Household, Community and contextual effects on childhood malnutrition in India: A multilevel approach

I Introduction

Child health and survival are of great concern among people in all walks of life and better child health and survival are considered as universal humanitarian goals. In the recent past, substantial improvements have been found in the child health and survival in most of the developing countries around the world. However, these achievements are still far below the levels projected at the 1978 International Conference on Primary Health Care held at Alma-Ata. Further, the childhood malnutrition level is still alarming around the world. In 1995, almost one-third of children under 5 years of age are estimated to be underweight in developing countries with almost half living in South Asia. Also, according to a report, about 55 percent of the deaths of children under age 5 years are due to malnourishment. It is also expressed that persistent under-nutrition kills many more people slowly in the long run than famines do. Additionally, it is widely accepted that adults who survive malnutrition as children are more vulnerable to the development of physical and intellectual abilities and they are more likely to suffer from higher levels of chronic illness and disability. Consequently the quality of future human resources largely depends on the health of children and improving the nutritional level of children is considered to be a priority area that produces high economic returns. Hence, there is an increasing appreciation that nutritional status of children under age 5 years should be upgraded for the promotion of health and for the improvement of the quality of human resources. To overcome the grave concern, several countries have introduced intervention programs to ameliorate the situation of declining nutritional level among children. World Health Organization (WHO) is one of the leading agencies in the South East Asian Region (SEAR) to introduce health and nutritional promotional programs. Among these the major nutritional programs in India are the Integrated Child Development Services (ICDS) and Tamil Nadu Integrated Nutrition Project (TINP). The former is a nation-wide program covering almost all the Indian states and the latter covers only the state of Tamil Nadu. However, for the better planning and implementation of such programs continued efforts are required to identify the key factors that affect the malnutrition among children.

Several theoretical explanations are found in the literature to explain malnutrition among children. Among these models, the family planning approach and the socio-economic approach have received much recent attention. Family planning proponents argue that malnutrition will disappear only with improvements in birth intervals, controlling birth order and other related factors. On the other hand, proponents of the socio-economic approach emphasize improvements in individual and household characteristics. While proponents of each approach have contributed to the development of understanding of the nutritional level in children, studies based in one approach are done to the exclusion of factors important to the other approach. The present study, however, incorporates these two approaches, family planning and socio-economic, into a single model for identifying the factors influencing the malnutrition among children in Rural India.

Another aspect that did not get much attention is the clustering of childhood malnutrition at household and community levels. A number of studies on the statistical analysis of child mortality risks identified family and community level clustering of child mortality. If such clustering exists for child mortality one can expect the same for nutritional status among children as well. Thus in this study we focus the presence of correlated outcomes among children residing in the same family and community. In other words, we control both for sibling correlation and for unobserved community effects by applying suitable multilevel model. The estimates from such model will provide a closer approximation to the true upper bound of the family effect, in addition to providing estimates of the magnitude and importance of community effect that are not captured by the other commonly used multivariate techniques.

II Frame Work

The basic frame work of studying the childhood malnutrition will be organized around three sets of factors such as genetic, behavioural and environmental and is similar to the Mosely and Chen's (1984) conceptual framework for the study of child mortality. A diagrammatic representation of the framework is given below.

		Form of effect		
		Genetic	**Behavioural**	**Environmental**
Level of operation	*Child*	Idiosyncratic genetic factors	Child-specific behaviour and care	
	Family/Household	Genetic factors shared among siblings	Parental competence, care of children common to all siblings	Household environment
	Community		Shared preferences, values, and cultural influences	Infrastructure, climate, physical and disease environment

Note: Adopted from Sastry (1997)

III Data

The present study uses data from the large-scale national sample survey, "National Family Health Survey (NFHS)" conducted in India. The NFHS was undertaken by various consulting organizations in collaboration and Population Research Centers. The NFHS dataset is comparable to that of the Demographic and Health Surveys conducted in many other countries. One of the unique features of this survey was the information available on height and weight of children in the context of the fertility and family planning behavior of the couples. Thus, for the first time, we can assess whether there exists any differentials in nutritional status of children in terms of social, economic and family planning characteristics of the population. Currently two rounds of data collection were carried out for NFHS and the data set is available to researchers for further analysis. The study proposes to use the NFHS data collected in the recent round, i.e. second round (NFHS – II).

IV Methods

To assess the nutritional status of individual children, the WHO recommended the use of Z-score indicators from the data on sex of the child, weight, height and age. The Z-score

indicators of weight-for-age (WAZ), height-for-age (HAZ) and weight-for-height (WHZ) are generally used for evaluating nutritional status of children. The commonly used cutoff value of Z-score is less than -2 and will be followed in the present study as well. The above-mentioned indices will be used for studying the malnutrition among children in Rural India. Following is the proposed basic multilevel model to be used for identifying the malnutrition among children in Rural India:

$$\log\left[\frac{\pi_{ijklm}}{1-\pi_{ijklm}}\right] = \beta x_{ijklm} + z_m + w_{lm} + v_{klm} + u_{jklm}$$

where, π_{ijklm} is the expected probability that child 'i' in household 'j' in PSU 'k' in district 'l' in state 'm' malnourished; x_{ijklm} is the vector of characteristics considered (please insert appropriate word if it is not correct) at individual, household or PSU levels and z_m, w_{lm}, v_{klm}, and u_{jklm} represent effects of unobserved factors (error terms) at state, district, PSU and household levels and follows normal distribution with mean zero. The standard assumption is that the observed responses $y_{ijklm} \sim$ Bernoulli (π_{jklm}).

Expected Results

We anticipate the following results from our analysis.

- Family/Household level factors have a significant contribution on childhood malnutrition in India as compared to factors at other levels of operation.
- At Family/Household level, we expect behavioral and household environmental factors are more important as compared to genetic factors.
- Variations in these factors are expected in different states which bring the idea of multidimensionality nature of the issue.
- Modifications in the current model are anticipated for better understanding of the issue.