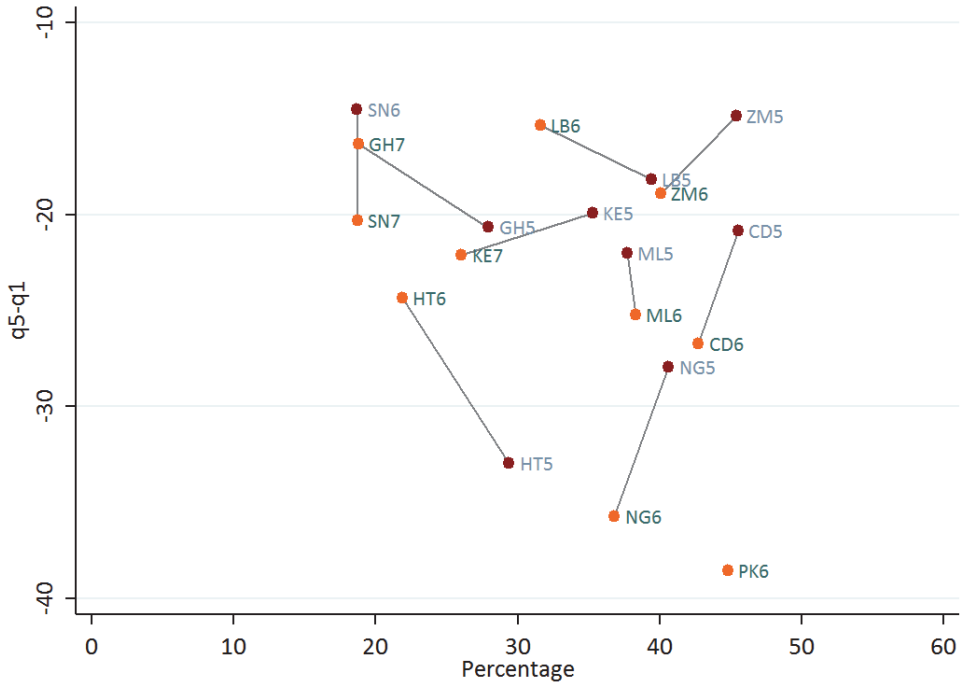
Figure 55 shows that in most countries stunting tends to increase as wealth decreases. Pakistan, Nigeria, and the DRC had the largest spread across the wealth quintiles. The gaps between the wealth quintiles also widened for Nigeria and DRC from one survey to the next. The greatest decrease in the gaps was in Haiti due to a decrease in stunting among children in the first, second, and third wealth quintiles. A decrease in the gaps was also observed in Ghana and Liberia.

Figure 55. Percentage of de facto children under age 5 who were stunted by wealth quintiles q1-q5



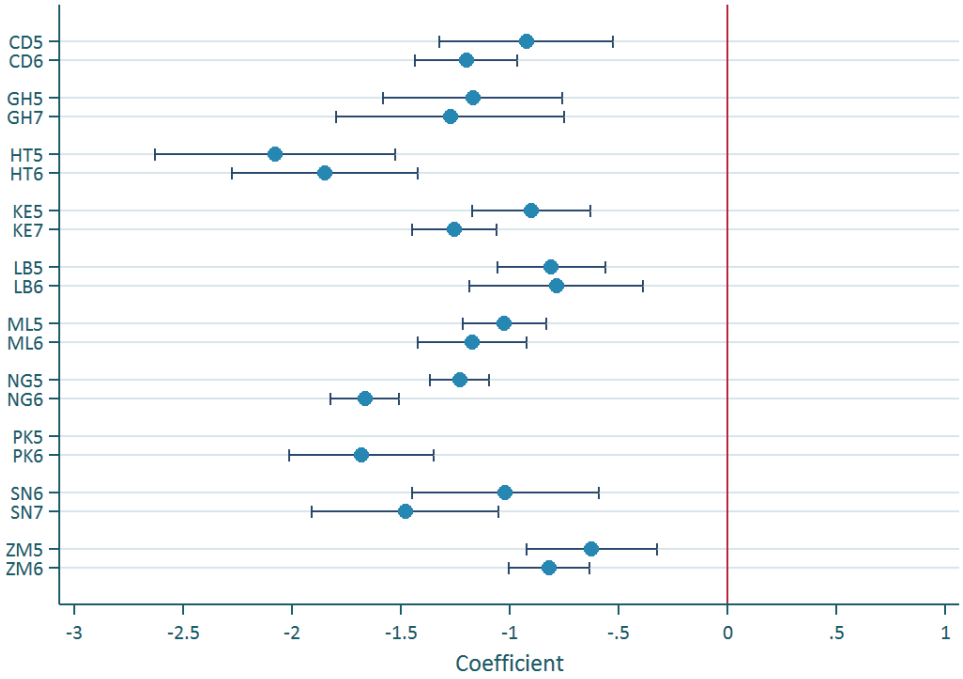
The differences shown in Figure 56 are all negative, consistent with stunting being more prevalent in the poorer wealth groups. Unlike the previous indicators, for stunting and wasting indicators, we would ideally see an increase in the difference (that is, becoming less negative, diminishing in magnitude) and a decrease in the prevalence from one survey to the next (that is, a point for the second survey that is above and to the left of the point for the first survey). For the most recent survey, the largest differences were found in Pakistan, Nigeria, and DRC. No changes could be plotted for Pakistan but the difference is reported with an orange dot for the most recent Pakistan survey. In that survey Pakistan had the highest prevalence of stunting among all the most recent surveys. The ideal trend (with the second dot above and to the left of the first dot) was observed for Haiti, Ghana, and Liberia. For Nigeria, Kenya, the DRC, and Zambia there was a decrease in the prevalence of stunting, but the magnitude of the difference between the highest and lowest quintiles increased.

Figure 56. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of de facto children under age 5 who were stunted



In Figure 57 all of the logit regression coefficients are negative and significantly different from zero. Pakistan, Nigeria, and Haiti had the lowest coefficients (most negative and largest). No improvements were observed between the surveys in terms of coefficients moving closer to zero or becoming non-significant.

Figure 57. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of stunting with the wealth quintile as a categorical predictor.



In Table 20 all of the concentration indices for wealth are negative, since the outcome is more concentrated in the poorer households. Only Haiti had a significant movement in the concentration index toward a less negative value. In the DRC and Nigeria the concentration index significantly moved toward a more negative value and more inequality. None of the concentration indices in the most recent surveys were significantly different from zero, indicating that according to this measure inequalities in stunting persist in all these countries.

Table 20. Concentration index (CI) estimates with tests of difference between two surveys for each country for the stunting indicator

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	-0.106 (0.03)	3597	-0.174 (0.02)	8884	-0.068	0.958*
GH	-0.161 (0.02)	2640	-0.136 (0.02)	3034	0.025	0.200
HT	-0.254 (0.02)	2930	-0.176 (0.02)	4694	0.078	**0.004**
KE	-0.161 (0.02)	5563	-0.173 (0.01)	20524	-0.013	0.722
LB	-0.131 (0.02)	5200	-0.106 (0.03)	3817	0.025	0.217
ML	-0.157 (0.02)	11567	-0.185 (0.02)	4803	-0.027	0.862
NG	-0.225 (0.01)	20633	-0.291 (0.01)	26306	-0.066	1.00*
PK	NA	NA	-0.295 (0.02)	3134	NA	NA
SN	-0.124 (0.02)	6456	-0.159 (0.02)	6697	-0.035	0.915
ZM	-0.103 (0.02)	5600	-0.125 (0.01)	12408	-0.022	0.796

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.
* Indicates that the p-value was significant in the opposite direction.

As Figure 58 shows, the greatest regional disparities were found in Pakistan, Nigeria, and the DRC. Regional gaps between the highest and lowest regions decreased the most for Haiti, followed by Liberia and Zambia. These countries also had the smallest differences between the highest and lowest regions in the most recent survey. Improvements in regional inequality were mainly due to a decrease in the prevalence of stunting in the highest region.

Figure 58. Percentage of de facto children under age 5 who were stunted with the national estimates and lowest and highest region estimates

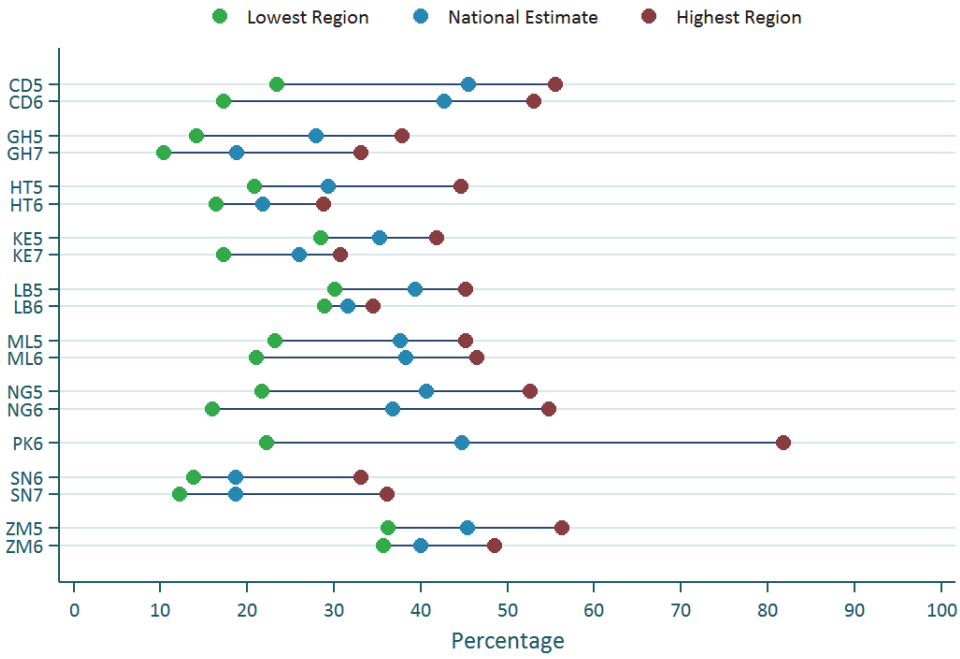
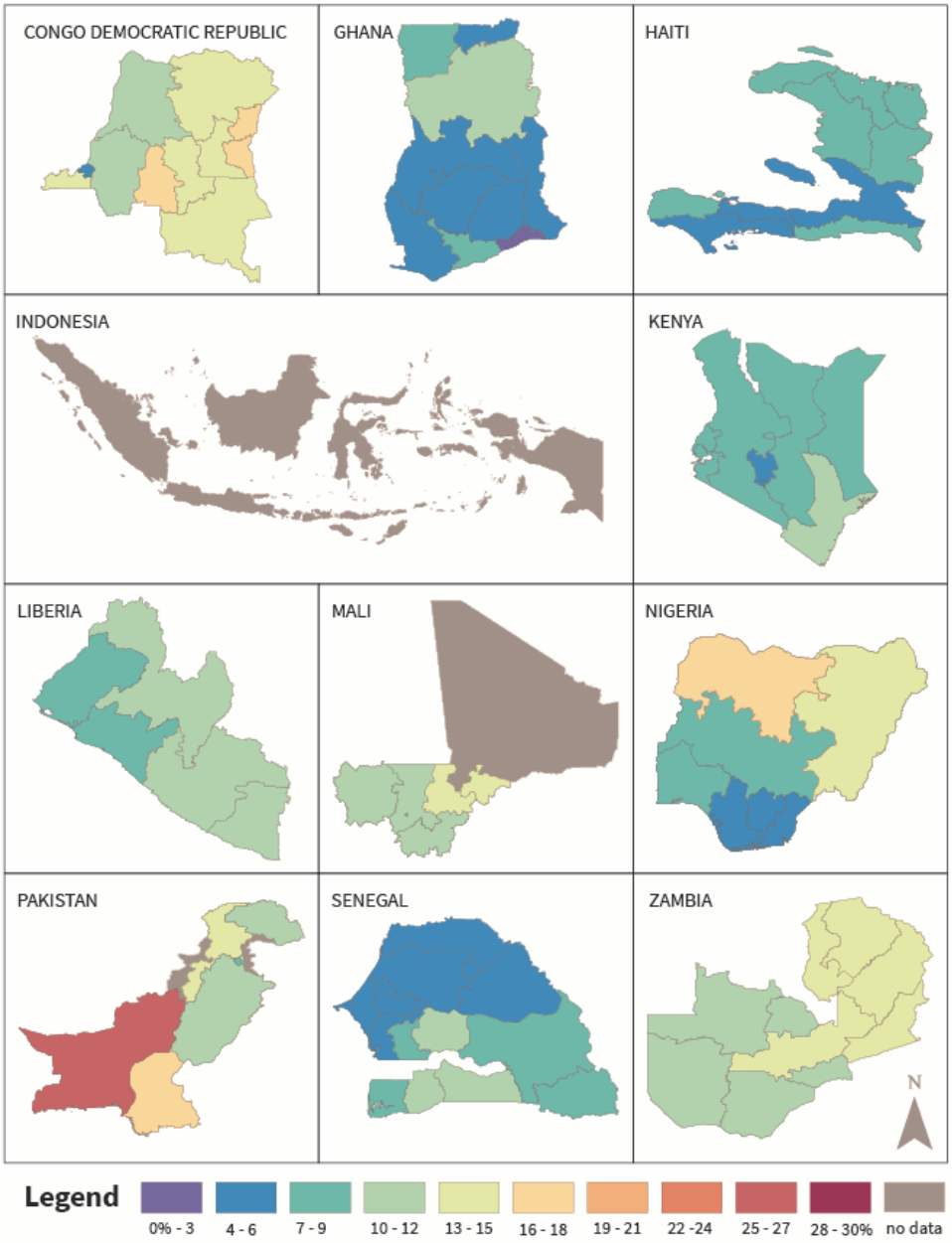


