



INDICATORS FOR MEASURING UNIVERSAL HEALTH COVERAGE: A FIVE-COUNTRY ANALYSIS (DRAFT)

September 2012

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Health Systems Division
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Abt Associates Inc. | 4550 Montgomery Avenue | Suite 800 North
| Bethesda, Maryland 20814 | P: 301.347.5000 | F: 301.913.9061
| www.healthsystems2020.org | www.abtassociates.com

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ACRONYMS

ANC	Antenatal care
ARI	Acute respiratory infection
ART	Antiretroviral therapy
BCG	Bacille Calmette-Guérin
CCI	Composite Coverage Index
DHS	Demographic and Health Survey
DOTS	Directly observed treatment short course
DPT	Diphtheria, Tetanus, Pertussis
ENAHO	Encuesta Nacional de Hogares (National Household Survey, Peru)
FP	Family planning
HIES	Household Income and Expenditure Surveys
ILO	International Labour Organisation
INEI	Instituto Nacional de Estadística e Informática (National Institute of Statistics, Peru)
ITN	Insecticide-treated net
LSMS	Living Standards Measurement Study
MCH	Maternal and child health
MDG	Millennium Development Goal
NCD	Non-Communicable Disease
NHA	National Health Accounts
NSO	National statistics office
OOP	Out-of-pocket
ORT	Oral rehydration therapy
PAR	Population attributable risk
SAM	Service Availability Mapping
SARA	Service Availability and Readiness Assessment
SII	Slope index of inequality
THE	Total health expenditures
UHC	Universal Health Coverage
UNHS	Uganda National Household Survey

USAID	United States Agency for International Development
VHLSS	Vietnam Households Living Standards Survey
WDI	World Development Indicators
WHO	World Health Organization

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EXECUTIVE SUMMARY

This study aimed to advance the dialogue on measurement of universal health coverage (UHC) by taking a practical, bottom-up approach – specifically, cataloguing indicators of UHC that have already been defined in the literature, assessing the feasibility of producing those indicators from already-available data sources, and reflecting upon their strengths and weaknesses. We aimed to expose key issues related to the feasibility and applicability of commonly proposed metrics of UHC, in order to help prioritize areas for further research and development, especially as donors and policymakers demand accurate metrics to gauge progress towards UHC.

Using the 2010 World Health Report’s three-dimensional framework for UHC as a starting point, we conducted a literature review of research that addressed measurement of one or more of the three dimensions. The service coverage dimension captures the aspiration that all people can obtain the health services they need, while the financial coverage dimension aims to ensure that they do not suffer financial hardship linked to paying for these services at the time they need them. The extent and distribution of coverage across various population sub-groups is reflected by the third dimension, which highlights the paramount importance of equity in coverage across income or wealth groups, sex, age, place of residence, migrant status, and ethnic origin.

Following the literature review, we selected indicators that are commonly available from surveys. Most indicators for financial risk protection are focused on measuring catastrophic payments and the extent to which out-of-pocket spending can be said to push the households into poverty. Measures of utilization of priority services are the most readily-available proxies for service coverage. They include maternal and child health (MCH) and reproductive health (RH) indicators. Less-routinely-captured indicators are service use for non-communicable diseases (NCD), diseases requiring clinical diagnosis (such as TB and HIV), conditions experienced by the elderly, or injuries. Population coverage indicators have largely focused on the measurement of equity in coverage across socioeconomic groups, proxied by consumption or wealth levels.

We generated values for these indicators using available data and reports from five countries (Bangladesh, Ethiopia, Peru, Uganda, and Vietnam). The main data sources used were the Demographic and Health Surveys (DHS) and country household expenditure surveys based on the Living Standards Measurement Study (LSMS) model. In addition to detailing some of the challenges of obtaining and manipulating the country datasets, we highlighted strengths and weaknesses of each indicator, including conceptual and practical limitations that affect their validity in measuring each of the dimensions of UHC.

Below is a summary of key conclusions:

- High-quality and standard MCH and RH service utilization indicators are available from the DHS. Owing to U.S. government and local country investment in the production of these data over the past three decades, the surveys are globally recognized for their quality and reliability, and are widely used already.
- However, MCH and RH service utilization measures capture one portion of service coverage. How (and how extensively) to capture other health conditions, such as NCDs or injuries, will be a critical challenge for UHC measurement going forward. As the burden of chronic diseases increases, better ways of capturing service coverage for these conditions will require data from sources other than household surveys, such as facility-based surveys and routine health information systems.
- The service package for UHC has not yet been defined. Open questions remain about whether

there should be a small or essential benefits package of high-impact, cost-effective services, or a more expansive (and expensive) package covering a wider range of possible needed services. How to handle variations in disease burden around the world, how to balance country relevance with consistency for global benchmarking, and the extent to which the choice of services should reflect the current availability of data, are other issues yet to be resolved.

- Measuring “effective coverage” with high-quality services remains challenging. Effective coverage implies that services must reach those who need them, and that they must be of adequate quality to result in health improvements. To date, while many quality metrics have been developed, it is still challenging to measure the quality of service provision on an aggregate level. In addition, it is particularly cumbersome to link the quality of service provision with the characteristics of beneficiaries reached and the health outcomes achieved.
- Several financial coverage indicators clearly highlight the burden of health care outlays on individuals and households and are in wide usage, though conceptual challenges remain. Limitations include their failure to capture those individuals who do not seek care because they cannot afford to do so and their limited ability to capture financial coverage *prior* to illness and care-seeking.
- There continue to be important limitations to the availability and quality of household expenditure surveys. The state of some of the datasets and accompanying documentation used in this analysis varied greatly, and data always required additional cleaning and preparation.

Given these observations, priorities for research and investment going forward may include:

- Strengthening routine, non-household survey data collection methods for UHC indicators. Strong facility-based information systems will permit collection of many more indicators (including indicators of NCDs) than cannot be reliably collected from self-reported surveys.
- Working towards greater global consensus on service coverage measurement, especially on issues such as an essential vs. comprehensive service package for UHC and criteria for selecting particular indicators.
- Investing in operations research on service coverage measurement, notably to develop feasible, aggregate indicators of process and outcome quality; and developing theoretically grounded and robust service coverage indexes that include a wider range of conditions.
- Investing in improvements to expenditure data collection, notably improved standardization of measures (especially for health expenditures), improved quality of data and data documentation, and better methodologies for capturing OOP expenditures.
- Developing financial risk protection measures that effectively address “undercounting” among the poorest of the poor. This could include developing composite measures of financial protection reflecting multiple sources of financial burden, such as decreased health status and lost earnings that result from failure to seek care, as well as impoverishment and catastrophe measures.
- Investing in an inclusive, consensus-oriented process to develop the set of UHC indicators for the post- Millennium Development Goals era. Involving country stakeholders in the identification of indicators of service and financial coverage is critical, as country buy-in will directly affect the extent to which UHC indicator data are collected, reported, and used.
- Narrowing the pool of possible indicators (or combining sets of indicators) and focusing on those that help policymakers make decisions are critical intermediate steps until a more robust set of individual indicators is available and before a “super-index” of UHC can be developed.

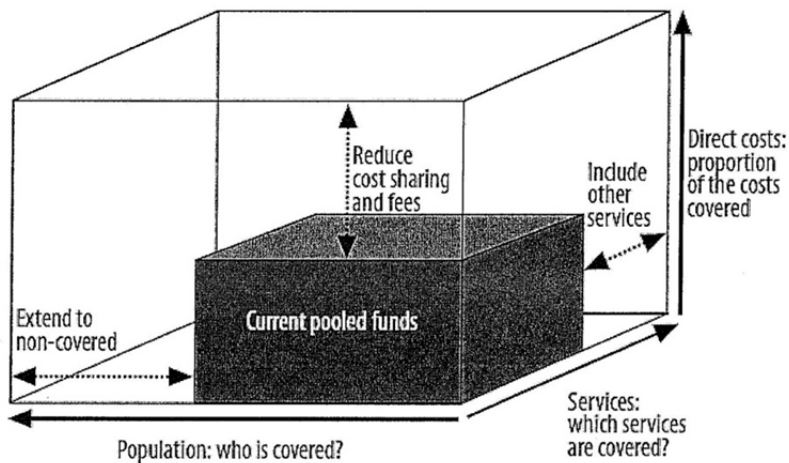
I. INTRODUCTION

As countries declare their commitment to achieving Universal Health Coverage (UHC) and introduce policies and approaches to achieve that goal, there is a need to establish guidelines and develop indicators to measure and monitor progress. The *World Health Report 2010* outlined a conceptual framework for UHC (World Health Organization [WHO] 2010) that suggested three broad dimensions:

- the range of services that are covered (service coverage);
- the proportion of the total costs covered through insurance or other risk pooling mechanisms (financial coverage); and
- the proportion of the population covered (population coverage).

The first dimension captures the aspiration that all people can obtain the health services they need, while the second aims to ensure that they do not suffer financial hardship linked to paying for these services at the time they need them. The extent and distribution of coverage across various population sub-groups is reflected by the third dimension, which highlights the paramount importance of equity in coverage across income or wealth, sex, age, place of residence, migrant status, and ethnic origin.

FIGURE I. THREE DIMENSIONS OF UNIVERSAL HEALTH COVERAGE



Source: World Health Report 2010

Although the framework represents a persuasive conceptual tool that has been widely accepted, it has been recognized that additional work is needed to operationalize measurable indicators for tracking a country's level of coverage. Donors and policymakers are seeking accurate metrics to gauge progress towards stronger health systems. There is particular urgency now as the global community begins to outline a post-Millennium Development Goals (MDG) agenda; a simple metric of UHC could be a compelling 'umbrella' indicator for health efforts post-2015.

However, developing reasonably low-cost and accurate methods to measure and track country progress towards UHC poses both conceptual and practical challenges. Some of the conceptual challenges include:

- How to develop indicators of service coverage that can be used across country contexts, given variations in disease burden and socio-economic status;
- How to reflect the financial burden of health care on the very poor, who may fail to seek care because they cannot afford to and thus incur no health spending; and
- How to capture the quality of care being provided, and relatedly how to distinguish between “nominal” or legal coverage and effective coverage with affordable, good quality care.

On the practical side, challenges include:

- How to develop indicators that serve the needs of different audiences: Simple indicators and cross-country benchmarking are useful for global advocacy purposes, but these metrics may be of limited use to country-level health planners and policymakers, who need more comprehensive, detailed, and actionable country-specific indicators for policy and management;
- How to capture the range of health conditions for which health care services might be needed in a practical manner. Some options include the use of selected tracer indicators or composite indexes;
- How to improve the availability and quality of data to support UHC measurement – including more standardized and frequent expenditure surveys; increased collection of data related to non-communicable diseases (NCDs); and stronger routine health information systems.

1.1 STUDY OBJECTIVES

This study aimed to advance the dialogue on measurement of UHC by taking a practical, bottom-up approach. Specifically, it catalogued the types of UHC indicators that have already been defined in the literature, assessed the feasibility of producing those indicators from already-available data sources in several countries, and reflected upon the strengths and weaknesses of those indicators. We aimed to expose key issues related to the feasibility and applicability of commonly proposed metrics of UHC, in order to help prioritize areas for further research and development. The objectives of the study were to:

- Review existing indicators that capture various aspects of UHC;
- Select those that are commonly available from surveys and generate values for these indicators using datasets and reports from five countries;
- Expose key measurement issues related to indicator validity, data availability, and data quality; and
- Highlight areas of weakness needing additional conceptual work or improved data gathering activities.

The remainder of this report is organized as follows. Section 2 presents our approach; Section 3 summarizes our review of the literature on the definitions and indicators of UHC; Section 4 discusses main findings, highlighting strengths and weaknesses of each indicator; and Section 5 concludes and identifies several recommendations for next steps.

2. STUDY APPROACH

Using the World Health Report’s three-dimensional framework for UHC as a starting point, we conducted a literature review of research that addressed measurement of one or more of the three dimensions. We reviewed more than 30 sources, including published articles, books, technical reports, and other gray literature, then compiled a list of common indicators. This included 7 indicators of financial protection; 18 indicators of service coverage; and 4 stratification variables for assessing equity in coverage.

The main data sources used were the Demographic Health Surveys (DHS) and country household expenditure surveys based on the Living Standards Measurement Study (LSMS) model. Additional data sources include the MDG Indicators¹ as well as the World Bank’s World Development Indicators (WDI)². We purposively selected five countries for in-depth secondary data analysis to explore the selected indicators, illustrate current data availability and highlight possible measurement challenges. The criteria for country selection were:

- At least two recent DHS surveys
- At least two recent LSMS-type surveys
- National Health Accounts estimation conducted
- Representation of Africa, Asia, and Latin America.

