MANCHESTER 1824

The University of Manchester

Economics
Discussion Paper Series
EDP-1209

Does Women's Empowerment Reduce Prevalence of Stunted and Underweight Children in Rural India?

Katsushi Imai

Samuel Kobina Annim

Raghav Gaiha

Veena S. Kulkarni

March 2012

Economics
School of Social Sciences
The University of Manchester
Manchester M13 9PL

Does Women's Empowerment Reduce Prevalence of Stunted and Underweight Children in Rural India?

Katsushi S. Imai *
Economics, School of Social Sciences, University of Manchester, UK

Samuel Kobina Annim
Economics, School of Social Sciences, University of Manchester, UK &
Department of Economics, University of Cape Coast, Ghana

Raghav Gaiha
Faculty of Management Studies, University of Delhi, India

Veena S. Kulkarni
Arkansas State University, USA

First Draft: 10th March 2012
This Draft: 23rd March 2012

Abstract

This study investigates whether mother's empowerment or relative bargaining power affects children's nutritional status using NFHS and NCAER data in 1992-2006. First, the relative bargaining index defined as the share of mother's schooling years over father's schooling years positively and significantly influences z scores of 'weight- for-age' and 'weight- for- height'- short-term measures of nutritional status of children. The results of quantile regression suggest, however, that the bargaining power will improve a chronic measure of nutritional status, or 'height for age' at the low end of conditional distribution of z score or those stunted. We also find that access to health scheme or health insurance and health-related facility, infrastructure and environment are important factors in reducing child malnutrition.

Key Words: Child Nutrition, Malnutrition, Empowerment, Bargaining, NFHS, NCAER, Quantile Regressions, Pseudo Panel, India

JEL Codes: C21, C23, C26, I14

*Corresponding Author:
Katsushi S. Imai (Dr)
Economics, School of Social Sciences,
University of Manchester, Arthur Lewis Building,
Oxford Road, Manchester M13 9PL, UK
Phone: +44-(0)161-275-4827; Fax: +44-(0)161-275-4928
E-mail: Katsushi.Imai@manchester.ac.uk

Acknowledgements
This study is founded by ESRC research grant entitled 'On the Change of Poverty and Undernutrition in Rural India'(RES-000-22-4028). We thank Md Azam, Subhasish Dey, Per Eklund, Raghbendra Jha, and Takahiro Sato for their valuable advice at various stages of the project. The views expressed here are those of the authors and the usual disclaimer applies.

Does Women's Empowerment Reduce Prevalence of Stunted and Underweight Children in Rural India?

I. Introduction

The objective of this study is to estimate the determinants of nutritional measures of children under three in rural India with a particular focus on the role of mother's status or bargaining power over father during the period 1992-2006. Malnutrition in India is still a major concern despite the country's impressive economic growth. India is one of a few countries with the worst levels of low birth weight, underweight and wasting among children in BRIC and SAARC [1] countries (IAMR, 2011). 43% (38%) of children under 5 are moderately underweight (stunted) in India, while the corresponding figures are 6% (11%) in China, 23% (14%) in Sri Lanka, 31% (37%) in Pakistan, 39% (43%) in Nepal and 41% (36%) in Bangladesh in 2000-7 (ibid., 2011), though these figures have gradually declined in India in the past three decades (Deaton and Drèze, 2009). Using the first two rounds of National Family Health Survey (NFHS) data in 1992-3 and 1998-9, Tarozzi and Mahajan (2007) documented that an overall nutritional status of children under three improved during the 1990s, but they also observed rural-urban disparity (in favour of urban children) as well as gender disparity which aggravated in favour of boys. More recently, based on the survey covering 112 rural (mostly backward) districts in relatively poor 9 states of India in 2010-11, the Naandi Foundation (2011) reported that (i) the prevalence of child underweight has decreased from 53 % in 2004 to 42 % in 2010-11 with an average annual rate of reduction of 2.9%; (ii) the nutritional advantage of girls over boys 0-3 years is reversed in 3-5 years (in both height- for- age and weight- for- age) which may suggest neglect of girls; and (iii) underweight children are more prevalent among mothers with low levels of education.

That is, despite some improvement, a substantial proportion of children is still undernourished-particularly in rural areas. This is not only a humanitarian concern requiring

[1] The South Asian Association for Regional Cooperation.

policy-makers and international communities to refocus their policy priorities on direct and indirect interventions to reduce children's malnutrition. The high level of child malnutrition in India also raises a concern for the country's prospects for continued economic growth given that child malnutrition in early years may result in malnutrition and lower cognitive skills when they grow up and work in the labour market.

There is a body of empirical literature focused on the determinants of child malnutrition, and thus on policy implications in India.[2] However, the results are mixed as they are context-specific, that is, most of the studies use cross-sectional household data only in a single year or field surveys for a relatively small number of households. In particular, a majority of the studies is based on one of the three rounds of NFHS data in 1992-3, or 1998-9 or 2005-6 (called NFHS 1, 2, and 3), while a few other studies used other data sources, such as NCAER. To overcome the limitations of using cross-sectional data of a single source, we use all the three rounds of NFHS data *as well as* the National Council of Applied Economic Research (NCAER) data in 1994 and 2005 and construct pseudo panel data. NCAER data are used as a robustness check to see if the results based on NFHS data could be generalised.

Recent empirical studies on child malnutrition in India tend to focus on one of the following three factors as determinants of children's nutritional or health status: (i) mothers' education, empowerment, and/or relative bargaining power vis-a-vis fathers', (ii) social capital at the community level; and (iii) policy interventions (e.g. Integrated Child Development Services (ICDS)), whilst most of the studies take account of other variables such as household income or consumption, household composition and characteristics, composition of children, caste affiliation, hygiene and sanitation facilities, and food prices.

For instance, drawing upon NCAER data in 1994, Gaiha and Kulkarni (2005) found by applying Poisson model that narrowing the wage gap between men and women – there proxy

[2] There is of course a huge empirical literature on child nutrition in developing countries outside India and we mention only a few in case they are particularly relevant to our paper.

for women's empowerment - reduces severe stunting in terms of the number of stunted children in a household. They also concluded that household income, household and children compositions, and caste affiliations matter in reducing stunting. In a variation, using NFHS-2, Maitra (2004) showed that child health is affected only indirectly through the improved usage of health care, which is determined by women's education and control over the household resources or bargaining power.

A few studies have focused on the role of social capital in improving child nutritional status. For instance, based on their field work on a group of tea estates in South India in 2002, Luke and Xu (2011) showed that the community-level women's education on weight at age one reduced the prevalence of malnutrition under the age of one. Kravdal (2003) used NFHS-2 data and found that women's empowerment index (a sum of binary response variables, such as, whether a husband is justified beating his wife in certain situations) as well as the average women's education in the census enumeration area

reduces child's mortality significantly.

On the policy side, most of the studies have evaluated the effectiveness of ICDS. A recent study by Kandpal (2011) applied Propensity Score Matching (PSM) and estimated treatment effects using mainly NFHS 3. The study concluded that ICDS increases height- for- age scores by 6%, contrary to previous research which showed little effect on child nutrition. For example, applying PSM to NFHS 1 and 2 data, Lokshin et al. (2005) found little impact of ICDS on z scores of height- for- age and weight- for -age and that programme placement is regressive across states.

On the methodology, a few recent studies (e.g. Borooah, 2005; Kandpal and McNamara, 2009) used quantile regression (QR) to analyse the determinants of child malnutrition to estimate effects of various factors on child nutritional status for different parts of distribution (e.g. for those underweight and overweight separately) as the results of OLS based on the

conditional mean may be misleading due to different behavioral response towards malnourished children and overweight children. Borooah applied QR to NCAER data in 1994 and showed that height- for- age is improved by household access to safe water and good hospital care in the low to middle range of distribution, and by mother's literacy in the middle of distribution of children's nutritional status. Kandpal and McNamara's study based on NFHS-3 also found that maternal health and education have larger effects at the lower end. We also use QR with particular focus on difference of effects of various factors for different parts of nutritional distribution.[3]

The present study is unique in the sense that it is based on two sources of national household survey data sets in 1992-2006, namely, three rounds of National Family Health Survey (NFHS) data and two rounds of National Council of Applied Economic Research (NCAER) data following Tarozzi and Mahjajan's (2007) recommendation for cross-checking the results using more than one data source over the years, not in a single year, to identify the true causes of children's malnutrition in India. Following the previous studies, we estimate the effects of mother's bargaining power relative to father's on child malnutrition by using an IV (instrumental variable) model where mother's bargaining power as well as access to health insurance scheme are treated as endogenous variables. We also apply quantile regressions to take account of different behavioural response of households towards malnourished children and those with children in the normal range of height or weight or overweight. Pseudo panel data models are also applied to identify the determinants of child malnutrition over the years.

The rest of the paper is organised as follows. The next section discusses theoretical issues and presents the basic analytical framework which underlies our econometric analysis. After describing the data in Section III, we discuss the econometric models and specifications in

[3] Aturupane et al. (2008) applied QR to estimate the determinants of weight (as well as height) for age and mother's education is important in reducing underweight at higher percentiles.

Section IV. Section V reports econometric results. The final section offers some concluding remarks.

II. Analytical Framework

Theoretical Considerations

This section discuses theoretical aspects of the determination of child nutritional status and outlines an analytical framework briefly to explain how the bargaining power of a mother relative to the father's would affect the health or nutritional status of children. In conceptualizing the determinants of child nutritional status, researchers could specify a structural health production function (e.g. Thomas, 1994) or model the intrahousehold bargaining model between a mother and a father and then derive the reduced form equation for the child health or nutrition where the bargaining or empowerment index is used as a determinant together with household characteristics.

Thomas (1994) combines a health production function where child health as an output is a function of a number of inputs (e.g. nutrient intakes and the quantity and quality of child/ health care and individual and household characteristics) with a standard utility function of the household member under a budget constraint for the household. This process can be typically done in the framework of unitary household models in which the household head makes a decision on behalf of household members, all the household resources are pooled, and a mother and a father have an identical taste (e.g. Becker, 1974, see Park, 2007 for the application to child nutrition).[4]

One could use the non-unitary models where a personal preference and bargaining power matter. This consists of cooperative bargaining models and non-cooperative bargaining models. In the cooperative bargaining models, a father or a mother derives his or her utility

[4] The health production approach could be incorporated in non-unitary or bargaining household models (Thomas, 1994).

from own consumption of commodities and public goods (e.g. health or nutritional status of children) and the bargaining process is affected by an outside option or the extrahousehold environmental parameters (EEP) which are, for example, conditional on the threat of martial dissolution or other environmental factors (e.g. McElroy and Horney, 1981; McElroy, 1990). In case of bargaining over child health or nutritional status, a father and a mother are assumed to make decisions over the quality of health, nutritional conditions of children or the spending in child health care independently as a part of his or her utility maximization problem (e.g. Maitra, 2004, Park, 2007; Fafchamps et al. 2009)[5]. Non-cooperative bargaining models include Lundberg and Pollak's (1993) model which specifies the threat point as a noncooperative equilibrium within marriage and define it in terms of traditional gender roles and gender role expectations.

Because the health production approach requires detailed data on health inputs (e.g. health care, nutritional intakes, and prices), our conceptual framework is based on the cooperative bargaining model following most of the empirical studies of child health and nutrition where the actual specification closely follows Imai and Sato (2010).

We assume that a household consists of a mother, m, a father, f, and a certain number of children, *K*, considered to be 'a public good' for both parents. It is assumed that children are not decision- makers and parents care about the average health quality or nutritional status of children. Let x_j be the j^{th} person's consumption ($j = m, f$), and q be the (average) health quality of children. The j^{th} person's utility is defined as $U_j\left(x_j, q_j \middle| A_j\right)$. Here we define A_j, EEP, a vector consisting of exogenous factors that determine the preferences of the individual

[5] Maitra (2004) assumes that parents bargain over the use of health care (e.g. prenatal care and hospital delivery) and examines the effects of health care of child mortality. To avoid complication in the empirical model, we assume that parents can directly bargain over child health and nutritional status where the bargaining coefficient captures both direct effects of bargaining and indirect effects through the use of health care.

j. A_j may depends on the factors determined outside the household, e.g. unearned income for *j*, as well as his or her individual characteristics.

Each individual is assumed to choose x_j (own consumption) and q (child quality) to maximise. In this setting, the household utility function is defined as where γ represents the "bargaining power" of a wife in a household ($0 < \gamma < 1$). The household's utility maximization problem is specified as follows:

$$\underset{x_m, x_f, q}{Max}\ U^H = \gamma U_m(x_m, q;\ A_m) + (1-\gamma) U_f(x_f, q;\ A_f) \qquad (1)$$

subject to

$$I = p_m x_m + p_f x_f + p_c q \qquad (2)$$

where I is a household's income, p_i is the price of the private goods for the mother or the father, and p_c is the shadow price of public goods, that is, children in this case. In general, the optimal q^* (health quality of child) will depend on parameters such as γ, p_c, I, p_i, and A_i as follows:

$$q^* = q^*(\gamma, I, p_m, p_f, p_c, A_m, A_f) \qquad (3)$$

This model sheds light on the household decision on child health. For example, "bargaining power" γ may reflect women's empowerment represented by female education and female labour participation. Given that a female is more likely than a male, to value q, the quality of children's health, the stronger bargaining power of a female reflected in higher γ leads to a better nutritional outcome. In this framework, higher level of education is likely to improve the nutritional status of children through higher γ. A_i represents each household member's attitude toward health care, which may be different in various classes or social groups. Economic growth increases a household's income level I and improves the health of children.