Figure 59 shows large regional disparities in Pakistan, with levels of stunting reaching 82% in Balochistan compared with 22% in Islamabad, the capital city (see Appendix 6). Large regional disparities were also found in Nigeria and the DRC. Relatively small disparities were found in Haiti, Liberia, and Zambia. Haiti had levels between 11% and 30% for all regions. In Liberia regions had levels between 21% and 40%, and in Zambia they were between 31% and 50%.

Figure 59. Regional map for the most recent survey of de facto children under age 5 who were stunted



Summary:

In Table 21, Nigeria and Pakistan consistently appear among the three most extreme countries according to the five measures. However, Nigeria is not among the three countries with the highest overall prevalence of stunting. CDR is among the most extreme three countries in the overall prevalence of stunting, the difference between the highest and lowest wealth quintiles, and regional differences.

Table 21. Summary table for the stunting indicator showing the top three countries with the following measures for the most recent survey

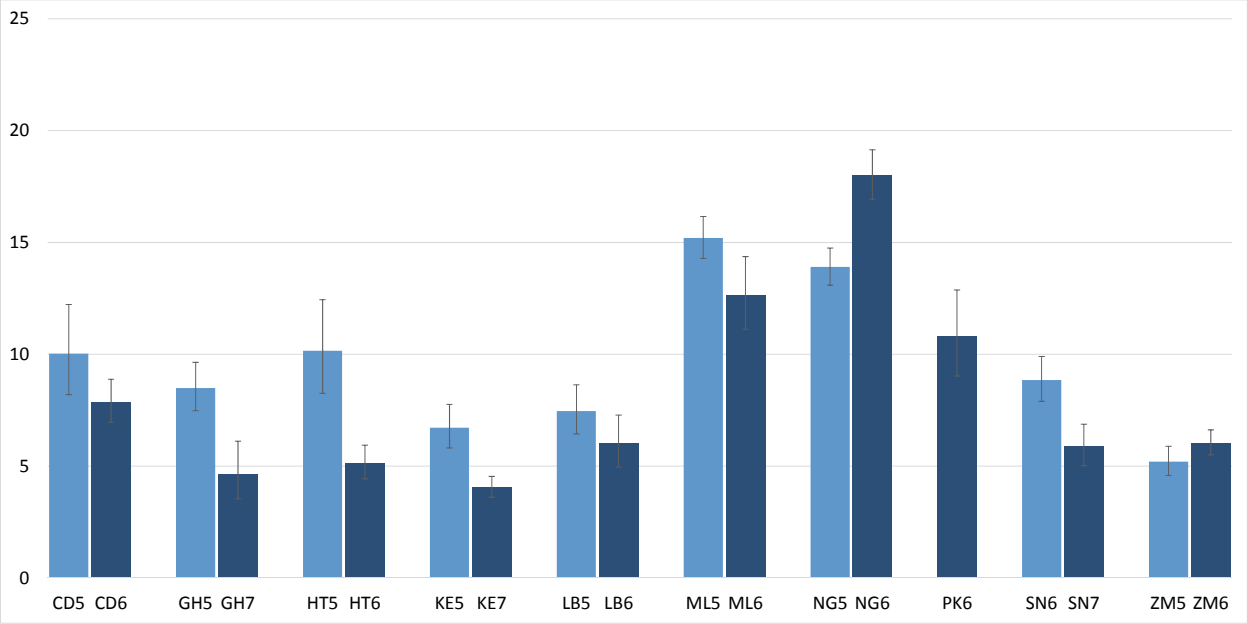
	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6					
GH7					
HT6					
ID6	NA	NA	NA	NA	NA
KE7					
LB6					
ML6					
NG6					
PK6					
SN7					
ZM6					

Note: NA indicates that the indicator is not available for the survey

3.11. Wasting

Figure 60 presents the levels of wasting for all the surveys except Indonesia and the 2006-2007 Pakistan, survey, which did not collect measurements of height and weight. Nigeria, Mali, and Pakistan had the highest levels of wasting, all over 10%, and in Nigeria there was a significant increase to approximately 18% in the most recent survey. There was a significant decrease in wasting in Ghana, Haiti, Kenya, and Senegal.

Figure 60. Percentage of de facto children under age 5 who were wasted



As Figure 61 shows, the largest spread across the wealth quintiles was found for Pakistan and Nigeria. While in Nigeria the gaps between the wealth quintiles narrowed between the first and second surveys, this improvement was accompanied by an increase in wasting. The smallest gaps in the level of wasting were found in the second survey in Zambia. Haiti showed the greatest improvement, with a decrease in the gaps by wealth as well as a decrease in wasting in all quintiles.

Figure 61. Percentage of de facto children under age 5 who were wasted by wealth quintiles q1-q5

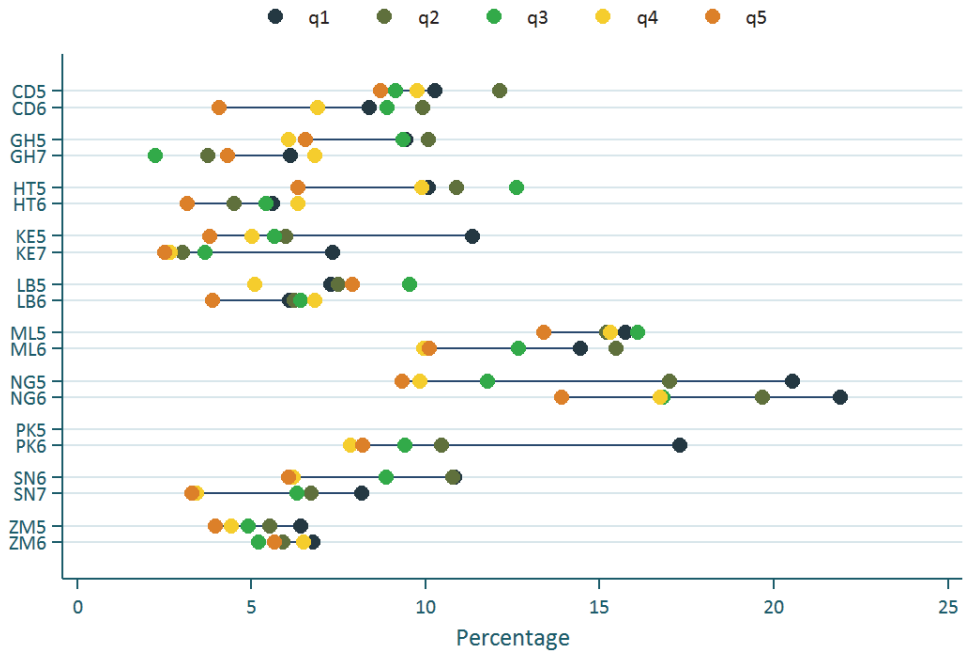
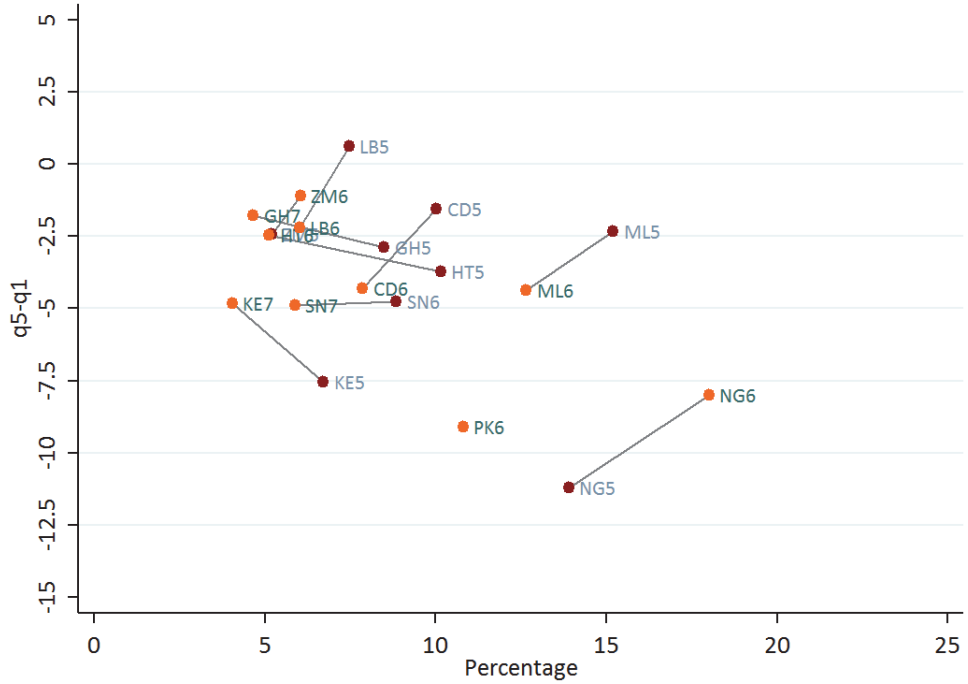


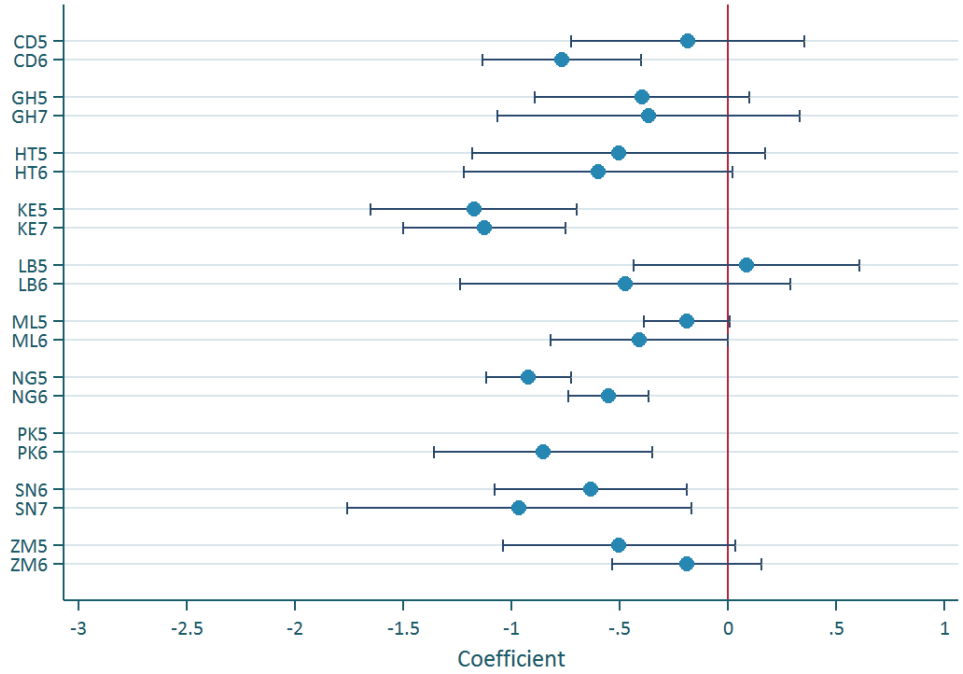
Figure 62 shows that the largest differences between the first and fifth wealth quintiles were found in Nigeria and Pakistan. As with stunting, the ideal trend we would like to see in Figure 62 would be a line with the orange dot above and to the left of the red dot. Kenya clearly exhibits this trend, followed to a lesser extent by Ghana and Haiti. The magnitude of the difference between quintiles also decreased in Nigeria, but this improvement was accompanied by an increase in the prevalence of wasting. The DRC, Mali, and Liberia showed clear increases in the magnitude of the difference, along with a decrease in the prevalence of wasting.

