Impact of Macro-Level Economic Improvement on Child Health: Childhood Malnutrition in Ghana, 1988-2003

Introduction

Malnutrition is currently the leading cause of the global burden of disease (Ezzati et al. 2002) and has been identified as the underlying factor in about 50% of deaths of children under 5 years of age in developing countries (Black et al 2003). Nearly a third of these children are stunted and a quarter are underweight a situation which is expected to worsen in some parts of the world including sub-Saharan Africa (De Onis et al 2000, De Onis 2004). These figures are indications of a serious public health crisis with long term effects on population health, human capital accumulation and sustainability of developing countries. The commitment of the international community to reducing childhood malnutrition and mortality has been renewed recently through the Millennium Development Goals, but achieving this ambition requires further studies on how the determinants and the level of malnutrition respond to changing economic context, which has been the case in many developing countries experiencing high burden.

In developing countries, economic crises have been shown to negatively impact child health (see Paxson et al on Peru, Hill et al on sub-Sahara Africa and Pongou et al on Cameroon). However, household and community factors involved in the mechanism linking macro-level economic shocks to micro outcomes (e.g. mortality, malnutrition etc.) have not been identified in most studies. In addition, studies have been mainly concerned with the health effects of economic downturns, with little attention to the impact of economic upturns. Yet many developing countries have experienced economic growth in recent years, with likely positive consequences on households' economic status and national health sector. In sub-Sahara Africa, Ghana is one of these countries that have experienced economic growth during the 1990s, setting it apart from the experience of other countries in the sub-region. Our study aims to examine the impact of this macro-level economic improvement on childhood malnutrition during the period 1988-2003, and to identify the intermediate socioeconomic and environmental factors that mediated this impact.

To that end, we would like to use the Demographic and Health Surveys, a nationally represented survey conducted in the years 1988, 1993, 1998 and 2003 in Ghana to:

1- examine trends in the prevalence of underweight and stunting in various socioeconomic and demographic groups in 1988-2003;
2- study the determinants of these outcomes, their trends and their distributions during the period of interest;
3- and evaluate the contribution of each determinant to the trends in malnutrition.

While various studies have investigated the relationship between economic crises and health, the unique contribution of our study is an enhancement of our understanding of the impact of macro-level economic improvement on child health and to show variation in this impact across various socioeconomic groups. Strategies and intervention programs based on the findings of this study in eliminating malnutrition is the motivating factor.

Economic Situation in Ghana

In 1982-1983, Ghana experienced its worst drought in 50 years which caused bush fires and in turn destroyed crops. During the same period, the country also experienced weak levels of consumption, minimum wages and social services. (USAID, 1992). As indicated in figure 1, the country experienced increase in GDP growth in the early 60's; however the economy began to decline in the early 70's. Ghana's Economy stabilized in 1984 and has maintained growth with little variance post that period.

Policy improvements and reforms have played a significant role in the growth of GDP. Between 1988 and 1991 the GDP's contribution to industry doubled and represented nearly 16% of GDP. (World Bank, 1992). The GDP growth has averaged 5% per year with inflation dropping from 122% before reform to about 10% in 1992. In recent years, the long term importance of agriculture has declined as industry gain momentum. Ghana took advantage of the *Heavily Indebted Poor Country* (HIPC) initiative and reached its decision point in 2002. The improvements in macroeconomics allowed the government to implement its reform agenda for the Ghana Poverty Reduction Strategy (GPRS). GPRS emphasizes wealth creation, improved governance and reductions in income and regional inequalities. (World Bank, 2004).

These macro level economic transformations were likely to have an impact at the micro level (household consumptions) and at the community level (health care sector, public infrastructure, access to water and sanitation, garbage removal, distance to electricity grid, etc). Kunbar (2001), pose a very interesting question about the growth in the economy of Ghana and what it means to income and livelihood of the people. In exploring this question, we hypothesize that changes in these household and community effects might have impacted childhood nutrition.

Methods

Data Source

Nationally representative Demographic and Health Surveys (DHS) were conducted in Ghana in 1988, 1993, 1998 and 2003. A two-stage probabilistic sample design was used to select clusters at the first level and households at the second level. In each household, information was collected on household socio-demographic variables. Women also provided information on their birth history and outcomes and on the health of their children. Children anthropometric indicators were also measured, making it possible to assess the effects of socio-demographic factors on child nutritional status.