We downloaded the DHS datasets and reports from the MEASURE DHS website³. We downloaded Peru’s expenditure survey datasets from the National Statistics Institute (INEI) website, at no cost. For the remaining countries, we sent official requests to the national statistics offices (NSO) and paid a fee to access the Bangladesh and Vietnam datasets. Despite several attempts, we were unable to obtain expenditure data from Ethiopia during the timeframe of the study. Table I below summarizes the datasets we sought to obtain.

TABLE I. DATASETS AND SOURCES, BY COUNTRY

Country	Datasets	Source
Bangladesh	<ul style="list-style-type: none"> • 2005 and 2010 Household Income and Expenditure Surveys (HIES) • 2004 & 2007 DHS reports and datasets 	Bangladesh Bureau of Statistics MEASURE DHS website
Ethiopia	<ul style="list-style-type: none"> • 2004/2005 and 2010/11 Welfare Monitoring Surveys (WMS) and Household Income and Consumption Expenditure Surveys (HICES)⁴ • 2000 & 2005 DHS reports and datasets 	Ethiopia Central Statistical Agency MEASURE DHS website
Peru	<ul style="list-style-type: none"> • 2007-2010 Encuesta Nacional de Hogares Panel (ENAHO) 	Insituto Nacional e Estadistica e Informatica (INEI website)

¹ <http://mdgs.un.org/unsd/mdg/Default.aspx>

² <http://data.worldbank.org/indicator>

³ <http://www.measuredhs.com/>

⁴ We were unable to obtain these datasets.

Country	Datasets	Source
	<ul style="list-style-type: none"> 2000, 2004-06 & 2007-08 DHS reports and datasets 	MEASURE DHS website
Uganda	<ul style="list-style-type: none"> 2005/06 and 2009/10 Uganda National Household Survey (UNHS) 2000-01, 2006 DHS reports and datasets 	Uganda Bureau of Statistics MEASURE DHS website
Vietnam	<ul style="list-style-type: none"> 2004 and 2008 Vietnam Households Living Standards Survey (VHLSS) 2002 DHS report and dataset 	Government Statistics Office of Vietnam MEASURE DHS website

Using available data from the five countries, we calculated a range of indicators of UHC according to the dimensions proposed in the 2010 World Health Report (WHO, 2010a). Specific definitions of each indicator are described in the Findings section. Expenditure survey data analysis was conducted using Stata. We also disaggregated results by region, rural/urban residence, wealth quintile, and consumption quintile. Figures and tables were prepared to illustrate the distribution of selected indicators. The full set of indicators produced is available with the authors upon request.

For several of the indicators of financial protection, we confirmed our estimates using the free “ADePT” software. This software was developed by the World Bank for poverty-related analyses, with recent additional capacity to analyze health financing and outcomes in a streamlined, automated manner.⁵ The health modules apply the methodology from *Analyzing Health Equity Using Household Survey Data* by O’Donnell, van Doorslaer, Wagstaff, and Lindelow [2008].

We replicated and expanded on the Composite Coverage Index (CCI) developed by Boerma et al. (2008). This composite index aggregates several maternal and child health (MCH) service coverage indicators and summarizes the collective level of coverage. Indicators cover various intervention areas, including family planning (FP), maternal and newborn care, immunization, and treatment of sick children. We replicated the methodology and attempted (as possible given data availability) to add additional service coverage areas (TB, HIV/AIDS, and Malaria) to the composite index.

The focus of this study is primarily on assessing indicators covering the first two dimensions of UHC. The third dimension of UHC reflects the extent and distribution of coverage across various population sub-groups. For the purpose of this study, we do not assess indicators under this dimension, which are primarily measures of equity, but whenever possible we compared service and financial coverage indicators among quintiles of socioeconomic status. Depending on the data source, we defined quintile rankings according to consumption or asset-based wealth levels.

We examined the feasibility and applicability of the proposed indicators using three focus criteria:

- Data availability – To what extent do existing data sources permit estimation of the indicator?
- Data quality – Are the data of sufficient quality to produce meaningful, consistent, and reliable results?
- Validity – To what extent does the indicator adequately measure financial protection or service coverage?

⁵ Some cleaning and transformation of data are needed in advance of using ADePT and care must be taken to make sure variables are expressed in the expected way.

With these criteria in mind, both the strengths and shortcomings of the key indicators of UHC proposed in the literature are summarized. We conclude with recommendations for future research and investment in further conceptual and practical work to advance UHC measurement.

It is worth noting that this study's purpose was not to evaluate specific countries' progress towards UHC or draw conclusions about what interventions are or are not working in a particular country context. The country data are used to illustrate the performance of the indicators, rather than the indicators being used to evaluate the country performance.

3. LITERATURE REVIEW

In this chapter, we summarize our review of the literature on definitions and indicators of UHC. As noted in the introduction, the World Health Report 2010 provides the most commonly referenced definition of UHC, describing it as a goal where all people have access to needed health services and do not suffer financial hardship paying for those services. The WHO's conceptual framework suggests three broad dimensions of UHC: population coverage, service coverage, and financial coverage. These imply three reinforcing strategic choices for countries to advance toward UHC: ensuring the availability of a comprehensive benefit package, selection of priority populations, and subsidizing the cost of care (WHO 2010a). Hypothetically, the volume of the cube illustrated in Figure 1 could be estimated and used as a coverage metric, although this would require defining each individual dimension in numerically concrete terms.

Another common and related definition of coverage has been proposed by the International Labor Organization (ILO). According to the ILO, "universal coverage of social health protection requires that all residents in a country can access in an equitable manner an essential benefit package of adequate quality if in equal need" (Scheil-Adlung et al. 2011). The ILO approach to coverage incorporates legislation that ensures the implementation and enforcement of coverage through affiliation, and effective access to health services, which encompasses affordability, availability, financial protection and quality of services. These components are further described below (International Labour Organization 2010; Scheil-Adlung et al. 2011):

1. **Affiliation:** The ILO considers affiliation with a public or private scheme, or enrollment in a national health insurance scheme as a prerequisite to risk pooling and a key indicator of coverage. Affiliation with a financial protection scheme correlates globally with reduced out-of-pocket (OOP) spending on health, which is known to disproportionately impede access to health care services among the poor and to expose households to potentially catastrophic health expenditures.
2. **Affordability:** This is defined as being able to access needed health care without facing the risk of health-related impoverishment. Affordability is acknowledged to be a relative concept (relative to global input prices and to household incomes), but in the absence of better proxies OOP spending is proposed as the ILO's indicator of affordability.
3. **Financial Protection:** The ILO defines financial protection as consisting of reducing OOP payments and providing compensation for lost income. The ILO suggests measuring financial protection through the incidence of catastrophic health expenditures.
4. **Availability:** Availability refers to the physical availability of inputs required to provide a health service (i.e. infrastructure, workforce, and medical goods and products). ILO researchers have developed an Access Deficit Indicator based on a country's available health workforce. Roughly, the indicator is calculated as the difference between the national density of skilled health workers and the median density of health workers in comparable countries.⁶

⁶ The ILO defines vulnerability groups for country comparison purposes. The vulnerability of a country is a composite indicator of the percentage of people living in absolute poverty (living on under \$2/day) and the share of informal workers in the labor market. Based on a country's vulnerability value, countries are then grouped by vulnerability levels (very low, low, medium, high, and very high).

5. **Quality:** Quality is defined in terms of how sufficiently qualified the healthcare workforce is and how adequate infrastructure is to provide the required services. The ILO proposes to use total health expenditure per capita and maternal mortality ratios as indicators of the quality of services (Scheil-Adlung et al. 2010).

Interestingly, the ILO's approach to health coverage uses several metrics that aim to be minimized rather than maximized – for instance, measuring *deficits* in affiliation rather than the percentage of the population with affiliation, and measuring OOP expenditures rather than the percentage with financial protection.

Most indicators for financial risk protection – which is integral to both the WHO and ILO concepts of UHC – are focused on measuring catastrophic payments. Two measures of catastrophic payments are most commonly used. The first is whether total household OOP spending on health exceeds a certain threshold percentage of the household's budget. Wagstaff and van Doorslaer have proposed a number of possible thresholds; most widely used are *10 percent of the household's total consumption* and *40 percent of the household's consumption net of expenditures on "basic necessities"* (Wagstaff et al. 2003). The functional definition of basic necessities differs within the literature, from median food expenditures in the country to the household's own reported food consumption expenditures. The aggregate indicator reported is the share of households in the country whose OOP health expenditures exceed these thresholds.

The second measure of catastrophic spending captures whether OOP spending can be said to push the household into poverty (impoverishment). The threshold in this case is a poverty line, either one established by the government (such as a food poverty line or total poverty line including food and non-food necessities) or an international poverty line such as \$1.25 per person per day in 2005 purchasing power parity terms (Wagstaff et al. 2003). To produce the indicator, 'pre-payment' (total household consumption) and 'post-payment' values (total consumption net of OOP health expenditures) are calculated for each household (Wagstaff et al. 2003). A household is said to be impoverished by catastrophic health payments if its pre-payment total consumption exceeds the poverty line, but health expenditures pushed its post-payment consumption below that line. The aggregate indicator produced is the share of the households in the country who are estimated to be impoverished by OOP health expenditures.

Both the catastrophic expenditure and impoverishment indicators are "headcount" or incidence measures. To capture the intensity of financial hardship, "gap" or "overshoot" indicators can also be calculated. The normalized poverty gap is defined as the "average amount by which resources fall short of the poverty line as a percentage of that line (counting the shortfall as zero for those with resources in excess of the line)" (van Doorslaer et al. 2006). Similar to the poverty gap, the "mean positive overshoot" indicator or catastrophic payment gap can be used to illuminate the depth of catastrophic payments. It is measured as the average percentage by which OOP spending exceeds the selected threshold.⁷

Indicators measuring service coverage and service availability have been suggested in publications by the MDG Countdown Research Group (Countdown 2008 Equity Analysis Group 2008, Hosseinpoor et al. 2011; Barros et al. 2012). This group explored methods for measuring progress in coverage of MCH services and developed a coverage gap index. This composite index is constructed by compiling several MCH service coverage indicators and summarizing the collective gap in coverage. Indicators were selected to address a range of intervention areas that represent health system delivery strategies for MCH services and were selected based on the following criteria: data availability; accuracy and

⁷ 'Positive' is used because payment below the cutoff (a negative value) is not included in the average. In other words, this is the average overshoot for those who have catastrophic payments.

consistency of measurement; relevance to health system strength; and potential health gains from achieving high levels of coverage (Countdown 2008 Equity Analysis Group, 2008). Intervention areas covered include family planning, maternal and newborn care, immunization, and treatment of sick children. Indicators within an intervention area are weighted equally. Each intervention area is then weighted equally and averaged to form the coverage gap index, defined as (1 minus percent coverage).

Developed through a joint WHO-USAID collaboration, the Service Availability and Readiness Assessment (SARA) is a facility-based tool designed to generate a set of indicators on service availability and service readiness. Service availability refers to the physical presence of the delivery of services, and is described by three areas of tracer indicators: (1) health infrastructure (measured by facility density per 10 000 population, inpatient bed density per 10 000 population, and maternity bed density per 1000 pregnant women), (2) core health personnel (measured by health workforce density), and (3) service utilization (measured by the number of outpatient visits per capita per year, and the number of hospital discharges per 100 population). The indicators are all expressed as a percentage score compared with a target or benchmark. Because the denominator is population size, the SARA can only be used to calculate service availability when implemented as a census or complemented with HMIS data (WHO 2012a).

Service readiness refers to the overall capacity of health facilities to provide health services, gauged by the availability of components required to provide services such as basic amenities, basic equipment, standard precautions, laboratory tests, and medicines and commodities (WHO 2012b). Defined in the SARA as an index of tracer items, the service readiness index may be considered a proxy for structural health care quality. Sierra Leone is the only country that has completed a SARA (in 2011). A handful of other countries conducted similar though less comprehensive assessments like the WHO Service Availability Mapping (SAM), which collects and presents basic information on health infrastructure, human resources and services offered. The SARA was designed to take the place of the SAM tool.

Much of the literature on the “population coverage” dimension of UHC has revolved around the measurement of equity in coverage across population groups, rather than the magnitude of coverage on the average. Indicators thus focus on comparing service and financial coverage among sub-populations. A frequently used approach is to disaggregate and analyze indicators by quintiles of socioeconomic status (usually wealth, consumption, or income), urban or rural residence, or by region. Other subpopulations of interest have included age groups, gender, and ethnic or religious groups.