Figure 62. The difference between the richest (q5) and the poorest (q1) wealth quintiles versus the percentage of de facto children under age 5 who were wasted



In Figure 63 the logit regression coefficients were not significant for the most recent surveys of Ghana, Haiti, Liberia, Mali, and Zambia. Kenya, Senegal, and Pakistan had the coefficients that were most negative (highest in magnitude). In the DRC the coefficient was significantly negative in the recent survey but was not significant in the previous survey, indicating a move to greater inequality in wasting among children.

Figure 63. The coefficient for the richest wealth quintile with the poorest wealth quintile as the reference category. Coefficients were produced from a logit regression of wasting with the wealth quintile as a categorical predictor.



As with the concentration indices for stunting, the concentration indices for wasting shown in Table 22 are all negative. The concentration indices for Ghana, Haiti, Liberia, and Zambia were not significantly different from zero, indicating that these countries reached equality according to this measure. The largest concentration index for the most recent surveys, in terms of magnitude, was found for Pakistan, Nigeria, and Mali. Nigeria was the only country that significantly improved its concentration index, while for Mali it had significantly moved toward a more negative value and more inequality.

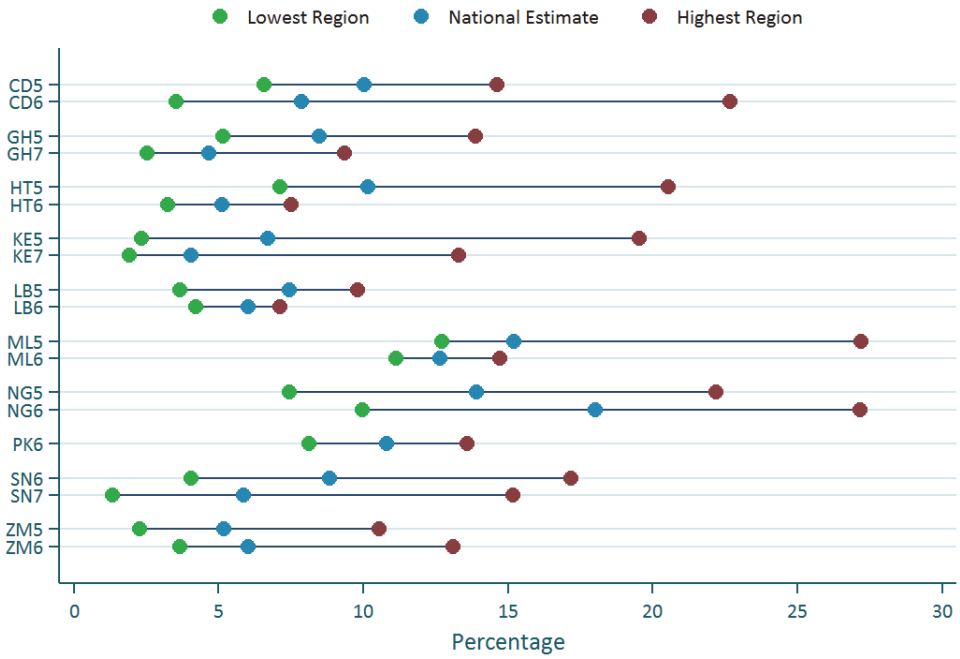
Table 22. Concentration index (CI) estimates with tests of difference between two surveys for each country for the wasting indicator

Country	CI (se) survey 1	survey 1 N	CI (se) survey 2	survey 2 N	survey 2-survey 1	CI decreased p-value
CD	-0.016 (0.02)	3597	-0.033 (0.01)	8884	-0.017	0.811
GH	-0.030 (0.01)	2640	-0.004 (0.02)	3034	0.026	0.088
HT	-0.019 (0.02)	2930	-0.006 (0.01)	4694	0.014	0.256
KE	-0.056 (0.01)	5563	-0.035 (0.01)	20524	0.020	0.045
LB	-0.005 (0.01)	5200	-0.008 (0.01)	3817	-0.003	0.575
ML	-0.013 (0.01)	11567	-0.045 (0.02)	4803	-0.032	0.955*
NG	-0.095 (0.01)	20633	-0.061 (0.01)	26306	0.035	**0.011**
PK	NA	NA	-0.070 (0.02)	3134	NA	NA
SN	-0.044 (0.01)	6456	-0.041 (0.01)	6697	0.003	0.437
ZM	-0.019 (0.01)	5600	-0.006 (0.01)	12408	0.013	0.114

Notes: the p-value is for a one-sided test and the concentration index includes the Erreygers (2009) correction.
* Indicates that the p-value was significant in the opposite direction.

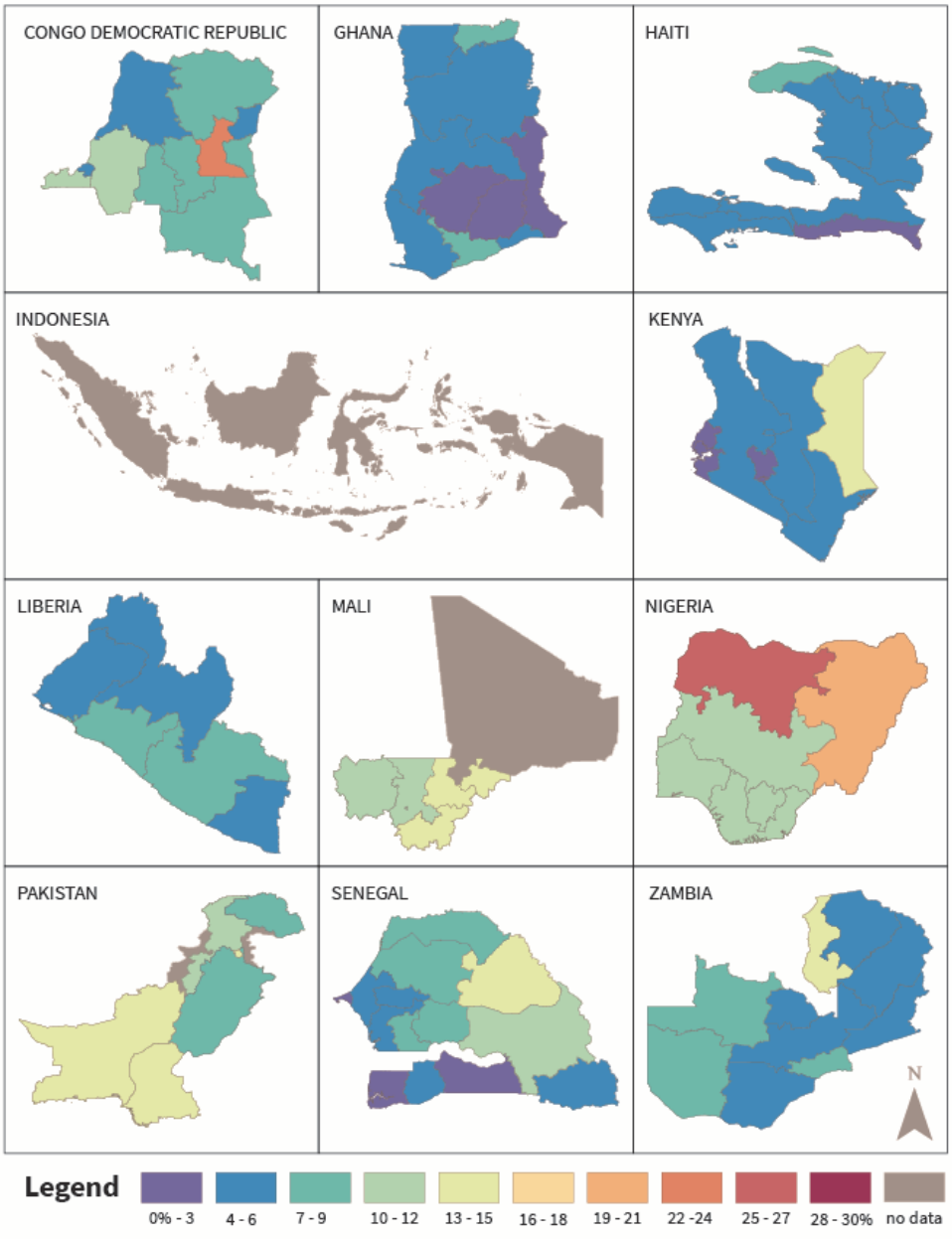
Figure 64 shows that the highest regional disparities in the most recent survey were in the DRC and Nigeria. Regional gaps also increased the most for the DRC, mainly due to an increase in the prevalence of wasting in the highest region. Mali and Haiti showed the greatest level of improvement, with a reduction of the regional gap due to a large decline in the level of wasting in the highest region. In Haiti there was also a substantial decrease in the prevalence of wasting in the lowest region.

Figure 64. Percentage of de facto children under age 5 who were wasted with the national estimates and lowest and highest region estimates



The scale in Figure 65 for the wasting indicator maps is different from the scale in the maps for previous indicators. This is because the wasting indicator reaches a maximum of approximately 30% among these countries. The scale was reduced accordingly. As Figure 65 shows, the highest regional disparities were found in DRC and Nigeria, where wasting levels reached over 21% in certain regions. Almost all the regions in Kenya and Haiti had wasting levels below 7%.

Figure 65. Regional map for the most recent survey of de facto children under age 5 who were wasted



Summary:

Table 23 summarizes the indicators of wasting. Nigeria and Pakistan appear among the three most extreme countries for four of the five measures. Senegal is among the most extreme three countries for three indicators.

Table 23. Summary table for the wasting indicator showing the top three countries with the following measures for the most recent survey

	Lowest prevalence	Largest difference	Highest coefficient	Highest concentration index	Highest regional difference
CD6					
GH7					
HT6					
ID6	NA	NA	NA	NA	NA
KE7					
LB6					
ML6					
NG6					
PK6					
SN7					
ZM6					

Note: NA indicates that the indicator is not available for the survey

3.12. Overall Summary

Tables 24-26 below provide an overall summary of the most extreme countries according to the five measures and all 11 indicators combined. The indicators are divided into three groups. Table 24 summaries the maternal health indicators of ANC, mCPR, SBA, and DHF. Table 25 gives the summary for the child health indicators of DPT3 and the three indicators of care seeking, for ARI, fever, and diarrhea. Table 26 provides the summary for the child nutrition indicators of EBF, stunting and wasting. Within the tables, each indicator is assigned a different color. That color appears in the columns of the tables for the three countries with the most extreme values of the indicator and the measure. The overall position of each country is reflected by the number of times its row is highlighted with a color.

