Health financing and access to effective interventions

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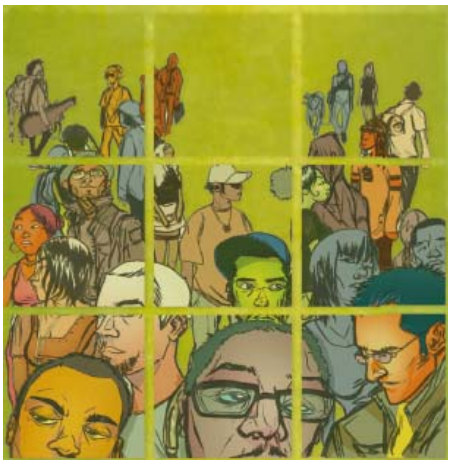
World Health Report (2010)
Background Paper, 8

HEALTH SYSTEMS FINANCING
The path to universal coverage

World Health Organization



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Introduction

While health is determined by many factors, health systems play a critical role in reducing morbidity and mortality (1). The contribution of a heath system to improving health depends, firstly, on how easily a person can access appropriate and effective health services in case of medical need. Access to effective preventive and curative interventions is one of the two components of universal coverage, while the other is protection against financial hardship as a result of using services (2).

Access is, nonetheless, a rather complex concept and the term is often used interchangeably with coverage or utilization. The ability to use services when they are needed is associated with factors related to both service provision and service usage - i.e. to supply and demand factors (3). On the provision side, there has to be an adequate supply of quality services that are efficacious. To what extent a person uses the services depends on many factors. Firstly, people have different expectations of their health and therefore have different perceptions of their health care needs. When need is perceived, many other factors still govern the actual use of services. Financial affordability, in terms of the costs of the services as well as the costs of accessing them, are important. However, many non-financial reasons may also be important, such as physical accessibility and cultural acceptability of the services and various forms of social exclusion and marginalization (4).

These complexities pose great challenges in measuring access. In practice, people tend to measure health service utilization or coverage. This is not totally satisfactory because it is also important to know whether the person who received the service really needed it. Adjustments for need can be made, but they have often relied on self-reported need from survey data which may not fully reflect actual medical need. This is because people's expectation have a significant impact of self reported need - for example, the rich often report greater need than the poor even though the poor are generally in worse health using objective criteria (5;6). Instead of using self-reported need, some researchers have used regressions to standardize utilization for differences in factors thought to be associated with objective need. However, the covariates in the regression are generally limited to demographic indicators, such as age and sex as very few household survey collect medical test information (7-9).

An additional consideration is that utilization data, even if they are adjusted for need, do not show either efficacy or quality of the intervention received. Ideally it would be important to know whether the

intervention was received with sufficient quality to be effective, information that is difficult to obtain from household surveys (10). Putting these considerations together, there is a growing literature on "effective coverage", defined as the proportion of the population who needed a service that received it with sufficient quality to be effective(11). This is the end result of the factors affecting access, so a secondary step would be to understand why some people did not receive the intervention with sufficient quality to ensure effectiveness.

Data that allows effective coverage to be calculated for a wide variety of interventions is very scarce. Rarely is information on quality available while data on the proportion of population who needed services and who obtained it is only available for a few interventions on a cross-country basis. The most widely available data concern the proportion of children immunized and the proportion of births attended by skilled health personnel (12). All children and all women delivering are in need of these services.

The purpose of this paper is to explore variations in intervention coverage across and within countries, trying to focus on the population who needed the services in the first place. We are, therefore, restricted to using coverage with childhood immunizations and coverage of births attended by skilled health workers. As a second step, we also examine the factors that are correlated with differences in coverage across countries, or population groups within countries. We also explore whether the data on self reported utilization and need from household surveys provide any useful information on variations in effective coverage.

Methodology

The percentage of births attended by skilled health personnel (SBA); percentage of infants who have received measles-containing vaccines (MCV); and percentage of infants who have received 3 doses of the diphtheria-tetanus toxoid-pertussis vaccine (DPT3) at one year of age are the key indicators of coverage used in the analysis. We also examine the proportion of people who report using services when they perceived a need to do so.

