Women's education or household wealth: Which is the best predictor of child health in developing countries?

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Introduction

The association between socioeconomic status (SES) and child health and survival has been extensively investigated in the developing world, with consistent evidence of poorer health outcomes among people from less privileged socioeconomic groups (Bicego and Boerma, 1993; Caldwell, 1979; Hobcraft, 1993; Fotso & Kuate, 2005a). Maternal education features prominently among the household-level socioeconomic factors that influence child health in developing countries (Mosley & Chen, 2004; Desai & Alva, 1998; Frost et al., 2005). However, the extent to which the relationship merely reflects the impact of economic advantage on health and survivorship, or reflects the influence of education in the community, has not yet been fully elucidated. Until recently, disentangling the ways in which maternal education and the economic situation of the household operate to impact on child health was hampered by the complexities of measuring household wealth or disposable income, especially in the context of subsistence agriculture or urban informal sector (Cleland and van Ginneken, 1988). Further, studies on socioeconomic inequalities in health have typically sought to identify independent effects of given socioeconomic variables, while controlling for others, thus overlooking the possible interrelations between socioeconomic indicators of interest (Lahelma et al., 2004).

This paper seeks to contribute to the debate by focusing on the effects of women's education and household wealth on child health. More specifically, the objectives are: 1) to compare the effects of maternal education and household wealth on child malnutrition; and 2) to investigate the pathways between maternal schooling and household wealth as determinants of child undernutrition.

This paper focuses on malnutrition among children in sub-Saharan Africa, since it is one of the major public health concerns, representing both a cause and a manifestation of poverty (ACC/SCN, 1997; Fotso & Kuate, 2005b). The evidence of short- and long- term consequences of nutritional deficiencies include increased risk of both morbidity from infectious diseases and mortality, impaired cognitive or delayed mental development, and subsequently, reduced learning abilities in school, and poor work capacity in adulthood (De Onis et al., 2000; Madise et al., 1999). Conversely, child malnourishment in developing countries is usually a consequence of poverty and its attributes of poor education, low family income, poor environment and housing, inadequate access to foods, to safe water and to health care services (Adair & Guilkey, 1997; Fotso & Kuate, 2005b).

Data and methods

Data

We use the most recent data sets available as of January 2007from the Demographic and Health Surveys (DHS) of the following 25 countries: Benin (2001), Burkina Faso (2003), Cameroon (2004), Chad (2004), Côte d'Ivoire (1998/99), Ethiopia (2005), Gabon (2000), Ghana (2003), Guinea (1999), Kenya (2003), Lesotho (2004), Madagascar (2003/04), Malawi (2004), Mali (2001), Mozambique (2003), Namibia (2000), Niger (1998), Nigeria (2003), Rwanda (2000), Senegal (2005), Tanzania (2004), Togo (1998), Uganda (2000/01), Zambia (2001/02) and Zimbabwe (1999). The DHS program uses standard methods to collect health and nutrition information on women aged 15-49 and their children, and various socioeconomic and bio-demographic characteristics. Health information are available for children up to 35 months in some countries and up to 59 months in others. For sake of consistency, we restrict our samples

to children aged 1-35 months.

Variables

The dependent variable used in this study is stunting or chronic malnutrition, measured by height-for-age. It is considered a measure of long-term nutritional deprivation and thus, the most reliable indicator of a child's nutritional status, especially for the purpose of differentiating socioeconomic conditions within and between countries (Frost et al., 2005; Zere and McIntyre, 2003). The variable is modeled as a continuous variable (z-scores) for the regression analysis, and as categorical for the descriptive analysis. In this latter case, children whose z-score falls more than two standard deviations below the median of the NCHS/CDC/WHO reference population are classified as stunted (De Onis et al., 2000).