Table 24. Maternal health indicators summary for the most recent surveys

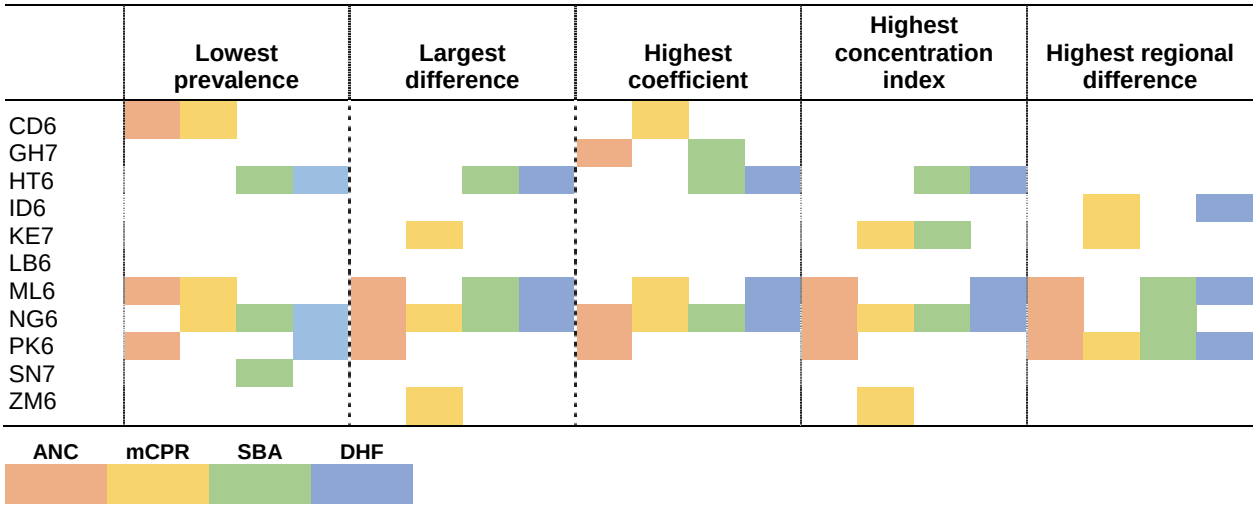


Table 25. Child health indicators summary for the most recent surveys

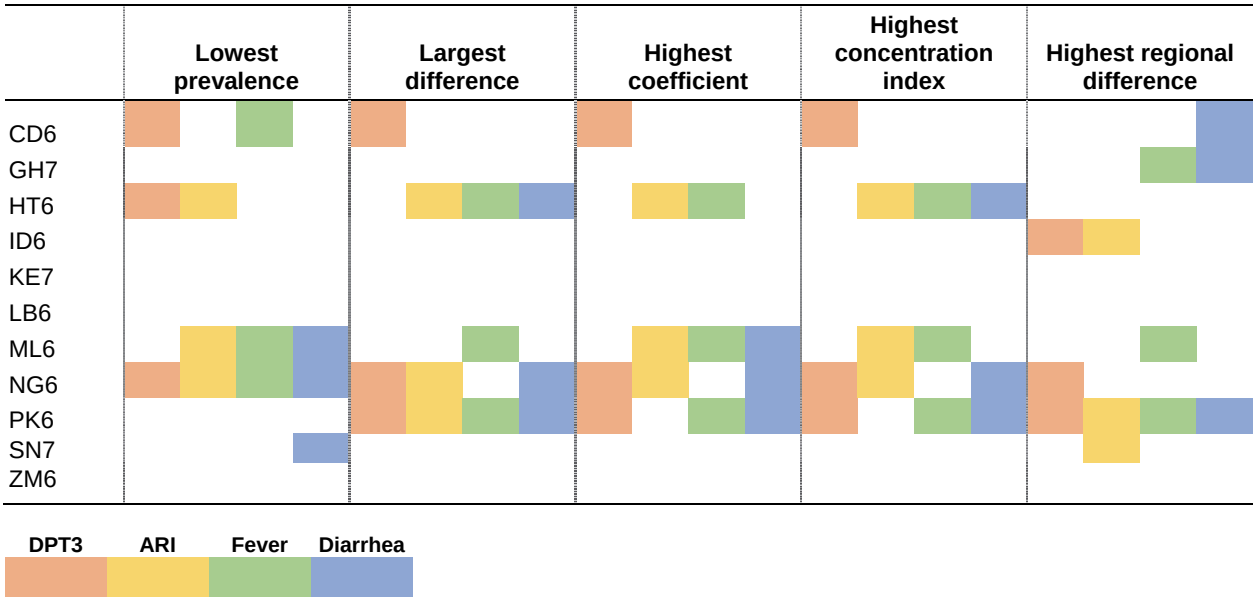
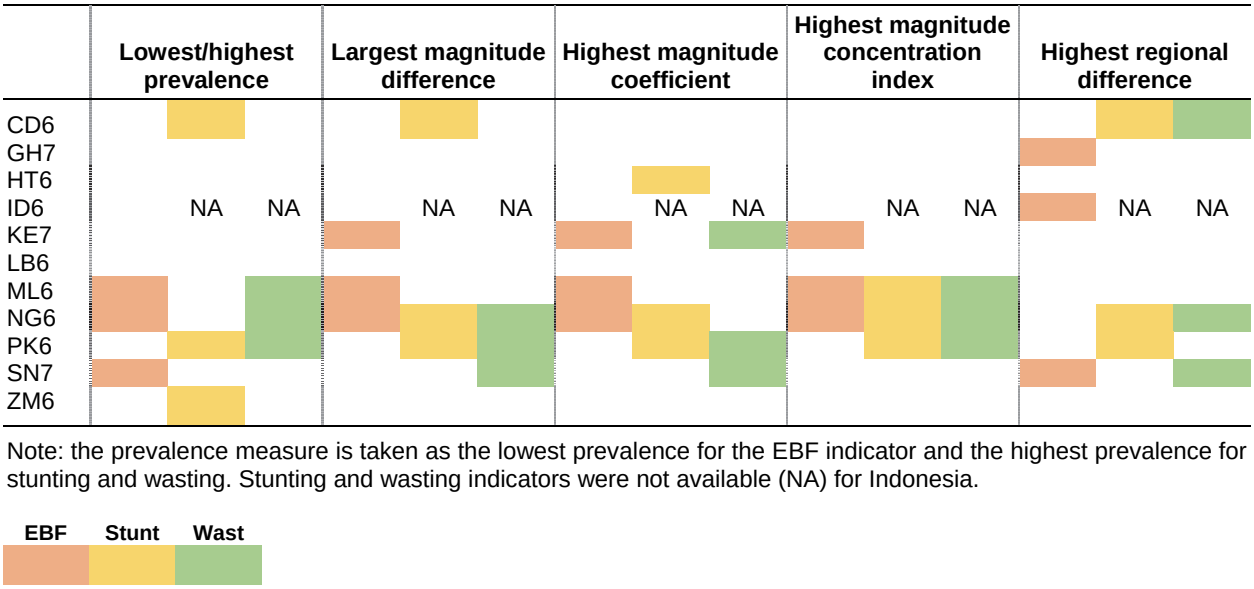


Table 26. Child nutrition indicators summary for the most recent surveys



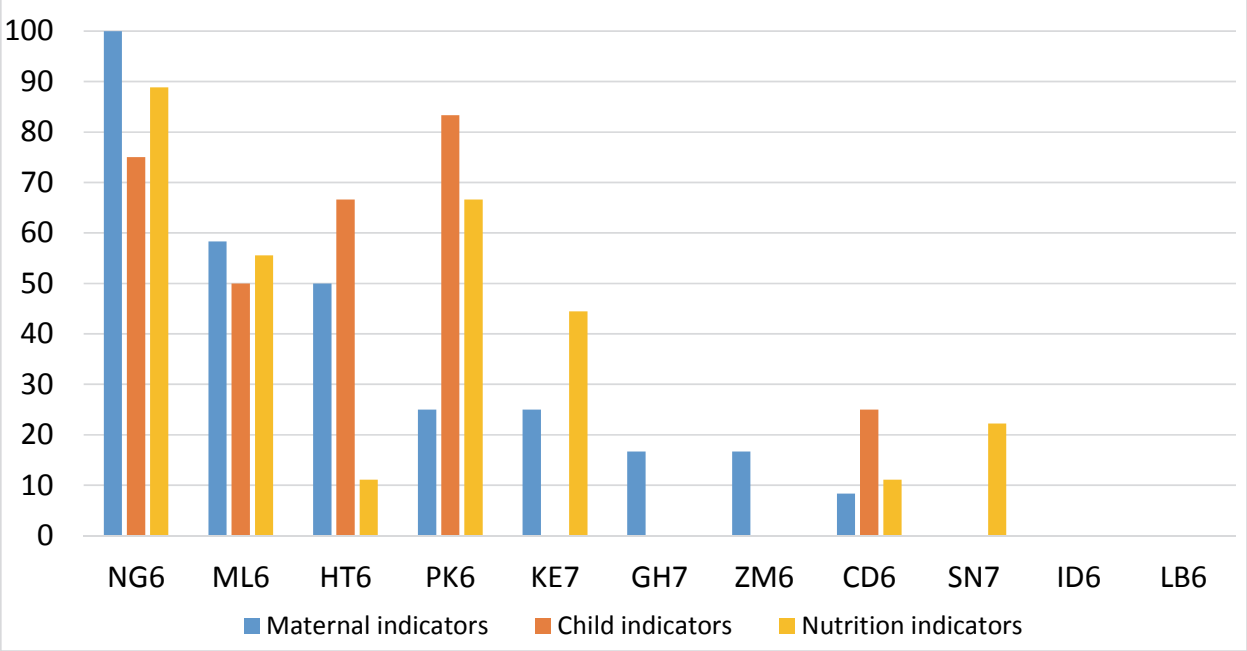
Note: the prevalence measure is taken as the lowest prevalence for the EBF indicator and the highest prevalence for stunting and wasting. Stunting and wasting indicators were not available (NA) for Indonesia.

To summarize the information in Tables 24-26, we constructed a wealth inequality score and a regional inequality score (the higher the score the higher the inequality). The wealth inequality score adds up the number of times each country appeared in the tables for the three wealth related measures (difference, logit regression coefficient, and concentration index), and divides the sum by its maximum possible value—the number of indicators and the number of wealth equality measures. Therefore, for the maternal and child indicators the count was divided by 12 (four indicators and three measures) and for the child nutrition indicators the count was divided by nine (three indicators and three measures). The normalized total was then multiplied by 100, to be interpretable as the percentage of the maximum possible value. Figure 66 presents the resulting percentages.

As Figure 66 shows, Nigeria, Mali, Haiti, and Pakistan have the highest scores for inequality by wealth. These countries are repeated the most often for the indicators in Tables 24-26. Each country is similar on the three sets of indicators, except that Haiti had a lower score for the nutrition indicators and Pakistan had a lower score for the maternal health indicators. At the other extreme, Indonesia and Liberia had a zero score for all the indicators, suggesting low levels of inequality by wealth for these indicators and measures. As these scores are based on a tally of the three highest levels of inequality for each indicator and measure, we cannot jump to the conclusion that Indonesia and Liberia actually have the lowest levels of inequality, but there is good consistency across indicators and measures. The specific values of indicators provided in the tables could be used to develop other syntheses and ranking procedures.

The other five countries—Kenya, Ghana, Zambia, CDR, and Senegal—have intermediate levels of wealth inequality, more often with the maternal health indicators or nutrition indicators, and least often with the child health indicators.

Figure 66. Wealth inequality score



The regional inequality scores presented in Figure 67 are based only on the measure of the regional difference between the highest and lowest region. The score was produced from the number of times each country appears in Tables 24-26 for this measure, divided by the number of indicators represented in the table and multiplied by 100 to be interpretable as the percentage of the maximum possible value. Pakistan has the highest regional inequality score for the maternal and child indicators. Mali has a high inequality score for the maternal indicators. Nigeria, DRC, and Senegal have high regional inequality scores for the child nutrition indicators. While Indonesia has a score of zero according to the wealth inequality score, it has a regional inequality score of 50% for the maternal and child indicators. As the maps have shown, this was mainly due to the Papua region, which showed large differences in the indicators compared with the other regions of Indonesia.

Haiti, Liberia, and Zambia have minimal evidence of regional inequality, with a score of zero for all three sets of indicators. Kenya has only one appearance among the top three countries for regional inequality, and that is for the use of modern contraception, or mCPR, which is particularly low in the North Eastern region.