In this study, child nutritional status is measured by weight for age z score (WAZ), height for age z score (HAZ), and weight for height z score (WHZ). The prevalence of underweight, stunting and wasting is defined as the proportion of children with WAZ, HAZ, and WHZ, respectively, below 2 standard deviations (SD) or more below the median weight for age (NCHS/CDC/WHO International reference). Variables included in the analysis are described in table 1-a.

Statistical analysis

We use a logistic regression model adjusting for heterokedasticity and intra-cluster correlation to estimate the relative risk of being malnourished.

Preliminary results

The prevalence of stunting fell from 29% to 26% between 1988 and 1993, and then increased to 29% during the period 1993-2003 (table 1-b). The prevalence of underweight fell progressive from 30% in 1988 to 21% in 2003. The level of wasting increased and then fell.

Factors associated with underweight and stunting are presented in table 2. In 1998 and 2003, boys were at higher risk of being stunted compared to girls. Children born to mothers with a secondary or higher educational level were at lower risk of malnutrition compared to other children, but this effect was only significant in 1998. We also note that living in a wealthy household (as indicated for instance by possession of car, refrigerator and TV) is associated with better nutritional status, although the effects of wealth indicators are not simultaneously significant. Hygiene facilities also have a positive effect on nutritional status. Access to and utilization of health care facilities were also associated with lower risk of malnutrition.

Discussion

Childhood underweight fell during the period 1988-2003 in Ghana, why stunting and wasting fluctuated, but did not change appreciably during this period, which was also one of macro-level economic improvement in the country. These findings suggest that underweight and stunting had different response to economic growth. This unavoidably raises the question of the mechanism linking macro-level economic changes to different indicators of child health. Our analysis shows socioeconomic and health factors associated with better child nutritional status increased during the period 1988-2003, which seems to justify declines in the prevalence of underweight, and which should have also caused the level of stunting to fall as well. It is possible that some determinants of stunting not captured by our analysis remained unchanged during the period of study, and additionally outweighed the benefits due to increase in household socioeconomic status (as indicated by increase in the proportion of educated parents, the household possession of car, TV etc.) and access to health care.

The next step of our analysis will consist of estimating the effects of change in the distribution of socioeconomic factors affecting child health on trends in malnutrition. This analysis will adapt the analytical framework used in Pongou et al (2005) to analyze the impact of economic crisis on childhood malnutrition in Cameroon during the 1990s.

References

Ezzati M, Lopez AD, Rodgers A, Vander Hoorn S, Murray CJ, and the Comparative Risk Assessment Collaborating Group. Selected major risk factors and global and regional burden of disease. *Lancet* 2002;360:1347-1360.

Black RE, Morris SS, Bryce J 2003. Where and why are 10 million children dying every year? Lancet 361, 2226-2234.

De Onis M, Blossner M, Borghi E, Frongillo EA, Morris R. Estimates of global prevalence of childhood underweight in 1990 and 2015. *JAMA* 2004;291(21):2600-06.

De Onis M, Frongillo EA, Blossner M. Is malnutrition declining ? An analysis of changes in levels of child malnutrition since 1980. *Bull World Health Organ.* 2000 ;78(10) :1222-33

Paxson C, Schady N. Child health and the 1988-1992 economic crisis in Peru. World Bank Policy Research Working Paper 2004; 3260

Hill K, Adansi-Pipim G, Assogba L, Foster A, Mukiza-Gapere J, Paxson C. Demographic effects of economic reversals in Subsaharan Africa. Washington: National Research Council. National Academy Press. Washington D.C. 1993.

Pongou R, Ezzati M, Salomon JA. Economic crisis and declining child nutrition in Cameroon during the 1990s: The mediating role of household effects. Harvard Center for Population and Development Studies. Working Paper Series 2005;15(2)

USAID; Accessed September 16, 2005. http://pdf.dec.org/pdf_docs/PDACF141.pdf

World Bank Group. Accessed September 16, 2005. http://www.worldbank.org/cgi-bin/sendoff.cgi?page=/data/countrydata/aag/gha_aag.pdf

World Bank Group. Accessed September 19, 2005. http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/GHANAEXTN/0,,menuPK:351962~pagePK:141132~piPK:141107~theSitePK:351952,00.html