The most commonly used indicators of socio-economic status are quintile rankings according to consumption or wealth levels. Households are classified into five (roughly) equal groups from poorest to richest. Consumption is a direct measure of socio-economic status, collected through long household surveys with modules on multiple classes of consumption (food, non-food, consumer durables, and housing) (O’Donnell et al. 2008). A principal example of the consumption approach is the LSMS, developed and refined by the World Bank. By comparison, wealth levels are captured most frequently using a proxy measure, a composite index of household assets and services (Rutstein and Johnson 2004). The DHS uses this approach to classify households.

There are advantages and disadvantages to the consumption and wealth asset index approaches (O’Donnell et al. 2008). The consumption-based approach requires careful and complex data collection and construction of the summary living standards measure. The complex questionnaire gives rise to concerns over measurement error. Others have commented that consumption quintiles suffer to some extent from endogeneity, as those who spend large, even catastrophic, amounts on health care may appear richer (by being bumped into a higher quintile) than they actually are. Despite such concerns, the consumption expenditures approach remains popular because it is a direct indicator with theoretical justification in economic theory as a smoothed measure of long-term socio-economic status. Information on assets, on the other hand, is easier to collect than consumption. Asset indexes can also be constructed quite easily using routines in Stata or other statistical software. However, the asset

approach has the disadvantage of lacking solid theoretical foundation, as does the principal components analysis method used to construct the index. Comparing rankings of households according to the consumption and the wealth (asset approach) often results in significantly different classifications and therefore the decision of which approach to use should not be taken lightly.

The MDG Countdown research group analyzed data by wealth quintile. They also used two additional measures: the Population Attributable Risk (PAR) ratio and the slope index of inequality (SII). The PAR is a measure drawn from the field of epidemiology, and is defined here as the difference between the coverage gap index for the population as a whole and the coverage gap index for the wealthiest quintile – it represents the disparity in coverage gaps. The PAR ratio is defined by dividing this PAR by the national coverage gap. It shows the proportional reduction in the coverage gap needed in order for the entire nation to have a coverage gap like the wealthiest quintile (Hosseinpoor 2011). The SII is defined as the slope of a regression line showing the relationship between a class or group's health status and its rank in socio-economic terms. It can be interpreted as “the absolute effect on average health of moving up one unit in the socio-economic scale” (Carr-Hill and Chalmers-Dixon 2005).

Perhaps more frequently-used measures of equity are the concentration curve and concentration index. Developed by World Bank researchers and also used in their ADePT software, the concentration curve is a plot of the cumulative percentage of a health variable compared with the cumulative percentage of a population variable, usually ordered by income or living standards (O'Donnell et al. 2008). These plots are used to graphically display the extent of inequality among a given population for the health indicator in question. The line where cumulative percentage of the health indicator equals the cumulative percentage of the population signifies equality. The concentration index provides a numeric measure for comparing concentration curves. The index is equivalent to 1 minus 2 times the area between the concentration curve and the line of equality. It is alternatively defined as: the covariance between the health variable and the fractional rank in the living standards distribution (O'Donnell et al. 2008).

This literature review allowed the collection of a list of common indicators of financial risk protection and service coverage. We generated values for these indicators using available data sources, and whenever possible, compared indicators among quintiles of socioeconomic status. In the following section, we illustrate these indicators and summarize their strengths and shortcomings.

4. FINDINGS

In this section, we present the indicators of financial risk protection and service coverage, discuss issues related to the availability and quality of the data, and highlight strengths and weaknesses of each indicator.

4.1 INDICATORS OF FINANCIAL COVERAGE

The following indicators emerged through our literature review as the most commonly referenced measures of the financing dimension of UHC, also referred to as financial risk protection.

TABLE 2: INDICATORS OF FINANCIAL RISK PROTECTION

Indicator	Definition	Source
Insurance Coverage		
Self-reported insurance coverage	Percentage of population who reported being covered by any type of health insurance program	Captured in some expenditure surveys, some DHS
Catastrophic Payments		
Incidence of catastrophic health expenditure due to OOP payments	Percentage of population whose health expenditures exceeds 10% of total expenditures	Estimations using household expenditure surveys
	Percentage of population whose health expenditures exceeds 40% of non-food expenditures	Estimations using household expenditure surveys
Incidence of impoverishment due to OOP payments	Percentage of population whose health expenditures put them below the poverty line	Estimations using household expenditure surveys
Mean positive overshoot of catastrophic payments	Average amount by which OOP spending exceeds threshold, for those with catastrophic payments	Estimations using household expenditure surveys
Poverty gap due to OOP payments	Average amount by which expenditures fall below the poverty line, for those impoverished by OOP payments	Estimations using household expenditure surveys
Out-of-Pocket Expenditures		
OOP expenditures on health as a percentage of total health expenditures (THE)		WHO database, National Health Accounts (NHA) reports

4.1.1 DATA AVAILABILITY

The measures of financial protection in Table 2 above are generated from two main data sources: household expenditure surveys, such as the LSMS, and National Health Accounts (NHA) estimations.

The LSMS methodology was developed by the World Bank to capture an integrated view of household outcomes across multiple dimensions (health, education, household consumption, and more). With varying degrees of technical involvement from the World Bank, many countries have adopted this survey approach and adapted it to their needs.

The frequency with which countries conduct expenditure surveys and NHAs varies. Few countries collect expenditure data annually (Peru's ENAHO is one exception); more commonly they are implemented every three to five years. According to the World Bank, over 130 countries have conducted at least one NHA estimation, but only approximately 40 have conducted more than one round of estimation or institutionalized the process for routine updates. Standard health financing indicators for all countries are made available on the WHO's Global Health Observatory database. They are based on actual NHA estimations when such estimations are available but represent interpolated figures in most years and for many countries. The majority of the data from NHA estimations to date have been reported in annexes to hard copy or pdf reports, making it difficult to access the data for cross-country or time series analysis. To address this challenge, WHO recently added a new section in the database that aggregates actual country-generated data from NHA estimations and reports. This new section of the database, initiated with support from Health Systems 20/20, currently includes data for 17 countries and will continue to expand as WHO collects and inputs country NHA data into the system.

Household expenditure datasets were sometimes difficult to access for this study. Acquiring LSMS data required contacting the country's NSO, submitting an application for the data, and paying up to several thousand U.S. dollars; datasets from two of the five countries needed to be purchased. In several cases, we had to follow up with the NSO numerous times to request missing data components (e.g., non-food consumption, health spending, and overall expenditure aggregates), as well as additional information about the dataset (survey weights used, prices, aggregation methods, etc.) because sufficient documentation was not initially included to permit analysis. In one case, while the questionnaire indicated that certain questions had been asked of respondents, the relevant data were not included in the datasets. The time between first contact with an NSO and receipt of full data with the necessary information for analysis was over one month. For only one country (Peru) was the full dataset needed available online, without substantial interaction with the NSO.

We were ultimately unable to obtain the LSMS dataset from Ethiopia despite repeated attempts. A food consumption aggregate variable was not provided in the Uganda LSMS, making it impossible for us to estimate the incidence of catastrophic health expenditures as a percentage of nonfood consumption.

Questions related to self-reported insurance coverage are included in some LSMS and DHS surveys but not consistently. The LSMS manual recommends that questions about whether costs are covered by insurance be included in the standard health module (Gertler et al., 2000). Of the four countries with LSMS data in this study, these questions were included in the questionnaires for Peru and Vietnam.

4.1.2 DATA QUALITY

The LSMS surveys are similar in general approach and in the categories of their content. Country-specific questionnaires based on the LSMS model do vary by country and, less often, over time. In this analysis, we observed differences in how health expenditure questions were phrased and recorded, whether respondents were asked about health insurance coverage and premiums, and recall periods for various questions. Differences in recall periods have been shown to influence the magnitude of reported health expenditures, since individuals tend to lump large or important outlays into the most recent period, and recall diminishes rapidly with time (Scott & Amenuvegbe, 1990).

These differences, when applied to consumption categories more generally, also affect the consumption expenditure aggregates used to define the household's socio-economic status, including where they fall

in relation to a poverty line. Significant differences in questionnaires and in how aggregates are constructed – which is a complicated and often undocumented process – can impinge on the ability to compare across countries in terms of financial indicators of catastrophic payments and impoverishment.

Documentation available with household expenditure datasets varied widely. In this study, it was not clear in some cases how consumption aggregates were constructed and what elements were included or excluded (e.g. health insurance premiums). Some datasets lacked organization, clear structure, or arrived in many separate files. In one case, the researchers received 40 separate files containing survey data without clear identification as to what files contained what information.

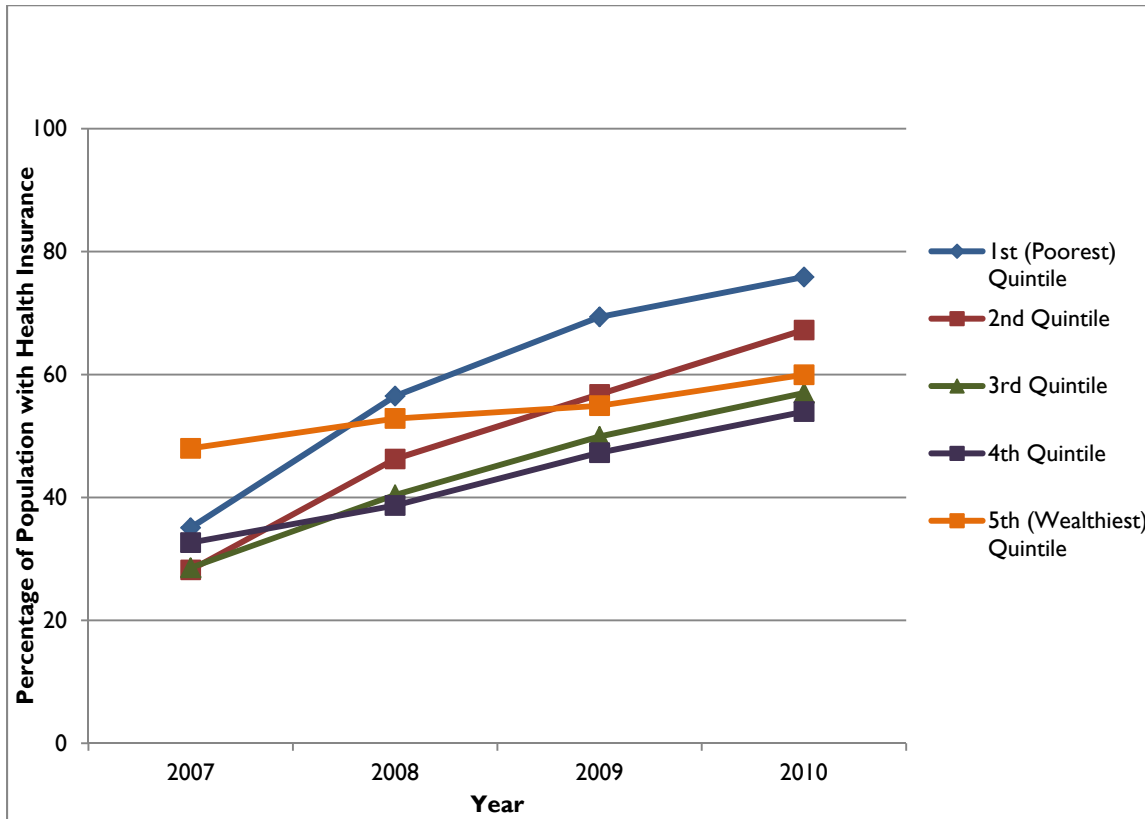
As noted, health financing indicators [such as total health expenditures (THE) per capita or OOP payments as a share of THE] are annually reported by the Global Health Observatory for most countries. When available, these estimates are based upon NHA exercises. Best practice guidelines for NHA estimation are available (WHO, 2003) and the quality of NHA data improves with each application of the methodology in a given country. The recently-developed NHA Production Tool (soon to be available for free download from WHO website) is now being used to streamline and standardize the NHA data collection. However, published Global Health Observatory expenditure indicator values are frequently not based on actual NHA data but rather are imputed or extrapolated from previous years, or based on country reports. In addition, they rely on numerous data sources for both numerator and denominator values – including government, donor, private household, and private employer data. OOP spending estimates often come from household surveys and are thus subject to the challenges described above. In general, these limitations can undermine the reliability of global health financing metrics, and make international comparisons problematic (Rannan-Eliya, WHO, 2010).

4.1.3 VALIDITY

4.1.3.1 INSURANCE COVERAGE

Perhaps the most basic and easiest to calculate indicator of nominal financial coverage is self-reported insurance coverage. Figures 2 and 3 illustrate this indicator for Peru based on responses to the ENAHO 2007-2010 Panel Survey, which asked respondents if they are covered by any type of health insurance program. Results appear to highlight the effects of insurance reforms which took place in Peru over this time period, in particular policy initiatives to expand coverage to low-income Peruvians through the *Seguro Integral de Salud* program. The increase in coverage among households in the poorest quintile and in rural areas is notable, while increases among higher-income and urban groups are less dramatic.