Figure 67. Regional inequality score

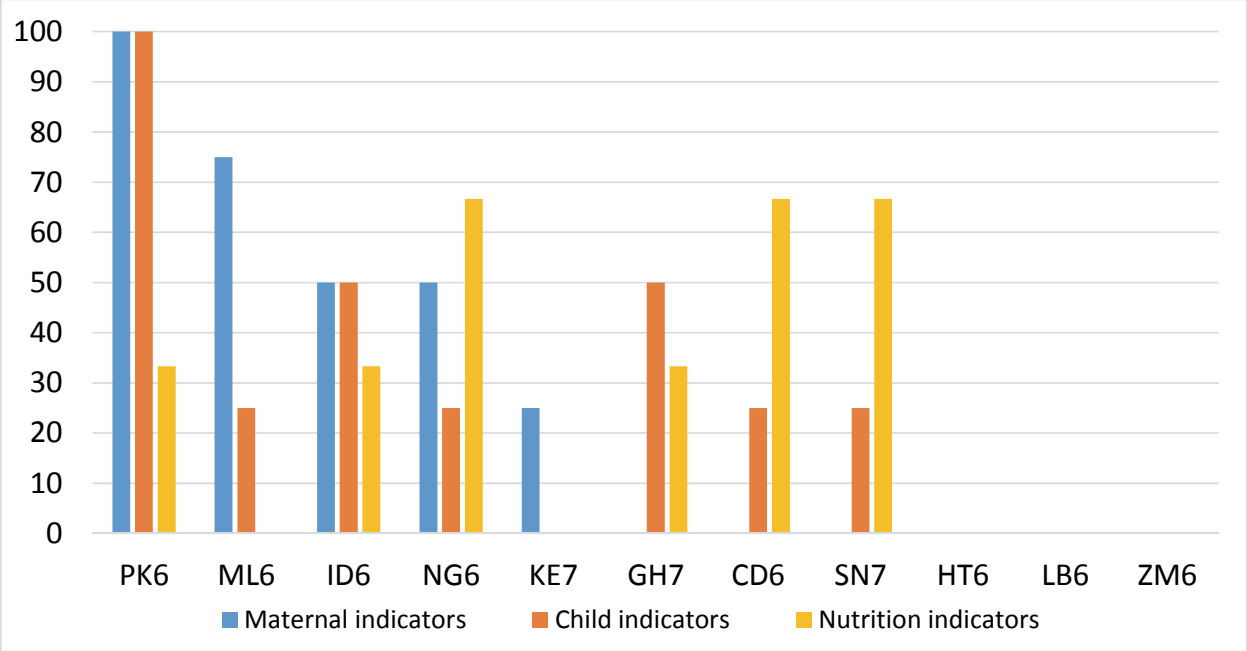


Table 27 provides a summary of the concentration index for all the indicators given earlier in Tables 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, and 22. A green bar indicates a significant improvement in the concentration index between the two surveys for each country, and a red bar indicates a significant deterioration in the concentration index or a move toward less equality. A null symbol (Ø) indicates that the concentration index for the most recent survey was not significantly different from zero, implying that equality was reached for that indicator and country.

Table 27 shows that overall the countries have improved in equality, with many reaching equality in their most recent survey particularly for DPT3, the three indicators of care seeking, and exclusive breastfeeding. Ghana, Indonesia, and Liberia showed significant improvements in 6 of the 11 indicators, and Ghana reached equality in the most recent survey for 7 indicators. Senegal and Zambia reached equality for five indicators, mainly the child health indicators. In Senegal, two indicators showed significant improvement in equality despite only having one year between the successive surveys in the analysis.

Some countries, however, have moved in the direction of greater disparities. In Mali the concentration index increased for seven indicators. Mali was followed by Nigeria, with a move toward greater inequality for 4 of the 11 indicators. While Zambia moved to greater inequality for care seeking for ARI symptoms and Mali for the EBF indicator, the concentration index for the most recent survey was still not significantly different from zero, implying equality in Zambia and Mali for ARI and EBF respectively. For these two countries and indicators, the concentration was not significantly different from zero in the earlier survey as well. Therefore, while there appears to be a deterioration when comparing the two surveys, in fact equality of the indicators across wealth quintiles was maintained.

No countries reached equality for the maternal health indicators of ANC, SBA, and DHF. Only Ghana, Haiti, and Indonesia reached equality for the mCPR indicator. None of the countries reached equality for the stunting indicator. In contrast, eight countries reached equality for the EBF indicator, followed by seven countries for the indicator of care seeking for diarrhea.

Table 27. Summary of changes in the concentration index for all 11 indicators. Significant improvement in equality between the last two surveys for each country appears in green and significant deterioration appears in red. No color indicates no significant change between surveys.

	ANC	mCPR	SBA	DHF	DPT3	ARI	Fever	Diarrhea	EBF	Stunt	Wast	Total Green	Total Red	Reached equality
DRC						Ø	Ø	Ø	Ø			2	2	4
Ghana		Ø			Ø	Ø	Ø	Ø	Ø		Ø	6	0	7
Haiti		Ø			Ø				Ø		Ø	3	3	4
Indonesia		Ø						Ø	Ø	NA	NA	6	0	3
Kenya						Ø		Ø				1	0	2
Liberia						Ø		Ø			Ø	6	0	2
Mali									Ø			0	7	1
Nigeria												3	4	0
Pakistan									Ø	NA	NA	1	1	1
Senegal					Ø	Ø	Ø	Ø	Ø			2	0	5
Zambia						Ø	Ø	Ø	Ø		Ø	3	2	5
Reached equality by indicator	0	3	0	0	3	6	4	7	8	0	4			

Note: Ø Indicates a concentration index for the most recent survey was not significantly different from zero, implying equality has been reached.

4. Discussion and Conclusion

This report provides an overview of the wealth and regional disparities for 11 maternal and child health (MCH) indicators in 11 countries. Several measures and methods were used to examine these disparities. Some were descriptive and covered only the lowest and highest wealth quintiles or the lowest and highest regions. Those approaches were included because they are easier to understand and communicate. Other approaches were more complex, used more information, and included confidence intervals or tests of significance. The analysis of regional disparities was mainly descriptive.

It is challenging to find a comprehensive measure to summarize the overall disparity in MCH for these 11 countries. The measures have limitations. Perhaps most important, a measure may indicate an apparent reduction of inequality but this reduction may not actually be an improvement. For instance, the gap between the lowest and highest wealth quintiles may have decreased between two surveys because of a decline in the prevalence of the indicator for the highest wealth index. That is, the gap was reduced because prevalence declined. This spurious evidence of improvement is a limitation with measures that use only the lowest and highest wealth quintiles, but it can also occur in more disguised form with a measure such as the concentration index that uses all the wealth quintiles.

Another limitation is that after a country has reached a high level of overall prevalence, there is less room for improvements, in either prevalence or equality, compared with a country with very low coverage. For instance, the DRC did not have a significant increase in the prevalence of delivery with assistance by an SBA, but it had one of the highest coverage levels for this indicator compared with other countries, reaching 81% in the most recent survey.

Despite these challenges, the summaries have highlighted countries that appear to be performing worse than other countries that have made great improvements. Mali, Nigeria, and Pakistan stand out as having difficulties in achieving equality by wealth for most of the MCH indicators, while Ghana, Indonesia, and Liberia show great improvements. Mali and Pakistan also ranked highest in regional inequality.

Indonesia was one of the best performing countries in terms of wealth inequalities, but had difficulties with achieving regional equality—surely due in part to the widely dispersed geographic nature of Indonesia. The summary of the concentration indices, which includes all the wealth quintiles and adjusts for the overall prevalence, shows several significant improvements in equality, and many countries have reached equality in the most recent survey, especially in the child health indicators (see Table 27).

Ghana, Senegal, and Zambia have reached equality for the highest number of indicators, according to the concentration index for the most recent survey. Comparisons of the concentration indices between the two surveys showed that Mali significantly moved toward greater inequality for 7 of the 11 indicators. It is important to note that the most recent Mali survey was conducted during a security crisis that made three regions and part of one region virtually inaccessible. The effect of this crisis can be seen in the performance of Mali for most of the MCH indicators examined. It is possible that the estimates of inequality would have been even greater if the regions omitted from the second survey could have been included.

The summary of the concentration indices (Table 27) provides a great deal of information on the wealth inequalities. However, regional disparities must also be taken into account before reaching broader conclusions about inequality in these countries. For instance, according to Table 27, wealth equality was reached for eight countries for the EBF indicator and for seven countries for the indicator of care seeking for diarrhea. However, regional disparities in care seeking for diarrhea (shown in Figures 46 and 47) and in EBF (shown in Figures 52 and 53) still remain in several of those countries. It is clear that equality across wealth quintiles does not necessarily imply equality across regions.

Finally, no single measure in this report can tell the full story of a country's status for a particular indicator. For planning purposes, the measures should be examined together, by indicator and by country, and ideally should be supplemented by other covariates in order to have a more complete view of the pattern of inequality in health by wealth status and geography, and to better identify social strata and regions where interventions are most needed. Further analyses of this type, using new information as it becomes available, can be useful for tracking progress and identifying possible deteriorations related to for disparities within countries.

References

Barros, A.J., C. Ronsmans, H. Axelson, E. Loaiza, A.D. Bertoldi, G.V. França, J. Bryce, J.T. Boerma, and C.G. Victora. 2012. "Equity in Maternal, Newborn, and Child Health Interventions in Countdown to 2015: A Retrospective Review of Survey Data from 54 Countries." *The Lancet* 379(9822):1225-1233.

Barros, A.J., and C.G. Victora. 2013. "Measuring Coverage in MNCH: Determining and Interpreting Inequalities in Coverage of Maternal, Newborn, and Child Health Interventions." *PLoS Med* 10(5):e1001390.

Binnendijk, E., R. Koren, and D.M. Dror. 2012. "Can the Rural Poor in India Afford to Treat Non-Communicable Diseases?" *Tropical Medicine & International Health* 17(11):1376-1385.

Boerma, J., J. Bryce, Y. Kinfu, H. Axelson, and C.G. Victora. 2008. "Mind the Gap: Equity and Trends in Coverage of Maternal, Newborn, and Child Health Services in 54 Countdown Countries." *The Lancet* 371(9620):1259-1267.

Erreygers, G. 2009. "Correcting the Concentration Index." *Journal of Health Economics* 28(2):504-515.

Hosseinpoor, A.R., N. Bergen, A.J. Barros, K.L. Wong, T. Boerma, and C.G. Victora. 2016. "Monitoring Subnational Regional Inequalities in Health: Measurement Approaches and Challenges." *International Journal for Equity in Health* 15(1):1.

Houweling, T.A., A.E. Kunst, M. Huisman, and J.P. Mackenbach. 2007. "Using Relative and Absolute Measures for Monitoring Health Inequalities: Experiences from Cross-National Analyses on Maternal and Child Health." *International Journal for Equity in Health* 6(1):15.

Mackenbach, J.P., and A.E. Kunst. 1997. "Measuring the Magnitude of Socio-Economic Inequalities in Health: An Overview of Available Measures Illustrated with Two Examples from Europe." *Social Science & Medicine* 44(6):757-771.

Monteiro, C.A., M.H.D.A. Benicio, W.L. Conde, S. Konno, A.L. Lovadino, A.J. Barros, and C.G. Victora. 2010. "Narrowing Socioeconomic Inequality in Child Stunting: The Brazilian Experience, 1974-2007." *Bulletin of the World Health Organization* 88(4):305-311.

O'Donnell, O., S. O'Neill, T. Van Ourti, and B. Walsh. 2016. "Conindex: Estimation of Concentration Indices." *The Stata Journal* 16(1):112.

Van de Poel, E., A.R. Hosseinpoor, C. Jehu-Appiah, J. Vega, and N. Speybroeck. 2007. "Malnutrition and the Disproportional Burden on the Poor: The Case of Ghana." *International Journal for Equity in Health* 6(1):21.

Van de Poel, E., A.R. Hosseinpoor, N. Speybroeck, T. Van Ourti, and J. Vega. 2008. "Socioeconomic Inequality in Malnutrition in Developing Countries." *Bulletin of the World Health Organization* 86(4):282-291.

Van Malderen, C., I. Ogali, A. Khasakhala, S.N. Muchiri, C. Sparks, H. Van Oyen, and N. Speybroeck. 2013. "Decomposing Kenyan Socio-Economic Inequalities in Skilled Birth Attendance and Measles Immunization." *International Journal for Equity in Health* 12(1):1-13.

Wagstaff, A. 2005. "The Bounds of the Concentration Index When the Variable of Interest Is Binary, with an Application to Immunization Inequality." *Health Economics* 14(4):429-432.