Kanbur, R. 2001, "Economic Policy, Distribution and Poverty: The Nature of Disagreements", *World Development*,

Table 1-a: Distribution (%) of selected variables

	1988	1993	1998	2003	P-value
Child demographics					
Sex					
Male	50.3	50.5	49.1	50.3	0.639
Female	49.7	49.5	50.9	49.7	
Average age (months)	18.5	16.8	27.9	28.6	0.001
Households demographics					
Mothers with a secondary or higher level of education	4.7	5.2	41.7	36.2	0.000
Fathers with secondary or higher education	11.6	12.2	55.9	47.8	0.000
Married mothers	90.6	91.6	90.1	90.9	0.343
Mother's age at birth	28.5	28.5	29.7	30.3	0.000
Households possessions					
Car	4.0	2.5	2.5	5.2	0.000
Refrigerator	21.8	25.3	32.2	35.4	0.000
TV	7.4	12.3	16.8	19.6	0.000
Piped water	26.4	29.3	30.6	28.8	0.001
Flush toilet	3.2	4.6	4.3	6.9	0.000
Access to health care					
Tetanus injection during pregnancy	73.1	79.7	83.2	85.1	0.000
Prenatal visit	84.4	86.1	89.7	69.4	0.000
Assistance at delivery by a health professional	42.2	58.6	68.6	45.5	0.000
Knowledge of ORS	60.9	77.6	82.6	90.0	0.000
Urban residence					
WAZ	29.4	25.8	25.9	29.4	0.001
HAZ	30.2	27.3	24.8	21.8	0.001
WHZ	7.8	11.3	9.5	7.1	0.001

Table 1-b: Trends in malnutrition in Ghana, 1988-2003

	1988	1993	1998	2003	P-value
Stuntung (HAZ<-2 SD)	29.4	25.8	25.9	29.4	0.001
Underweight (WAZ<-2SD)	30.2	27.3	24.8	21.8	0.001
Wasting (WHZ<-2SD)	7.8	11.3	9.5	7.1	0.001

Table 2: Robust logistic Regression of underweight and stunting on demographic and socio-demographic variables

	Underweight (WAZ<-2 SD)				Stunting (HAZ<-2 SD)			
	1988	1993	1998	2003	1988	1993	1998	2003
Child sex (male vs. female)	0.962	1.173	1.096	0.98	1.05	1.235	1.355**	1.305*
Child age (in months)	1.306**	1.258**	1.093**	1.141**	1.277**	1.232**	1.136**	1.144**
Child age*child age	0.994**	0.995**	0.999**	0.998**	0.996**	0.997**	0.999**	0.998**
Sec. or higher educ. (mother)	0.998	0.601	0.778*	0.968	0.791	0.701	0.747*	1.015
Sec. or higher educ. (father)	0.742	0.815	0.87	0.761	0.713	0.94	0.872	0.784*
Age at birth	0.954	0.967	0.949	0.923	0.913	0.86*	0.937	0.94
Age at birth*age at birth	1.001	1.001	1.001	1.001	1.001	1.002*	1.001	1.001
Car	1.577	0.993	0.418	0.546	1.566	0.391	0.204*	0.405*
Refrigerator	1.047	0.935	0.905	0.848	0.879	0.682	0.84	1.044
TV	0.547*	0.96	0.708	0.866	0.817	1.239	0.649*	0.586*
Piped water	0.854	0.843	0.762	0.67	0.791	0.754	0.797	0.864
Flush toilet	0.701	0.194**	0.815	0.915	0.484	0.745	1.289	1.043
Tetanus injection	1.077	0.946	1.077	0.943	1.115	1.086	1.032	0.697*
Medical assistance at birth	0.775*	0.773	1.145	0.93	0.763*	1.009	0.872	0.695**
Prenatal visit	0.789	0.703	0.711	0.669	0.801	0.608*	0.643*	0.74
Knowledge of ORS	0.828	0.732*	0.851	0.819	0.889	0.746*	1.18	0.869
Urban	0.967	1.282	1.185	0.925	0.971	1.344	1.395*	0.924
Observations	1813	1791	2594	2237	1813	1791	2594	2237

*significant at 5%; ** significant at 1%

Figure 1: Real GDP Per Capita, 1965 – 2000