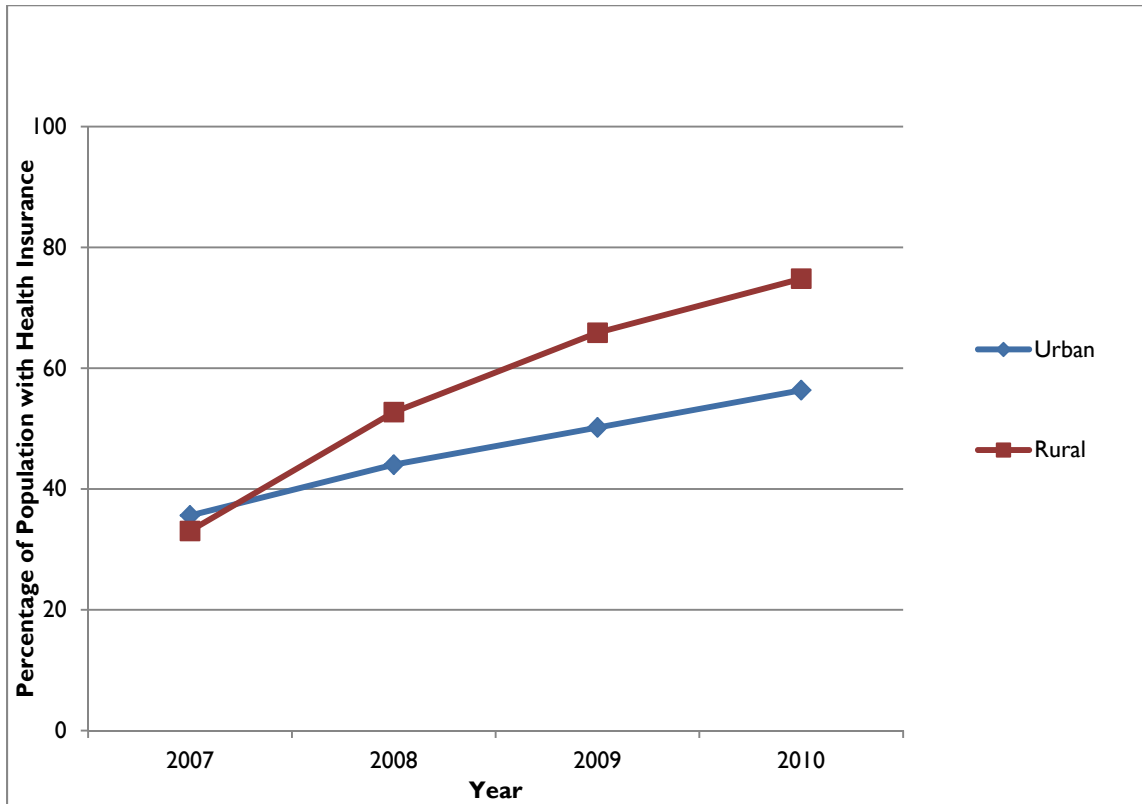
FIGURE 2. PERCENTAGE OF POPULATION IN PERU REPORTING HEALTH INSURANCE COVERAGE, BY WEALTH QUINTILE



Source: ENAHO 2007-10 Panel Survey

This indicator reflects the breadth of self-reported insurance coverage across the population and captures individuals' perception of whether they are insured. Because it is a self-reported measure, correlation with registered affiliation with a particular scheme, or up-to-date payments, is not guaranteed; the usefulness of this metric depends on individuals having accurate information about their and their family's health care coverage at the time of the survey. Perceptions of affiliation may not align with actual benefits provided at the time care is needed. More importantly, correlation with financial risk protection (or the percentage of health care costs paid OOP) cannot be assumed. The extent of effective financial coverage would depend on the depth of a given scheme's benefits package and the magnitude of co-payments or co-insurance charged. Self-reported insurance coverage is thus a limited measure of *effective financial coverage* – the extent to which an individual is protected from impoverishing costs at the time of seeking care.

FIGURE 3. PERCENTAGE OF POPULATION IN PERU REPORTING HEALTH INSURANCE COVERAGE, BY LOCATION

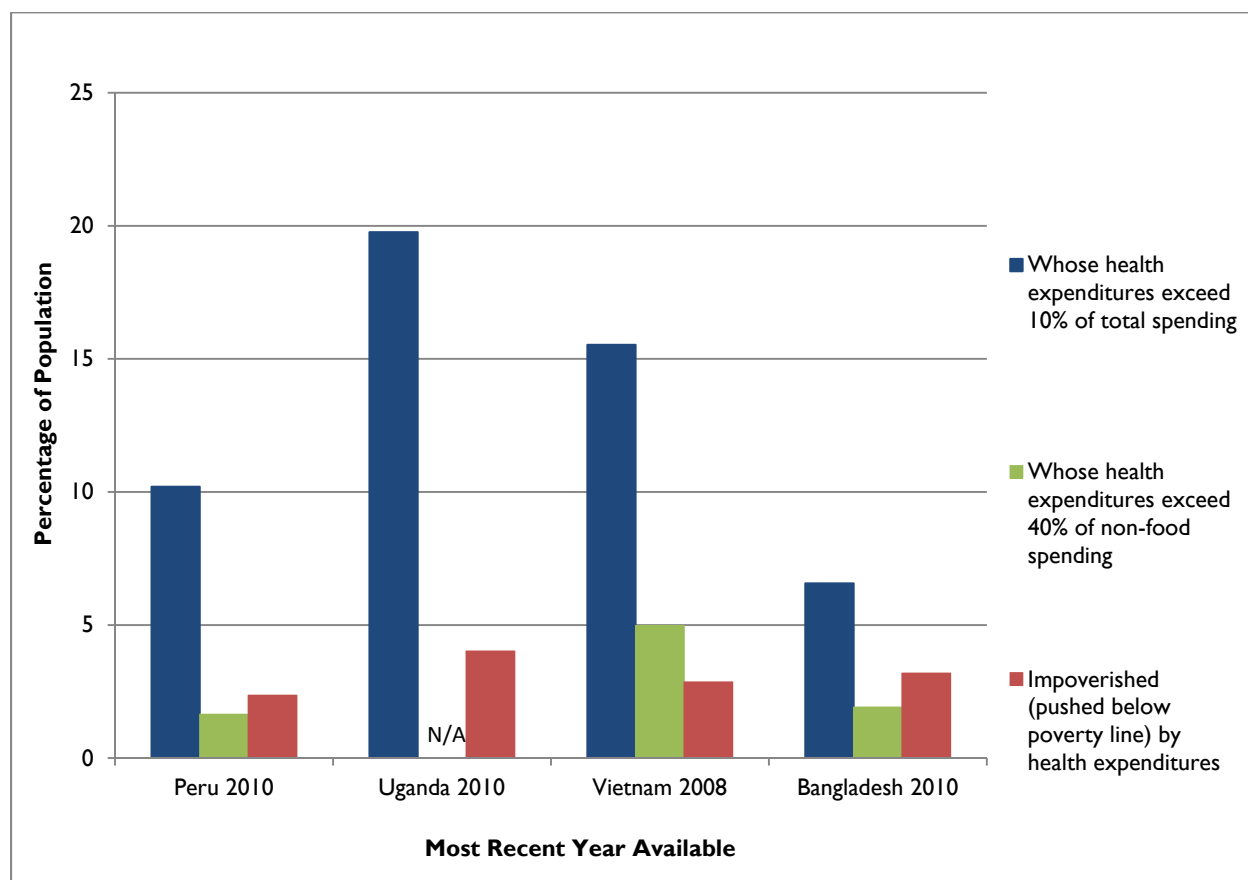


Source: ENAHO 2007-10 Panel Survey

4.1.3.2 CATASTROPHIC PAYMENTS

Indicators of financial risk protection – highlighting the percentage of the population at risk of financial hardship due to health expenditures, as well as the extent of that hardship – aim to measure effective financial coverage more directly. As noted in the literature review, two measures of catastrophic payments are most commonly applied: health expenditures exceeding a particular threshold of the household’s budget, and impoverishment due to health spending. Figure 4 below illustrates these indicators in four out of our five datasets (expenditure data were not available from Ethiopia in time for this study). Two catastrophic thresholds are presented: health expenditures exceeding 10% of total household spending and exceeding 40% of non-food household spending. The “impoverished by health expenses” indicator calculates the share of the population that falls below the poverty line when health spending is subtracted from household resources (total expenditures). We used the international poverty line (\$1.25/day per person in 2005 PPP terms) for all countries except Peru; Peru’s poverty rate using the international line was very low, so the national poverty line was used instead.

FIGURE 4. CATASTROPHIC HEALTH EXPENDITURE INDICATORS



Sources: Estimations using country household expenditure surveys

These catastrophic payment indicators measure different underlying constructs, as observed in the differing incidence values within each country in a given year, and they also reflect variations in incidence across population sub-groups. Because they are defined relative to measures of socioeconomic status, the indicators can reflect the concept of *hardship*. One general limitation of these indicators, however, is that they provide information *only on the population who sought care and were able to obtain care*. They do not capture those who failed to seek care at all, because services were not available or were completely unaffordable.

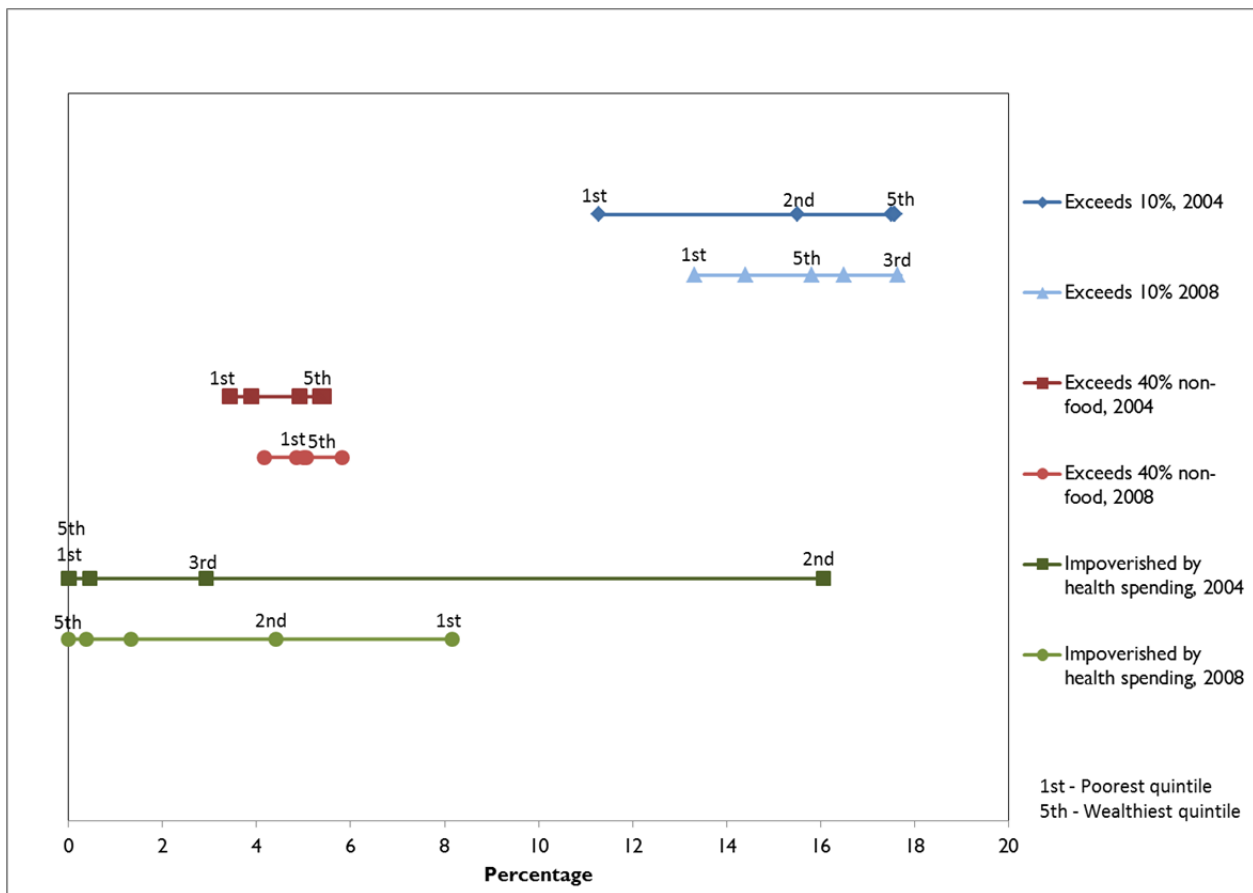
Indicators that count those whose expenditures exceed certain thresholds (10% of total spending, 40% of non-food, etc.) give equal importance to individuals who meet this mark, regardless of wealth status. However, the incidence of “catastrophe” measures across socioeconomic groups varies based upon which threshold and which denominator are chosen. Choosing to exclude food consumption from the denominator tends to intensify the incidence of catastrophe among the poor, whose budgets tend to be allocated predominantly to food spending.