III. Data

This study draws upon NFHS Data in 1992-3, 1998-9 and 2005-6 and NCAER data in 1994 and 2005. The NFHS is a major nationwide, large multi-round survey conducted in a representative sample of households in India with a focus on health and nutrition of household members, especially of women and young children.[6] The survey covers the issues including fertility, family planning, maternal and child health, gender, HIV/AIDS, nutrition and malaria. Data were collected at the individual level (children, mothers and fathers in NFHS-3) as well as household and community level. This study uses data on children 0 to 3 years in rural areas for NHHS-1, 2 and 3. This is because children below age 4 are covered in NFHS-1, below 3 in NHHS-2, and below 5 in NFHS-3. It is also well known that nutritional conditions from 0 to 3 years have the most fundamental effect on stunting in later life (e.g. Maluccio et al., 2007).

We supplement NFHS data by NCAER data. The data were collected through multi-purpose household survey designed and conducted by NCAER. The initial survey was carried out in 1994 covering 16 states with a multi-stage sample design and the districts were cross-classified by income by income from agriculture and female literacy rate to form homogeneous strata in terms of these variables.[7] In 2004-5 the Indian Human Development Survey (IHDS) was used to explore the effect of both wages and activity intensity on adult's BMI. The IHDS data collected through collaborative research between NCAER and the University of Maryland, USA is aimed at tracking (through panel) the daily lives of Indian households from multi-perspectives. Both rounds of data are nationally representative (covering all the states of India) and the thematic areas include education, health, livelihoods, family processes and the social structure within which the households operate. One of the

[6] See http://www.nfhsindia.org/index.html for the detailed description of NFHS.
[7] See Gaiha and Kulkarni (2005) for further details of NCAER data in 1994.

limitations of NCAER data in 2005 is that age of a child is recorded only in years, not in month. Therefore, we construct the z scores of 'weight for height' (wasting) for children below 3 years using NCAER data. For NFHS data, z scores of 'height- for- age' (stunting), 'weight for age' (underweight) as well as 'weight for height' for children below 3 years are used.

On z scores, we follow the z score based on WHO (2006) which included 'children from a diverse set of countries: Brazil, Ghana, India, Norway, Oman and the USA' (ibid., p.1) as the reference group to capture the ethnic and racial diversity. Following WHO (1997) and Gaiha and Kulkarni (2005), z score is defined as:

$$z - score = (x_i - x_{median}) / \sigma^x \qquad (4)$$

where x_i is, for example, height of child i, x_{median} is the median height from the reference population of the same age and gender, and σ^x is the standard deviation from the mean of the reference population. The z-score for the reference population has a standard normal distribution in the limit. Thus, there is a less than 2.3% probability that a healthy child will have a z score less than -2 (WHO, 1997). It is normally assumed that children with a z score below -3 is classified as 'severely stunted', those with a z score between -3 and -2 are 'moderately stunted'. Underweight or wasting is defined in the same manner. In this study, however, we define children with z score below 4 as 'acutely malnourished' given the large number of children severely or moderately malnourished. Also, as the factors influencing underweight and overweight children are likely to be different, we consider the factors affecting those in other appropriate ranges, defined by z scores of -1, -2, 0, 1, 2, and 3.[8]

IV. Econometric Specifications

[8] Descriptive statistics of variables used in the regressions are given in Appendix 1.

Our main objective of the econometric analyses is to identify determinants of child malnutrition in rural India to test (i) whether the relative bargaining power or empowerment of a mother affects nutritional status of her children; and (ii) what sort of factors (including those associated with children, households, infrastructure and policy) are likely to change the their nutritional status. There are three methodological aspects of the present study that distinguish it from extant studies on child malnutrition in India. First, following Borooah (2005) and Kandpal and McNamara (2009), we apply quantile regressions (in addition to OLS) to estimate different coefficient estimates at different points in the conditional distribution of nutritional status, rather than at the mean. Second, IV estimation has been also applied to take into consideration (i) bargaining power of women and (ii) access to health insurance schemes. Third, in order to combine three rounds of NFHS data (and two rounds of NCAER data), we use pseudo panel data models.

OLS and IV

We presented a simple version of bargaining models in Section II, but it is not easy to find the variables which would exactly capture different factors specified in the theoretical model (e.g. the extrahousehold environmental parameters and the bargaining coefficient γ). We thus use the reduced form equation approach where the child nutritional condition is a function of the bargaining indicators and household characteristics because the household survey data we use (namely NFHS or NCAER data) do not contain the variables, such as prices specific to father or mother's consumption or the individual unearned income.

Here we consider the reduced form equation which estimates the effect of (a proxy of) the bargaining power on child nutritional status. Here we distinguish three units, a child, a

household and a community.[9] We denote i for the i^{th} child (or an ID number identifying a particular child) and h for the h^{th} household (a household ID number) in a total sample at time t (year). We estimate q_{ih}, a nutritional status indicator (namely, z score of height for age, weight for age, or weight for height) as:

$$q_{ih} = q_{ih}(\gamma_h,\ B_i,\ X_h,\ \ Z_h,\ \ H_h, R, P) \tag{5}$$

It is assumed here that A_m and A_f (or A_m/A_f) in the equation (3) can be captured by a single variable γ_h representing the bargaining power between father and mother. We proxy γ_h by (i) a dummy variable on whether a husband is justified for hitting or beating his wife when she is unfaithful to him (1 for Yes; 0 for No); (ii) a dummy on whether a mother needs permission from her husband when she goes to market (1 for Yes; 0 for No); or (iii) the proportion of mother's schooling years to father's schooling years ([schooling years of mother]/ [schooling years of father]) (after controlling for an average schooling years of mother and father). In case of IV, γ_h is instrumented by the (proportional) difference of father's age and mother's on the ground that the relatively older father tends to have a larger bargaining power, but it does not have a separate and direct impact on their child's nutritional conditions. B_i is a vector of characteristic of the i^{th} child: whether male or not; age and its square; and whether the second, third or fourth child.

X_h is a vector of household specific variables, such as household characteristics and compositions, such as, household size; share of children under the age of 5 in total number of household members; the average schooling years of a father and a mother; mother's age; its square; a wealth index; and whether a household has access to electricity; whether a

[9] Variance should be clustered at the house level, but as quantile regressions or IV regressions do not allow us to 'cluster' regression due to technical constraints of *Stata 11.0*, we take account of the clustering effects only for OLS. But in case of OLS, once we introduce the heteroscedasticity-robust estimator, 'clustering' cannot be corrected. We have found (in case of OLS) that clustering at household or at community level would not change the results significantly and so given the large sample size, we present the case where only heteroscedasticity is adjusted by a robust estimator.

household has a radio (or a TV; bicycle; a flush toilet). Z_h is a vector of variables capturing the social, environmental or infrastructural factors specific to the h^{th} household: time necessary for getting water; a household belongs to scheduled castes (SCs) (or scheduled tribes (STs); other backward groups); religion dummies (e.g. Hindu, Muslim; Christians). H_h is a policy variable that would affect child's health: whether a household has access to a health scheme or health insurance. This is instrumented by the infrastructure variable to capture the availability of information, that is, how many households in the village have access to a telephone in IV. R is a vector of regional dummies (whether BIMARU [10]; whether South (or East; West) area of India) as well as state dummies to take account of state fixed effects. P is a price vector (sugar; egg; cereal).

Quantile Regressions

As discussed by Aturupane et al. (2008) and Borooah (2005), it is important to estimate the effect of various variables on child nutritional status on different points in its conditional distributions as behavioral response to predictors (e.g. health insurance, mother's bargaining power) is likely to be different among a malnourished child and an overweight child. As in Koenker and Bassett (1978), quantile regression for the θ^{th} percentile takes the form[11]:

$$\underset{b \in R^K}{Min} \left[\sum_{i \in \{i: q_i \geq X_i b\}} \theta \left| q_i - \mathrm{X}_i b \right| + \sum_{i \in \{i: q_i \prec X_i b\}} (1-\theta) \left| q_i - \mathrm{X}_i b \right| \right] \qquad (6)$$

where $0 < \theta < 1$, q_i is a dependent variable (z score of child nutritional status), and X_i is a vector of all the explanatory variables in the equation (5). For example, if θ=0.5, this is a median regression. Most of the studies show the results θ=0.05, 0.1, 0.25, 0.75 and so on, but we have chosen the median of each nutritional group for θ to estimate the (approximate)

[10] It stands for Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh.
[11] See Buchinsky (1994) and Eide and Showalter (1998) for the application of quantile regressions in the US.

determinants of nutritional conditions for each group. For example, if we find that 12% of children are severely undernourished ($z < -3.0$), we have used 0.06 as θ. Also, because the error terms in each group is unlikely to be without heteroscedasticity, bootstrap estimates of the asymptotic variances are calculated with 100 repetitions.

Pseudo Panel Data Model[12]

One of the limitations of the above model is that each round of NFHS or NCAER data is used separately for the cross-sectional estimations. To overcome this and to identify the determinants of child nutritional status over the years, we also apply the pseudo panel model which aggregates micro-level data by any cohort that is common across cross-sectional data sets in different years. We apply the pseudo panel for the cohort *k* based on the combination of states and mother's age groups (15-19 years, 20-24 years, … , 45-49 years). The cohort is denoted as *k* in the equation (2) below.

$$\overline{q_{ih\,kt}} = \overline{q_{ih\,kt}}\left(\overline{\gamma_{h\,kt}}, \overline{B_{i\,kt}}, \overline{X_{h\,kt}}, \overline{Z_{h\,kt}}, \overline{P_{kt}}\right) \qquad (7)$$

where k denotes cohort and t stands for survey years for three rounds of NFHS data , 1992, 1998 and 2005, or two rounds of NCAER data in 1994 and 2005. The upper bar means that the average of each variable is taken for each cohort, k for each round, t. Regional variables do not have time variation and have been dropped. A variable on health scheme or health insurance has been also dropped as this is available only in NFHS-3.

The equation (7) can be estimated by the standard static panel model, such as fixed effects or random effects model.

$$\overline{q_{i\,kt}} = \alpha + \sum_{l=1}^{w} \overline{X_i}^{l} \beta^{l}{}_{kt} + D_t\,\chi + \overline{\mu}_{kt} + \overline{e}_{kt} \qquad (8)$$

[12] The exposition closely follows Imai and Sato (2010).

where $\overline{q}_{i\,kt}$ is a dependent variable, $\overline{\mathrm{X}}_{i\,kt}^{\,l}$ represents explanatory variables in the equation (7), D_t is a vector of year dummies, $\bar{\mu}_{kt}$ is the unobservable individual effect specific to the cohort *k* (e.g. cultural effects which are not captured by explanatory variables), and $\bar{e}_{kt}$ is an error term. The issue is whether equation (8) is a good approximation to the underlying household panel models for household *i* in equation (8)' below. It is not straightforward to check this as we do not have 'real' panel data.

$$\overline{q}_{i\,kt} = \alpha + \sum_{l=1}^{w} \overline{\mathrm{X}}_{i}^{\,l} \beta^{l}{}_{kt} + D_t\,\chi + \bar{\mu}_{kt} + \bar{e}_{\,kt} \qquad (8)'$$

$$q_{it} = \alpha' + \sum_{l=1}^{q} \mathrm{X}^{l}{}_{it}\,\beta^{l} + D_t\chi + \mu_i + e_{it} \qquad (3)'$$

However, as shown by Verbeek and Nijman (1992) and Verbeek (1996), if the number of observations in cohort *k* tends to infinity, $\bar{\mu}_{kt} \to \mu_k^{\,*}$ and the estimator is consistent. In our case, *k* is reasonably large and thus the estimator is likely to be almost consistent. Once we take account of the cohort population, equation (8) will become the model developed by Deaton (1985) whereby $\overline{q}_{i\,kt}$ and $\overline{\mathrm{X}}_{i\,kt}$ are considered to be error-ridden measurements of unobservable cohort means, which leads to so-called 'error-in-variables estimator' (see Fuller, 1987 for more details).

V. Econometric Results

This section discusses econometric results based on the models given in Section VI. Because the results are voluminous, we highlight only key variables, such as bargaining variables in this section, and give the full results in Appendices.

Table 1 summarizes the coefficient estimates of bargaining indictors estimated by NFHS data, namely, the ratio of mother's schooling years to father's schooling years (for NFHS-1, 2 and 3); whether a husband is justified in beating his wife when she is unfaithful; or whether a wife is allowed to go to the market without permission from a husband (NHHS-2 and 3 only).

Each variable is inserted at one time. Average education of a father and a mother is included as a control variable for the ratio of schooling years. Table 2 shows the corresponding results for NCAER data.