As a first step, the paper presents within-country differences among socio-economic groups for these indicators. The relationship between health system financing structure and coverage are inherently intertwined with ability to pay and economic inequalities. This paper thus explores differences in coverage across different economic quintiles. Appendix table 1 lists the country abbreviations used in the figures.

Subsequently, the variation in coverage across countries is compared with health systems financing indicators using multivariate regressions. The way a health system is financed is an important determinant of financial access to services, particularly the extent to which countries rely on forms of prepayment and pooling (e.g. insurance or tax-funded health services) rather than direct out-of-pocket expenses such as user-fees (13;14). For this paper, we tested per capita general government health expenditure (GGHE), which consists of government health expenditures (all levels of government) from general government revenues as well as expenditures funded from compulsory social health insurance. In general, the higher this is, the greater the expected level of financial risk protection and coverage.

Other components of the overall health system including the number of providers play an essential role in enabling access. As such, their impact needs to be adequately considered. As this paper focused on the childhood immunization and the delivery, the density of nursing and midwifery personnel (Nurse_mid) - the number per 100,000 population - is used as an explanatory variable. Access may also depend on the level of socio-economic development. The analysis accounts for this by adding the percentage of literacy among adult women (Fem_lit) as an independent variable, something that has frequently been linked to levels of coverage for interventions associated with maternal and child care (15).

Finally, GDP per capita was used to reflect economic development. In this case not only the dependent variable, the independent variables are also likely to be linked to GDP, in particular GGHE per capita. In order to take into account this endogenous relationship GDP per capita is treated as an instrumental variable in the regression analysis. All financial data were tested in terms of US dollars at the official exchange rate. Robust standard errors were used to account for country-level clustering in the regression models.

Data sources

Self reported utilization and need are taken from the household surveys available to us, specifically Living Standards Measurement Study type surveys (LSMS) and the World Health Organization's World Health Survey (WHS) (16). Coverage for measles, DPT3 and births with skilled health personnel are taken from the World Health Organization's Statistical Information System (WHOSIS) for the cross-country analysis(17). For the within country analysis, a breakdown of coverage by different population groups is not available from WHOSIS, so we turned to Demographic and Health Surveys (DHS) which allow a breakdown by wealth quintiles (18). The specific surveys used are listed in appendix table 1.

Health system financing indicators are from the World Health Organization's National Health Accounts database (NHA)(19). Adult female literacy is from the World Development Indicators database (WDI), while the density of nursing and midwifery personnel is from the WHOSIS database (20). It should be noted that regression analysis is performed only on low and middle income countries as the WDI dataset does not contain information about high income countries. In any case, there is virtually no variation in coverage for these health services in high income countries, with all of them reporting close to 100% coverage. A summary of the data is provided in Table 1.

Table 1. Summary of variables used and data sources

Indicators	Data sources	No. of countries	Year
Coverage within countries:			
Self-reported utilization	LSMS, WHS	66	1993-2005
Percentage of deliveries attended by medically trained persons	DHS	56	1990-2005
Percentage of infants who have received measles-containing vaccines	DHS	55	1990-2005
Percentage of infants who have received 3 doses of the diphtheria-tetanus toxoid-pertussis vaccine	DHS	55	1990-2005
Coverage across countries:[a]			
Self-reported utilization	LSMS, WHS	59	1995-2005
Percentage of deliveries attended by skilled health personnel	WHOSIS	128	1995-2007
Percentage of infants who have received measles-containing vaccines	WHOSIS	132	1995-2007
Percentage of infants who have received 3 doses of the diphtheria-tetanus toxoid-pertussis vaccine	WHOSIS	132	1995-2007
Explanatory variables[a]			
Adult female literacy rate[b]	WDI	132	1990-2007
Density of nursing and midwifery personnel (number per 100,000 population)	WHOSIS	132	1990-2007
General government health expenditure (GGHE_cap)	NHA	132	1995-2007
General government health expenditure as a share of gross domestic product (GGHE/GDP)	NHA	132	1995-2007
Gross domestic product per capita (GDP_cap)	NHA	132	1995-2007