The impoverishment indicator captures the hardship caused by health expenditures compared to an absolute threshold: are these expenditures enough to push a household into poverty? Interestingly, it assumes that health spending is somehow “involuntary” or unavoidable, because otherwise households would not choose to become impoverished. It emphasizes those in the socioeconomic distribution whose pre-health event household consumption was close to the poverty line; it only captures those who are deemed to have “crossed the line” due to health expenditure, and so does not include individuals who were already below the poverty line – nor those who may not have fallen below the

absolute threshold but nonetheless experienced a major welfare loss. In addition, the indicator assumes that total expenditure would have remained the same for the given time period, even if the individual had not purchased health care. In other words, it is assumed that the household does not employ coping mechanisms – such as borrowing or selling productive assets – in order to make health payments. These assumptions are acknowledged in the literature to be quite unrealistic (Wagstaff, 2008).

Figure 5 presents these three catastrophic payment indicators for Vietnam, broken down by wealth quintiles for 2004 and 2008. Examining the data by wealth quintile can highlight inequities that would not be apparent from a single national-level value. It also illustrates the importance of understanding the particular country context in explaining observed figures.

FIGURE 5. VIETNAM CATASTROPHIC HEALTH EXPENDITURE INDICATORS, 2004 AND 2008



Source: Vietnam Households Living Standards Survey, 2004 and 2008

For example, when looking at the top series in Figure 5 (spending more than 10% of total budget on health care), households in the wealthiest quintile appear to experience a greater incidence of catastrophic health expenditure than those in the poorest quintile. It is therefore the relatively wealthier segment of the population that is “pulling up” the national indicator value (the 3rd and 4th quintiles values are so close to the 5th as to be indistinguishable on the chart). Without detailed knowledge of the country context, we cannot interpret the underlying reasons behind these results. Perhaps the poorest quintile had a lower incidence because there is strong social protection for the

poorest; perhaps those in the wealthier quintiles are using more expensive private health care services because they are of better quality and the wealthy can afford them; perhaps the poorest simply are not accessing care, or are accessing cheaper and poorer quality care. The indicator values, without supplementary information, cannot distinguish between the presence of strong financial risk protection and failure to obtain care at all.

The Vietnam case also highlights interpretational challenges with the impoverishment indicator, when comparing by wealth quintiles. In 2004, the incidence of impoverishment due to health care spending was zero among households in both the 1st and 5th quintiles. However, the reasons underlying these results are very different. In the case of the wealthiest households, no one moved below the poverty line; in the case of the poorest quintile, all households were *below* the poverty line to begin with. In contrast, by 2008, part of the sample in the lowest quintile was considered non-poor; therefore some who incurred health expenditures “registered” now as falling into poverty. Conceptually, these two conditions would seem important to distinguish, but the indicator as defined combines the groups as being “not impoverished by health care spending”.

While the impoverishment indicator measures the incidence of being pushed into poverty by OOP payments for health care, it does not tell us the severity of the experienced poverty. The poverty gap indicator helps illuminate this issue. Table 3 compares the most recent data from Bangladesh and Vietnam to illustrate this.

TABLE 3: POVERTY HEADCOUNT AND NORMALIZED POVERTY GAP, PRE- AND POST OUT-OF-POCKET HEALTH PAYMENTS

	Pre-payment poverty rate	Post-payment poverty rate	Change	Pre-payment poverty gap	Post-payment poverty gap	Change
Bangladesh	43.7	46.8	3.2	11.1	12.1	1.0
Vietnam	15.2	18.1	2.9	3.7	4.3	0.6

Source: 2010 HIES for Bangladesh and 2008 HLSS for Vietnam. Poverty line is \$1.25 per capita per day in 2005 PPP terms. Poverty gap is normalized by the poverty line, with expenditures above the poverty line counted as 0. Change is in percentage points.

The poverty gap captures how far below the poverty line a household falls. Bangladesh’s poverty rate is higher than Vietnam’s, and the average household’s “depth” below the poverty line in Bangladesh is also greater. Average household consumption in Bangladesh falls 11.1 percent below the poverty line among those who are poor, compared to 3.7 percent below for Vietnam. Subtracting health payments from household resources increases the poverty rate in Bangladesh by 3.2 percentage points and increases the poverty gap by 1.0 percentage point. The results are slightly lower for Vietnam. Such increases in the poverty gap derive not only from those who fall into poverty because of health payments, but those who were already poor becoming poorer when health payments are factored in.⁸ Simply looking at the impoverishment indicator – the change in headcount – might lead one to falsely conclude that Bangladesh and Vietnam are fairly similar.

⁸ One could decompose the amount of the poverty gap that is due to those who were already poor and those pushed into poverty by OOP payments.

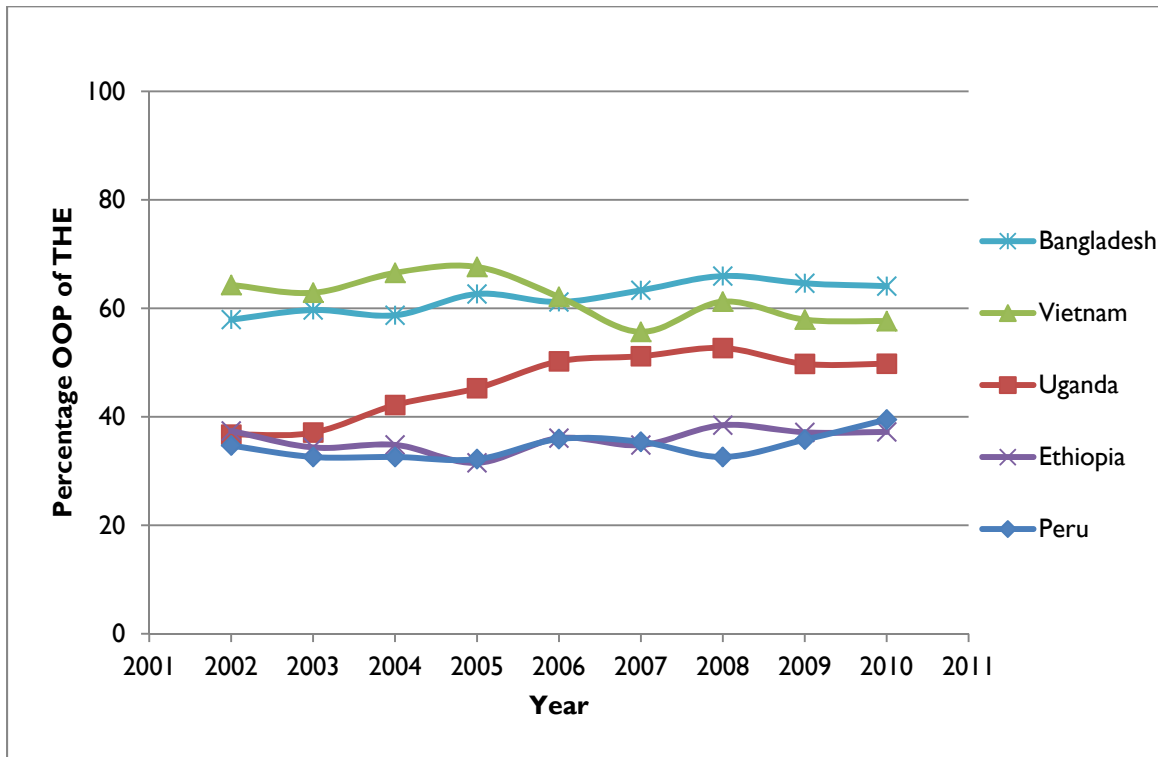
Similar to the poverty gap, the “mean positive overshoot” indicator illustrates the magnitude of catastrophic payments by capturing the average percentage by which OOP spending exceeds the selected threshold. For example, the indicator value for Vietnam in 2008 is 11.2 percent at the threshold of 10 percent of household expenditures. This means that the average individual in Vietnam falling into the catastrophic category pays fully 21.2 (10+11.2) percent of his or her resources on health care. By comparison, the average individual in Bangladesh with catastrophic payments pays 17.5 percent.

4.1.3.3 OUT-OF-POCKET EXPENDITURES

Estimated using NHA data as well as country reports, the indicator “OOP expenditure on health as a percentage of THE” is recommended by the 2010 World Health Report as a core indicator for financial risk protection in health at the macro or national level. OOP spending as a share of total health financing is positively and significantly correlated with the incidence of financial catastrophe due to health spending (Xu et al. 2007). As a single, national-level indicator, OOP as a share of THE does not capture inequalities in the distribution of financial risk across population sub-groups. While OOP indicators often incorporate household expenditure survey data, the total health expenditure denominator (which includes public sector spending, private insurance, and spending by private employers) can only be estimated at a national level using NHA methods and cannot be broken down into subgroups.

Figure 6 presents trends in OOP spending as a percentage of THE for the five countries in this study. The figure illustrates that this indicator can be useful for broad cross-country comparisons, as well as reviewing trends over time in a given country. Understanding the specific reasons for these trends requires additional country-level information, however.

FIGURE 6. OUT-OF-POCKET SPENDING AS A PERCENTAGE OF TOTAL HEALTH EXPENDITURE



Sources: WHO NHA, some data may have been imputed. Peru data sourced from WB, unavailable from WHO

4.2 INDICATORS OF SERVICE COVERAGE

The following indicators emerged through our literature review as commonly-referenced measures of the service coverage dimension of UHC. We limited our analysis to those that could be produced using household survey data. The literature review chapter highlights other potential national- and facility-level indicators of service coverage, including quality and service availability measures. The health service coverage indicators listed here are commonly used as measures of population access to health care.

TABLE 4. INDICATORS OF SERVICE COVERAGE

Indicator	Definition	Source
Service utilization indicators		
Births delivered in a health facility	Percentage of live births in the previous five years delivered in a health facility	DHS
Births assisted by a skilled provider	Percentage of live births in the previous five years attended by a skilled health provider	DHS; UNICEF/UNFPA; WHO Global Health Observatory database
Women receiving any antenatal care (ANC) from a skilled provider	Percentage of women age 15-49 who gave birth in the previous five years who received ANC at least once from a skilled health provider	DHS; UN MDGs Indicators; WHO Global Health Observatory database, UNICEF
Married women in reproductive age using modern family planning (FP) method	Percentage of women aged 15–49 years currently married or in union who are using (or whose partner is using) a modern contraceptive method	DHS
Family planning needs satisfied	Percentage of currently married women who say that they do not want any more children or that they want to wait 2 or more years before having another child, and are using contraception	DHS
Received all basic vaccines	Percentage of children aged 12–23 months who received a BCG vaccine, a measles vaccine and three doses each of DPT and polio vaccine excluding polio vaccine given at birth.	DHS; WHO Global Health Observatory database
Received measles vaccine	Percentage of children aged 12–23 months who are immunised against measles ⁹	DHS; WHO Global Health Observatory database, UNICEF
Received 3 doses of DPT vaccine	Percentage of children aged 12–23 months who received three doses of diphtheria, pertussis, and tetanus vaccine	DHS; WHO Global Health Observatory database; UNICEF
Received BCG vaccine	Percentage of children aged 12–23 months currently vaccinated against BCG	DHS; WHO Global Health Observatory database
Received oral rehydration	Percentage of children under-5 with	DHS for select countries;

⁹ In the WHO Global Health Observatory database and the UN MDGs Indicators website, this indicator is defined as the percentage of children under one year of age who have received at least one dose of measles-containing vaccine in a given year. For countries recommending the first dose of measles vaccine in children over 12 months of age, the indicator is calculated as the proportion of children less than 12-23 months of age receiving one dose of measles-containing vaccine.