World Health Organization. 2013. *Handbook on Health Inequality Monitoring with a Special Focus on Low-and Middle-Income Countries*. Geneva: World Health Organization.

Appendices

Appendix 1. Maternal health indicators overall prevalence, difference index and coefficient index

	Four or more ANC visits			Modern CPR use for women in a union			Last birth assisted by SBA			Last birth delivered in health facility		
Survey	**% [C.I.]**	**%q5-%q1**	**q5 coeff. [C.I.]**	**% [C.I.]**	**%q5-%q1**	**q5 coeff. [C.I.]**	**% [C.I.]**	**%q5-%q1**	**q5 coeff. [C.I.]**	**% [C.I.]**	**%q5-%q1**	**q5 coeff. [C.I.]**
CD5	47.1 [43.5,50.7]	21.3	0.9 [0.6,0.2]	5.9 [4.9,7.1]	11.2	1.8 [1.2,2.4]	76.0 [72.1,79.6]	36.2	3.3 [2.8,3.9]	72.3 [68.0,76.3]	40.3	3.2 [2.7,3.7]
CD6	48.0 [45.7,50.3]	29.8	1.2 [1.0,0.3]	8.0 [7.1,9.1]	13.4	1.8 [1.4,2.1]	81.1 [78.4,83.5]	30.8	3.1 [2.7,3.6]	80.6 [78.0,83.0]	32.2	3.3 [2.8,3.7]
GH5	78.2 [75.7,80.4]	30.9	2.2 [1.6,0.6]	15.6 [14.2,17.2]	9.3	0.7 [0.3,1.1]	61.6 [58.5,64.6]	70.7	4.1 [3.4,4.8]	60.2 [57.0,63.2]	68.6	3.6 [3.1,4.2]
GH7	87.3 [85.3,89.0]	21.7	2.7 [1.9,0.7]	21.7 [20.0,23.4]	-1.6	-0.1 [-0.4,0.2]	76.0 [73.4,78.4]	47.7	3.6 [3.0,4.2]	75.2 [72.6,77.7]	48.1	3.4 [2.9,4.0]
HT5	53.8 [51.0,56.6]	49.0	2.2 [1.9,0.6]	22.8 [21.3,24.3]	12.8	0.8 [0.5,1.1]	29.0 [26.2,32.0]	62.6	3.4 [3.0,3.8]	27.4 [24.6,30.4]	60.5	3.3 [2.9,3.7]
HT6	67.3 [64.8,69.6]	37.2	2.0 [1.6,0.5]	28.6 [27.0,30.2]	-4.2	-0.2 [-0.4,0.0]	41.1 [38.5,43.8]	69.7	3.5 [3.2,3.9]	39.5 [36.9,42.2]	67.9	3.5 [3.2,3.8]
ID5	81.5 [80.1,82.9]	35.3	2.8 [2.5,0.7]	54.4 [53.3,55.5]	8.0	0.3 [0.2,0.4]	74.2 [72.2,76.1]	50.1	3.3 [2.9,3.6]	48.0 [45.7,50.2]	69.4	3.4 [3.2,3.7]
ID6	87.8 [86.9,88.6]	26.2	2.5 [2.2,0.7]	54.6 [53.6,55.5]	3.2	0.1 [0.0,0.2]	84.3 [83.0,85.6]	37.5	3.0 [2.6,3.5]	64.4 [62.6,66.2]	57.3	2.8 [2.6,3.1]
KE5	47.1 [44.8,49.5]	27.4	1.1 [0.9,0.3]	37.1 [35.1,39.1]	29.9	1.5 [1.2,1.8]	48.0 [44.4,51.5]	59.9	2.8 [2.3,3.2]	46.8 [43.3,50.3]	62.1	2.9 [2.4,3.4]
KE7	57.6 [56.3,58.9]	31.0	1.3 [1.2,0.4]	49.9 [48.8,51.1]	25.1	1.1 [0.9,1.2]	66.6 [65.1,68.0]	58.4	3.2 [3.0,3.5]	65.9 [64.4,67.4]	59.4	3.3 [3.0,3.5]
LB5	66.0 [61.7,70.0]	23.5	1.1 [0.7,0.4]	10.7 [9.3,12.3]	12.8	1.6 [1.1,2.0]	51.2 [46.3,56.1]	53.9	2.5 [1.9,3.0]	41.6 [37.2,46.2]	50.6	2.2 [1.7,2.8]
LB6	78.1 [76.0,80.1]	20.5	1.2 [0.7,0.4]	19.5 [17.2,22.0]	7.7	0.5 [0.1,1.0]	65.3 [61.9,68.5]	44.8	2.4 [1.7,3.2]	60.3 [56.7,63.8]	38.7	1.8 [1.1,2.4]
ML5	35.5 [33.2,37.8]	41.1	1.8 [1.5,0.5]	6.8 [6.0,7.6]	13.2	1.9 [1.6,2.3]	51.4 [48.2,54.6]	50.8	2.5 [2.0,3.0]	47.5 [44.1,50.8]	53.2	2.5 [2.0,2.9]
ML6	41.2 [38.8,43.7]	46.8	2.0 [1.8,0.6]	9.9 [9.0,11.0]	19.6	2.2 [1.8,2.5]	61.3 [58.1,64.4]	58.8	3.5 [3.2,3.8]	57.8 [54.4,61.1]	64.9	3.7 [3.4,4.0]
NG5	45.2 [43.6,46.9]	65.5	3.1 [2.9,0.8]	9.6 [9.0,10.3]	19.5	2.4 [2.1,2.6]	40.6 [38.9,42.3]	77.7	4.2 [3.9,4.5]	36.5 [34.8,38.1]	72.5	3.9 [3.6,4.1]
NG6	51.1 [49.0,53.2]	67.6	3.3 [3.1,0.9]	9.8 [9.0,10.6]	21.8	3.5 [3.1,3.9]	40.0 [37.9,42.0]	80.9	4.6 [4.4,4.9]	37.4 [35.4,39.4]	75.2	4.2 [3.9,4.5]
PK5	28.5 [26.8,30.4]	54.0	2.8 [2.4,0.8]	20.7 [19.7,21.8]	18.7	1.2 [1.0,1.4]	41.7 [39.6,43.7]	59.8	2.8 [2.5,3.0]	37.0 [35.0,39.1]	60.4	2.9 [2.6,3.1]
PK6	36.6 [34.1,39.1]	64.5	3.1 [2.9,0.8]	24.9 [23.6,26.2]	12.7	0.7 [0.4,1.0]	55.2 [51.7,58.7]	53.6	2.6 [2.2,3.0]	51.6 [48.3,54.9]	54.9	2.6 [2.2,2.9]
SN6	46.5 [44.0,49.0]	42.0	1.8 [1.5,0.5]	15.4 [13.7,17.2]	21.7	1.8 [1.4,2.3]	52.7 [48.9,56.5]	65.8	3.2 [2.7,3.7]	73.9 [70.1,77.5]	58.4	3.6 [3.0,4.2]
SN7	48.1 [45.5,50.7]	40.6	1.7 [1.5,0.4]	19.4 [17.5,21.5]	15.6	1.1 [0.8,1.4]	60.6 [56.5,64.6]	52.3	2.4 [1.8,3.1]	78.8 [75.5,81.9]	47.9	3.5 [2.7,4.2]
ZM5	60.3 [58.4,62.2]	2.3	0.1 [-0.2,0.1]	30.1 [28.7,31.6]	15.0	0.7 [0.5,0.9]	49.1 [46.4,51.8]	65.4	3.5 [3.1,4.0]	50.5 [47.8,53.3]	63.6	3.5 [3.0,3.9]
ZM6	55.5 [54.0,57.0]	13.8	0.6 [0.4,0.1]	41.2 [39.9,42.5]	24.8	1.1 [0.9,1.2]	68.6 [66.9,70.3]	45.8	3.0 [2.7,3.3]	71.8 [70.1,73.5]	41.8	3.0 [2.6,3.4]

Appendix 2. Child health indicators overall prevalence, difference index and coefficient index

	Three doses of DPT			Treatment of ARI symptoms			Treatment of fever symptoms			Treatment of diarrhea		
Survey	% [C.I.]	%q5-%q1	q5 coeff. [C.I.]	% [C.I.]	%q5-%q1	q5 coeff. [C.I.]	% [C.I.]	%q5-%q1	q5 coeff. [C.I.]	% [C.I.]	%q5-%q1	q5 coeff. [C.I.]
CD5	45.0 [40.0,50.2]	45.3	2.0 [1.4,2.5]	41.9 [37.8,46.1]	14.6	0.6 [0.1,1.1]	45.1 [41.4,48.8]	25.6	1.0 [0.7,1.4]	32.6 [27.2,38.6]	-0.5	0.0 [-0.7,0.6]
CD6	60.5 [57.2,63.8]	35.0	1.7 [1.2,2.1]	41.6 [35.6,47.9]	6.3	0.3 [-0.5,1.1]	39.9 [37.3,42.4]	4.1	0.2 [-0.1,0.5]	39.0 [36.0,42.0]	-4.4	-0.2 [-0.6,0.2]
GH5	88.8 [85.3,91.5]	5.3	0.6 [-0.5,1.8]	60.4 [50.7,69.4]	42.5	2.1 [-0.2,4.4]	64.0 [58.7,69.0]	38.9	2.0 [1.0,3.0]	57.1 [51.9,62.1]	17.1	0.7 [-0.1,1.5]
GH7	88.5 [85.9,90.7]	4.6	0.5 [-0.5,1.5]	52.6 [42.3,62.7]	2.1	0.1 [-1.4,1.6]	55.9 [51.1,60.7]	-1.1	0.0 [-0.7,0.6]	44.9 [39.1,50.7]	-8.3	-0.3 [-1.1,0.5]
HT5	53.0 [48.2,57.7]	26.4	1.1 [0.5,1.7]	33.3 [26.7,40.6]	16.7	0.8 [-0.2,1.8]	36.0 [32.5,39.6]	12.7	0.6 [0.0,1.1]	30.7 [26.7,34.9]	10.9	0.5 [-0.1,1.2]
HT6	62.5 [58.6,66.3]	13.2	0.6 [0.0,1.2]	37.9 [34.0,42.1]	28.4	1.3 [0.8,1.8]	40.1 [37.0,43.3]	26.4	1.1 [0.8,1.5]	33.9 [30.6,37.3]	21.9	0.9 [0.5,1.4]
ID5	66.7 [64.0,69.3]	36.5	1.7 [1.3,2.1]	66.4 [62.5,70.1]	23.4	1.1 [0.5,1.6]	66.8 [64.6,69.0]	24.1	1.1 [0.7,1.4]	51.0 [47.7,54.4]	26.6	1.1 [0.6,1.6]
ID6	72.0 [69.7,74.2]	32.9	1.7 [1.3,2.0]	75.3 [71.3,78.9]	10.3	0.5 [-0.2,1.2]	73.5 [71.6,75.3]	13.5	0.7 [0.4,1.0]	64.6 [61.7,67.5]	-1.4	-0.1 [-0.5,0.4]
KE5	86.4 [83.2,89.1]	12.3	0.9 [0.2,1.7]	55.9 [47.9,63.6]	6.1	0.3 [-1.0,1.5]	48.6 [44.8,52.4]	-0.5	0.0 [-0.5,0.5]	48.6 [43.4,53.9]	-2.3	-0.1 [-0.8,0.6]
KE7	89.9 [88.4,91.2]	9.4	0.9 [0.4,1.5]	65.7 [62.6,68.7]	10.9	0.5 [0.0,1.0]	62.5 [60.4,64.6]	9.5	0.4 [0.1,0.7]	57.6 [55.0,60.3]	-5.2	-0.2 [-0.6,0.2]
LB5	50.3 [44.7,55.8]	42.3	1.8 [1.1,2.5]	62.2 [56.1,68.0]	30.5	1.7 [0.7,2.8]	56.7 [52.6,60.8]	22.4	0.9 [0.3,1.5]	49.3 [43.5,55.0]	22.4	0.9 [0.3,1.5]
LB6	71.4 [67.4,75.1]	21.5	1.0 [0.4,1.6]	50.7 [44.1,57.3]	-4.3	-0.2 [-1,0.7]	57.5 [53.6,61.4]	11.6	0.5 [-0.1,1.1]	46.8 [42.7,51.0]	6.0	0.2 [-0.5,1.0]
ML5	67.6 [64.2,70.8]	12.3	0.6 [0.1,1.1]	38.1 [33.4,42.9]	32.6	1.4 [0.8,1.9]	32.8 [29.8,36.0]	29.4	1.3 [0.9,1.7]	17.8 [14.9,21.0]	16.9	1.0 [0.4,1.6]
ML6	63.1 [59.8,66.3]	30.0	1.3 [0.9,1.7]	26.7 [19.1,35.9]	21.9	1.1 [-0.1,2.3]	28.3 [24.1,33.0]	37.5	1.8 [1.1,2.4]	28.3 [24.9,31.9]	19.1	1.0 [0.4,1.6]
NG5	35.4 [33.3,37.6]	67.8	3.6 [3.2,3.9]	45.4 [40.5,50.4]	34.4	1.4 [0.7,2.1]	54.1 [51.9,56.4]	29.9	1.2 [1.0,1.5]	42.2 [39.6,44.8]	30.7	1.3 [0.9,1.7]
NG6	38.2 [35.9,40.6]	72.5	3.9 [3.6,4.3]	34.5 [29.8,39.5]	36.9	1.6 [0.7,2.5]	31.5 [29.1,33.9]	18.4	0.8 [0.5,1.2]	28.9 [26.4,31.6]	19.3	1.0 [0.6,1.4]
PK5	58.5 [55.1,61.8]	43.1	1.9 [1.5,2.3]	69.3 [65.7,72.6]	27.7	1.5 [0.9,2.1]	65.8 [63.0,68.4]	19.6	0.9 [0.5,1.3]	54.5 [51.4,57.6]	20.1	0.8 [0.4,1.2]
PK6	65.2 [60.9,69.2]	58.1	2.8 [2.3,3.4]	64.4 [60.0,68.6]	22.3	1.1 [0.3,1.8]	64.8 [61.7,67.7]	22.6	1.1 [0.7,1.5]	61.0 [57.3,64.6]	22.8	1.0 [0.6,1.5]
SN6	88.5 [86.1,90.5]	15.1	1.5 [0.5,2.5]	53.0 [43.2,62.6]	27.2	1.1 [0,2.2]	43.5 [39.4,47.7]	13.7	0.6 [0.1,1.0]	38.8 [33.8,44.0]	16.0	0.7 [0.1,1.3]
SN7	89.3 [86.4,91.7]	5.9	0.6 [-0.7,1.9]	42.2 [31.8,53.3]	-19.6	-0.8 [-2.2,0.5]	45.8 [39.8,51.9]	12.2	0.5 [-0.4,1.3]	32.8 [28.2,37.9]	11.4	0.5 [-0.4,1.4]
ZM5	79.6 [76.3,82.6]	16.2	1.5 [0.7,2.2]	68.2 [61.1,74.6]	-21.8	-1 [-2,0]	62.8 [58.9,66.7]	3.2	0.1 [-0.5,0.8]	58.8 [54.5,62.9]	-3.6	-0.2 [-0.9,0.5]
ZM6	85.8 [83.8,87.7]	15.8	1.6 [1.0,2.3]	69.7 [64.0,74.8]	12.6	0.7 [-0.3,1.6]	71.9 [69.5,74.2]	6.6	0.3 [-0.1,0.7]	65.6 [62.9,68.2]	-1.8	-0.1 [-0.5,0.3]