[a] These are data used in the regression analysis

[b] The closest subsequent rate was used for years without data

Results

Self reported utilization

Self-reported need for health care across countries ranged from under 5% to over 45% in 66 countries where data exist. The general utilization rate ranged from less than 1% to 38%, while utilization given self-reported need ranged from 9.5% to 99%.[1]

Figure 1 presents self-reported need and utilization given need within the countries in the dataset with income quintiles on the horizontal axis - quintile 1 is the lowest income group. The lowest quintile reports less need than the highest quintile in three fourths of the countries studied. This pattern is contradictory to the well established evidence that higher income groups enjoy better health than the lower income groups (4). For utilization among those with self-perceived need, evidence from a number of countries such as Morocco and Philippines show that richer quintiles use more services. However, exceptions include Comoros and Guatemala where the 4^{th} and 5^{th} quintiles use fewer services than the rest of the population.

Maternal and child health indicators: inequities within countries

The distribution of access to SBA, DPT3 and MCV across different quintiles is shown in Figure 2. This data is from the DHS survey and quintiles are based on household assets. Different patterns of access among the three interventions and different countries patterns are observed. SBA is lower than DPT3 and MCV in the majority of countries in this study. However there are exceptions, such as Kyrgyzstan and Gabon, where MCV and DPT3 are lower than SBA.

We also observe that the use of these interventions increases with wealth although the extent of the inequity varies across countries. In a small number of countries, such as Jordan, the data suggest a high level of overall access to SBA, DPT3 and MCV and low level of disparity across quintiles. In many other countries, however, there are considerable disparities. For example in some settings, DPT3 coverage in the lowest quintile was only 10% of coverage in the highest quintile, while MCV coverage in the lowest

[1] General utilization data based on self-reported need in WHS and LSMS datasets seems to follow similar distributions. Self-reported need for health care across countries ranged from under 5% to over 45% in the WHS dataset and from under 10% to over 40% in the LSMS dataset. The general utilization rate was also similar in the WHS and LSMS dataset. In the WHS dataset, it ranged from: less than 10% in 20 countries; between 10% and 20% in 25 countries; between 20% and 30% in 4 countries; and above 30% in 3 countries. In the LSMS dataset, it ranged from: under 10% in 12 countries; between 10% and 20% in 9 countries; and above 20% in 4 countries. Finally, rate of utilization given need varied between less than 10% and above 90% with similar distributions in both LSMS and WHS datasets.

quintile was only 20% of coverage in the highest quintile. In other countries, such as Burkina Faso MCV and DPT3 coverage is similar, but access to skilled birth attendants is lower among poorer quintiles. In countries such as Chad and Ethiopia, access to skilled birth attendants is 20 times lower in the poorest quintile than in the richest quintile.

In other countries, consistent patterns are not observed as income increases. For example, in Viet Nam, the gradient of access to SBA and MCV changes after the second quintile. In countries such as Nepal, access to SBA is low for everyone except those in the last quintile. However, in others countries such as Gabon, only the poorest seem to have considerably less access to SBA as compared to the other quintiles, whose differences are more marginal. These patterns of exclusion from access are likely to reflect health systems features as well as the socio-economic differences within countries.

Figure 1 - Self-reported need and utilization of services given self-reported need by percentage of population