Indicator	Definition	Source
therapy (ORT) and continued feeding for diarrhea treatment	diarrhoea in the past 2 weeks who received ORT (packets of oral rehydration salts, or recommended home fluids such as sugar-salt-water solution) and continued feeding	MICS; UNICEF
Sought treatment for acute respiratory infection (ARI)	Percentage of children aged 0–59 months who showed symptoms of ARI in the two weeks preceding the survey who sought care from a health provider	DHS; MICS
Received anti-malarial drugs	Percentage of children aged 0–59 months who had fever in the two weeks preceding the survey who received anti-malarial drugs	DHS for select countries; WHO Global Health Observatory database
Access to antiretroviral (ART) drugs	Percentage of population with advanced HIV infection with access to ART drugs	UN MDGs Indicators
Other service coverage tracer indicators		
Households with at least one mosquito net	Percentage of households with at least one mosquito net (treated or untreated)	DHS for select countries
Children under 5 sleeping under insecticide-treated net (ITNs)	Percentage of children under five years of age who slept under an ITN the night before the survey	DHS for select countries; WHO Global Health Observatory database
Pregnant women sleeping under ITNs	Percentage of pregnant women age 15-49 who slept under an ITN the night before the survey	DHS for select countries
TB treatment success rate under directly observed treatment short course (DOTS)	Percentage of tuberculosis cases detected and cured under DOTS	UN MDGs Indicators
Percentage of women with serious problems in accessing health care ¹⁰	Percentage of women age 15-49 who reported that they have serious problems in accessing health care for themselves when they are sick	DHS for select countries

4.2.1 DATA AVAILABILITY

As noted in the Approach section, we used DHS datasets and country reports to produce selected service coverage indicators. The DHS are widely viewed as the gold standard for standardized household surveys on topics related to MCH, FP, fertility, and childhood mortality in developing countries. Since 1984, the USAID-funded MEASURE DHS project has supported over 90 countries to perform more than 300 surveys. Most countries aim to conduct the core DHS every three to five years to track changes in the country's health trends, and each survey takes on average 18-20 months from survey preparation to final dissemination. DHS datasets and final reports are available for free through the MEASURE DHS website. They are thus among the most widely available and easy-to-access sources of household survey data. DHS data can be disaggregated by various sample sub-groups, allowing for distributional comparisons across geographic regions and wealth levels, among others.

The standard DHS do not routinely (and are not intended to) gather information on diseases requiring clinical diagnosis (such as TB and HIV), NCDs, or injuries. Some special surveys on HIV and malaria are

¹⁰ Depending on country questionnaire problems included: 'distance to facility', 'getting money for treatment', 'getting permission to go for treatment', 'having to take transport', 'not wanting to go alone', 'concern no female provider available', 'concern no provider available', and 'concern no drugs available.'

conducted. For this study, tuberculosis and HIV-related indicators were sourced from the UNSTATS MDGs Data¹¹. These data are available online and are drawn from national statistics provided by governments to the United Nations Statistics Division.

4.2.2 DATA QUALITY

To provide the most consistent information that can be used for domestic, regional, and global comparison, MEASURE DHS has standardized the procedures for its survey implementation and methodology for analysis. Recently, MEASURE DHS partnered with the K4Health Project to create a DHS Toolkit, which compiles all the questionnaires, manuals, and other print documents necessary to conduct the DHS from start to finish. MEASURE DHS staff also provide technical support throughout the survey implementation process to ensure that the procedures are consistent with the technical standards set by the DHS.

MEASURE DHS has put in place processes within its methodology to ensure data quality and consistency. The countries are asked to adopt the standard model questionnaires fully, although additional questions of particular interest can be added, and irrelevant questions can be deleted. The standard DHS survey typically has a large sample size between 5,000 and 30,000 households to build a nationally representative data. Data input and editing is conducted concurrently with data collection to ensure quality control of the data collected.

MEASURE DHS has data quality policies to handle the inevitable circumstances of inconsistent or incomplete data, which are prone to happen in large surveys in developing countries. Examples of such policies include how to handle missing values and sampling weights. Data are cleaned, weighted, aggregated, and analyzed in a systematic manner, as outlined in the manual and policies to yield results that accurately reflect the population. Finally, all countries that take part in the DHS disseminate the data in a consistent manner so that different countries present the information in identical formats. DHS' rigorous data quality standards make it one of the most reliable sources for many countries' service coverage indicators.

While the DHS questionnaires are more consistent than LSMS-style surveys, they still vary somewhat among countries and over time, which can make comparisons across countries or over years more difficult. Country-specific answer categories help ensure relevance to the local context but occasionally impede cross-country analysis. One variable needed to prepare the Boerma index described below (“oral rehydration therapy in combination with continued feeding”) was not available for some countries for earlier years (e.g. Bangladesh 2004 and Ethiopia 2005), and answer categories differed in such a way as to not be comparable. DHS questions on topics other than MCH – such as malaria – tended to vary more significantly between surveys.

4.2.3 VALIDITY

4.2.3.1 SERVICE UTILIZATION INDICATORS

Measures of utilization of priority services are the most readily-available proxies for service coverage. The MCH and FP indicators in Table 4 are widely recognized as high-priority services essential for women and children worldwide. Use of these services – assuming they are provided at an adequate level of quality – has been shown to prevent unnecessary mortality and morbidity. Moreover, it is

¹¹ <http://mdgs.un.org/unsd/mdg/Default.aspx>

usually straightforward to identify who is at risk or in need of MCH and FP services; “those in need” can generally be identified via observable characteristics (pregnancy, age) or via self-report (need for FP).¹²

We illustrate these indicators using Bangladesh’s DHS survey reports in 2004 and 2007; similar indicators are available from the other five countries’ reports but are not presented here. Table 5 presents aggregate (national-level) percentages of the relevant populations (e.g., women who have given birth in the previous five years, children within an age range, etc.) who reported receiving a particular service. Except in the case of “family planning needs satisfied,” the general trend over the three-year period is of increased utilization of the specific services.

TABLE 5. PERCENTAGE OF RELEVANT POPULATIONS IN BANGLADESH COVERED BY INTERVENTION

	2004	2007
Births delivered in a health facility	9.3	14.6
Births assisted by a skilled provider	13.2	18.0
Women receiving ANC from a skilled provider	48.8	51.7
Family planning needs satisfied	84.1	76.5
Received all basic vaccines	73.1	81.9
Received Measles vaccine	75.7	83.1
Received 3 doses of DPT vaccine	81.0	91.1
Received BCG vaccine	93.4	96.8
Received ORT and continued feeding for diarrhea treatment	67.2	76.6
Sought treatment for ARI	20.3	37.1

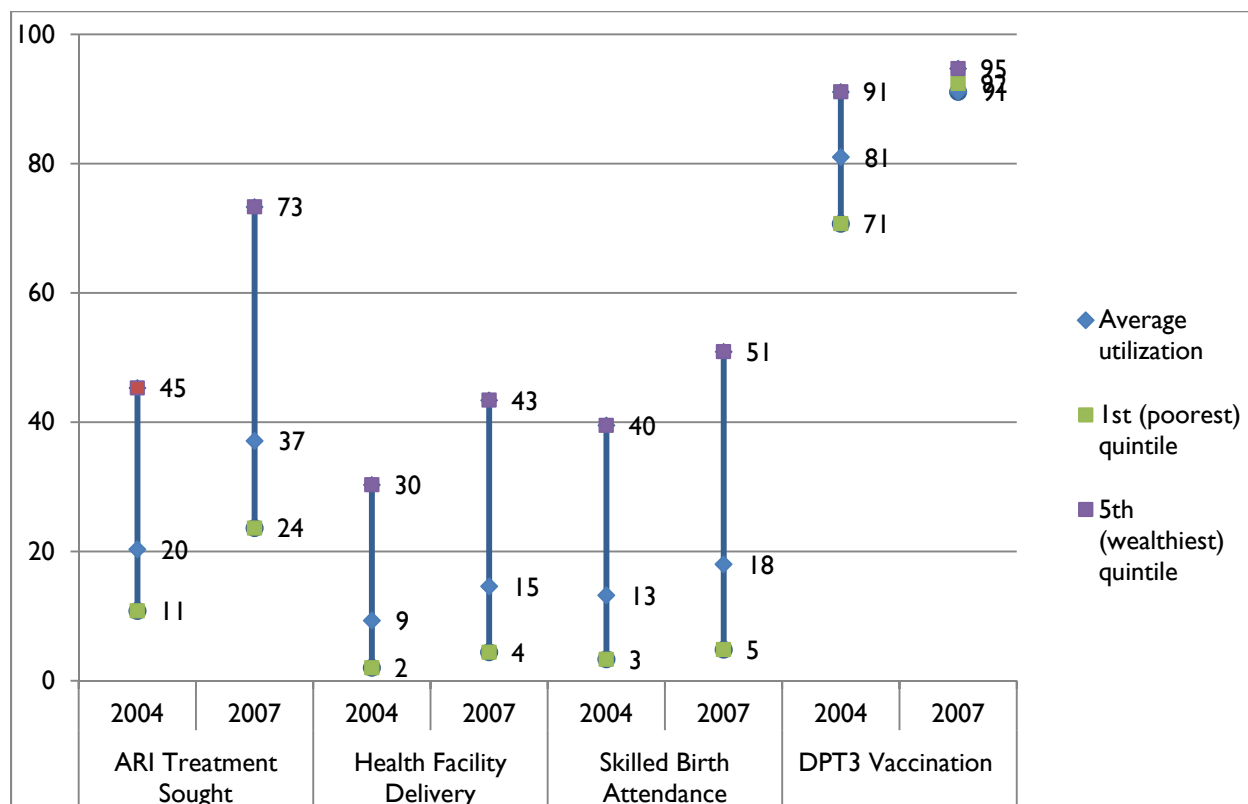
Sources: Bangladesh DHS reports 2004 & 2007

DPT3 = 3 doses of Diphteria, Pertussis and Tetanus vaccine, BCG = tuberculosis vaccine

Comparing service coverage indicators in 2007 to those in 2004 allows us to see how service coverage has changed by wealth quintile (Figure 7). For example, much of the improvement in the skilled birth attendance and health facility delivery indicators at the national level is due to improved access for women in the wealthiest quintile. In contrast, DPT3 vaccination coverage shows the “catching up” for households in the lowest quintile. These comparisons can provide useful guidance to policymakers in identifying which segments of the population are not accessing care in proportionate numbers.

¹² The one exception from this short list of indicators might be “sought treatment for ARI” as families may not be able to accurately diagnose acute respiratory infections in need of clinical treatment.

FIGURE 7. PERCENTAGE OF RELEVANT POPULATIONS IN BANGLADESH COVERED BY INTERVENTION, BY WEALTH QUINTILE



Source: Bangladesh DHS Reports 2004 & 2007

One limitation to the validity of survey-based indicators of service coverage relates to the quality of care provided. If services utilized are not of adequate quality, then patients do not have *effective service coverage*. For instance, a delivery attended by a skilled birth attendant or in a health facility may not prevent morbidity or mortality if the provider fails to use a partograph to monitor the progress of labor, does not maintain good hygiene during delivery, or does not have essential medications in stock. ANC visits may not result in improved pregnancy outcomes unless each visit is used to deliver evidence-based services such as monitoring for preeclampsia, tetanus toxoid immunization, intermittent preventive treatment for malaria, and identification and management of sexually transmitted infections. Using household surveys alone, it is very difficult to measure the quality of service provision, and thus effective coverage, given that respondents may not remember or may not have understood what specific procedures were used during these visits. Integrating service use with service quality measures (from facility surveys and other sources) is thus an important area for future work.

A second challenge in measuring service coverage validly is choosing the appropriate set of services to consider. The DHS indicators above reflect one possible set of services that are cost-effective and of high value in terms of their health and social welfare impacts. However, they emphasize basic health services for children and reproductive age women exclusively. DHS-type surveys do not routinely capture service use for NCDs, diseases requiring clinical diagnosis, conditions experienced by the elderly, or injuries.

“Service coverage” can be defined narrowly to reflect an essential benefits package or set of highly cost-effective services, or it can be defined inclusively to reflect a wide range of services that groups of varying ages and income levels may be likely to need. Developing a simple, intuitive metric for coverage

becomes more challenging as the range of services reflected is expanded. Gathering data on hundreds of health indicators is not practical or affordable for most countries, and the information may not be actionable or useful to policymakers. Some practitioners might argue that very comprehensive service packages (covering advanced tertiary care or end-of-life care) are not appropriate or affordable for low- and middle-income countries, and that providing all possible services to all people is not the intention of “universal coverage”. Going forward, measurement challenges will intensify if the set of service coverage indicators expands to include NCDs and other conditions. Assessing the need for care will become less straightforward; receipt of treatment for conditions which first require clinical diagnosis (such as cancer) cannot be reliably measured through self-reported household-level surveys. This also makes it challenging to compare across sub-groups such as wealth quintiles as the data for sub-group indicators come from sources other than household surveys.