Appendix 3. Child nutrition indicators overall prevalence, difference index and coefficient index

	Exclusive breastfeeding			Stunting			Wasting		
Survey	**% [C.I.]**	**%q5-%q1**	**q5 coeff. [C.I.]**	**% [C.I.]**	**%q5-%q1**	**q5 coeff. [C.I.]**	**% [C.I.]**	**%q5-%q1**	**q5 coeff. [C.I.]**
CD5	36.1 [31.1,41.4]	-10.2	-0.5 [-1.3,0.3]	45.5 [42.7,48.4]	-20.8	-0.9 [-1.3,-0.5]	10 [8.2,12.2]	-1.6	-0.2 [-0.7,0.4]
CD6	47.8 [44.3,51.4]	-9.4	-0.4 [-0.8,0.1]	42.7 [40.9,44.6]	-26.7	-1.2 [-1.4,-1.0]	7.9 [7.0,8.9]	-4.3	-0.8 [-1.1,-0.4]
GH5	63.1 [57.2,68.6]	2.5	0.1 [-0.8,1.0]	28 [25.8,30.2]	-20.7	-1.2 [-1.6,-0.8]	8.5 [7.5,9.6]	-2.9	-0.4 [-0.9,0.1]
GH7	52.3 [47.2,57.3]	-19.4	-0.8 [-1.4,-0.2]	18.8 [17,20.6]	-16.3	-1.3 [-1.8,-0.7]	4.7 [3.5,6.1]	-1.8	-0.4 [-1.1,0.3]
HT5	40.7 [34.9,46.7]	-13.0	-0.6 [-1.3,0.2]	29.4 [26.9,32]	-33.0	-2.1 [-2.6,-1.5]	10.2 [8.3,12.4]	-3.7	-0.5 [-1.2,0.2]
HT6	39.7 [35.2,44.4]	-5.1	-0.2 [-0.9,0.5]	21.9 [20,23.8]	-24.4	-1.8 [-2.3,-1.4]	5.1 [4.4,5.9]	-2.4	-0.6 [-1.2,0.0]
ID5	32.5 [28.9,36.3]	-21.7	-1.1 [-1.6,-0.6]	NA	NA	NA	NA	NA	NA
ID6	41.5 [38.0,45.0]	2.8	0.1 [-0.3,0.6]	NA	NA	NA	NA	NA	NA
KE5	31.9 [26.7,37.7]	-13.3	-0.6 [-1.3,0.1]	35.3 [33.2,37.4]	-19.9	-0.9 [-1.2,-0.6]	6.7 [5.8,7.8]	-7.5	-1.2 [-1.6,-0.7]
KE7	61.4 [57.2,65.5]	13.9	0.6 [0.0,1.2]	26 [25,27.1]	-22.1	-1.3 [-1.4,-1.1]	4.0 [3.6,4.5]	-4.8	-1.1 [-1.5,-0.7]
LB5	29.1 [23.8,35.0]	-1.7	-0.1 [-1.1,1.0]	39.4 [37.5,41.4]	-18.2	-0.8 [-1.1,-0.6]	7.5 [6.4,8.6]	0.6	0.1 [-0.4,0.6]
LB6	55.2 [49.7,60.7]	-23.6	-1.0 [-1.8,-0.1]	31.6 [29.3,34]	-15.4	-0.8 [-1.2,-0.4]	6.0 [5.0,7.3]	-2.2	-0.5 [-1.2,0.3]
ML5	37.8 [34.4,41.3]	-10.9	-0.5 [-0.9,0.0]	37.7 [36.2,39.2]	-22.0	-1.0 [-1.2,-0.8]	15.2 [14.3,16.2]	-2.3	-0.2 [-0.4,0.0]
ML6	34.2 [30.5,38.1]	3.5	0.2 [-0.3,0.7]	38.3 [36.2,40.4]	-25.2	-1.2 [-1.4,-0.9]	12.7 [11.1,14.4]	-4.4	-0.4 [-0.8,0.0]
NG5	13.1 [11.5,14.8]	14.5	1.3 [0.8,1.8]	40.6 [39.5,41.7]	-27.9	-1.2 [-1.4,-1.1]	13.9 [13.1,14.8]	-11.2	-0.9 [-1.1,-0.7]
NG6	17.4 [15.5,19.5]	33.4	2.4 [2.0,2.9]	36.8 [35.6,38]	-35.7	-1.7 [-1.8,-1.5]	18.0 [16.9,19.1]	-8.0	-0.6 [-0.7,-0.4]
PK5	37.3 [33.6,41.1]	-9.8	-0.4 [-1.0,0.1]	NA	NA	NA	NA	NA	NA
PK6	37.8 [33.7,42.0]	3.0	0.1 [-0.4,0.7]	44.8 [42,47.6]	-38.6	-1.7 [-2.0,-1.3]	10.8 [9,12.9]	-9.1	-0.9 [-1.4,-0.3]
SN6	37.4 [33.2,41.9]	13.7	0.6 [0.0,1.1]	18.7 [17.3,20.1]	-14.5	-1.0 [-1.4,-0.6]	8.8 [7.9,9.9]	-4.8	-0.6 [-1.1,-0.2]
SN7	32.4 [27.3,38.1]	-4.8	-0.3 [-1.0,0.5]	18.7 [17.2,20.4]	-20.3	-1.5 [-1.9,-1.0]	5.9 [5.0,6.9]	-4.9	-1.0 [-1.8,-0.2]
ZM5	60.9 [56.8,64.8]	11.3	0.5 [-0.1,1.0]	45.4 [43.5,47.3]	-14.9	-0.6 [-0.9,-0.3]	5.2 [4.6,5.9]	-2.4	-0.5 [-1.0,0.0]
ZM6	72.5 [69.5,75.4]	-3.6	-0.2 [-0.7,0.4]	40.1 [38.9,41.3]	-18.9	-0.8 [-1.0,-0.6]	6.0 [5.5,6.6]	-1.1	-0.2 [-0.5,0.2]

Note: NA indicates that the indicator is not available for the survey

Appendix 4. Maternal health indicators with the national, lowest and highest regional estimates

	Four or more ANC visits					Modern CPR use for women in a union					Last birth assisted by SBA					Last birth delivered in health facility				
survey	Low region	Low region name	National estimate	High region	High region name	Low region	Low region name	National estimate	High region	High region name	Low region	Low region name	National estimate	High region	High region name	Low region	Low region name	National estimate	High region	High region name
CD5	22.6	Sud-kivu	47.1	69.0	Kinshasa	2.0	Kasa occident	5.9	12.9	Kinshasa	53.0	Equateur	76.0	97.3	Kinshasa	38.8	Equateur	72.3	97.1	Kinshasa
CD6	35.3	Sud-kivu	48.0	73.9	Kinshasa	3.6	Katanga	8.0	18.0	Kinshasa	63.1	Katanga	81.1	97.6	Kinshasa	62.6	Katanga	80.6	98.5	Kinshasa
GH5	66.9	Upper east	78.2	89.5	Greater Accra	5.4	Northern	15.6	20.3	Greater Accra	32.3	Northern	61.6	85.6	Greater Accra	31.9	Northern	60.2	85.5	Greater Accra
GH7	73.0	Northern	87.3	93.5	Ashanti	10.7	Northern	21.7	28.6	Central	39.5	Northern	76.0	93.2	Greater Accra	38.8	Northern	75.2	93.0	Greater Accra
HT5	37.3	Sud-est	53.8	62.0	Nord-est	12.1	Sud-est	22.8	27.3	Artibonite	14.4	Sud-est	29.0	41.0	Aire metropoli-taine/ reste-quest	12.6	Sud-est	27.4	38.9	Aire metropoli-taine/ reste-quest
HT6	59.9	Grand-anse	67.3	79.3	Nord-est	24.6	Sud-est	28.6	37.3	Centre	19.4	Grand-anse	41.1	52.3	Camps	19.2	Grand-anse	39.5	50.7	Camps
ID5	49.8	Papua barat	81.5	97.6	Dki jakarta	24.6	Papua	54.4	67.1	Bengkulu	35.8	Maluku	74.2	97.4	Dki jakarta	8.9	Southeast sulawesi	48.0	91.8	Bali
ID6	34.0	Papua	87.8	97.2	Yogyakarta	17.7	Papua	54.6	63.6	Lampung	43.1	Papua	84.3	98.8	Jakarta	19.0	West sulawesi	64.4	98.2	Bali
KE5	32.0	North eastern	47.1	66.8	Nairobi	3.1	North eastern	37.1	58.3	Central	29.6	Western	48.0	89.6	Nairobi	18.4	Northeastern	46.8	90.3	Nairobi
KE7	36.9	North eastern	57.6	73.1	Nairobi	3.3	North eastern	49.9	60.7	Central	34.6	North eastern	66.6	91.0	Nairobi	30.6	North eastern	65.9	90.9	Central
LB5	51.3	South eastern A	66.0	75.9	Monrovia	5.3	South eastern b	10.7	17.3	Monrovia	34.6	South eastern b	51.2	85.8	Monrovia	25.2	North western	41.6	72.4	Monrovia
LB6	59.8	South Eastern B	78.1	81.5	South central	13.2	North central	19.5	22.6	South central	54.0	North western	65.3	74.6	South central	50.3	North western	60.3	68.5	South central
ML5	18.9	Tombouctou	35.5	68.0	Bamako	2.0	Mopti	6.8	16.2	Bamako	19.1	Kidal	51.4	93.3	Bamako	19.5	Kidal	47.5	91.1	Bamako
ML6	20.4	Mopti	41.2	71.4	Bamako	2.8	Mopti	9.9	22.2	Bamako	32.2	Mopti	61.3	95.7	Bamako	28.7	Mopti	57.8	95.1	Bamako
NG5	20.8	North west	45.2	81.4	South west	2.5	North west	9.6	20.5	South west	11.0	North west	40.6	81.5	South east	9.3	North west	36.5	73.8	South east
NG6	30.4	North west	51.1	86.9	South west	2.7	North east	9.8	24.6	South west	13.9	North west	40.0	83.6	South west	12.8	North west	37.4	78.5	South east
PK5	7.4	Balochistan	28.5	36.5	Sindh	12.9	Balochistan	20.7	21.8	Punjab	25.0	Balochistan	41.7	47.5	Sindh	18.6	Balochistan	37.0	44.9	Sindh
PK6	12.2	Balochistan	36.6	82.1	Islamabad (ict)	15.9	Balochistan	24.9	42.4	Islamabad (ict)	20.3	Balochistan	55.2	89.2	Islamabad (ict)	18.1	Balochistan	51.6	88.3	Islamabad (ict)
SN6	28.6	Kolda	46.5	61.9	Dakar	4.4	Kedougou	15.4	28.6	Dakar	24.6	Kaffrine	52.7	87.0	Dakar	37.6	Tamba-counda	73.9	94.9	Dakar
SN7	28.2	Sedhiou	48.1	57.9	Ziguinchor	6.6	Diourbel	19.4	31.4	Dakar	34.6	Kedougou	60.6	84.3	Dakar	44.2	Kedougou	78.8	97.2	Dakar
ZM5	54.4	Lusaka	60.3	68.0	Luapula	13.5	Luapula	30.1	45.9	Eastern	29.4	Northern	49.1	80.1	Lusaka	31.5	Northern	50.5	80.7	Lusaka
ZM6	50.6	Western	55.5	62.9	Copperbelt	29.4	Western	41.2	49.1	Lusaka	48.6	Northern	68.6	90.3	Lusaka	51.6	Northern	71.8	91.1	Lusaka