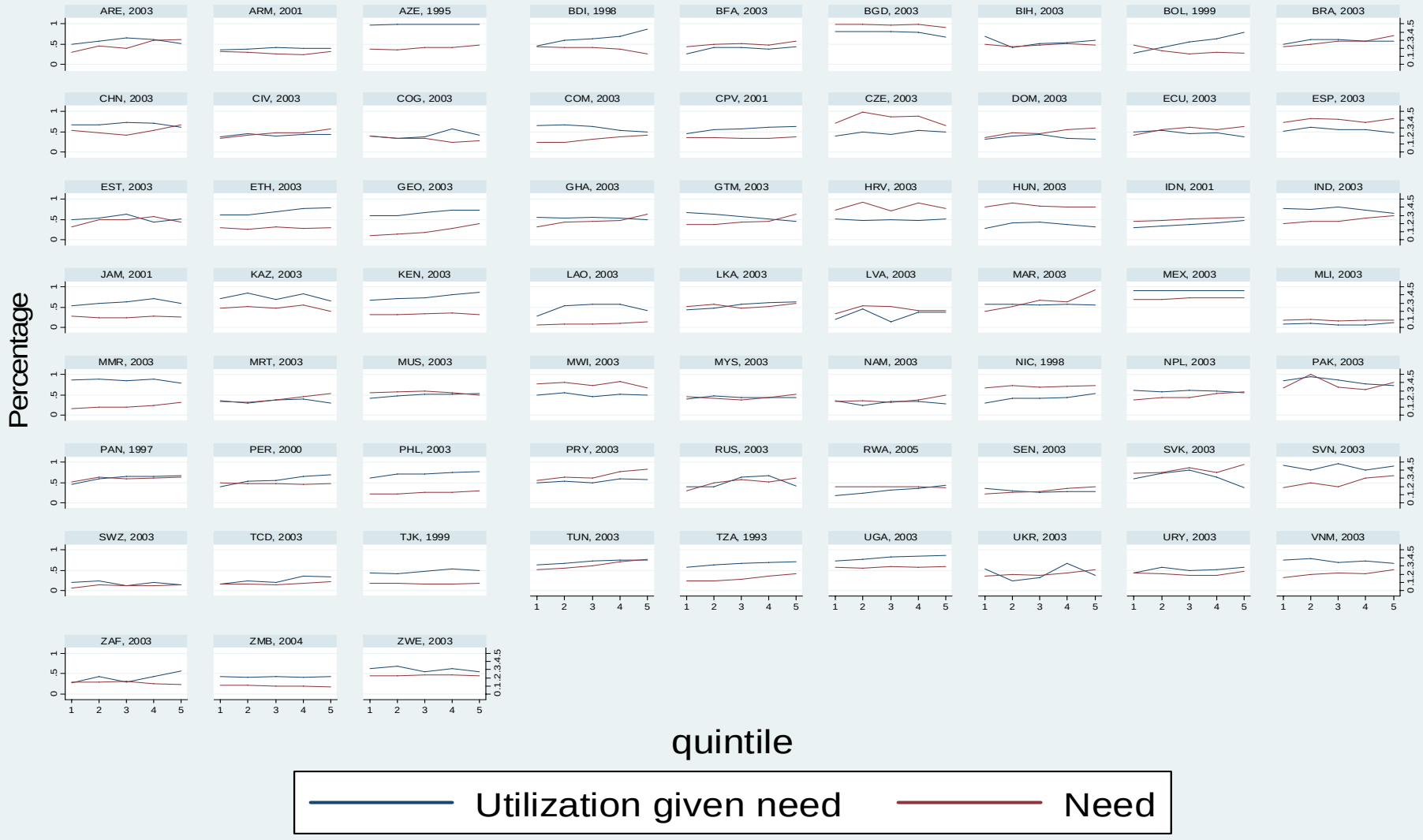