(Table 1 to be inserted)

The first panel shows the results for NFHS-1 (1992-3). It is observed that the results of OLS do not necessarily represent the results at the ends of distributions, though they are roughly close to those in the middle (e.g. z score from -1 to 1). Here it is important to find that increase in mother's relative bargaining power (in terms of schooling) tends to improve severely and moderately stunted children as well as severely underweight children. Average education is positive and significant. In the second panel for NFHS-2 (1998-9), we find that (i) mother's relative bargaining is positive and significant for 'weight- for- age' and for 'weight- for- height' (only for those who are undernourished in both cases), but statistically not significant for 'height- for- age'; (ii) average education is positive and mostly significant, (iii) 'beating' negatively and significantly affects 'weight- for- age' and 'weight- for- height' in the range 'acutely malnourished'; and (iv) a woman's autonomy (in terms of going to the market) positively and significantly affects 'weight- for- age' (for the malnourished) and 'weight- for- height' (for the acutely malnourished).

From NFHS-3 (2005-6), we do not find many cases where a bargaining variable is statistically significant, while average education is positive and significant in most cases. In one case ($0<z<1$ for 'weight- for- height'), the relative schooling years has a significant and positive effect on the nutritional indicator. And in another ($-2<z<-1$ for 'weight- for- height'), it tends to be worsened by a father's 'beating'. We have carried out IV estimation where a bargaining indicator is instrumented by the relative age difference of a husband and a wife. As in OLS, bargaining variables remain statistically non-significant.

A main insight here is that improvement in women's bargaining power over men tends to improve children's nutritional status mainly for households in the 1990s, but this effect became weak in 2005-6. To see if this conclusion will hold if we use NCAER data, we have carried out OLS and quantile regressions for NCAER data in 1994 and 2005. However, we have found that while average education is generally positive and significant, the bargaining variable is not significant. Hence, the results in Table 1 will have to be interpreted with caution because conflicting results imply that regression results are likely to be context-specific.

(Table 2 to be inserted)

Because the results are very large, we will summarise the results based on the cross-sectional regressions (i.e., OLS, IV and quantile regressions or QR) for three rounds of NFHS data and two rounds of NCAER data.[13] The first column of each panel summarises the results of OLS and IV where '+' or '-' are shown in case the coefficient estimate is significant. If it is significant only for OLS or IV, it is shown as, e.g., "+(ols)". If the variables are not available, it is shown as 'NA'. In case of QR, while '+' and '-' signs indicate statistically significant cases, we show, e.g. '+M' for the case where a positive and significant coefficient is found in one of the categories 'malnourished' (z score <-2.0), '+N' (or '-N') for significant cases for 'normal' (-2.0<z 2.0) and '+O' (or '-O') for significant cases for 'overnourished'.

(Table 3 to be inserted)

It is important to note that the coefficient estimates of OLS based on the mean of the conditional distribution of a dependent variable do not necessarily reflect the coefficient

[13] Appendix Table A2 to Appendix Table A5 give the full set of results.

estimates of each group derived by QR, though as expected the results of OLS by and large reflect the results for the 'normal' group (which is closer to the median regression). The results of QR will be useful for us to check whether those of OLS will hold for all the nutritional groups across the entire conditional distribution of z. In a few cases, the results of QR are not only different from those of OLS, but changes the signs at different points of conditional distributions. For example, a child's age is not statistically significant for 'weight-for- height' (wasting) in OLS or IV for NFHS-3 (Appendix Table 4(a)), but it is positive and significant up to the group with z score <-1.0, not significant for the group with z between -1 and negative and significant for those with z score >1.0 (Appendix Table 4(d)). This implies that the change of 'weight for height' is in the direction of being equalized which is statistically significant, but OLS will never capture this. This is the point emphasized by Borooah (2005).

However, such a case is rare and we get results mostly consistent across different estimation methods. Because the space is limited, we highlight a few important results.

Consistent with previous studies (e.g. Borooah, 2005, Kandpal and McNamara, 2009), whether a child is male is negative and significant in most cases. But, as suggested by Charmarbagwala et al. (2004), the sign of a sex dummy of a child can differ across countries, over the years, and our results are likely to be context specific. Age of a child is negative and significant with its square positive and significant, implying that z score is decreasing as a child grows but a marginal change will be smaller as he or she grows. Consistent with Gaiha and Kulkarni (2005), the higher birth order negatively affects nutritional status irrespective of which measure is used for NHFS data. In case of NCAER data, a negative effect of higher birth order is not observed very clearly for a z score of weight- for- height.

The results of bargaining variables have been already discussed. The variable on whether a household has access to health scheme or health insurance is available for only NFHS-3.

Only in case of IV applied to 'weight- for- age', where it is instrumented by the availability of telephone in the region (incomplete).[14] The result suggests that household access to heath scheme and health insurance improves the child's nutritional condition (in terms of underweight measure) after taking account of the endogeneity problem.

'Time necessary for getting water' has an expected negative and significant sign in some cases, in particular, for underweight and wasting. As women are responsible for fetching water, there is an unavoidable trade-off between this activity and child care. Access to electricity has a positive and significant coefficient for underweight and wasting measures, Among the variables on household characteristics, mother's age is highly significant and positive with its square negative and significant for all the three measures. Access to a radio is positive and significant only for children malnourished or in the normal range in 1992-3. Access to a TV is positive and significant mainly in 1998-9. Having fridge is positive and significant only in 2005-6. Children from scheduled castes or scheduled tribes tend to have lower levels of z scores.

As hypothesised, we obtained negative and significant coefficient estimates for food price for NFHS-1 and NCAER data in 2005. The coefficient estimate, however, became positive and significant for NFHS-2. The reason is not clear. Prices of sugar, egg and cereal are negative and significant for weight- for- age in 2005-6 (for NFHS-3). While the coefficient estimates of cereal prices were positive and significant for NCAER in 1994 data, those for sugar and cereal were negative and significant in 2005.

Table 4 reports the results of pseudo panel model based on NFHS data. Because the variables available for NFHS-1 are limited, we present two cases – NFHS 1, 2 and 3 and NFHS 2 and 3 - for three different child nutrition indicators. These are shown in columns 1 to

[14] In the first stage, the instrument is significant with a t value of 3.12. While over-identification is ruled out (the equation is exactly identified), the results of under-identification and weak identification tests imply that the excluded instruments are correlated with the endogenous regressors and the correlation is not weak.

6. The choice between fixed effects model and random effects model is based on the Hausman test and except one case (column 2) we have chosen the fixed effects model. Table 5 presents the results of the pseudo panel data model based on two rounds of NCAER data in 1994 and 2005 for 'weight- for- height'. The results of both fixed effects and random effects models are shown in columns (1) and (2), while the Hausman test result favours fixed effects model.

(Tables 4 and 5 to be inserted)

The relative bargaining power of mother in terms of schooling years is positive and statistically significant for 'weight- for -age' and 'weight –for- height' in columns 2, 3, 5 and 6 of Table 4. The coefficient estimate of the relative bargaining indicator for mothers is also positive and significant for 'weight- for- height' in column (1) of Table 5, based on the fixed effects model. Our hypothesis that the role of mother's relative bargaining power or empowerment in improving her children's nutritional status in terms of short-term nutritional deprivation is corroborated by both NFHS data and NCAER data. However, the relative bargaining indicator is not significant for 'height- for- age' which represents chronic or long-term nutritional deprivation in Table 4, although, as discussed earlier, the bargaining variable's effect is positive and significant on those malnourished in QR for NFHS-1.

However, 'whether a husband is justified in beating his wife' is 'positive' and significant for weight- for- age in the column (5), contrary to our prediction. Looking more closely at the corresponding case of QR for NFHS-2 and 3 in Table 1, we find that 'beating' is not significant for NFHS-2 (except for the first category of 'acutely malnourished' where 'beating' is negative and significant) or NFHS-3. It is likely that positive and statistically insignificant results in OLS and QR for NFHS-3 become dominant once we highlight inter-

state variations. 'Whether a wife is allowed to go to the market without permission from husband' is positive and significant for 'height- for -age' and 'weight- for- age'.[15]

We summarise the results selectively below. While the share of children under 5 is negative and significant for 'weight- for- height' in column (1) of Table 5 for NCAER data, it is positive but non-significant in column 3,and positive and significant in column 6 for NFHS data. But it is negative for 'height- for- wage' and 'weight- for- age'. The results are mixed, but by and large, having more children under five tends to result in worse nutritional conditions of children. Consistent with previous results, boys under three are worse nourished than girls. A child's age is mostly negative and significant with its square positive.

As before, mother's age is positive and significant (with square positive and significant) for 'weight- for- age' and 'weight- for- height'. The effect of having a 'flush toilet' on child nutritional status is more clearly observed in case of pseudo panel (Table 4) where it is positive and significant at the 1% level.

The effect of 'time for getting water' on child nutrition is also more clearly observed in pseudo panel models in Tables 4 and 5. It is negative and significant for 'weight- for- height' in columns 3 and 6 of Table 4 and column 1 of Table 5. Electricity is also negative and significant for 'weight- for- height' in column 3. Access to a TV positively increases z score irrespective of its definition when NFHS-2 and 3 are used, while it is significant only for 'weight- for- height' for NFHS 1, 2 and 3. Children belonging to scheduled castes (SC) are more likely to be undernourished for all the measures for NFHS.[16] Food price is not

[15] Because the pseudo panel model involves averaging the values for each cohort, interpretation of the coefficient estimate is not straightforward. But one can imagine that the marginal effect is not large as 1 unit increase of 'beat_unfaithful' (equivalent to 100% increase in the probability of a wife being allowed to go to the market without permission of her husband) only increases z score of height- for-age by 0.453 (0.342 for weight- for -age).

[16] However, in case of NCAER data, coefficients for SCs and STc are positive and significant. The reason is not clear – it may be due to the fact that 'weight- for- height' is sensitive to changes or measurement errors in two factors (weight and height) rather than one. So we will use 'height- for -age' and 'weight- for- age' are our preferred measures.

significant in most of the cases except for ‘weight- for- age’ in column 5 of Table 4 where the coefficient of food price is positive and significant.

VI. Concluding Observations

This study investigated whether mother’s empowerment or relative bargaining power affects children’s nutritional status using three rounds of NFHS data in 1992-3, 1998-9, 2005-6 as well as the National Council of Applied Economic Research (NCAER) data in 1994 and 2005. NCAER data are used as a robustness check to see if the results based on NFHS data could be generalised. OLS, IV, quantile regressions (QR) and pseudo panel model are applied to these data sets. Main conclusions have been summarised as follows.

First, the relative bargaining index defined as the share of mother’s schooling years over father’s schooling years positively and significantly influences z scores of ‘weight- for- age’ and ‘weight- for- height’- short-term measures of nutritional status of children. The results of QR suggest, however, that the bargaining power will improve a chronic measure of nutritional status, or ‘height- for- age’ at the low end of conditional distribution of z score or those stunted.

Second, the result of IV estimation indicates that access to health scheme or health insurance – which is instrumented by the proxy for infrastructure - tends to improve ‘weight-for- age’ in 2005-6.

Third, health-related facility, infrastructure and environment are important factors in reducing the prevalence of child malnutrition. For example, wider access to a flush toilet is likely to improve nutritional status of children in terms of stunting and underweight. Easier access to water is important in reducing ‘wasting’. The results of QR imply that access to radio and TV is important for improving the measures of ‘stunting’ and ‘underweight’

particularly at the lower parts of the conditional distribution. Also, children belonging to scheduled caste are more likely to be undernourished.

Fourth, QR yields an additional insight into child malnutrition because behavioural responses towards undernourished and overnourished children are likely to differ.

Despite the steady decline in the prevalence of undernourished children, India is still one of a few countries with the worst levels of low birth weight, underweight and wasting among children in BRIC and SAARC countries. In terms of policy implications, more provisions of health scheme or health insurance are likely to be effective in reducing the temporary nutritional deprivation of children. Infrastructure (e.g. access to electricity) and health facilities are found to be also important. But policies to empower women in poor households that tend to have more malnourished children are required for reducing not only short-term nutritional deprivations but also chronic deprivations. If we go by the predictions of household models-both Beckerian and bargaining-expanding outside employment options for women is key to their empowerment.

References

Aturupane, H., eolalikar, A., and Gunewardena, D. (2008). 'The Determinants of Child Weight and Height in Sri Lanka: A Quantile Regression Approach', Working Papers RP2008/53, World Institute for Development Economic Research, Helsinki, UNU-WIDER.

Becker, G. S. (1974). 'A theory of Social Interactions', *Journal of Political Economy*, 82, pp.1063-1094.

Borooah, V. A. (2005). 'The height-for-age of Indian children', *Economics and Human Biology*, 3, 45-65.

Buchinsky, M. (1994). 'Changes in the U.S. Wage Structure 1963-1987: Application of Quantile Regression', Econometrica, 62(2): 405-458.

Charmarbagwala, R., Ranger, M., Waddington, H., White, H. (2004). 'The Determinants of Child Health and Nutrition: A Meta-Analysis', Independent Evaluation Group (IEG) Working Paper, Washington D.C., World Bank.

Eide, E., and Showalter, M. H. (1998). 'The effect of school quality on student performance: A quantile regression approach', *Economics Letters*, 58(3), pp.345-350.

Fafchamps, M., Kebede, B. and Quisumbing, A. (2009). 'Intra-household Welfare in Rural Ethiopia', Oxford Bulletin of Economics and Statistics, 71(4), pp.567-599.

Fuller, W. A. (1987). *Measurement Error Models*, New York, Wiley and Sons.

