Extended Abstract
Trends and Inequalities in Access to Reproductive Health Services in Developing Countries: Which services are reaching the poor?
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Background

In 1987 during the Nairobi Safe Motherhood Conference, the long-neglected issue of high maternal mortality was brought to the world's attention for the first time. By the end of the conference, reducing maternal mortality and morbidity was declared a global priority and the Safe Motherhood Initiative was launched with the goal of reducing maternal deaths by at least half by the year 2000. Nearly two decades later, there has been little or no progress towards achieving this objective. According to the World Health Organization, there were 585,000 maternal deaths worldwide in 1990 compared to 529,000 maternal deaths in 2000.

Ninety-nine percent of these deaths occurred in developing countries. The country with the highest estimated number of maternal deaths is India (136,000), followed by Nigeria (37,000). Most maternal deaths and complications are preventable, given sufficient access to essential and emergency obstetric care, safe abortion, and family planning services. This is illustrated by the marked difference in the risk of maternal death between developed and developing countries. Nonetheless, safe motherhood is an attainable goal in developing countries. Prime examples are Cuba and Sri Lanka where despite limited resources reductions in maternal mortality have been brought about through a national commitment to women's health.

Pregnancy related death and complications have specific medical causes that are clearly understood and respond to appropriate treatment. Interventions for reducing maternal morbidity and mortality include the implementation of family planning services, venues for safe abortion, antenatal care, skilled birth attendants during normal childbirth, and accessible emergency obstetric care and facilities. In developing countries, the critical policy issue is how to realistically implement a maternal morbidity and mortality reduction program in the setting of competing health issues, limited healthcare and monetary resources, and political realities.

In this paper we examine two types of interventions that can significantly effect maternal health: 1. antenatal care; and 2. skilled birth attendance.

1. Antenatal care. Antenatal care consists of patient education, treatment of existing health problems, treatment of pregnancy-induced problems, and screening for risk factors. To be effective, antenatal care must be linked with treatment of maternal complications. The most serious and common complications of pregnancy and childbirth cannot be prevented or treated during antenatal care. However, a small proportion of maternal deaths can be avoided through education about good hygiene and the danger signs that require emergency medical care.

2. Skilled attendance at birth. In developing countries, most births still take place at home. According to the Demographic and Health Surveys (DHS), an average 55% of births take place at home with the assistance of relatives or untrained traditional birth assistants. Because hospital delivery is beyond the financial means of many developing countries, increasing skilled attendance at birth has been proposed as a strategy for reducing maternal death and disability. Skilled birth attendants refer to persons with midwivery skills who are trained to proficiency in the management of normal delivery and in the diagnosis, management, or referral of obstetric complications. At the present time, only 53% of pregnant women in developing countries deliver with the help of a skilled attendant. A study of 64 countries using maternal mortality estimates from RAMOS, DHS, and vital registration systems of develop countries found that a 10-point increase in the proportion of skilled attendance at childbirth is associated with a predicted maternal mortality ratio reduction of 70 per 100,000 live births.

This paper presents an analysis of time trends in antenatal care and birth attendance based on 61 surveys conducted in 18 developing countries over the past 20 years, using data from the Demographic and Health Surveys (DHS). The goal of the paper is to examine trends in average levels and inequalities in the provision of reproductive health services in the past two decades. The paper will explore why there is a great inequality gradient in skilled birth attendance than in antenatal care, and also examine poor-rich and urban-rural differences. The three main questions explored in the analysis are:
   1) What have been the trends in average levels and, more importantly, inequalities in delivering antenatal care and skilled birth attendance to women in low income countries over the past two decades?
   2) Why are some countries more efficient than others at delivering maternal health interventions to poor populations?
   3) Which countries have been more effective at reducing urban-rural inequalities in reproductive health services?

Because of the multi-country, relatively consistent nature of the DHS, this study is able to use data collected and analyzed using similar instruments and methods across regions and countries of the world. As a result, we can provide a detailed analysis of similarities and differences of socioeconomic gradients of maternal health interventions both within and between countries and regions. This is an important step in considering how wealth or income may interact with other factors, from geography to policy, to affect maternal health and pregnancy outcomes.

Data and Methods
The DHS is a household survey program that collects data on maternal and child health, using nationally representative samples ranging from 3,000 to 90,000 respondents. The DHS program has provided the technical assistance necessary to implement more than 120 surveys in over 60 countries the developing world, in Africa, Asia, the Near East, Latin America, and the Caribbean. The core questionnaire is asked to a nationally representative sample of women aged 15-49, and includes questions on basic socio-demographic characteristics, reproduction, contraception, antenatal, delivery, and postpartum care, breastfeeding and nutrition, and several questions on children's health.