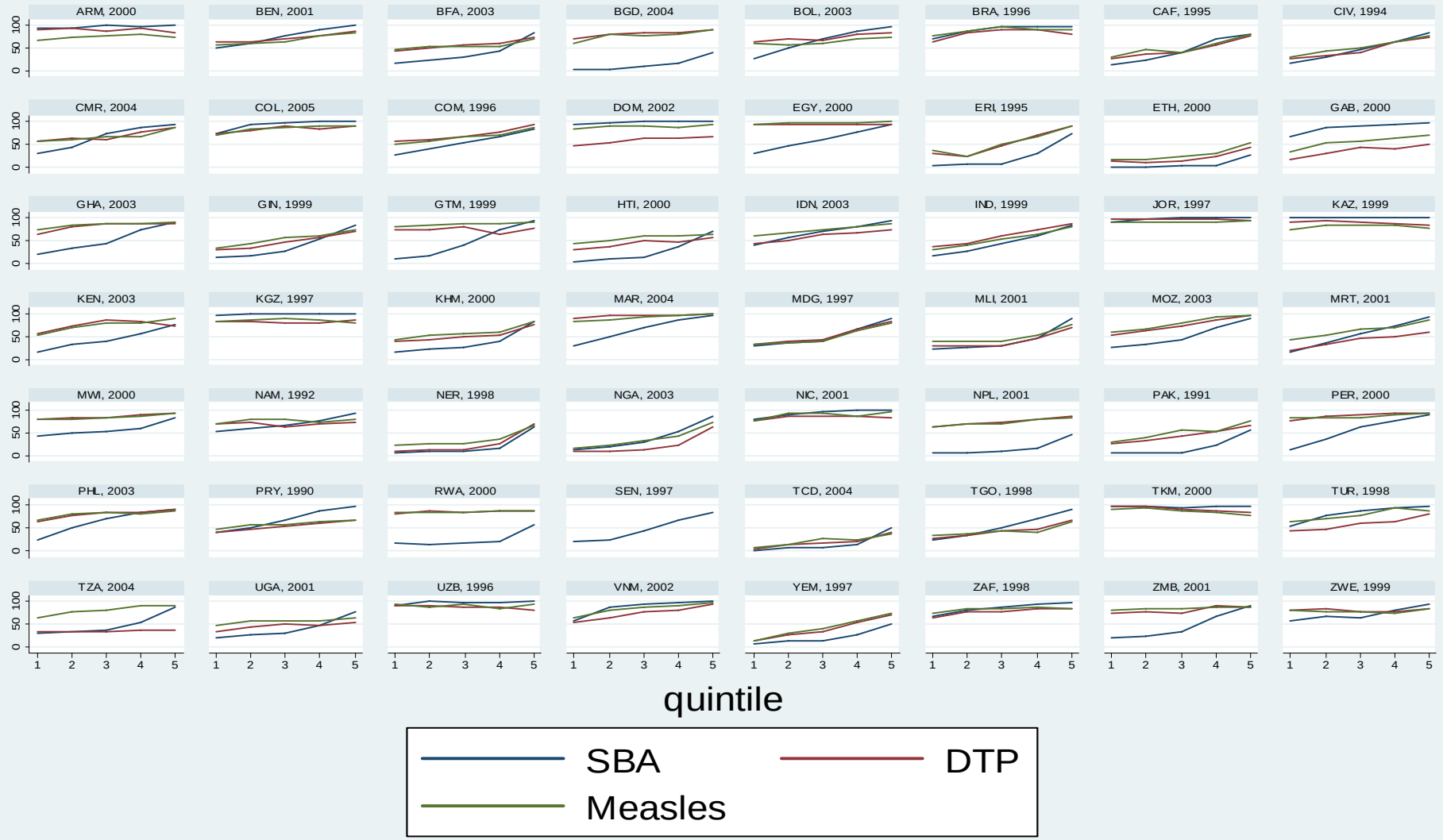


