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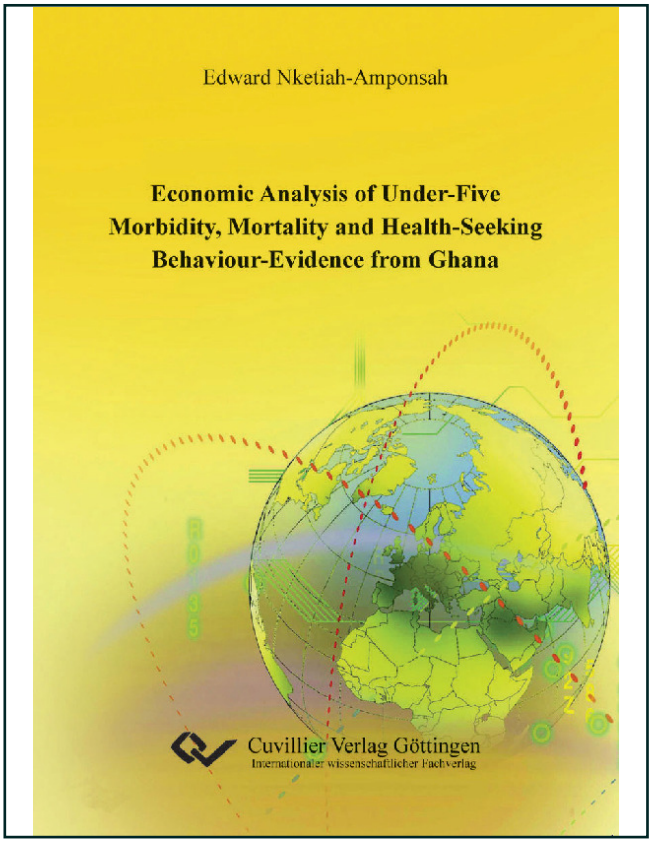
Economic Analysis of under-five Morbidity, Mortality and Health-seeking Behaviour – Evidence from Ghana



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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

There is vast literature on the determinants of under-five mortality and the demand for health care encompassing the entire population or a section of it using cross-sectional or panel data. Often socio-economic, demographic and biomedical factors have been found to be significant predictors of the demand for health care and health care utilization. This chapter presents the literature threefold; child mortality, health seeking behaviour in terms of choice of health care provider and demand for health insurance.

2.2 Child Mortality

Several studies have been carried out on infant and child mortality using Census, Living Standards and Demographic Health Survey (DHS) data. The literature treats the phenomenon two-fold; using cross-sectional or panel household data on one hand and cross-sectional time series or panel data on the other hand (*see* Imam, 2004; Hanmer *et al*. 2003; Fayissa, 2001; Ranis *et al*. 2000; Waldmann, 1992). However, this study is based on cross-sectional household data. The literature on the determinants of childhood mortality consistently identifies four broad categories of factors; household characteristics that have an indirect effect on mortality (e.g. maternal education, paternal education, region of residence, household income, and access to safe drinking water and sanitation); biological attributes at birth that have direct influence on health and nutrition (e.g. sex of the child, birth order, birth interval and mothers' age); health inputs before, during and after delivery that directly affect mortality but can be influenced by parental behaviour (e.g. prenatal care, institutional delivery, immunization, postnatal care and breast feeding); supply side factors that indicate the availability of health infrastructure such as community health centre, primary health centre and private/public hospitals.

Desai and Alva (1998) investigated the effect of maternal education on three indicators of child health-infant mortality, children's height for age and number of vaccinations received using Demographic and Health Survey data for 22 developing countries. The authors argued

that maternal education may be a proxy for the socio economic status of the household as well as for characteristics of the community of residence. Thus more educated women are more likely to have come from higher socio-economic strata and are likely to reside in areas with better health systems as well as water and sanitation systems.

Derose and Kulkarni (2005) using multi-level logistic analysis found community HIV rates, women's education and immunization as significant determinants of child mortality in Zambia. In Egypt, Aly and Grabowski (1990) used logit analysis to model child death probability using Egypt's World Fertility Survey in 1980. They concluded that source of drinking water and sanitation was significantly and negatively related to child mortality. Woldemicael (1988) employed logistic regression to examine the effect of some environmental and socioeconomic factors that determine childhood diarrhoea in Eritrea using data from the 1995 Eritrea Demographic and Health Survey (EDHS). The results show that type of floor material, household economic status and place of residence are significant predictors of diarrhoea.

Gangadharan *et al* (2000) used probit analysis to model child mortality in Pakistan and found that girls have a significant lower probability of dying in age group 0-1 but have a significant higher probability of dying in the age group 1-5. Thus the higher mortality of girls in the age group 1-5 reflects discrimination against girls in the form of lower health and other resource inputs. Additionally, they found mother's education beyond a certain threshold and increased duration between births to significantly reduce child mortality. Boone and Zhan (2006) employed logistic regression for analyzing child mortality in a cross-section of countries. The study found mother's and father's education as significant determinants of child mortality in poor countries.