The DHS questionnaire also records a full birth history from all women of reproductive age; it is largely recognized as a reliable and valuable source for estimates of both infant and child mortality in developing countries.

The DHS program also asks the respondent whether or not her household or a member of her household owns a series of assets (electricity, a radio, television, refrigerator, bicycle, motorcycle, car, main construction materials of the walls, roof, and floor of the house, source of drinking water, and type of toilet facility, as well as, in some cases, other country-specific assets). This information allows for the construction of an index of economic status, based on a statistical model which generates a series of cut-points on a latent variable (economic status), above which respondents are more likely to own that particular asset than not. Combined, the answers to these asset questions give an estimate of a household's economic status, allowing us to examine health outcomes and risk factors with a poor/non-poor lens, or across income quintiles.

The estimation of economic status has been done using a latent variable model (a dichotomous version of the hierarchical ordered probit model). The estimation of economic status is done concurrently for all countries in the analysis, leading to an index that is on the same scale for all countries. This enables us to compare health levels in households at the same level of income across developing countries. For this analysis, we have distributed the population in each country to "developing country quintiles." These quintiles have been constructed so that Quintile 1 refers to the bottom 20% of the population across all developing countries. This allows for comparisons of child mortality rates in the absolute poor (bottom quintile) across all countries in this analysis. We also examine which countries have been more effective at reaching the poor over the past two decades.

The countries included in this analysis are presented in Table 1 below along with the years in which the surveys were conducted.

Table 1. List of countries with 3 or more DHS available

Country	**Years for which data are available**				
Bangladesh	1993	1997	1999/2000		
Bolivia	1989	1994	1998		
Colombia	1986	1990	1995	2000	
Dominican Republic	1986	1991	1996	1999	2002
Egypt	1992	1995	2000		
Ghana	1988	1993	1998		
Guatemala	1987	1995	1998		
Indonesia	1987	1991	1994	1997	2002
Jordan	1990	1997	2002		
Mali	1987	1996	2001		
Morocco	1987	1992	1995		
Nigeria	1990	1999	2003		
Peru	1986	1992	1996	2000	
Senegal	1986	1993	1997	1999	
Uganda	1988	1995	2000/01		

Tanzania	1992	1996	1999
Zambia	1992	1996	2001
Zimbabwe	1988	1994	1999

Preliminary Results and Significance
In addition to concerns about health equity, an important implication of the association between socioeconomic status and reproductive health services is the design of policies and programs that reach those most at risk, by increasing their coverage to ensure including the poor and rural populations, or targeting programs towards them. Therefore, beyond the widely-acknowledged notion that poor nations and households are generally those at highest risk for maternal mortality and complications of childbirth, the specific details of socioeconomic patterns are important for policy and program design.
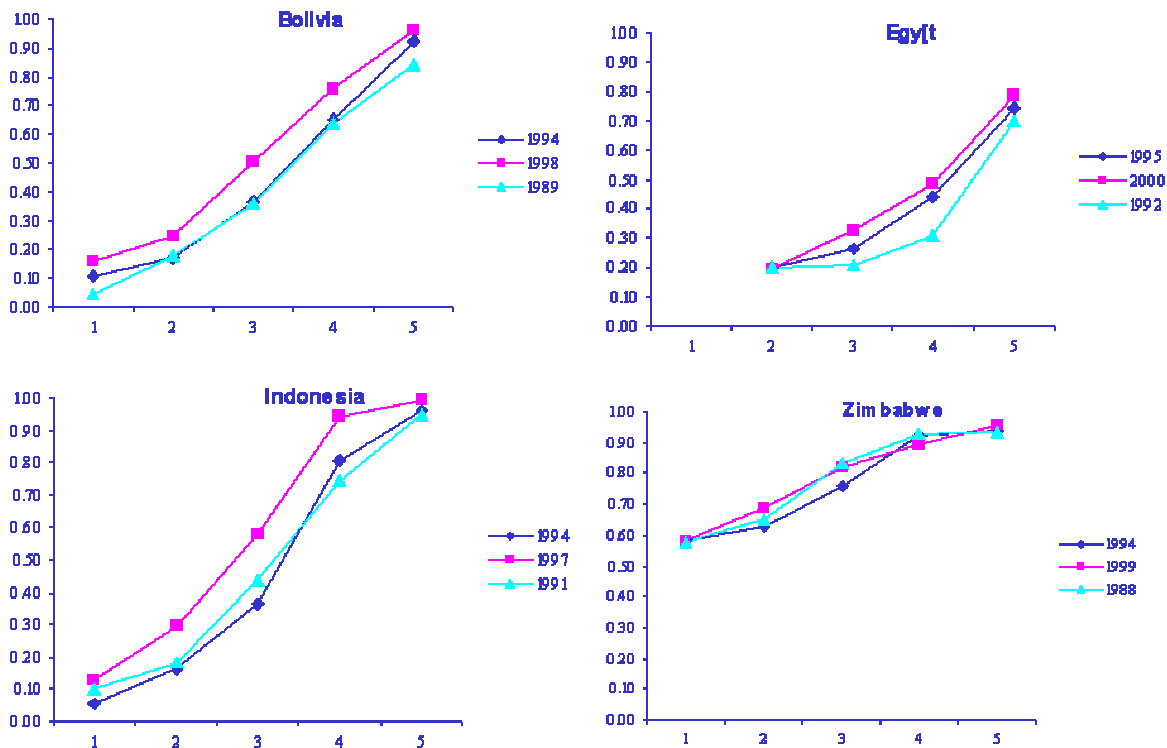
The figures that follow demonstrate the type of results this paper is going to explore. Figure 1 presents trends in skilled birth attendance for Bolivia, Egypt, Indonesia and Zimbabwe based on 3 DHS each. It is interesting to note that the level of coverage of skilled birth attendance has not changed very much over the time period covered by the 3 surveys. In Bolivia and in Indonesia there is an increased of around 5 percentage points over the 10 year period of observation. The more striking result is the remarkable inequalities across income quintiles in all four of these countries, which persist over time as well. In Bolivia, somewhere between 5-15 percent of women in the poorest quintile have skilled attendance during birth, contrasted with 80-95 percent of women in the richest quintile. The inequalities are similar across income quintiles in Indonesia and Egypt. In Zimbabwe, while there are still remarkable inequalities across income quintiles the gradient is less steep than in the other three countries. It is also interesting to note that there is little variation in level of coverage for the richest quintile in these countries.