Figure 2 - Percentage of SBA, MCV and DTP



Results from cross country regressions

Regression analysis was performed separately on the 4 indicators of access against general government expenditure per capita, adult female literacy rate and density of nursing and midwifery personnel with GDP per capita as an instrumental variable as discussed earlier. The results are summarized in Table 2

Table 2. Regression results

Utilization among those who reported need

	Coefficient	Robust standard error	t	P>t	95% Confidence interval	
GGHE_percapita	-0.023	0.029	-0.800	0.426	-0.081	0.035
Fem_lit	0.297	0.141	2.110	0.039	0.016	0.579
Nurse_mid	-0.037	0.040	-0.950	0.348	-0.117	0.042
Constant	0.478	0.077	6.210	0.000	0.324	0.632
Number of	68.00					
F(3,	1.73					
Prob > F	0.17					
R-squared	0.12					
Root MSE	0.17					
Number of clusters	58.00					

Percentage of births attended by skilled health personnel

	Coefficient	Robust standard error	t	P>t	95% Confidence interval	
GGHE_percapita	7.280	1.045	6.970	0.000	5.212	9.348
Fem_lit	47.343	7.960	5.950	0.000	31.589	63.096
Nurse_mid	4.633	1.520	3.050	0.003	1.624	7.642
Constant	-0.150	3.967	-0.040	0.970	-8.001	7.701
Number of obs	214.00					
F(3, 125)	163.85					
Prob > F	0.00					
R-squared	0.78					
Root MSE	12.99					
Number of clusters	126.00					

Percentage of infants who have received measles-containing vaccines

	Coefficient	Robust standard error	t	P>t	95% Confidence interval	
GGHE_percapita	1.662	0.867	1.920	0.058	-0.054	3.378
Fem_lit	33.827	6.219	5.440	0.000	21.525	46.129
Nurse_mid	2.200	1.195	1.840	0.068	-0.164	4.564
Constant	44.292	3.256	13.600	0.000	37.852	50.733
Number of obs	1649.00					
F(3, 127)	50.71					
Prob > F	0.00					
R-squared	0.42					
Root MSE	14.72					
Number of clusters	132.00					

Percentage of infants who have received 3 doses of the diphtheria-tetanus toxoid-pertussis vaccine

	Coefficient	Robust standard error	t	P>t	95% Confidence interval	
GGHE_percapita	1.762	1.027	1.720	0.089	-0.269	3.793
Fem_lit	32.559	6.965	4.670	0.000	18.780	46.338
Nurse_mid	2.396	1.439	1.670	0.098	-0.450	5.242
Constant	44.284	3.852	11.500	0.000	36.664	51.904
Number of obs	1636.00					
F(3, 131)	58.04					
Prob > F	0.00					
R-squared	0.47					
Root MSE	13.11					
Number of clusters	132.00					

In the general utilization regression, only adult female literacy is statistically significant at the 5% level, with a positive sign. The other covariates, including GGHE per capita, have no significant relationship with use. The overall explanatory power of the model is 12%

In the coverage indicators, all the covariates have positive relationships with the access to SBA, DTP3 and MCV. GGHE per capita is significant at the 1% level in the SBA regression, and 10% level in the DTP3 and MCV regressions. The density of nursing and midwifery personnel and adult female literacy are also significant at least at the 10% level. The explanatory power of the models range from 42% to 78%.

Discussion

This analysis explores two types of indicators for measuring access to care: general utilization and coverage of particular interventions. Results from this study suggest that both types of indicators reflect within country disparities in access to care. However, general utilization may underestimate the disparities across socio-economic groups and may not be suitable for cross-country analysis.

The indicators used in this study are derived from household surveys. For coverage indicators, such as immunization and deliveries in the presence of skilled birth attendants, the most common data sources are the Demographic and Health Surveys (DHS) and the Multiple Indicator Cluster Surveys (MICS). They collect data using standard questionnaires which is very useful for conducting cross-country comparisons. Data used to derive general utilization are from different types of households surveys that contain health services utilization data. These range from LSMS, socio-economic surveys, as well as health surveys including the World Health Survey. The different survey instruments used in data collection pose challenges for cross-country comparisons. Even if questions are similar in some cases (for example in the case of the WHS), the time when the data is collected may make a difference because of seasonal disease patterns and other context-specific events.

Adjustment for need also poses considerable methodological and conceptual challenges when general utilization is considered. Indeed, in line with previous thinking, we find that the poor are less likely to report need for health

services (21). Hence, utilization among those with self-perceived need may overestimate access for the poor and therefore, underestimate disparities across quintiles. These types of problems seem to also be reflected in the cross-country regression analysis, which is further complicated by differences in demographical structure and socio-economic factors. On the other hand, there is little ambiguity regarding need or efficaciousness in the indicators of immunization or maternal health services. All pregnant women and infants are the target population for these interventions and they are considered key in decreasing morbidity and mortality (22;23).