Wang (2002) using cross-sectional demographic and health surveys and OLS concluded that at the national level, access to electricity, vaccination in the first year of life and public health expenditures can significantly reduce child mortality. In the urban areas, however, only access to electricity has a significant health impact while in rural areas, increasing vaccination coverage is important for reducing mortality.

In their study on Bangladesh, Bairagi *et al* (1999) using a duration model concluded that changes in mother's education, birth interval and birth order had little effect on mortality

decline. Duration modelling is applied by Hala (2002) to assess water and sanitation's impact on child mortality in Egypt. The results show that access to municipal water decreases the risk of child mortality but sanitation is found to have a more significant impact on mortality than water. In Malawi, Baker (1999) and Espo (2002) used indirect methods to estimate levels and trends of mortality in Malawi. The main findings are that source of drinking water and sanitation facilities are strong predictors of infant mortality. Berger *et al* (2002) analyzed the causes of under-five mortality in Zambia using Bayesian dynamic logit model for discrete time survival data and Markov-Chain Monte Carlo methods. The study showed that several variables, including the age of the mother and the breastfeeding duration exhibited distinct age-dependencies.

The hazard rate framework is utilized by Klaauw and Wang (2003), in which a flexible parametric framework for analyzing infant and child mortality is developed. Their model predicts that a significant number of under-five child deaths can be averted by providing electricity, improving the education of women, providing sanitation facilities and reducing in-door air pollution. Wang (2003), using data from the 2000 Ethiopia DHS examined the environmental determinants of child mortality by constructing three hazard models (the Weibull, the Piece-wise and the Cox model) to examine three age-specific mortality rates: neonatal, infant and under-five mortality. He found a strong and positive statistical relationship between child mortality rates and poor environmental conditions.

In another study, Jacoby and Wang (2004) examined the linkages between child mortality and morbidity in rural China using a competing risks approach. The key findings are that access to safe water/sanitation and maternal education reduce child mortality risks while use of unclean cooking fuels (wood and coal) significantly reduces the neonatal survival probability in rural areas.

Sang-Hyop (2005) estimated a household demand for immunization and the effect of immunization coverage on the probability of child survival in rural India. The author argued that mothers with high risk of child mortality may engage in compensatory behaviour in the demand for health inputs and that those who are favourable to prenatal care might engage in complementary behaviour in the demand for postnatal care (i.e. more likely to also obtain postnatal care). To address the problem of self-selection in the demand for health inputs, child mortality model was estimated jointly with the demand for immunization, demand for

delivery care, and demand for prenatal care. Child mortality was specified as a proportional hazard model; while the demand for immunization was modelled as an ordered probit. Both the demand for prenatal care and delivery were specified as random effects probit models.

Eldin and Maglab (2003) examined the impact of parent's education, health services and household standard of living measured by permanent income, on child survival in rural Sudan using household data consisting of 1400 rural residents. Child mortality was assumed to depend on the education levels of the mother and father, household's income per adult, mother's age, public programme variables related to health (such as availability of hospital beds per capita and services to improve sanitation and water-borne diseases) and rural dummies. It is argued that women's allocation of time between market and home production (upbringing and care of children) might influence the health status of children. The two-Stage Least Squares estimation technique was used with household assets used as identifiers in the regression. However, the OLS technique was also used for comparison of results. Both maternal and paternal education was found to have a significant negative impact on child mortality. However, maternal education was found to have a larger and more significant impact than paternal education.

Kravdal (2004) investigated the effects of the educational attainment of mothers and other women in the community on child mortality in India using the National Family Health Survey of 1998-1999. Child mortality was specified as a discrete–time hazard model and some of the explanatory variables considered were education of the mother, average education of women (capturing education of other women in the community) and women's autonomy variables (economic, physical, decision-making and emotional) which were incorporated as potentially mediating or confounding factors.

Kravdal (2004) also estimated logistic models for (15) health and health care indicators (including vaccination of children, whether the woman received antenatal care, received tetanus vaccination and had moderate or severe anaemia). Average education of women, mother's education, religion, wealth, urbanization, availability of health care facilities and the age of the child were some of the explanatory covariates used to model health and health care indicators. The results showed that higher mother's education and average education of women in the community are significant in reducing child mortality. Also, physical, decision-making and emotional indicators reduce the incidence of child mortality. In the case

of health and health care indicators, mother's education and average education of women also proved to be significant factors influencing their demand. The author recommended policies to enhance women's autonomy at both the individual and community level since their autonomy is crucial in reducing child mortality.

Blunch (2005) examined the impact of maternal literacy and numeracy skills, formal education and adult literacy course participation on child health inputs (vaccinations and postnatal care) and child mortality in Ghana. He adopted an Instrumental Variable (IV)-based two-stage least squares (2SLS) estimation technique to account for the potential endogeneity of maternal skills, schooling and adult literacy course participation. His preliminary results revealed that formal schooling, adult literacy course participation and literacy and numeracy skills have a positive impact on child health input demand and hence reduce child mortality. The author recommended improvement in child health knowledge through the inclusion of health topics in the curricula of adult literacy programmes.