Gaiha, R., and Kulkarni, V. (2005). 'Anthropometric Failure and Persistence of Poverty in Rural India', *International Review of Applied Economics*, 19(2), pp.179-197.

IAMR (Institute of Applied Manpower Research) (2011) *India Human Development Report 2011: Towards Social Inclusion*, New Delhi, Oxford University Press.

Imai, K., and Sato, T. (2010). 'Fertility, Parental Education and Development in India: Evidence from National Household Survey Data', RIEB Discussion Paper Series DP2010-17, Kobe, Kobe University.

Kandpal, E. (2011).'Beyond Average Treatment Effects: Distribution of Child Nutrition Outcomes and Program Placement in India's ICSD', *World Development,* 39(8), pp.1410-1421.

Kravdal, Ø. (2003). 'Child Mortality in India: Exploring the Community-level Effect of Education', Health Economics Research Programme Working Paper 2003:4, Oslo: Department of Economics, University of Oslo.

Lokshin, M., Das Gupta, M., Gragnolati, M. and Ivaschenko, O. (2005) 'Improving Child Nutrition? The Integrated Child Development Services in India', *Development and Change,* 36(4), pp.613-640.

Luke, N., and Xu, H. (2011). 'Exploring the meaning of context for health: Community influences on child health in South India', *Demographic Research,* 24, pp.345-374.

McElroy, M. B. (1990). 'The empirical content of Nash-bargained household behaviour', *Journal of Human Resources,* 25(4), pp.559-583.

McElroy, M. B and Horney, M. J. (1981). 'Nash-Bargained Household Decision: Towards a Generalisation of the Theory of Demand', *International Economic Review,* 22(2), pp.333-349.

Kandpal, E., and McNamara, P. E. (2009). 'Determinants of Nutritional Outcomes of Children in India: A Quantile Regression Approach', presented at the Agricultural and Applied Economics Association 2009 AAEA & ACCI Joint Annual Meeting, Milwaukee, Wisconsin, July 2009.

Maluccio, J., Hoddinott, J., Behrman, J. R., Martorell, R., Quisumbing, A. R., and Stein, A. D. (2007) 'The Impact of an Experimental Nutritional Intervention in Childhood on Education among Guatemalan Adults', FCND Discussion Paper 207, Washington DC, IFPRI.

The Naandi Foundation (2011). HUNGaMA: Fighting Hunger & Malnutrition –The HUNGaMA Survey Report - 2011 http://www.hungamaforchange.org/ (accessed March 2012).

Park, C. (2007). 'Marriage Market, Parents' Bargaining Powers and Child Nutritional and Education', *Oxford Bulletin of Economics and Statistics*, 69(6), pp. 773-793.

Tarpzzi, A., and Mahajan, A. (2007). 'Child Nutrition in India in the Nineties', *Eonomic Development and Cultural Change,* 55(3), pp.441-486.

Thomas, D. (1994). 'Like Father, like Son: Like Mother, like Daughter: Parental Resources and Child Height', *Journal of Human Resources*, 29 (4), pp. 950-988.

Verbeek, M. (1996). 'Pseudo Panel Data', in Matyas, L. & Sevestre, P. (Eds.), *The econometrics of panel data: A handbook of the theory with applications, second edition*, in *Advanced Studies in Theoretical and Applied Econometrics*, vol. 33, Boston and London, Kluwer Academic, pp. 280-92.

Verbeek, M., and Nijman T. E. (1992). 'Can Cohort Data Be Treated As Genuine Panel Data?'. *Empirical Economics*, 17, pp.9-23.

WHO (1997). *WHO Global Database on Child Growth and Malnutrition*, Geneva, WHO.

WHO (2006). *Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development*, Geneva, WHO.

Table 1 A summary of Effects of Bargaining Power of Mother on child malnutrition in Rural India (NFHS 1, 2 and 3) **Table 1 A summary of Effects of Bargaining Power of Mother on child malnutrition in Rural India (NFHS 1, 2 and 3)**

	OLS			Quantile Regression							
				(1) Z score -4.0	(2) Z score -3.0	(3) Z score -2.0	(4) Z score -1.0	(5) Z score -0	(6) Z score 1.0	(7) Z score 2.0	(8) Z score 3.0
NFHS-1 Rural 1992-3											
	Height for Age			Height for Age							
[Mother's Schooling Yrs/ Father's Schooling Yrs]	0.0508			0.000238	0.122**	0.0750*	0.0442	0.00342	-0.0315	-0.0740	-0.179
(Bargaining)	(1.504)			(0.00364)	(2.755)	(2.127)	(1.235)	(0.0637)	(-0.397)	(-0.643)	(-1.523)
Average Education	0.0343+			0.0110	0.0402	0.0490*	0.0415+	0.0465+	0.0227	0.0576	0.0866
	(1.784)			(0.354)	(1.118)	(2.265)	(1.847)	(1.750)	(0.525)	(0.672)	(0.756)
	Weight for Age			Weight for Age							
[Mother's Schooling Yrs/ Father's Schooling Yrs]	0.0400+			0.0741	0.0672*	0.0406	0.0591*	0.00499	-0.00794	-0.0656	-0.127
(Bargaining)	(1.901)			(1.384)	(2.170)	(1.494)	(2.284)	(0.188)	(-0.241)	(-1.327)	(-0.550)
Average Education	0.0446**			0.0214	0.0435**	0.0505**	0.0544**	0.0613**	0.0597**	0.0684*	0.00818
	(3.676)			(0.768)	(2.598)	(3.337)	(3.692)	(4.005)	(2.994)	(2.334)	(0.0689)
	Weight for Height			Weight for Height							
[Mother's Schooling Yrs/ Father's Schooling Yrs]	-0.00508			-0.0830	-0.0387	0.0630	0.0173	4.13e-06	-0.0427	-0.0349	-0.0708
(Bargaining)	(-0.177)			(-0.919)	(-0.499)	(1.540)	(0.449)	(0.000145)	(-0.936)	(-0.431)	(-0.509)
Average Education	0.0381*			0.0661	0.0476	0.0548+	0.0319	0.0376+	0.0310	0.0565	0.0283
	(2.356)			(1.106)	(1.158)	(1.737)	(1.546)	(1.936)	(1.583)	(1.455)	(0.417)
	OLS	IV		Quantile Regression							
				(1) Z score -4.0	(2) Z score -3.0	(3) Z score -2.0	(4) Z score -1.0	(5) Z score -0	(6) Z score 1.0	(7) Z score 2.0	(8) Z score 3.0
NFHS-2 Rural 1998-9											
	Height for Age			Height for Age							
[Mother's Schooling Yrs/ Father's Schooling Yrs]	-0.00176	-0.000731	-0.00162	0.0277	0.0183	-0.00162	-0.00940	0.00407	0.00550	-0.0177	-0.0284
(Bargaining)	(-0.147)	(-0.0108)	(-0.125)	(1.035)	(1.189)	(-0.126)	(-0.677)	(0.259)	(0.228)	(-0.762)	(-0.632)
Average Education	0.0421**	0.0430	0.0424**	0.0416**	0.0551**	0.0490**	0.0470**	0.0398**	0.0310**	0.0175	0.0303
	(7.865)	(0.872)	(3.347)	(3.768)	(8.449)	(8.125)	(7.934)	(5.328)	(2.904)	(1.073)	(1.215)

Whether a husband beats	0.000834	0.120		0.0290	0.0161	0.0128	-0.0168	0.0355	0.0620	-0.139	-0.474**
if a wife is unfaithful	(0.0243)	(0.0145)		(0.464)	(0.369)	(0.319)	(-0.416)	(0.688)	(0.844)	(-1.341)	(-2.693)
Whether a wife is allowed to go to market without permission from a husband	0.0353		-0.0518	0.0607	0.0701	0.0318	-0.00761	0.0725	0.0794	-0.0939	4.70e-05
	(0.937)		(-0.0144)	(0.918)	(1.425)	(0.800)	(-0.170)	(1.302)	(1.001)	(-0.798)	(0.000256)
	Weight for Age			Weight for Age							
[Mother's Schooling Yrs/ Father's Schooling Yrs]	0.0222*	0.0368	0.0231*	0.0649**	0.0364*	0.0272**	0.00654	0.0221	0.0118	0.00631	-0.0423
(Bargaining)	(2.327)	(0.483)	(2.263)	(3.157)	(2.384)	(3.150)	(0.637)	(1.422)	(0.612)	(0.197)	(-0.826)
Average Education	0.0448**	0.0549	0.0478**	0.0420**	0.0603**	0.0505**	0.0396**	0.0383**	0.0276**	0.0252	0.0291
	(10.39)	(1.075)	(3.616)	(3.826)	(8.692)	(7.981)	(8.392)	(7.278)	(3.249)	(1.639)	(1.197)
Whether a husband beats	-0.0369	1.670		-0.141+	-0.0290	-0.0317	-0.0124	0.00586	-0.0400	-0.0283	-0.0248
if a wife is unfaithful	(-1.322)	(0.190)		(-1.835)	(-0.678)	(-0.896)	(-0.352)	(0.175)	(-0.750)	(-0.267)	(-0.124)
Whether a wife is allowed to go to market without permission from a husband	0.0633*		-0.806	0.142+	0.124*	0.0672+	0.0382	0.0878*	0.0107	0.126	0.0989
	(2.119)		(-0.208)	(1.810)	(2.474)	(1.803)	(1.068)	(2.323)	(0.182)	(1.205)	(0.532)
				Weight for Height							
[Mother's Schooling Yrs/ Father's Schooling Yrs]	0.00592	0.175	0.0279	0.0324	0.0623**	0.0401*	0.0136	0.0201	0.00560	-0.0321	-
(Bargaining)	(0.415)	(0.289)	(0.648)	(0.863)	(2.655)	(2.394)	(1.140)	(1.412)	(0.260)	(-0.858)	-
Average Education	0.0194**	0.161	0.0557	0.0384**	0.0531**	0.0376**	0.0307**	0.0170**	0.00883	-0.00674	-
	(2.890)	(0.319)	(1.120)	(3.708)	(4.920)	(5.234)	(5.587)	(2.750)	(0.834)	(-0.651)	-
Whether a husband beats	-0.0698	24.81		-0.156+	-0.0631	-0.0380	-0.0782*	-0.0461	-0.0553	-0.0458	-
if a wife is unfaithful	(-1.617)	(0.280)		(-1.832)	(-0.815)	(-0.710)	(-2.508)	(-1.436)	(-0.773)	(-0.586)	-
Whether a wife is allowed to go to market without permission from a husband	0.126**		-9.118	0.188*	-0.0183	0.0746	0.0663+	0.105*	0.162*	0.104	-
	(2.645)		(-0.738)	(2.381)	(-0.243)	(1.328)	(1.710)	(2.331)	(2.405)	(1.471)	-
NFHS-3 Rural 2005-6											
	Height for Age			Height for Age							
[Mother's Schooling Yrs/ Father's Schooling Yrs]	0.00427	0.0124	-0.00473	0.0688**	0.0306*	0.0104	-0.00604	-0.0175	-0.00783	-0.0199	-0.0669
(Bargaining)	(0.421)	(1.019)	(-0.216)	(4.810)	(2.307)	(0.991)	(-0.507)	(-1.127)	(-0.314)	(-0.614)	(-0.922)
Average Education	0.0283**	0.0162	0.0169	0.0381**	0.0428**	0.0399**	0.0345**	0.0277**	0.0140	-0.00199	-0.0425
	(5.610)	(1.485)	(0.561)	(3.030)	(5.700)	(6.956)	(7.304)	(3.999)	(1.553)	(-0.121)	(-1.395)