At the same time, there are non-trivial challenges to relying only on a small set of proxy indicators. By what criteria should such indicators be selected? Critical questions include:

- Will the small set be “universal” or should it vary according to country context, burden of disease, or income level?
- Should the indicators prioritize vulnerable population groups (such as children under five or pregnant women) or should they reflect a wider range of groups and conditions?
- Should the ease of data collection or the availability of routinely available data influence the choice of indicators?
- To what extent should the selected proxy indicators correlate strongly with other health conditions that are not measured? (e.g. “tracer indicators”)
- Should cost-effectiveness (health impacts achieved per dollar of investment) be the most critical criterion? Or, should other factors (such as alleviation of suffering) be incorporated as well?

As yet, there is no global consensus on these questions. Coming to agreement on whether a broad or narrow range of indicators should be included, and on the criteria for selecting indicators, is another important area for future work.

4.2.3.2 COMPOSITE INDEXES OF SERVICE COVERAGE

An alternative approach to reporting a range of individual indicators is a composite indicator or index. Developing composites does not eliminate the challenges described above; composites are constructed from a series of individual indicators and a methodology must be chosen for aggregating or averaging and weighting the individual measures. However, valid composites can have the advantage of succinctly summarizing a broad spectrum of information and facilitating cross-country and cross-time comparisons.

In this study, we attempted to replicate and expand on the CCI developed by Boerma et al. (2008) for four countries¹³ using two waves of data. The CCI aggregates two maternal and newborn care indicators, two family planning indicators, three immunization indicators, and two indicators of treatment of sick children (Table 6). Indicators within an intervention area are weighted equally. Each intervention area is then weighted equally and averaged to form a coverage index [or a coverage gap index, defined as (1 minus percent coverage)]. Definitions for these indicators are provided in Table 4. We calculated the overall CCI, as well as the values for the poorest and wealthiest quintiles (Table 7 & Figure 8).

¹³ Additional indicators for Vietnam were not available for the years needed.

TABLE 6. COMPONENTS AND SOURCES FOR COMPOSITE COVERAGE INDEX

Index Group	Abbrev.	Indicator	Source
Maternal and Newborn Care	SBA	Percent of births assisted by a skilled provider	DHS
	ANC	Percent of women receiving ANC	DHS
Family Planning	FP	Percent of women whose Family Planning needs were satisfied	DHS
Immunization	MSL	Percent of children with measles vaccine	DHS
	DPT3	Percent of children with 3 doses of DPT vaccine	DHS
	BCG	Percent of children with BCG vaccine	DHS
Treatment of Sick Children	ORT	Percent of children who received ORT and continued feeding	DHS
	ORS	Percent of children who received ORS packets*	DHS
	ARI	Percent of children who sought treatment for ARI	DHS

*Used when ORT variable was not available

Source: Boerma et al. 2008

TABLE 7. COMPOSITE COVERAGE INDEX RESULTS

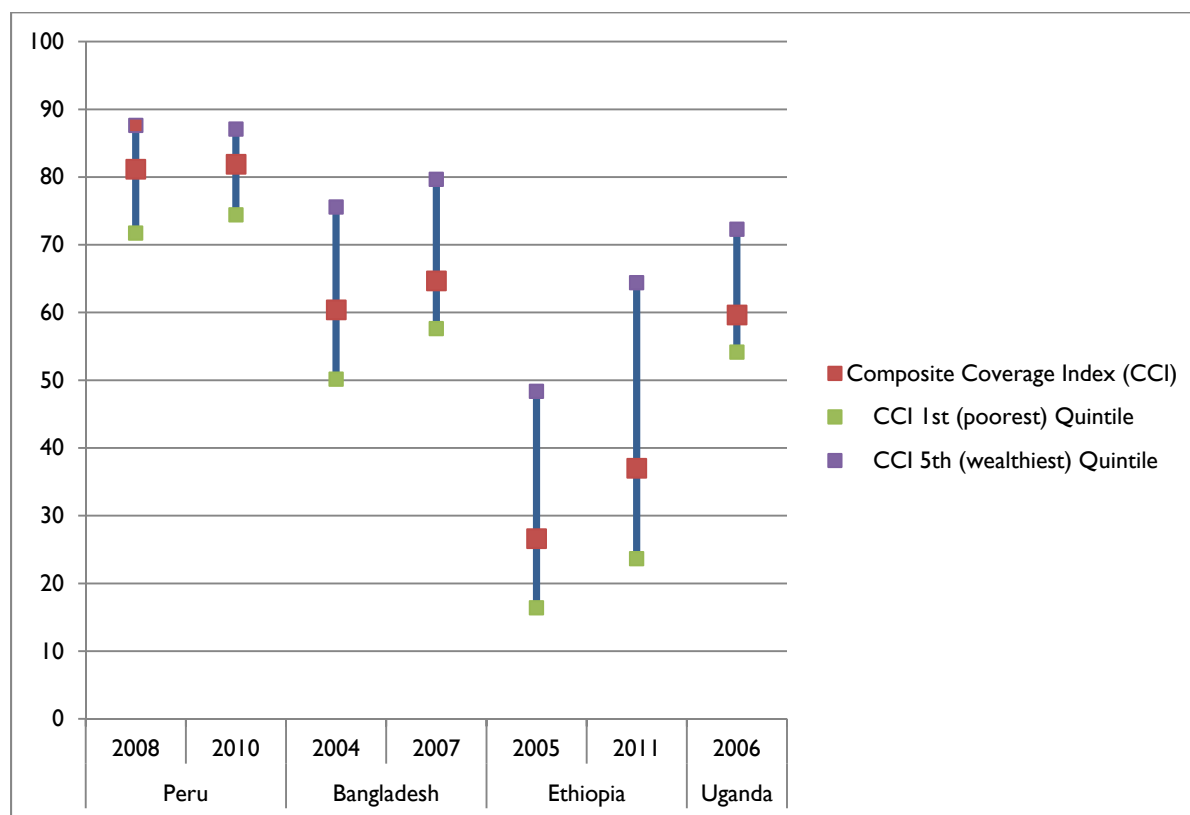
	Peru		Bangladesh		Ethiopia		Uganda
	2008	2010	2004	2007	2005	2011	2006
Composite Coverage Index (CCI)	81.2	81.9	60.4	64.7	26.6	37.0	59.6
CCI 5th (wealthiest) Quintile	87.6	87.1	75.6	79.6	48.3	64.4	72.3
CCI 1st (poorest) Quintile	71.7	74.4	50.1	57.6	16.4	23.6	54.2
CCI Ratio Q1/Q5	0.8	0.9	0.7	0.7	0.3	0.4	0.7
CCI Difference between Q5 and Q1	15.9	12.7	25.4	22.0	32.0	40.8	18.1

Source: Authors' calculations. The formula for aggregating the indicator values is:

$$CCI = ((ORT+ARI)/2 + FP + (SBA+ANC)/2 + (MSL+2DPT3+BCG)/4)/4$$

Source: Authors' calculations

FIGURE 8. COMPOSITE COVERAGE INDEX VALUES FOR FOUR COUNTRIES



Source: Authors' calculations

The CCI values convey notable findings both at the aggregate level and by quintile. In the aggregate, Peru appears to have achieved the highest rates of MCH and FP service coverage and the least inequality in coverage, while Ethiopia shows less than fifty percent coverage of these services and the widest spread between the poorest and wealthiest groups. For the three countries with at least two waves of data, there were improvements in aggregate MCH and FP service coverage over time. The distribution of coverage by quintile appears to have narrowed over time in both Peru and Bangladesh, while wealth quintile inequality worsened in Ethiopia.

How useful are these index values to policymakers? A key advantage of indexes is that they are easy to understand and promote, and can help policymakers quickly assess critical “big-picture” changes over time. A limitation of index measures is that the granularity of information contained in individual indicators is lost. With the CCI, policymakers must consider to what extent indexes reflect general health care service coverage in these countries. A coverage index value of 99 would not mean that universal service coverage had been achieved, but rather nearly-universal utilization of this subset of services for a certain subset of the population; the index scores cannot be interpreted as “the percentage of the population with health service coverage.” While each country could potentially compose and weight an index of the services it determines to be most relevant or important, the index would then not be useful for comparing coverage levels internationally.

To enhance the validity of this index by reflecting a broader spectrum of conditions, we attempted to expand on the CCI to include indicators beyond MCH: coverage of tuberculosis, HIV treatment, and malaria prevention and treatment interventions. Limited data availability made this challenging –

particularly identifying indicators that were consistent across countries and time, and that could be linked with population sub-groups like wealth quintiles. Table 8 summarizes additional indicators available, while Table 9 summarizes the various index combinations that we were able to create using available data for the particular year. For purposes of this inquiry, we followed Boerma et al. (2008) in assigning equal weight to each category of coverage. Assigning equal weights is an arbitrary scheme and should be re-examined when conducting further research.

TABLE 8. ADDITIONAL INDICATORS FOR COMPOSITE COVERAGE INDEX

Index Group	Abbrev.	Indicator	Source
TB and HIV	TBD	TB detection rate under DOTS, percentage (mid-point)	UNstats MDGs.un.org
	TBS	TB success rate (% of detected who completed treatment) under DOTS	UNstats MDGs.un.org
	ART	Proportion of population with advanced HIV and access to antiretroviral drugs	UNstats MDGs.un.org
Insecticide-Treated Bednets	HHITN	Percent with at least one of any type of mosquito net	DHS
	CITN	Percent of children under 5 sleeping under ITNs	DHS
	PWITN	Percent of pregnant women sleeping under ITNs	DHS
Treatment of Sick Children	AML	Percent of children under 5 who took anti-malarial drugs	DHS*

*Same indicator reported in UNstatsMDGs. Some also report % who received treatment within 2 days.

The large number of empty cells in Table 9 reflects the challenges of limited data availability. Data on TB detection and success rates as well as the proportion of the population with advanced HIV and access to antiretroviral drugs were only available at the national level. These indicators could not be disaggregated by quintiles or other sub-populations. Indeed, as previously mentioned, household surveys that typically allow a breakdown by population quintiles do not routinely capture service use for diseases requiring clinical diagnosis. Malaria-related indicators are only available in selected DHS. The 2006 DHS in Uganda included data on anti-malarial treatment for children under five years of age with fever, as well as data on bed net ownership and use by children and pregnant women. Ethiopia reported only on the antimalarial treatment indicator.

Notably, the addition of extra variables painted a very different picture of service coverage in some cases, with “average coverage” falling from 81% to 73% in Peru (2008) and from 60% to 50% in Bangladesh (2004) once tuberculosis and HIV indicators were included. In the absence of a more widely-agreed upon measure of service coverage, it is impossible to determine whether the more inclusive coverage indexes are more “valid” than the narrower indexes.

TABLE 9. VARIATIONS ON THE COMPOSITE COVERAGE INDEX

Variations on CCI	Peru		Bangladesh		Ethiopia		Uganda
	2008	2010	2004	2007	2005	2011	2006
CCI indicators plus TB and ART indicators ¹⁴	73.1	NA ¹⁵	50.4	57.3	28.7	NA ¹⁶	52.2
By quintiles ¹⁷	NA		NA		NA		NA
CCI plus malaria treatment and prevention indicators ¹⁸							51.3
5th quintile							64.1
1st quintile							46.2
Spread between Q5 and Q1							17.9
CCI plus TB, ART, and malaria indicators ¹⁹							47.3
By quintiles							NA ²⁰
CCI plus “received antimalarial” ²¹					25.2	35.1	
5th quintile					45.9	60.4	
1st quintile					15.1	22.5	

Source: Authors’ calculations

4.2.3.3 QUALITATIVE INDICATORS OF BARRIERS TO ACCESS

The service coverage indicators above are useful measures of what services *have* been used overall and among sub-populations. However, they do not highlight the specific reasons why care is not being accessed. Figure 9 below depicts an indicator, with values from Ethiopia, that is available in selected DHS reports on perceived barriers to access; it was available for three (Ethiopia, Peru, and Uganda) of the five countries examined, with some country-specific variation in the types of included barriers. For example, approximately 80 percent of women in the poorest quintile respond that “having to take transport” is a serious barrier to accessing care; whereas transport presents a significant problem for about 40 percent of women in the wealthiest quintile.

