Extended Abstract
Trends and Determinants of Inequalities in Child Mortality in Developing Countries: Who has been effective at reaching the Poor?

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Child mortality, often on the agenda of public health and international development agencies, has received renewed attention as a part of the United Nation's Millennium Development Goals (MDGs). Approximately 10 million infants and children under five years of age die each year, with large variations in under-five mortality rates, and trends, across regions and countries.

This paper presents an analysis of time trends in childhood mortality of 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 child mortality and in inequalities in child mortality in the past two decades and link them to their major determinants. The paper will explore why some countries have been effective in reducing child mortality inequities while others are exhibiting an increase in income-related inequalities in child mortality.

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 childhood mortality 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 child survival.

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 childhood risks, diseases, and mortality is the design of policies and programs that reach those most at risk, by increasing their coverage to ensure including the poor, or targeting programs towards them. Therefore, beyond the widely-acknowledged notion that poor nations and households are generally those at

highest risk for childhood mortality, the specific details of socioeconomic patterns are important for policy and program design.

Figure 1 below demonstrates an example of the type of results our paper is going to try and explore. Figure 1 shows for Peru and for Bolivia the time trend in child mortality inequalities from the mid-1970s to the late-1990s. The two countries start out with a very similar profile of both average level of child mortality but also inequality in child mortality across income quintiles. Over the course of the two decades, Peru achieves remarkable reductions in both average level and inequalities in child mortality, while the situation in Bolivia is very different. While there is some reduction in child mortality for the poorest quintile, inequalities persist across income quintiles. Further, while in the 1970s the poorest populations in Peru and Bolivia were at the same level of child mortality, by the 1990s Peru has achieved much more progress in reducing mortality in the poor than Bolivia. We plan to explore why Peru has been more effective than Bolivia in reaching the poor, including a thorough analysis of policies and interventions that have been implemented.

Figure 1. Trends in child mortality inequities since the 1970s for Peru and Bolivia.