Whether a husband beats	0.0455		-1.634	-0.0398	-0.0683	-0.0291	0.0448	0.0995+	0.188*	0.354**	0.365+
if a wife is unfaithful	(1.316)		(-0.358)	(-0.606)	(-1.351)	(-0.751)	(1.300)	(1.917)	(2.573)	(2.771)	(1.864)
Whether a wife is allowed to go to market without permission from a husband	0.0551+			0.0200	0.0568	0.0284	0.0604+	0.0247	0.0963	0.161	0.125
	(1.673)			(0.276)	(1.270)	(0.727)	(1.669)	(0.533)	(1.373)	(1.326)	(0.683)
Health Insurance Scheme	-0.0204	4.092		-0.232	0.132	0.0131	0.0413	-0.0936	-0.0103	0.127	-0.220
	(-0.220)	(1.254)		(-0.728)	(0.904)	(0.124)	(0.417)	(-0.463)	(-0.0596)	(0.397)	(-0.523)
	Weight for Age			Weight for Age							
[Mother's Schooling Yrs/ Father's Schooling Yrs]	0.00546	0.0155	0.0139	-0.0279	0.0208	0.00852	0.00418	0.00859	0.0252	-0.00790	0.00845
(Bargaining)	(0.668)	(1.526)	(0.878)	(-0.832)	(1.185)	(0.854)	(0.455)	(0.705)	(1.476)	(-0.272)	(0.124)
Average Education	0.0334**	0.0193*	0.0464*	0.0544**	0.0513**	0.0335**	0.0283**	0.0267**	0.0306**	0.00800	-0.0184
	(8.636)	(2.161)	(2.309)	(3.064)	(6.988)	(5.718)	(6.096)	(4.802)	(4.204)	(0.553)	(-0.926)
Whether a husband beats	0.0156		2.067	-0.0125	-0.0508	0.00442	0.0118	0.0350	0.0599	0.0742	-0.0836
if a wife is unfaithful	(0.604)		(0.701)	(-0.169)	(-1.018)	(0.121)	(0.399)	(0.880)	(1.178)	(0.711)	(-0.560)
Whether a wife is allowed to go to market without permission from a husband	-0.00379			0.0319	0.0383	0.0220	-0.0115	-0.0455	-0.0412	0.0202	0.201
	(-0.154)			(0.303)	(0.751)	(0.677)	(-0.413)	(-1.335)	(-0.657)	(0.240)	(1.210)
Health Insurance Scheme	0.0412	5.267+		0.0848	0.0214	-0.00635	0.0607	-0.0208	0.139	0.479	0.117
	(0.528)	(1.865)		(0.476)	(0.183)	(-0.0556)	(0.903)	(-0.151)	(0.670)	(1.324)	(0.247)
	Weight for Height			Weight for Height							
[Mother's Schooling Yrs/ Father's Schooling Yrs]	0.00891	0.0112	0.0198	0.0325	0.0241	0.00455	0.00215	0.00526	0.0233+	0.0170	0.0107
(Bargaining)	(0.972)	(1.110)	(1.045)	(1.218)	(1.428)	(0.313)	(0.184)	(0.446)	(1.940)	(0.744)	(0.284)
Average Education	0.0215**	0.0184*	0.0417	0.0384**	0.0552**	0.0392**	0.0190**	0.0162**	0.0141*	0.0188+	0.00877
	(5.149)	(2.473)	(1.523)	(3.135)	(4.158)	(5.476)	(3.526)	(3.347)	(2.453)	(1.708)	(0.442)
Whether a husband beats	-0.0512+		3.019	0.0999	-0.0823	-0.0542	-0.0771+	-0.0249	-0.0508	-0.158*	-0.319*
if a wife is unfaithful	(-1.850)		(0.789)	(1.150)	(-1.031)	(-1.210)	(-1.944)	(-0.798)	(-1.283)	(-2.167)	(-2.411)
Whether a wife is allowed to go to market without permission from a husband	-0.0467+			0.0509	-0.113	-0.0636	-0.0312	-0.0331	-0.0367	-0.0203	0.0734
	(-1.759)			(0.567)	(-1.532)	(-1.575)	(-0.963)	(-1.043)	(-0.918)	(-0.324)	(0.489)
Health Insurance Scheme	0.0245	1.224		0.578*	0.0378	-0.0464	-0.0182	0.0566	0.0103	0.0718	-0.272
	(0.309)	(0.558)		(2.333)	(0.270)	(-0.388)	(-0.146)	(0.613)	(0.0796)	(0.360)	(-0.827)

Table 2 Effects of Bargaining Power of Mother on child malnutrition in Rural India (based on NCAER data)

Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)
		Quantile Regression[$]				
	OLS	Severely Malnourished	Acutely Malnourished	Slightly Malnourished	Malnourished	Normal
		-3.72(4.80)[a]	-2.41(15.1)[a]	-1.49(29.5)[a]	-0.55(49.5)[a]	1.22(80.2)[a]
NCAER data in 1993						
Mother's Schooling Yrsucation/Father's Schooling Yrsucation	**0.00**	**-0.00**	**-0.01**	**0.01**	**-0.00**	**0.01**
	[0.34]	**[-0.23]**	**[-0.42]**	**[0.93]**	**[-0.08]**	**[0.45]**
[Mother's Schooling Yrsucation + Father's Schooling Yrsucation]/2	**0.02**	**0.03**	**0.00**	**0.01**	**0.03**	**0.04**
	[1.71]+	**[1.56]**	**[0.23]**	**[0.52]**	**[1.87]+**	**[2.36]***

Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)
		Quantile Regression[$]				
	OLS	Severely Malnourished	Acutely Malnourished	Slightly Malnourished	Malnourished	Normal
		-3.72(4.80)[a]	-2.41(15.1)[a]	-1.49(29.5)[a]	-0.55(49.5)[a]	1.22(80.2)[a]
NCAER data in 1993						
Mother's Schooling Yrsucation/Father's Schooling Yrsucation	**0.00**	**-0.00**	**-0.01**	**0.01**	**-0.00**	**0.01**
	[0.34]	**[-0.23]**	**[-0.42]**	**[0.93]**	**[-0.08]**	**[0.45]**
[Mother's Schooling Yrsucation + Father's Schooling Yrsucation]/2	**0.02**	**0.03**	**0.00**	**0.01**	**0.03**	**0.04**
	[1.71]+	**[1.56]**	**[0.23]**	**[0.52]**	**[1.87]+**	**[2.36]***

Table 3 Summary of Results of OLS, IV and Quantile Regressions (QR) based on NFHS and NCAER Data

	NFHS-1 (1992/3)						NFHS-2 (1998/9)						NFHS-3 (2005/6)						NCAER-1994		NCAER-2005	
	HAZ*[1]		WAZ*[1]		HWZ*[1]		HAZ*[1]		WAZ*[1]		HWZ*[1]		HAZ*[1]		WAZ*[1]		HWZ*[1]					
VARIABLES	OLS/IV	QR	OLS/IV	QR	OLS/IV	QR	OLS/IV	QR	OLS/IV	QR	OLS/IV	QR	OLS/IV	QR	OLS/IV	QR	OLS/IV	QR	OLS	QR	OLS/IV	QR
Child Characteristics																						
child_male	-	-M		-MN		-MN	-	-	-	-M	-	-MN	-	-MN	-	-N		-MN	-	-		
age	-	-	-	-			-	-	-	-	-	-M	-	-	-	-		+M -NO			-	-N
age2	+	+	+	+	+	+NO	+	+	+	+	+	+MN	+	+	+	+		-M +O	-	+M -N		
second child		-N	-	+M/- N		+O	-	-MN		-N		-N			-	-M	-	-NO			*NA* *NA*	
third child		-O	+	-O		-N	-	-MN	-	-MN	-	-N		-MN	-	-MN	-	-N		-N	*NA* *NA*	
forth more	-	-NO	-	- NO	-	-NO	-	-MN	-	-MN	-	-N	-	-MN	-	- MN		-N		-N	*NA*	
Bargaining																						
Schooling_Ratio		+ M	+	+ M					+	+M		+M		+M								
AV_Schooling Yrs	+	+ MN	+	+	+	+N	+	+MN	+	+ MN	+(ols)	+MN	+	+	+	+	+	+	+	+M		
beat_unfaithful				*NA*				-O				-M		+NO				-(ols)		*NA*		
allow_market				*NA*						+M	+(ols)	+MN	+(ols)	+N	+(iv)			-(ols)		*NA*		
Policy																						
health_scheme				*NA*					*NA*						+(iv)					*NA*		
Environment																						
time_water		-N	-N						-(ols)	-M						-N		-MN	-	-N		+N
electricity			+	+ MN	+	+N			+	+M		+M			-	-NO	+	-NO	*NA*	*NA*	*NA*	*NA*
Household Composition Characteristics																						
mother_age	+	+ NO	+	+	+	+N	+	+MN	+	+MN	+(ols)	+N	+(iv)	+	+	+MN		-O		+N		
mother_age2		+NO	-	-	-		-	-MN	-	-MN	-(ols)	-N	-(iv)	-	-	- MN		+O		-N		
hhsize								-MO					-				+(ols)	+MN				
child5_share				-O	-	-NO				+O	+		-	-			+	+N	+	+N		
radio		+ M	+	+ MN	+	+MN										-O			*NA*	*NA*	*NA*	*NA*
TV	+	+ M		+ M			+	+MN	+	+MN		+MN							*NA*	*NA*	*NA*	*NA*
fridge										+M	+(ols)		+	+	+	+N			*NA*	*NA*	*NA*	*NA*

bicycle									-N						+M		-NO	-	-NO					
flushtoilet		+M				-O	+		+	+ NO						+	-MO						+	+M
wealth_index				**NA**					**NA**				+	+	+			+			+			+N
Income pc				**NA**					**NA**						**NA**					+	+			
Income pc*Toilet				**NA**					**NA**						**NA**						+M			
hh_SC		+ N			-	-N	-	-MN	-	-MN		-M	-	-MN	-	-MN					+M			
hh_ST						-N	-	-NO	-	-MN		-MN	-	-M	-	-MN	-	-N			+N			-N
hh_Other	-			-M	+	+MO	-(ols)	+N	-(ols)	-MN	-(ols)	-MN	-	-MN	-(iv)									
Hindu		+O				-M				-MN	-(ols)		+(ols)	+NO						+	+N	-	-N
Muslim								+O	-(ols)			-M	+(ols)	+NO						+	+N		-N
Christian							+(ols)	+NO		+O										+	+N		-N
Sikh										-		-MN		+N						+	+		+M
Regional Dummies																								
BIMARU							-(iv)	-M +O		-	+(ols)		-	-	-		-(ols)					-	-
South				+ N									-	+	-	+M		-MN		-	-	-	-
East		- O	-										-(ols)	+	-					-	-M	-	-
West	+	+ MO	-		-	-NO	-(iv)		-	+M -O				-MN		-N								
Price																								
Food Price	-	- M		- N		+M -NO	+(ols)	+NO	+(ols)		+(ols)				*NA*						*NA*			
Sugar Price				NA					NA				-	-NO	-	+		+N				-	-	
Egg Price				NA					NA				-(ols)		-			+NO						
Cereal Price				NA					NA						-(iv)					+	+M	-	-N	

*1 HAZ: Z score for Height for Age; WAZ: Z score for Weight for Age; WHZ: Z score for Weight for Height.

*2 "+" or "-" is shown in the case where the coefficient estimates are statistically significant. In the case of Quantile Regression (QR), M stands for 'Malnourished'. That is, "+M" means "positive and statistically significant only for malnourished children. Similarly, N stands for Normal and O stands for Over-nourished. We put M (or N, O) if we find any sub-group for which a coefficient estimate is statistically significant. A full set of results are given in Appendix Tables A2- Appendix Tables.

Table 4 Pseudo Panel for Z Score of Children, NFHS

VARIABLES	(1) Height for Age	(2). Weight for Age	(3). Weight for Height	(4). Height for Age	(5). Weight for Age	(6). Weight for Height
Fixed or Random	Based o NFHS 1, 2 and 3			Based on NFHS 2 and 3		
Effects Model	FE	RE	FE	FE	FE	FE
Schooling_Ratio	0.0432	**0.197****	**0.280****	0.0601	**0.243****	**0.281***
	(0.476)	**(3.372)**	**(3.451)**	(0.497)	**(3.047)**	**(2.484)**
AV_Schooling Yrs	0.0143	0.00645	-0.0354	0.0353	0.0231	-0.0298
	(0.367)	(0.316)	(-1.012)	(0.814)	(0.809)	(-0.736)
beat_unfaithful	-	-	-	0.388	**0.376***	0.260
				(1.451)	**(2.140)**	(1.040)
allow_market	-	-	-	**0.453+**	**0.342***	0.136
				(1.946)	**(2.230)**	(0.627)
	(0.437)	(-0.407)	(0.728)	(-1.037)	(0.946)	(2.321)
child5_share	-0.485	**-0.381+**	0.0672	**-3.348****	0.398	2.541*
	(-1.521)	**(-1.885)**	(0.235)	**(-3.012)**	(0.544)	(2.448)
child_male	-0.0312	-0.156	**-0.400***	-0.174	**-0.292+**	**-0.468***
	(-0.145)	(-1.043)	**(-2.076)**	(-0.735)	**(-1.876)**	**(-2.123)**
age	**-0.218****	**-0.0760***	**-0.0785+**	**-0.149****	**-0.0675+**	-0.0722
	(-4.153)	**(-2.103)**	**(-1.670)**	**(-2.654)**	**(-1.823)**	(-1.374)
age2	**0.00357****	**0.00182***	**0.00208+**	0.00194	0.00133	0.00198
	(2.752)	**(2.030)**	**(1.792)**	(1.396)	(1.454)	(1.531)
second child	0.566	-0.213	-0.472	**0.829+**	0.0624	**-0.890***
	(1.401)	(-0.776)	(-1.306)	**(1.813)**	(0.207)	**(-2.084)**
third child	0.354	-0.368	-0.427	**1.072+**	-0.167	**-0.909+**
	(0.781)	(-1.194)	(-1.053)	**(1.920)**	(-0.454)	**(-1.745)**
forth more	0.480	**-0.721****	**-0.844***	**1.122***	-0.0291	**-1.041***
	(1.132)	**(-2.694)**	**(-2.222)**	**(2.347)**	(-0.0923)	**(-2.331)**
mother_age	0.0259	**0.124****	**0.115***	-0.0730	0.0263	**0.113+**
	(0.412)	**(2.979)**	**(2.040)**	(-1.029)	(0.564)	**(1.710)**
mother_age2	-0.000351	-0.00173**	-0.00158*	0.000809	-0.000455	-0.00148
	(-0.405)	(-2.982)	(-2.030)	(0.824)	(-0.705)	(-1.614)
flushtoilet	**0.949****	**0.654****	**-0.647***	0.374	-0.0266	**-0.688***
	(3.274)	**(4.184)**	**(-2.495)**	(1.024)	(-0.111)	**(-2.017)**
time_water	0.00188	-0.00105	**-0.01000****	0.00276	0.00300	**-0.00894***
	(0.468)	(-0.404)	**(-2.772)**	(0.627)	(1.035)	**(-2.175)**
electricity	0.349	-0.0861	**-0.463+**	0.296	-0.169	-0.447
	(1.273)	(-0.638)	**(-1.890)**	(0.988)	(-0.858)	(-1.595)
radio	0.400	0.237	-0.324	-0.0536	0.0240	-0.251
	(1.533)	(1.492)	(-1.390)	(-0.181)	(0.123)	(-0.907)
TV	0.00482	0.165	**0.767****	**0.752***	**0.675****	**0.914****
	(0.0163)	(0.905)	**(2.893)**	**(2.155)**	**(2.939)**	**(2.803)**
fridge	0.311	0.0471	0.0649	0.0581	0.371	-0.0460
	(0.814)	(0.203)	(0.190)	(0.119)	(1.155)	(-0.101)
bicycle	0.363	0.161	-0.112	-0.0972	0.215	-0.137
	(1.534)	(1.302)	(-0.528)	(-0.354)	(1.187)	(-0.535)
hh_SC	**-1.191****	**-0.699****	**-0.499+**	**-1.402****	**-1.036****	**-1.000****
	(-3.884)	**(-3.731)**	**(-1.819)**	**(-3.845)**	**(-4.318)**	**(-2.937)**
hh_ST	0.378	-0.00342	-0.0479	-0.217	-0.382	-0.427
	(1.078)	(-0.0197)	(-0.153)	(-0.502)	(-1.344)	(-1.059)
hh_Other	-0.137	0.129	**0.388+**	-0.129	0.112	0.110
	(-0.522)	(0.895)	**(1.658)**	(-0.422)	(0.556)	(0.385)
Hindu	-0.389	**-0.431+**	0.157	-0.592	0.118	0.185