¹⁴ The formula used is: $((ORT+ARI)/2 + FP + (SBA+ANC)/2 + (MSL+2DPT3+BCG)/4 + (TBD+TBS)/2 + ART)/6$

¹⁵ Data from 2010 on the TB and ART indicators are not available

¹⁶ TB and ART data not available for 2011

¹⁷ TB and ART indicators are not broken down by wealth quintiles or other categories

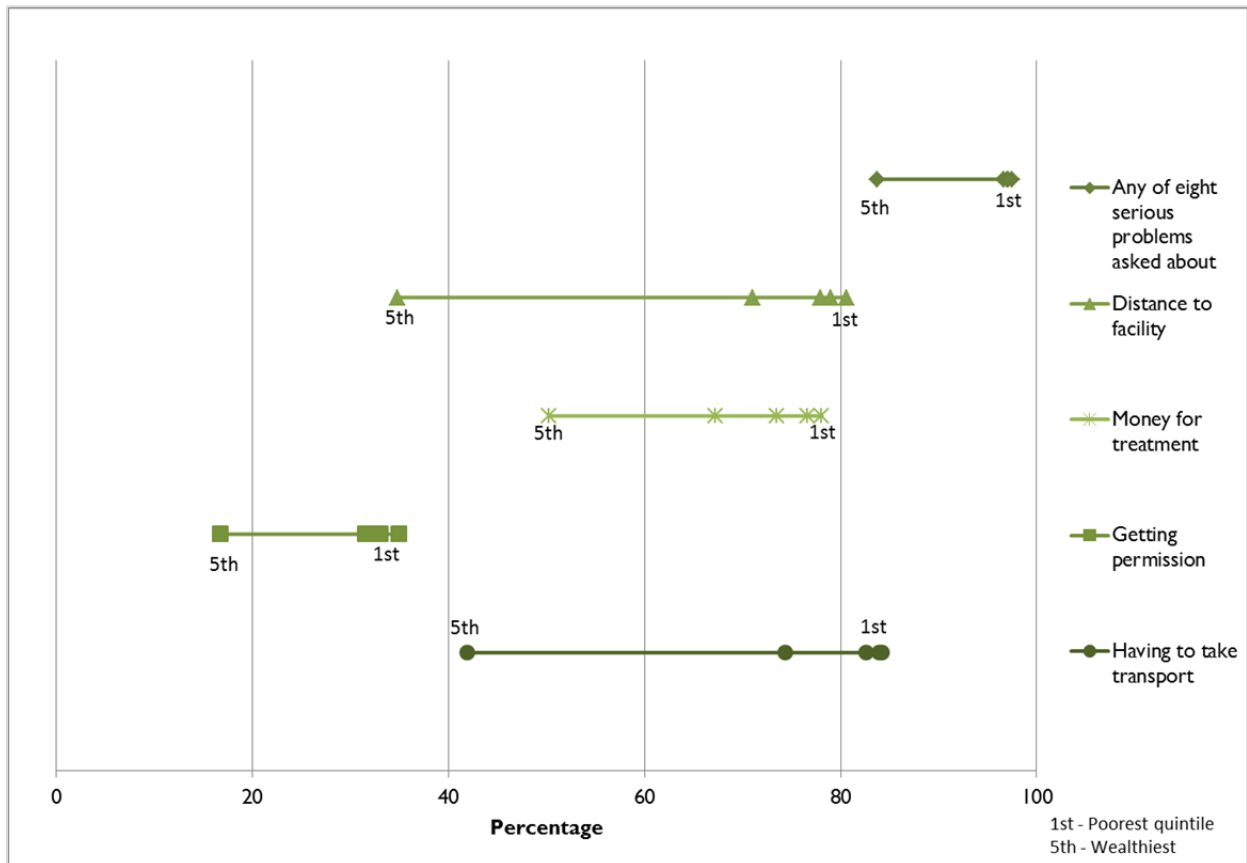
¹⁸ The formula used is: $((ORT+ARI+AML)/3 + FP + (SBA+ANC)/2 + (MSL+2DPT3+BCG)/4 + (HHITN+CITN+PWITN)/3)/5$

¹⁹ The formula used is: $((ORT+ARI+AML)/3 + FP + (SBA+ANC)/2 + (MSL+2DPT3+BCG)/4 + (HHITN+CITN+PWITN)/3 + (TBD+TBS)/2 + ART)/7$

²⁰ TB and ART indicators are not broken down by wealth quintiles or other categories

²¹ The formula used is: $((ORS+ARI+AML)/3 + FP + (SBA+ANC)/2 + (MSL+2DPT3+BCG)/4)/4$

FIGURE 9. PERCENTAGE OF WOMEN IN ETHIOPIA REPORTING THEY HAVE SERIOUS PROBLEMS ACCESSING HEALTH CARE FOR THEMSELVES, BY WEALTH QUINTILE, 2011



Source: Ethiopia DHS 2011 Report

Some of the reported barriers may provide information that is comparable across countries or across years within a country, although differences in the total number of questions asked makes the “Any of these” summary indicator invalid for cross-country comparisons. As these are also close-ended and prompted questions, it is possible that respondents listed more serious problems than if they had been asked to name their problems without prompting. It is also possible that serious problems were not captured, and women are not offered the opportunity to report other problems which were not asked about. However, these more qualitative questions about barriers can provide insight into why populations or sub-populations may not access needed care.

5. SUMMARY AND CONCLUSIONS

In this analysis, we conducted a literature review to generate a list of commonly-used existing or proposed indicators of UHC. We selected those that are available from routine household surveys, such as the LSMS and the DHS, and reported values for the indicators using available data from five countries (Bangladesh, Ethiopia, Peru, Uganda, and Vietnam). In addition to detailing some of the challenges of obtaining and manipulating the country datasets, we highlighted strengths and weaknesses of each indicator, including conceptual and practical limitations that affect their validity in measuring one of the three dimensions of UHC.

Below is a summary of key conclusions that the study team drew from this analysis:

5.1 SERVICE COVERAGE

- **High-quality MCH and RH service utilization indicators are available from the DHS.** Standard indicators of maternal health, immunization, treatment of childhood illness, and family planning are widely available from the DHS in numerous countries. These are globally recognized for their quality and reliability, and are widely used already. U.S. government and local country investment in the production of high-quality data over the past three decades has made this possible.
- **MCH and RH service utilization measures capture one portion of service coverage.** How (and how extensively) to capture other health conditions will be a critical challenge for UHC measurement going forward. The DHS do not routinely (and are not intended to) gather information on NCDs or injuries. In the post-MDG era and as the burden of chronic diseases increases, better ways of capturing service coverage for these conditions will be necessary. This will likely require data from sources other than household surveys, such as facility-based surveys and routine health information systems, since identifying who is in need of such services becomes less straightforward for many NCDs.
- **The service package for UHC has not yet been defined.** Indicators refer to specific underlying constructs. Without defining some type of standard package of services to be included in a “universal” scheme, it will be difficult to achieve global agreement on key coverage indicators. As noted in the findings section, agreement has not been reached about whether there should be a small or essential benefits package of high-impact, cost-effective services, or a more expansive (and expensive) package covering a wider range of possible needed services. In either case, open questions include:
 - **Global consistency and relevance** – How should variations in disease burden around the world be handled? Should indicators be tailored to specific country contexts? How can country relevance be balanced with consistency for global benchmarking?
 - **Priority groups vs. universality** – Should indicators focus on services which predominantly benefit vulnerable or underserved groups, or should selected indicators be more “neutral”?
 - **Data constraints** – To what extent should the choice of services to be measured reflect the actual (current) availability of data?

- **Indicators, tracer indicators, and indexes** – Should the global community pursue the selection of tracer indicators or development of composite indexes? Or should a wide range of individual indicators be collected and reported?
- **Measuring “effective coverage” with high-quality services remains challenging.** Effective coverage implies that provision of services is not enough to achieve coverage; the services must reach those who need them, and they must be of adequate quality to result in health improvements. To date, while many quality metrics have been developed, it is still challenging to measure the quality of service provision on an aggregate level – even in high-income countries. While *structural* measures of quality that reflect the availability of proper infrastructure, human resources, and inputs are somewhat available (using Service Provision Assessments for instance), measuring *process* quality is far more difficult and resource-intensive because it often requires direct observation of service delivery. In addition, it is particularly cumbersome to link the quality of service provision with the characteristics of beneficiaries reached and the health outcomes achieved.

5.2 FINANCIAL COVERAGE

- **Several standard financial coverage indicators are widely and increasingly used.** A relatively well-agreed-upon and widely measured set of key indicators of financial protection has been developed over the past two decades– including out-of-pocket spending as a percentage of total health expenditure, the incidence of financial catastrophe due to health expenditure, and impoverishment due to health expenditure. These indicators clearly highlight the burden of health care outlays on individuals, households, and societies. While these indicators are now accepted as relatively standard, some conceptual challenges remain. These include:
 - **Capturing the poorest:** Measurement of financial protection explicitly aims to address the financial burden of health care seeking, but existing measures of financial coverage do not capture those individuals who fail to seek care because they cannot afford to do so or do not have access to credit. For instance, in measures of catastrophic expenditure, it is not possible to distinguish those with excellent financial protection from those who fail to seek care. In addition, those who are already living under the poverty line are not reflected in the numerator of impoverishment indicators, which thus tend to highlight the impact of health spending on the near-poor and middle class.
 - **Nominal vs. effective coverage:** The WHO definition of financial coverage (proportion of costs covered by insurance or other risk pooling mechanisms) implies the ideal of affiliation to a financial protection scheme. In countries where such schemes exist and function effectively, measures of nominal affiliation (such as enrollment) may be useful. But currently we are only able to measure effective financial coverage “post hoc” or after care has been sought for an illness. Articulating better measures of financial coverage *prior* to illness and care-seeking is an important area for future work.
- **There are limitations to the availability and quality of household expenditure surveys.** The LSMS are fairly standardized and of reasonably good quality, but nonetheless exhibit far more variability from country to country and year to year than surveys like the DHS. Our team experienced surprising difficulties obtaining LSMS or LSMS-like datasets. The state of the datasets and accompanying documentation varied greatly and data always required additional cleaning and preparation. We were unable to obtain expenditure data from Ethiopia within the timeframe of this study. More broadly, others have commented (Lu, Chin and Murray 2009) on the limitations of self-reported survey methods for accurately measuring health care-seeking and out-of-pocket spending. Going forward, investments in improving the quality of health expenditure data should be prioritized.

5.3 GOING FORWARD

The WHO's three-dimensional conceptual framework for UHC is persuasive, intuitive, and logical; converting this framework into concrete, practical indicators nonetheless entails “devil in the details” challenges, as seen from this analysis. Given these observations and conclusions, the study team also identified several recommendations for next steps, most of which focus on priorities for research and investment going forward.

- **Strengthen routine, non-household survey data collection methods for UHC indicators:** Routine data sources will be far more policy-relevant and cost-effective for country planners and health sector managers over the long term. Strong facility-based information systems will permit collection of many more indicators (including indicators of NCDs) than cannot be reliably collected from self-reported surveys.
- **Work towards greater global consensus on service coverage measurement:** A global discussion is needed to move forward on issues such as an essential vs. comprehensive service package for UHC, criteria for selecting particular indicators, the choice of tracer indicators vs. an index, a consistent set of core indicators vs. country-specific indicators, and other open questions.
- **Invest in operations research on service coverage measurement:** This includes conducting quantitative analysis to identify those tracer indicators that best proxy for a wide range of health conditions; developing feasible, aggregate indicators of quality that go beyond structural quality to include process and outcome quality measures; and developing theoretically grounded and robust service coverage indexes that include a wider range of conditions.
- **Invest in improvements to expenditure data collection:** Again responding to some of the limitations described above, we recommend global investment in greater frequency of expenditure surveys, improved standardization of measures (especially for health expenditures), improved quality of data and data documentation, reduced lag time between data collection and sharing, streamlined data access, and improved methodologies for capturing out-of-pocket expenditures.
- **Develop financial risk protection measures that effectively address “undercounting” among the poorest of the poor:** This could include developing composite measures of financial protection reflecting multiple sources of financial burden (such as decreased health status and lost earnings that result from failure to seek care, as well as impoverishment and catastrophe measures).
- **Invest in inclusive, consensus-oriented process to develop the set of UHC indicators:** Country stakeholders should be involved in identifying the indicators of service and financial coverage most useful to them, as country buy-in will directly affect the extent to which UHC indicator data are collected, reported, and used.
- **Postpone developing a “super-index” of UHC until a more robust set of individual indicators is available:** Developing an aggregate index of UHC that would collapse the service use and financial coverage components into one linear metric (such as “the percentage of the population with coverage”) has intuitive appeal, and it would be a powerful advocacy tool. It could also be a potentially powerful policy tool if the index reflected clear underlying constructs and could be used to track country progress. But in reality, this vision seems far-off given the need first to better develop the operational indicators upon which such an index would be built. For countries implementing policies to achieve UHC, there is value in reflecting each individual dimension of coverage separately. Work should continue to explore methods to combine indicators into dimension-specific indexes. Narrowing the pool of possible indicators that need to be tracked, and focusing on those that most help policymakers make decisions, are critical intermediate steps. Investing today in indicators that are useful to country planners will pay off in future progress.

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