Despite the challenges the analysis still shows some very interesting results. We observe that utilization is lower in the lowest income group. This result is consistent across countries and holds for both utilization and coverage indicators. However, inequities are not always linear across quintiles and the extent of inequity differs across countries. This all strongly suggests that different health systems are indeed complex and overarching generalizations about inequities in access may not always be suitable.

The results from the maternal and child health intervention regressions suggest that health system indicators are associated with intervention coverage, such as health system financing and health human resource. The results show that in low and middle income countries the total government financial input and the amount of health worker are associated with better access to services. Economic growth improves people's living condition and contributes to longer life expectancy. A well functioning health system with adequate government financial input and human resource is critical for assuring the access of effective health interventions and therefore saving lives and improving health outcome.

Indeed, maternal and child health interventions rely of a broad range of publically-financed inputs, ranging from health promotion campaigns to vaccines and medicines. Nonetheless, general government health expenditure per capita reflects aggregate levels of national health financing. But clearly, information regarding the benefits offered in any national program will be more directly related to health services utilization. How the public funding is used in the health sector, such as information on the type of services or facilities receiving public subsidies may also be used in the absence of well-defined and universal benefits package. Future efforts in collecting this type of information would make the international comparisons more meaningful.

It also is very reaffirming to note that all three child and maternal health interventions are positively correlated with female literacy. This adds to the evidence that education, particularly women's education, contributes to health outcomes (24). It also generally supports that socioeconomic factors play an important role in access to effective health services. Our analysis also suggests that supply side factors, such as health staffing levels have an impact on coverage.

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Appendix

Appendix Table 1. Country abbreviations used in the figures

Country abbreviation	Country
ARE	United Arab Emirates
ARM	Armenia
AZE	Azerbaijan
BDI	Burundi
BEN	Benin
BFA	Burkina Faso
BGD	Bangladesh
BIH	Bosnia and Herzegovina
BOL	Bolivia (Plurinational State of)
BRA	Brazil
CAF	Central African Republic
CHN	China
CIV	Côte d'Ivoire
CMR	Cameroon
COG	Congo
COL	Colombia
COM	Comoros
CPV	Cape Verde
CZE	Czech Republic
DOM	Dominican Republic
ECU	Ecuador
EGY	Egypt
ERI	Eritrea
ESP	Spain
EST	Estonia
ETH	Ethiopia
GAB	Gabon
GEO	Georgia
GHA	Ghana
GIN	Guinea
GTM	Guatemala
HRV	Croatia
HTI	Haiti
HUN	Hungary
IDN	Indonesia
IND	India
JAM	Jamaica
JOR	Jordan
KAZ	Kazakhstan
KEN	Kenya
KGZ	Kyrgyzstan

KHM	Cambodia
LAO	Lao People's Democratic Republic
LKA	Sri Lanka
LVA	Latvia
MAR	Morocco
MDG	Madagascar
MEX	Mexico
MLI	Mali
MMR	Myanmar
MOZ	Mozambique
MRT	Mauritania
MUS	Mauritius
MWI	Malawi
MYS	Malaysia
NAM	Namibia
NER	Niger
NGA	Nigeria
NIC	Nicaragua
NPL	Nepal
PAK	Pakistan
PAN	Panama
PER	Peru
PHL	Philippines
PRY	Paraguay
RUS	Russian Federation
RWA	Rwanda
SEN	Senegal
SVK	Slovakia
SVN	Slovenia
SWZ	Swaziland
TCD	Chad
TGO	Togo
TJK	Tajikistan
TKM	Turkmenistan
TUN	Tunisia
TUR	Turkey
TZA	United Republic of Tanzania
UGA	Uganda
UKR	Ukraine
URY	Uruguay
UZB	Uzbekistan
VNM	Viet Nam
YEM	Yemen
ZAF	South Africa
ZMB	Zambia
ZWE	Zimbabwe