	(-0.538)	**(-1.648)**	(0.243)	(-0.740)	(0.224)	(0.248)
Muslim	-1.140	-0.380	0.111	**-1.674***	-0.350	-0.0777
	(-1.529)	(-1.406)	(0.166)	**(-1.983)**	(-0.630)	(-0.0986)
Christian	**-1.190+**	-0.245	0.161	**-1.242+**	0.309	0.385
	(-1.925)	(-0.999)	(0.292)	**(-1.910)**	(0.723)	(0.634)
Sikh	**-2.442***	-0.375	**1.871***	**-2.605***	0.0285	2.176*
	(-2.344)	(-1.033)	**(2.007)**	**(-2.377)**	(0.0396)	(2.125)
rural	-	-0.629	-	-	-	
		(-0.906)				
BIMARU	0.392	**-0.310****	**1.169****	0.526	0.716*	**1.316****
	(0.968)	**(-3.831)**	**(3.229)**	(1.229)	(2.544)	**(3.295)**
South	**-0.819***	**-0.199***	-0.00629			0.329
	(-2.463)	**(-2.537)**	(-0.0212)			(0.960)
East	-0.440*	**-0.296****	-0.201	-0.505*	**-0.581****	-0.286
	(-2.447)	**(-3.893)**	(-1.249)	(-2.553)	**(-4.468)**	(-1.551)
West		**-0.255****		0.570	0.0563	
		(-3.078)		(1.551)	(0.233)	
Food price	-0.000239	-0.00124	0.00242	0.00420	**0.00625***	0.00640
	(-0.0941)	(-1.377)	(1.065)	(0.875)	**(1.978)**	(1.427)
D_1998	0.0809	**0.461+**	**2.054+**			
	(0.0631)	**(1.736)**	**(1.791)**			
D_2005	0.523		1.900	1.688	**1.917***	1.039
	(0.258)		(1.050)	(1.210)	**(2.089)**	(0.798)
Constant	-0.211	-1.728	-3.896	0.706	-4.204	-4.172
	(-0.0939)	(-1.852)	(-1.935)	(0.344)	(-3.118)	(-2.191)
Observations	390	419	390	338	338	338
R-squared	0.377		0.486	0.408	0.404	0.498
Number of state	29	29	29	29	29	29
Hausman Test	**$Chi^2(29)$=**	**$Chi^2(30)$=**	**$Chi^2(29)$=**	**$Chi^2(30)$=**	**$Chi^2(30)$=**	**$Chi^2(31)$=**
	93.17**	**19.23**	**280.85****	**59.79****	**138.07****	**66.55****
Prob>chi^2	**0**	**0.935**	**0**	**0.001**	**0**	**0.0002**
Chosen Model	**FE**	**RE**	**FE**	**FE**	**FE**	**FE**
Fixed or random-effects						

t-statistics in parentheses (** p<0.01, * p<0.05, + p<0.1).

FE stands for Fixed-Effects Model and RE random effects model.

Table 5 Pseudo Panel for Z Score of Children (Weight for Height), NCAED data

Explanatory Variables	(1) FE	(2) RE
Mother's Education/Father's Education	**0.38**	0.09
	(2.77)**	(1.26)
(Mother's Education + Father's Education)/2	0.11	**0.13**
	(0.99)	**(2.07)***
Child's Sex (Male)	-0.01	-0.15
	(-0.01)	(-0.35)
Child's age	-0.36	-0.16
	(-1.36)	(-1.07)
Child's age Squared	-0.01	0
	(-0.13)	-0.09
Household Size	**0.34**	**0.22**
	(3.03)**	**(3.87)****
Share of kids less than 5 years in a household	**-4.66**	-2.2
	(-1.71)+	(-1.50)
BIMARU[1]	-	**-0.44**
	-	**(-1.90)+**
South	-	-0.21
	-	(-1.05)
East	-	**-0.43**
	-	**(-1.85)+**
Price of Sugar	0.00	0
	(0.65)	(-1.05)
Price of Eggs	0.02	-0.01
	(0.87)	(-1.47)
Price of Cereals	0	0
	(-1.37)	(-0.91)
Hindu	0.28	1.05
	-0.12	-0.59
Muslim	-1.16	0.26
	(-0.45)	-0.15
Christian	-1.12	0.59
	(-0.29)	-0.25
Sikh	-3.9	1.2
	(-1.05)	-0.61
Distance to Water	**-0.05**	-0.01
	(-3.56)**	(-1.37)
Household owns toilet	-4.46	-7.24
	(-0.63)	(-1.57)
Log of per capita income	0.13	0.5
	-0.36	(2.21)*
Log of per capita income * Toilet	0.71	0.89
	-0.88	(1.68)+
Scheduled caste	**2.69**	**0.99**
	(3.16)**	**(2.17)***
Scheduled tribe	**2.12**	**1.72**
	(1.91)+	**(2.72)****
Constant	-3.52	-6.24
	(-0.76)	(-2.20)
N	266	266
Adj. R^2	-0.593	-
F-statistics	3.82	-
F-test (Unobserved=0)	-	-
Hausman test	40.50(0.00)	

t statistics in brackets ----- + p<.10, * p<.05, ** p<.01; [1] Base reference for location is North.
FE stands for Fixed-Effects Model and RE random effects model.

Appendix 1:

Descriptive Statistics of the Data

NFHS Data
Appendix Tables A1(a)-(c)

(To Be Added)

NCAER Data

Appendix Table A1(d): Descriptive statistics for estimations (N=4089) NCAER 1993

	Statistics			
Variables	**Mean**	**Std. Dev.**	**Min**	**Max**
Weight/Height z-scores	-0.384	2.048	-4.96	5
Mother's Age	31.536	11.117	16	81
Mother's Age Squared	1118.041	943.463	256	6561
BIMARU	0.415	0.493	0	1
South	0.256	0.437	0	1
East	0.174	0.379	0	1
Others	83.478	97.430	0	3002
Price of Sugar	7.242	20.192	0	360
Price of Eggs	114.534	75.743	13.5	1375
Price of Cereals	0.815	0.388	0	1
Hindu	0.128	0.334	0	1
Muslim	0.017	0.128	0	1
Christian	0.027	0.163	0	1
Distance to Water	9.080	41.874	0	801
Household owns toilet	0.125	0.331	0	1
Log of per capita income	7.926	0.776	4.682	11.222
Log of income * Household owns toilet	1.038	2.760	0	10.743
Child's sex (Male)	0.505	0.500	0	1
Child's age	1.535	1.164	0	3
Child's age Squared	8.745	8.276	0	25
Household Size	7.192	3.422	3	25
Share of Children less than 5 years in the household	0.359	0.127	0.071	0.714
Schedules Caste	0.244	0.429	0	1
Scheduled Tribe	0.140	0.347	0	1
Mother's Schooling Yrsucation/Father's Schooling Yrsucation	4.321	3.217	0.062	16
[Mother's Schooling Yrsucation + Father's Schooling Yrsucation]/2	3.885	3.290	0	15
Birth Order (Second Child)	0.277	0.447	0	1
Birth Order (Third Child)	0.177	0.382	0	1
Birth Order (Fourth or more)	0.223	0.416	0	1

Appendix Table A1(e): NCAER 2005 Descriptive statistics for estimations (N=6692)

	Statistics			
Variable	**Mean**	**Std. Dev.**	**Min**	**Max**
Weight/Height z-scores	-0.240	1.878	-5	5
Mother's Age	26.651	5.635	15	63
Mother's Age Squared	742.033	337.066	225	3969
BIMARU	0.383	0.486	0	1
South	0.263	0.440	0	1
East	0.207	0.405	0	1
Others	0.006	0.074	0	1
Price of Sugar	19.778	1.674	4	28
Price of Eggs	22.910	3.918	0	65
Price of Cereals	16.857	6.462	0	100
Hindu	0.824	0.381	0	1
Muslim	0.115	0.319	0	1
Christian	0.013	0.111	0	1
Sikh	0.025	0.155	0	1
Distance to Water	6.429	9.744	0	120
Household owns toilet	0.093	0.290	0	1
Log of per capita income	8.320	0.855	2.813	11.904
Log of income * Household owns toilet	0.831	2.613	0	11.316
Child’s sex (Male)	0.515	0.500	0	1
Child’s age	1.726	1.083	0	3
Child’s age Squared	4.152	3.554	0	9
Household Size	7.163	3.208	3	33
Share of Children less than 5 years in the household	0.298	0.122	0.056	0.667
Schedules Caste	0.252	0.434	0	1
Scheduled Tribe	0.117	0.321	0	1
Mother’s Schooling Yrsucation/Father’s Schooling Yrsucation	0.841	0.502	0.167	4
[Mother’s Schooling Yrsucation + Father’s Schooling Yrsucation]/2	1.419	1.211	0	5

Appendix 2: Details of Regression Results based on NFHS-1 (1992-3)

Appendix Table A2(a): OLS for Z Score of Children NFHS1 Rural, 1992-3

	(1)	(2)	(3)
	OLS	OLS	OLS
VARIABLES	Height for Age	Weight for Age	Weight for Height
hhsize	2.63e-07	-0.000642	-0.00276
	(2.53e-05)	(-0.0892)	(-0.326)
child5_share	-0.141	-0.169	-0.331+
	(-0.595)	(-1.062)	(-1.673)
child_male	-0.152*	-0.147**	-0.157**
	(-2.524)	(-3.792)	(-3.052)
age	-0.114**	-0.0467**	-0.0142
	(-9.585)	(-6.058)	(-1.387)
age2	0.00152**	0.000785**	0.000813**
	(4.917)	(3.921)	(3.052)
second child	0.0227	0.0335	-0.0423
	(0.262)	(0.616)	(-0.551)
third child	-0.140	-0.132+	-0.122
	(-1.324)	(-1.936)	(-1.367)
forth more	-0.396**	-0.329**	-0.297**
	(-3.205)	(-4.179)	(-2.905)
Schooling_Ratio	0.0508	0.0400+	-0.00508
	(1.504)	(1.901)	(-0.177)
AV_Schooling Yrs	0.0343+	0.0446**	0.0381*
	(1.784)	(3.676)	(2.356)
mother_age	0.0801+	0.108**	0.0832*
	(1.657)	(3.553)	(2.068)
mother_age2	-0.000719	-0.00144**	-0.00112+
	(-0.895)	(-2.848)	(-1.713)
flushtoilet	0.239*	0.182*	-0.0223
	(2.116)	(2.489)	(-0.237)
time_water	-0.00128	-0.000341	-0.00122
	(-0.866)	(-0.392)	(-0.875)
electricity	0.0343	0.177**	0.146*
	(0.435)	(3.444)	(2.182)
radio	0.00320	0.0839*	0.0841+
	(0.0555)	(2.166)	(1.768)
TV	0.165+	0.0868	-0.0328
	(1.830)	(1.468)	(-0.436)
fridge	-0.0594	-0.0961	0.119
	(-0.495)	(-0.983)	(1.500)
bicycle	0.0579	0.0174	-0.0877
	(0.853)	(0.408)	(-1.577)
hh_SC	0.142	-0.0487	-0.198*
	(1.500)	(-0.855)	(-2.453)
hh_ST	0.0922	-0.0736	-0.0401
	(1.088)	(-1.271)	(-0.552)
hh_Other	-0.166+	-0.0811	0.182*
	(-1.940)	(-1.484)	(2.410)
Hindu	-0.0158	0.106	0.0511
	(-0.0446)	(0.502)	(0.201)
Muslim	-0.256	-0.0707	-0.0750
	(-0.693)	(-0.320)	(-0.277)
Christian	0.203	0.273	0.130
	(0.524)	(1.180)	(0.456)
Sikh	0.451	0.368	0.159
	(0.986)	(1.281)	(0.451)
BIMARU		-0.154	-0.0186
		(-1.003)	(-0.0830)