Appendix 5. Child health indicators with the national, lowest and highest regional estimates

	Three doses of DPT					Treatment of ARI symptoms					Treatment of fever symptoms					Treatment of diarrhea				
Survey	Low region	Low region name	National estimate	High region	High region name	Low region	Low region name	National estimate	High region	High region name	Low region	Low region name	National estimate	High region	High region name	Low region	Low region name	National estimate	High region	High region name
CD5	17.4	Maniema	45.0	83.4	Bas-congo	30.3	Kasa oriental	41.9	61.3	Kinshasa	35.4	Kasa oriental	45.1	67.3	Kinshasa	19.1	Kasa oriental	32.6	50.2	Katanga
CD6	42.6	Equateur	60.5	87.0	Nord-kivu	29.9	Nord-kivu	41.6	55.7	Kasai-oriental	31.9	Orientale	39.9	48.7	Kinshasa	32.4	Kasai-oriental	39.0	70.3	Maniema
GH5	75.1	Northern	88.8	96.0	Western	31.6	Volta	60.4	78.4	Upper east	44.8	Volta	64.0	83.6	Upper east	33.1	Volta	57.1	77.3	Upper east
GH7	80.7	Northern	88.5	96.7	Upper west	36.7	Northern	52.6	76.9	Western	39.3	Greater Accra	55.9	79.8	Upper east	27.5	Ashanti	44.9	75.9	Western
HT5	38.6	Nord-quest	53.0	76.9	Nord-est	7.1	Nippes	33.3	45.2	Nord-quest	13.0	Nippes	36.0	47.9	Artibonite	16.9	Sud	30.7	47.0	Nord-quest
HT6	48.1	Nord-quest	62.5	86.1	Nippes	22.6	Nord-est	37.9	44.9	Aire metropoli-taine/ reste-quest	30.2	Sud-est	40.1	46.0	Aire metropoli-taine/ reste-quest	24.0	Artibonite	33.9	44.1	Nord-est
ID5	33.7	Di aceh	66.7	97.0	Di yogyakarta	39.2	Maluku	66.4	86.3	South sulawesi	43.2	Maluku	66.8	83.5	Dki jakarta	21.8	Maluku	51.0	84.3	Bali
ID6	35.3	Papua	72.0	96.4	Yogyakarta	53.7	Papua	75.3	100.0	West papua	52.0	South kalimantan	73.5	84.1	Bali	45.3	Yogyakarta	64.6	81.6	Bengkulu
KE5	57.1	Northeastern	86.4	92.9	Rift valley	45.2	Central	55.9	89.9	Nairobi	33.3	Western	48.6	56.5	Coast	31.4	Western	48.6	67.6	Northeastern
KE7	77.4	North eastern	89.9	95.5	Central	35.4	North eastern	65.7	71.0	Nyanza	49.5	North eastern	62.5	68.7	Eastern	44.2	North eastern	57.6	64.7	Coast
LB5	19.1	South eastern B	50.3	75.1	Monrovia	38.4	South eastern A	62.2	83.7	Monrovia	41.4	South eastern a	56.7	69.0	Monrovia	34.0	South eastern A	49.3	63.9	South eastern b
LB6	52.0	South eastern b	71.4	81.5	North western	47.8	South central	50.7	55.5	South eastern a	53.7	North central	57.5	60.6	South central	45.3	North central	46.8	55.6	South eastern b
ML5	24.8	Kidal	67.6	79.6	Bamako	26.0	Koulikoro	38.1	52.6	Bamako	0.0	Kidal	32.8	45.8	Bamako	0.0	Kidal	17.8	31.0	Bamako
ML6	43.6	Mopti	63.1	74.1	Bamako	13.2	Mopti	26.7	39.7	Bamako	20.5	Koulikoro	28.3	55.2	Bamako	21.3	Mopti	28.3	34.0	Sikasso
NG5	9.1	North west	35.4	66.9	South east	30.7	North east	45.4	63.7	South east	42.6	North east	54.1	71.9	South east	35.9	North east	42.2	75.2	South east
NG6	13.9	North west	38.2	80.7	South east	28.5	North central	34.5	57.6	South west	23.9	South east	31.5	48.6	South west	24.4	North east	28.9	42.0	North central
PK5	46.7	Balochistan	58.5	64.5	Punjab	49.8	Nwfp	69.3	78.0	Sindh	49.1	Balochistan	65.8	75.0	Sindh	40.1	Nwfp	54.5	66.2	Sindh
PK6	27.1	Balochistan	65.2	91.2	Islamabad (ict)	29.3	Khyber pakhtun-khwa	64.4	81.6	Sindh	26.5	Khyber pakhtun-khwa	64.8	77.6	Sindh	23.0	Khyber pakhtun-khwa	61.0	73.0	Sindh
SN6	66.6	Tamba-counda	88.5	97.7	Thies	0.0	Matam	53.0	100.0	Kedougou	33.2	Thies	43.5	63.2	Kedougou	17.6	Thies	38.8	60.4	Louga
SN7	64.9	Kedougou	89.3	97.5	Louga	0.0	Saint-louis	42.2	100.0	Ziguinchor	24.9	Diourbel	45.8	59.0	Ziguinchor	23.2	Thies	32.8	47.3	Ziguinchor
ZM5	60.5	Northwestern	79.6	91.9	Lusaka	49.3	Luapula	68.2	87.8	Southern	52.2	Northern	62.8	80.9	Southern	48.6	Luapula	58.8	74.9	Eastern
ZM6	79.2	Luapula	85.8	94.4	Copperbelt	57.4	Luapula	69.7	79.2	North	61.9	Central	71.9	86.0	North	57.9	Central	65.6	73.6	Eastern

Appendix 6. Child nutrition indicators with the national, lowest and highest regional estimates

	Exclusive breastfeeding					Stunting					Wasting				
Survey	Low region	Low region name	National estimate	High region	High region name	Low region	Low region name	National estimate	High region	High region name	Low region	Low region name	National estimate	High region	High region name
CD5	23.4	Kasa occident	36.1	72.2	Nord-kivu	23.4	Kinshasa	45.5	55.5	Sud-kivu	6.6	Nord-kivu	10.0	14.6	Kasa oriental
CD6	27.3	Kinshasa	47.8	77.1	Maniema	17.3	Kinshasa	42.7	53.0	Sud-kivu	3.5	Kinshasa	7.9	22.7	Maniema
GH5	45.1	Ashanti	63.1	83.3	Volta	14.2	Greater Accra	28.0	37.9	Eastern	5.2	Volta	8.5	13.9	Upper west
GH7	27.7	Western	52.3	83.3	Upper west	10.4	Greater Accra	18.8	33.1	Northern	2.5	Volta	4.7	9.4	Upper east
HT5	14.5	Sud-est	40.7	55.5	Centre	20.9	Aire metropoli-taine/ reste-quest	29.4	44.6	Centre	7.1	Sud-est	10.2	20.5	Artibonite
HT6	21.7	Artibonite	39.7	56.5	Nord-est	16.4	Aire metropoli-taine/ reste-quest	21.9	28.8	Sud-est	3.2	Sud-est	5.1	7.5	Nord-quest
ID5	13.0	Kep bangka belitung	32.5	62.5	Sulawesi barat	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na
ID6	13.7	Bangka belitung	41.5	65.6	West nusa tenggara	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na
KE5	5.5	Northeastern	31.9	55.4	Eastern	28.5	Nairobi	35.3	41.9	Eastern	2.3	Western	6.7	19.5	Northeastern
KE7	43.1	North eastern	61.4	75.9	Nairobi	17.2	Nairobi	26.0	30.8	Coast	1.9	Western	4.0	13.3	North eastern
LB5	8.3	South eastern a	29.1	37.7	North central	30.1	Monrovia	39.4	45.2	South eastern b	3.7	North western	7.5	9.8	Monrovia
LB6	42.2	South eastern a	55.2	65.8	North western	29.0	North western	31.6	34.5	North central	4.2	South eastern b	6.0	7.1	South eastern a
ML5	26.5	Tombouctou	37.8	74.9	Kidal	23.2	Bamako	37.7	45.2	Sikasso	12.7	Mopti	15.2	27.2	Kidal
ML6	30.3	Sikasso	34.2	39.2	Koulikoro	21.1	Bamako	38.3	46.5	Mopti	11.1	Koulikoro	12.7	14.7	Mopti
NG5	4.0	North east	13.1	22.0	South west	21.7	South east	40.6	52.6	North west	7.5	South south	13.9	22.2	North east
NG6	4.3	North west	17.4	42.1	South west	16.0	South east	36.8	54.8	North west	10.0	South west	18.0	27.1	North west
PK5	32.5	Punjab	37.3	55.2	Nwfp	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na
PK6	23.1	Balochistan	37.8	66.3	Gilgit baltistan	22.2	Islamabad (ict)	44.8	81.9	Balochistan	8.1	Gilgit baltistan	10.8	13.6	Sindh
SN6	18.3	Kaolack	37.4	63.5	Ziguinchor	13.8	Thies	18.7	33.1	Kaffrine	4.1	Thies	8.8	17.2	Matam
SN7	12.2	Kaolack	32.4	64.5	Kedougou	12.2	Dakar	18.7	36.1	Kolda	1.3	Dakar	5.9	15.2	Matam
ZM5	44.1	Luapula	60.9	80.9	Central	36.2	Southern	45.4	56.3	Luapula	2.3	Copperbelt	5.2	10.6	Western
ZM6	61.7	North	72.5	90.9	Southern	35.7	Lusaka	40.1	48.5	Northern	3.7	Northern	6.0	13.1	Luapula

Note: NA indicates that the indicator is not available for the survey