This point, which we also refer to as "within income group inequalities," is more clearly demonstrated by Figure 2. Figure 2 presents the range of observed levels of skilled birth attendance across the set of countries in this analysis, by level of income. This graph shows that for the bottom four quintiles, across the set of countries in the analysis there is a tremendous range of percent of births attended by skilled personnel. The range in quintile 1 goes from near zero to just over 80%, which means that in some countries 80% of the poorest women have births attended by skilled personnel, while in others almost none of women in the bottom quintile have skilled attendance during birth. This pattern holds for the bottom four quintiles. The top quintile, that is the richest 20% of women across the countries in this analysis, exhibits much less variation, with a rage from about 75% to close to 100%. This implies that all countries are effective at providing reproductive health services to the richest women in their populations.

From a policy standpoint it will be very interesting to study why some countries are at (relatively) high levels of reproductive service coverage for the poor populations, while others provide no services to women living in the bottom quintile. We will explore whether this is related to focus on reproductive health and explicitly stating improving reproductive health services as a priority for the health system.

Finally, we will study how much of this inequality is related to urban-rural residence and which countries are more effective (and how) at providing reproductive health services to women living in remote areas. A preliminary analysis shown in Figure 3 shows that urban-rural differences in skilled birth attendance are pronounced in all regions and across all income quintiles[1]. The gap between urban and rural is smaller for the richer quintiles; however, the fact that the gap remains significant suggests that policies may need to be focusing on geographic barriers to access in addition to socioeconomic barriers.

Figure 1. Inequalities across income quintiles in skilled birth attendance

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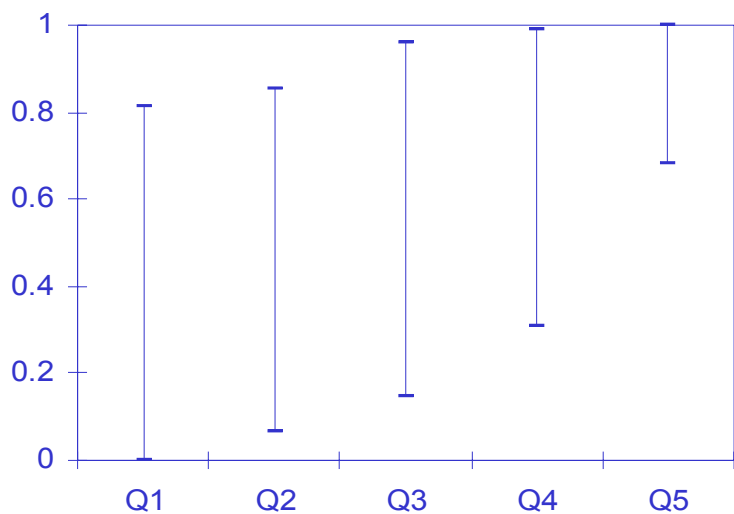Figure 2. Within quintile inequalities, across countries, in skilled birth attendance

Figure 3. Skilled birth attendance by quintile in Urban and Rural Populations: 4 regions