South	0.237	0.101	0.155
	(1.393)	(0.778)	(0.638)
East	0.0604	-0.514**	-
	(0.249)	(-2.879)	
West	0.322+	-0.572**	-0.470+
	(1.919)	(-4.295)	(-1.872)
foodprice	-0.00470**	-0.00170	0.000148
	(-3.414)	(-1.539)	(0.0954)
Constant	1.470	-1.576	-2.410+
	(1.061)	(-1.621)	(-1.684)
Observations	3,550	5,335	3,483
R-squared	0.178	0.110	0.064

Robust t-statistics in parentheses

** p<0.01, * p<0.05, + p<0.1

Appendix Table A2(b): Quantile regression for Z Score of Children: Height for Age NFHS1 Rural, 1992-3

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Z score -4.0	Z score -3.0	Z score - 2.0	Z score - 1.0	Z score - 0	Z score 1.0	Z score 2.0	Z score 3.0
	8% extremely	22.0% severely	47.1%					
VARIABLES	stunted	stunted	stunted	74.9%	91.2%	97.3%	99.0%	99.6%
hhsize	-0.00973	-0.00534	0.00497	-0.00527	0.000177	0.00449	-0.0457	-0.0581
	(-0.526)	(-0.256)	(0.433)	(-0.488)	(0.0107)	(0.192)	(-1.256)	(-1.412)
child5_share	-0.313	-0.628	0.0684	-0.292	-0.0616	-0.208	-1.426	-1.468
	(-0.816)	(-1.259)	(0.267)	(-1.162)	(-0.150)	(-0.363)	(-1.527)	(-1.121)
child_male	-0.142	-0.245*	-0.0810	-0.106	-0.0971	0.0597	-0.0667	-0.668
	(-1.177)	(-2.302)	(-1.164)	(-1.526)	(-1.186)	(0.392)	(-0.279)	(-1.359)
age	-0.00991	-0.0568**	-0.0881**	-0.128**	-0.156**	-0.200**	-0.274**	-0.309**
	(-0.416)	(-2.896)	(-6.048)	(-9.031)	(-8.076)	(-7.116)	(-5.797)	(-3.734)
age2	-1.83e-05	0.000281	0.000974**	0.00181**	0.00229**	0.00287**	0.00431**	0.00492*
	(-0.0330)	(0.562)	(2.624)	(4.993)	(4.565)	(3.980)	(3.296)	(2.371)
second child	0.0916	0.129	0.0114	0.00317	-0.210+	0.0443	0.163	0.169
	(0.580)	(0.789)	(0.114)	(0.0295)	(-1.710)	(0.194)	(0.509)	(0.273)
third child	-0.107	-0.0716	-0.0343	-0.203	-0.209	-0.376	-0.481+	-0.788
	(-0.698)	(-0.420)	(-0.278)	(-1.468)	(-1.347)	(-1.362)	(-1.649)	(-0.992)
forth more	-0.242	-0.246	-0.179	-0.450**	-0.615**	-0.917**	-1.076*	-0.857
	(-1.162)	(-1.069)	(-1.628)	(-3.127)	(-3.203)	(-2.847)	(-2.217)	(-0.884)
Schooling_Ratio	0.000238	0.122**	0.0750*	0.0442	0.00342	-0.0315	-0.0740	-0.179
	(0.00364)	(2.755)	(2.127)	(1.235)	(0.0637)	(-0.397)	(-0.643)	(-1.523)
AV_Schooling Yrs	0.0110	0.0402	0.0490*	0.0415+	0.0465+	0.0227	0.0576	0.0866
	(0.354)	(1.118)	(2.265)	(1.847)	(1.750)	(0.525)	(0.672)	(0.756)
mother_age	0.0234	0.00691	0.0124	0.141**	0.139+	0.166	0.198	0.408*
	(0.306)	(0.0787)	(0.229)	(2.761)	(1.947)	(1.257)	(1.175)	(2.073)
mother_age2	8.28e-05	0.000633	9.86e-05	-0.00170*	-0.00175	-0.00182	-0.00154	-0.00546+
	(0.0637)	(0.434)	(0.108)	(-2.087)	(-1.488)	(-0.882)	(-0.550)	(-1.792)
flushtoilet	0.778**	0.418*	0.224+	0.161	0.0836	0.198	0.718	1.325**
	(3.329)	(2.269)	(1.648)	(1.401)	(0.551)	(0.705)	(1.405)	(3.268)
time_water	0.00401	0.00148	-0.00204	-0.00251+	-0.00127	-0.00577	-0.00864	-0.0185**
	(1.351)	(0.629)	(-1.020)	(-1.839)	(-0.548)	(-1.560)	(-1.584)	(-2.830)
electricity	0.0624	-0.118	0.0461	0.0970	0.0444	-0.148	-0.316	-0.387
	(0.570)	(-0.798)	(0.454)	(1.278)	(0.387)	(-0.853)	(-1.236)	(-0.580)
radio	0.0778	0.146+	0.00214	-0.0558	-0.0303	0.0187	-0.0802	-0.254
	(0.744)	(1.726)	(0.0334)	(-0.978)	(-0.294)	(0.114)	(-0.407)	(-0.666)
TV	0.451**	0.164	0.231*	0.169+	-0.00662	0.0483	0.0609	0.221
	(2.762)	(1.053)	(1.997)	(1.758)	(-0.0499)	(0.237)	(0.203)	(0.363)
fridge	-0.258	-0.224	-0.0257	0.0380	0.0220	0.359	-0.183	-0.279
	(-1.007)	(-0.861)	(-0.151)	(0.201)	(0.130)	(0.862)	(-0.250)	(-0.660)
bicycle	0.0154	-0.0339	0.0510	0.0527	0.0818	0.141	0.105	0.0489
	(0.137)	(-0.280)	(0.655)	(0.715)	(0.817)	(0.731)	(0.373)	(0.115)
hh_SC	0.0456	-0.0330	0.174	0.174+	0.133	0.181	0.0881	0.0571
	(0.260)	(-0.215)	(1.548)	(1.923)	(0.920)	(0.829)	(0.191)	(0.0824)
hh_ST	0.109	-0.0669	-0.000435	0.0996	0.173	0.247	0.334	0.414
	(0.746)	(-0.456)	(-0.00450)	(1.072)	(1.320)	(1.035)	(0.974)	(0.526)
hh_Other	-0.130	-0.209	-0.162	-0.120	-0.0578	0.0918	-0.0205	-0.178
	(-0.772)	(-1.539)	(-1.556)	(-1.220)	(-0.448)	(0.487)	(-0.0576)	(-0.227)
Hindu	0.0866	0.291	-0.295	-0.0883	-0.738	-0.518	0.0989	1.625**
	(0.0694)	(1.019)	(-0.489)	(-0.238)	(-1.031)	(-0.766)	(0.151)	(3.620)

Muslim	-0.334	-0.0816	-0.512	-0.312	-0.880	-0.360	0.627	1.813**
	(-0.260)	(-0.229)	(-0.814)	(-0.847)	(-1.240)	(-0.497)	(0.797)	(3.485)
Christian	0.424	0.561	-0.263	0.0718	-0.316	-0.104	0.840	1.663*
	(0.288)	(1.410)	(-0.430)	(0.171)	(-0.390)	(-0.130)	(0.973)	(2.195)
Sikh	0.442	1.009+	-0.0418	0.567	-0.338	0.117	1.886+	2.613**
	(0.319)	(1.670)	(-0.0615)	(1.091)	(-0.405)	(0.101)	(1.700)	(4.518)
South	1.278**	1.210**	0.966**	0.699**	0.466**	0.104	-0.0175	-0.574
	(3.593)	(5.404)	(5.766)	(4.684)	(2.989)	(0.295)	(-0.0294)	(-0.589)
East	-0.318	0.314	0.0269	-0.0395	0.427	0.602	0.0914	-1.133**
	(-0.672)	(0.699)	(0.138)	(-0.126)	(0.910)	(1.295)	(0.174)	(-3.197)
West	-0.0373	0.532+	0.338+	0.367+	0.563*	0.552	2.713	1.646**
	(-0.0823)	(1.652)	(1.717)	(1.833)	(2.322)	(1.242)	(1.542)	(5.924)
foodprice	-0.00844**	-0.00799**	-0.00452**	-0.00347*	-0.00278	-0.00183	-0.00300	-0.0199**
	(-3.352)	(-2.776)	(-2.792)	(-2.050)	(-1.576)	(-0.532)	(-0.301)	(-3.404)
Constant	1.236	2.879	1.683	0.274	1.658	1.722	4.007	16.87**
	(0.491)	(1.064)	(1.116)	(0.158)	(0.869)	(0.511)	(0.423)	(3.226)
	3,550	3,550	3,550	3,550	3,550	3,550	3,550	
Observations	3,550	3,550	3,550	3,550	3,550	3,550	3,550	3,550

t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix Table A2(c): Quantile regression for Z Score of Children: Weight for Age NFHS1 Rural

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Z score -4.0	Z score -3.0	Z score -2.0	Z score -1.0	Z score -0	Z score 1.0	Z score 2.0	Z score 3.0
	18.3%	34.1%						
	extremely	severely	55.6%				97.2%	98.5%
VARIABLES	underweight	underweight	underweight	75.4%	88.2%	94.2%	overweight	obese
hhsize	-0.00322	0.00881	0.00715	0.00555	0.00288	-0.00962	-0.0258	-0.0664
	(-0.192)	(0.905)	(0.805)	(0.651)	(0.329)	(-0.805)	(-1.531)	(-0.907)
child5_share	-0.0620	0.0153	-0.0218	-0.155	-0.0821	-0.334	-0.685+	-1.933
	(-0.165)	(0.0664)	(-0.102)	(-0.765)	(-0.389)	(-1.179)	(-1.821)	(-1.177)
child_male	-0.248**	-0.0990+	-0.108*	-0.172**	-0.124**	-0.0406	-0.0316	-0.0649
	(-2.838)	(-1.900)	(-2.306)	(-3.770)	(-2.624)	(-0.648)	(-0.327)	(-0.152)
age	-0.0243	-0.0290**	-0.0370**	-0.0548**	-0.0601**	-0.0680**	-0.0499**	-0.0839
	(-1.490)	(-2.934)	(-4.162)	(-6.310)	(-6.619)	(-5.648)	(-2.633)	(-0.952)
age2	0.000340	0.000442+	0.000591*	0.000976**	0.001000**	0.000968**	0.000336	0.000888
	(0.775)	(1.662)	(2.473)	(4.185)	(4.134)	(3.018)	(0.674)	(0.381)
second child	0.107	0.138+	0.0465	0.0437	-0.0489	-0.172+	-0.207	-0.108
	(0.899)	(1.878)	(0.698)	(0.672)	(-0.714)	(-1.925)	(-1.499)	(-0.173)
third child	-0.0918	-0.00408	-0.0709	-0.106	-0.237**	-0.328**	-0.385*	-0.177
	(-0.618)	(-0.0448)	(-0.865)	(-1.337)	(-2.877)	(-3.024)	(-2.385)	(-0.250)
forth more	-0.273	-0.130	-0.223*	-0.310**	-0.451**	-0.556**	-0.700**	-0.879
	(-1.597)	(-1.255)	(-2.399)	(-3.414)	(-4.759)	(-4.440)	(-3.834)	(-1.140)
Schooling_Ratio	0.0741	0.0672*	0.0406	0.0591*	0.00499	-0.00794	-0.0656	-0.127
	(1.384)	(2.170)	(1.494)	(2.284)	(0.188)	(-0.241)	(-1.327)	(-0.550)
AV_Schooling Yrs	0.0214	0.0435**	0.0505**	0.0544**	0.0613**	0.0597**	0.0684*	0.00818
	(0.768)	(2.598)	(3.337)	(3.692)	(4.005)	(2.994)	(2.334)	(0.0689)
mother_age	0.126+	0.0358	0.0755*	0.103**	0.141**	0.172**	0.168*	0.210
	(1.920)	(0.890)	(2.055)	(2.876)	(3.799)	(3.422)	(2.278)	(0.516)
mother_age2	-0.00179+	-0.000451	-0.00101+	-0.00135*	-0.00193**	-0.00233**	-0.00197	-0.00196
	(-1.682)	(-0.675)	(-1.649)	(-2.244)	(-3.113)	(-2.711)	(-1.569)	(-0.263)
flushtoilet	0.151	0.247*	0.199*	0.114	0.237*	0.256*	0.162	-0.317
	(0.848)	(2.336)	(2.099)	(1.251)	(2.516)	(2.103)	(0.886)	(-0.401)
time_water	-0.000449	0.000138	-0.000168	-0.00123	-1.78e-05	0.000424	-0.00204	-0.00176
	(-0.206)	(0.114)	(-0.150)	(-1.114)	(-0.0157)	(0.295)	(-0.877)	(-0.201)
electricity	0.349**	0.222**	0.151*	0.141*	0.141*	0.0316	0.01000	0.302
	(3.059)	(3.346)	(2.539)	(2.455)	(2.386)	(0.399)	(0.0802)	(0.535)
radio	0.122	0.103*	0.0587	0.0410	0.0677	0.119+	0.0627	0.0536
	(1.407)	(1.974)	(1.201)	(0.884)	(1.455)	(1.940)	(0.677)	(0.125)
TV	0.262+	0.122	0.123+	0.0763	-0.0203	0.0184	-0.0321	0.322
	(1.933)	(1.531)	(1.738)	(1.102)	(-0.290)	(0.210)	(-0.231)	(0.634)
fridge	-0.353*	-0.194+	0.0135	0.119	0.170*	0.0344	0.0315	0.0625
	(-2.103)	(-1.875)	(0.149)	(1.297)	(2.264)	(0.386)	(0.244)	(0.114)
bicycle	-0.000577	0.00873	0.0136	-0.0128	-0.00518	0.0673	0.111	-0.0728
	(-0.00622)	(0.154)	(0.268)	(-0.262)	(-0.104)	(1.044)	(1.127)	(-0.181)
hh_SC	0.0432	-0.0712	-0.0621	-0.0414	-0.0440	-0.0470	-0.0363	0.0460
	(0.340)	(-0.935)	(-0.910)	(-0.627)	(-0.641)	(-0.524)	(-0.263)	(0.0757)
hh_ST	-0.0656	-0.0684	-0.116+	-0.0537	-0.0502	-0.0686	-0.0947	-0.0837