Two key predictors of child nutritional status are of interest: (i) Household wealth index that captures household's possessions, type of drinking water source, toilet facilities and flooring material, and recoded as poor (lowest 33.3%), middle (next 33.3%), and rich (top 33.3%), with poor as the reference category; and (ii) Mother's education, coded as no education (reference category), primary, secondary or higher. The control variables used in this study are (i) at the community level: urban-rural place of residence; (ii) at the household level: father's education; (iii) at the mother level: age at birth of the index child, marital status, and parity; and (ii) at the child level: age, sex, birth weight, age-specific immunization status, birth order and interval, and breast feeding duration.

Methods of analysis

This study uses multilevel models to account for the hierarchical structure of the data whereby children are nested within mothers, mothers clustered within households, and households in turn, are nested within sampling clusters. As a result, the conventional assumption of independence of observations is no more valid, since units from the same group are expected to be more alike, at least in part because they share a common set of characteristics or have been exposed to a common set of conditions (Raudenbush and Bryk, 2002; Rasbash et al., 2002; Duncan et al., 1998). The number of households with more than one mothers, and the number of mothers with more than one children aged 1-35 months, were too small in our data to allow a modelling of mother and household as separate levels of analysis. Children born to different mothers from the same community were then modelled statistically as part of the same community, and all household- and mother-level covariates treated as child level variables. Both country-level and pooled data analyses were carried out.

Country-level analysis consisted of two-level (child, community) random intercept models, while pooled data analyses consisted of three-level (child, community, country) random intercept models. Both the country and the pooled analyses were carried through six different models: Model 1 is the null model (with no predictors at either level 1 or 2). It allows us to estimate the intra-community correlation coefficient, defined as the proportion of the total variance in the outcome that is between communities. Models 2 and 3 are bivariate analyses of the association of child malnutrition with household wealth and maternal education. Models 4 and 5 add all control variables to Models 1 and 2, respectively, and allow us to assess the robustness of household wealth and maternal education as predictors of child nutritional status. Finally, Model 6 includes both socioeconomic variables and all control variables, with the goal of assessing the change in the effect of one predictor when the other is controlled for. Using a theoretical framework whereby maternal education precedes household wealth in influencing child health, we can assess the extent to which the effects of wealth on child nutritional status are explained by mother's education, and the extent to which the effects of household wealth are mediated through maternal education.

Preliminary results and discussion

Our results show that the prevalence of malnutrition is very high, ranging from about 20 percent in Namibia, Gabon, Togo and Cote d'Ivoire, to more than 40 percent in Ethiopia, Niger, Zambia, Malawi and Madagascar. Intra-community variation associated with child nutritional status varied from as low as 2-5 percent in six countries (Guinea, Benin, Lesotho, Malawi, Togo, Zambia and Cote d'Ivoire) to about 10 percent in Madagascar, Ethiopia and Tanzania, and even 17.5 percent in Nigeria. Bivariate analyses indicate that both maternal education and household wealth are closely linked to child malnutrition in the selected countries, the only exception being Côte d'Ivoire where the effects of mother's education do not demonstrate statistical significance. Multilevel regression results show that household wealth tends to be more robust, and to have higher power in predicting child malnutrition, than maternal education.

This overall finding of higher effects of household wealth is supportive of the view that malnutrition may be largely a reflection of the material dimension of poverty, and that income is the more crucial factor in alleviating child malnutrition. Similar results of lower predictive power of maternal schooling as an explanatory factor of child malnutrition were found by Madise et al. (1999) and Griffiths et al. (2004) in their comparative studies of six sub-Saharan African countries. Though their studies did not include an overall measure of wealth, their results indicated that the type of toilet facility had stronger effects on child stunting, than maternal education. Other studies (e.g. Fotso, 2007) have also shown that household wealth explained most of the urban-rural differentials in child malnutrition. Our finding therefore suggests that while education remains critical in improving child health, wealth-related factors such as improved water and sanitation, and access to food and health care, are also at least as important.

The result on the comparison between household wealth and maternal education, while plausible, cannot be considered as definitive since other variables not measured or not measurable, such as food availability, agricultural and climate characteristics, air pollution, and epidemiologic data, may be at work. The fact that the community-level variance demonstrates statistical significance in almost all countries is supportive of the possible effect of unobserved community factors.

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