Maitra and Pal (2005) examined the relationship between early childbearing, parental use of health inputs and child mortality in Bangladesh. The authors argue that mother's age at birth as well as hospital delivery and child vaccination are chosen by the couple (i.e. they are endogenous in the child mortality regression). Consequently, they attempted to address the potential bias resulting from endogeneity by jointly estimating child mortality, mother's age at birth and the demand for health inputs allowing for cross-correlations between the unobserved components of the residual terms in these equations.

Early child birth, institutional delivery, child vaccination and child mortality were all estimated as random effects probit models. The results revealed significant adverse selection in that women having early childbirth tended to use health inputs differently from all other women. Prior to accounting for self-selection in the choice of hospital delivery and child vaccination, hospital delivery was significant but was seen as having a harmful effect on child health.

Wang (2003) investigated the determinants of child mortality in LDCs using Demographic and Health Surveys data from over 60 low income countries. The results show that at the national level access to electricity, incomes, vaccination and public health expenditure significantly reduce child mortality. For the rural sample, vaccination is the only significant

predictor for child mortality while access to electricity is the only significant mortality determinant in the urban sample. Although pooled cross sectional data improves model performance because of the rich source of data, country specific effects are not captured.

Iram and Butt (2008) estimated the socioeconomic determinants of child mortality in Pakistan using sequential probit model. The study posits that breastfeeding protects children from early exposure to diseases and ill health and that mother's education is strongly related to neonatal mortality, infant mortality and child mortality through improved child caring practices. Proximate determinants such as prenatal care, income and environmental conditions were also found to be significantly related to child mortality**.**

Kovsted *et al*. (2002) investigated the impact of health knowledge on child health and mortality in Bissau, the capital of Guinea Bissau using duration modelling. Using the mothers' knowledge of malaria as a proxy for health knowledge and controlling for covariates, they concluded that the importance of maternal education in child health outcomes diminishes or disappears when health knowledge is introduced into the model. However, it was established that health knowledge has significant effect on both child mortality and health when instrumented for to capture endogeneity.

Earlier studies on childhood and under-five mortality in Ghana have examined socio-economic and bio-demographic factors without recourse to supply side variables such as availability of good roads and health personnel (Benefo and Schultz, 1996; Amankwah, 1996, Binka *et al*. 1995, Tawiah, 1989; Adansi-Pipim, 1985).

On the determinants of fertility and child mortality in Ghana and Cote d'Ivoire, Benefo and Schultz (1996) used OLS and Instrumental Variable Estimation. The dependent variable for the fertility equation estimated with OLS is the number of children born alive to women over age fifteen, treating child mortality as exogenous. In the child mortality estimation, child mortality is endogenous and identified by instruments measuring community health services and environment. Some of the main findings were that economic resources of households, maternal education, access to markets and food prices are significantly associated with child mortality in Ghana. In Cote d'Ivoire, households living a greater distance from a clinic experience higher mortality among their children while women's education was found to be a significant predictor of child mortality. On the issue of fertility, women's education was

proven to be the most important predictor in both countries. One important setback of the study was the omission of child characteristics which constitutes an integral biological endowment in the estimation of a child's health production function. This omission is attributable to the fact that the data source (Living Standards Survey) lacks such attributes.

Using pooled data from the 1998 and 2003 Ghana Demographic Health Surveys and a piecewise constant hazard model with gamma-shared frailty, Gyimah (2007) found at the bivariate level that children whose mothers identified as Muslims and traditional believers have a significantly higher risk of death compared with their counterparts whose mother's identified as Christians. However, the religious differences disappeared after the mediating and confounding influence of socioeconomic factors were controlled. In his previous study on ethnicity and infant mortality in Ghana, he found significant ethnic differences at the bivariate level. However, the ethnic differences disappeared after controlling for socio-economic variables (Gyimah, 2002). Although, Gyimah's paper provides an excellent contribution to the body of knowledge on child health outcomes, he did not control for supply side factors such as access to roads.

Bour (2003) studied the effect of maternal education on childhood mortality in Ghana using the Ghana Demographic and Health Survey data (1998) and World Bank data of 2000. Using graphic and linear regression models, the study confirmed that there is an inverse relationship between mother's education and child survivorship. While the study provides insight into the relationship between maternal education and child survivorship, it failed to account for the role of the public sector via public health investment. In addition, the hypothesized linear relationship employed in the study is oversimplified.

Asante (2003) using OLS found contrasting results regarding some covariates of under-five mortality including significant and positive association between income, use of safe drinking water and higher education on under-five mortality in Ghana. The unexpected outcome might be attributable to the use of inappropriate econometric model since OLS is incapable of capturing the dynamics. Additionally, maternal and child specific biomedical factors were not controlled for. The use of survival analysis in the current study, coupled with the introduction of supply side variables makes interesting comparisons with previous results.