	(-0.490)	(-0.878)	(-1.669)	(-0.792)	(-0.718)	(-0.738)	(-0.651)	(-0.137)
hh_Other	0.0132	-0.115	-0.109+	-0.0322	-0.0596	-0.156+	-0.127	-0.203
	(0.106)	(-1.562)	(-1.654)	(-0.503)	(-0.896)	(-1.784)	(-0.950)	(-0.343)
Hindu	0.356	0.435	0.0301	-0.175	0.221	0.100	0.338	0.544
	(0.819)	(1.632)	(0.118)	(-0.705)	(0.854)	(0.316)	(0.600)	(0.868)
Muslim	0.0244	0.273	-0.101	-0.309	0.0414	0.0866	0.284	0.284
	(0.0531)	(0.973)	(-0.379)	(-1.188)	(0.152)	(0.256)	(0.484)	(0.259)
Christian	0.407	0.656*	0.117	-0.0711	0.302	0.272	0.495	0.629
	(0.811)	(2.132)	(0.407)	(-0.253)	(1.020)	(0.734)	(0.797)	(0.412)
Sikh	0.746	0.978*	0.397	-0.0696	0.246	-0.0626	0.909	1.963*
	(1.156)	(2.543)	(1.106)	(-0.200)	(0.681)	(-0.136)	(1.332)	(2.258)
BIMARU	-0.594	-0.322	-0.254	0.258	0.311	0.0520	0.0883	-0.163
	(-1.221)	(-1.090)	(-0.952)	(0.999)	(1.178)	(0.145)	(0.169)	(-0.182)
South	0.744	0.729*	0.578*	0.745**	0.426	-0.105	-0.144	-0.208
	(1.428)	(2.305)	(2.020)	(2.694)	(1.504)	(-0.275)	(-0.259)	(-0.199)
West	-0.104	0.240	0.262	0.281	0.00408	-0.366	-0.270	-0.674
	(-0.266)	(1.000)	(1.216)	(1.360)	(0.0193)	(-1.299)	(-0.655)	(-0.489)
foodprice	-0.000687	-0.00145	-0.00118	-0.00315*	-0.00345*	-0.000841	-0.00204	0.00236
	(-0.268)	(-0.937)	(-0.846)	(-2.326)	(-2.495)	(-0.450)	(-0.742)	(0.441)
Constant	-5.317**	-2.723*	-2.266*	-0.210	-0.0707	-1.233	0.225	-2.128
	(-2.845)	(-2.303)	(-2.098)	(-0.200)	(-0.0655)	(-0.862)	(0.105)	(-0.338)
Observations	5,335	5,335	5,335	5,335	5,335	5,335	5,335	5,335

t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix Table A2(d): Quantile regression for Z Score of Children: Weight for Height NFHS1 Rural, 1992-3

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Z score -4.0 3.7% extremely	Z score -3.0 8.5% severely	Z score -2.0 20.5%	Z score -1.0	Z score -0	Z score 1.0	Z score 2.0	Z score 3.0
VARIABLES	wasted	wasted	wasted	45.5%	74.5%	90.8%	96.6%	98.5%
hhsize	0.0110	0.00649	0.0116	0.00727	-0.00176	-0.0140	-0.0290	-0.0506
	(0.519)	(0.241)	(0.622)	(0.802)	(-0.205)	(-1.256)	(-1.406)	(-1.272)
child5_share	-0.238	-0.0757	-0.122	-0.168	-0.224	-0.508*	-1.154**	-0.775
	(-0.366)	(-0.118)	(-0.306)	(-0.708)	(-1.087)	(-1.993)	(-2.623)	(-0.776)
child_male	-0.255+	-0.577**	-0.307**	-0.166*	-0.0698	-0.0470	-0.138	-0.351
	(-1.778)	(-4.059)	(-3.563)	(-2.555)	(-1.145)	(-0.674)	(-1.073)	(-1.642)
age	0.0613*	0.0752**	0.0364+	0.00303	-0.0204*	-0.0479**	-0.0741**	-0.140**
	(2.197)	(2.954)	(1.958)	(0.270)	(-2.061)	(-3.424)	(-2.584)	(-3.964)
age2	-0.00135+	-0.00104	-0.00012 0	0.000572 *	0.000986**	0.00132**	0.00180 *	0.00285**
	(-1.657)	(-1.486)	(-0.247)	(1.982)	(3.896)	(3.680)	(2.446)	(3.003)
second child	0.0574	0.0118	-0.191	-0.0928	-0.0655	-0.0975	0.318+	0.0208
	(0.258)	(0.0551)	(-1.411)	(-0.883)	(-0.831)	(-1.003)	(1.801)	(0.0640)
third child	0.263	0.0641	-0.0908	-0.109	-0.0831	-0.241+	0.0625	-0.444
	(1.043)	(0.267)	(-0.555)	(-0.990)	(-0.934)	(-1.770)	(0.340)	(-0.920)
forth more	-0.0903	0.0745	-0.175	-0.312*	-0.226*	-0.441**	-0.216	-0.941+
	(-0.294)	(0.270)	(-0.940)	(-2.417)	(-2.102)	(-3.008)	(-0.986)	(-1.652)
Schooling_Ratio	-0.0830	-0.0387	0.0630	0.0173	4.13e-06 (0.000145	-0.0427	-0.0349	-0.0708
	(-0.919)	(-0.499)	(1.540)	(0.449)	)	(-0.936)	(-0.431)	(-0.509)
AV_Schooling Yrs	0.0661	0.0476	0.0548+	0.0319	0.0376+	0.0310	0.0565	0.0283
	(1.106)	(1.158)	(1.737)	(1.546)	(1.936)	(1.583)	(1.455)	(0.417)
mother_age	0.0382	-0.0310	0.0321	0.0808+	0.0960+	0.104+	0.0241	0.238
	(0.342)	(-0.290)	(0.504)	(1.709)	(1.869)	(1.772)	(0.230)	(1.481)
mother_age2	-7.63e-05	0.000732	-0.00034 9	-0.00107	-0.00147+	-0.00130	8.10e-05	-0.00308
	(-0.0401)	(0.421)	(-0.335)	(-1.379)	(-1.673)	(-1.403)	(0.0464)	(-1.295)
flushtoilet	-0.186	0.337	0.245	0.0953	-0.0501	-0.145	-0.444*	-0.0625
	(-0.458)	(1.087)	(1.527)	(0.804)	(-0.458)	(-1.140)	(-2.273)	(-0.145)
time_water	-0.00154	0.00126	-0.00050 5	0.000300	-0.00111	-0.000560	-0.00162	-0.00609

	(-0.377)	(0.331)	(-0.229)	(0.176)	(-0.623)	(-0.257)	(-0.584)	(-1.160)
electricity	0.289	0.207	0.0207	0.130+	0.153+	0.167+	0.175	0.247
	(1.571)	(1.224)	(0.171)	(1.724)	(1.836)	(1.783)	(0.980)	(0.782)
radio	0.300+	0.337**	0.261**	0.0946+	0.0643	-0.0262	-0.0263	-0.0390
	(1.886)	(2.864)	(4.052)	(1.851)	(1.277)	(-0.604)	(-0.235)	(-0.161)
TV	-0.195	-0.0609	-0.0834	-0.0846	-0.00269	0.0152	-0.161	-0.220
	(-0.810)	(-0.290)	(-0.677)	(-0.635)	(-0.0341)	(0.155)	(-0.908)	(-0.567)
fridge	-0.00914	0.0299	0.0146	0.250*	0.156+	0.0937	0.411	-0.00891
	(-0.0204)	(0.0901)	(0.0772)	(2.314)	(1.839)	(0.796)	(1.506)	(-0.0344)
bicycle	-0.0809	-0.0896	-0.0818	-0.0849	-0.106	-0.108	0.0746	-0.344
	(-0.434)	(-0.536)	(-0.973)	(-1.251)	(-1.517)	(-1.178)	(0.544)	(-1.354)
hh_SC	0.0668	0.189	-0.195	-0.316**	-0.202*	-0.224+	-0.239	0.220
	(0.297)	(1.092)	(-1.274)	(-2.811)	(-2.300)	(-1.863)	(-1.260)	(0.776)
hh_ST	0.223	0.184	0.00734	-0.0406	-0.0912	-0.223**	-0.253	0.156
	(1.021)	(0.934)	(0.0514)	(-0.409)	(-1.178)	(-2.677)	(-1.510)	(0.443)
hh_Other	0.396	0.467*	0.229	0.0636	0.0550	0.163	0.221	0.558*
	(1.543)	(2.397)	(1.641)	(0.733)	(0.631)	(1.438)	(1.415)	(1.991)
Hindu	-1.479**	-0.475	0.00559	0.422	0.226	0.109	0.178	-0.722
	(-2.821)	(-1.394)	(0.0142)	(1.100)	(0.747)	(0.231)	(0.260)	(-0.620)
Muslim	-1.728**	-0.532	-0.245	0.226	0.107	-0.0113	0.266	-0.603
	(-2.892)	(-1.376)	(-0.580)	(0.526)	(0.331)	(-0.0224)	(0.392)	(-0.459)
Christian	-1.228+	-0.0268	0.0751	0.404	0.265	0.122	0.288	-0.255
	(-1.651)	(-0.0628)	(0.184)	(0.978)	(0.782)	(0.232)	(0.358)	(-0.207)
Sikh	-1.305	-0.657	0.311	0.414	0.279	-0.263	1.231	0.482
	(-1.278)	(-0.886)	(0.700)	(0.814)	(0.704)	(-0.369)	(1.025)	(0.338)
BIMARU	-0.245	-0.659	0.0606	0.121	0.113	0.0599	-0.200	0.666
	(-0.428)	(-1.200)	(0.131)	(0.565)	(0.397)	(0.123)	(-0.359)	(1.083)
South	0.774	-0.0786	0.328	0.239	0.284	0.170	-0.199	-0.238
	(1.104)	(-0.126)	(0.659)	(0.928)	(0.820)	(0.324)	(-0.346)	(-0.350)
West	-0.105	0.301	0.159	0.00602	-0.510+	-0.815+	-1.995**	-1.026
	(-0.165)	(0.480)	(0.291)	(0.0214)	(-1.816)	(-1.758)	(-3.313)	(-1.382)
foodprice	0.00739*	0.0139**	0.00456	0.00279	-0.00181	-0.00518*	-0.0121*	-0.0117*
	(2.498)	(3.493)	(1.205)	(1.391)	(-1.131)	(-2.013)	(-2.056)	(-2.050)
Constant	-11.12**	-15.47**	-7.909*	-6.034**	-0.763	3.699	12.37*	11.48*
	(-3.661)	(-4.204)	(-2.319)	(-3.291)	(-0.488)	(1.600)	(2.429)	(2.088)
Observations	3,483	3,483	3,483	3,483	3,483	3,483	3,483	3,483

t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix 3 Details of Regression Results based on NHHS-2 (1998-9)

Appendix Table A3(a) OLS/IV for Z Score of ChildrenOLS for Z Score of Children, Rural, 1998-9

	(1) OLS	(2) IV	(3) IV	(4) OLS	(5) IV	(6) IV	(7) OLS	(8) IV	(9) IV
VARIABLES	Height for Age	Height for Age	Height for Age	Weight for Age	Weight for Age	Weight for Age	Weight for Height	Weight for Height	Weight for Height
hhsize	-0.0108*	-0.0114	-0.0113	-0.00166	-0.00693	-0.00600	0.0123+	-0.0463	-0.0301
	(-2.130)	(-0.437)	(-0.551)	(-0.393)	(-0.266)	(-0.309)	(1.846)	(-0.220)	(-0.526)
child5_share	0.0489	0.0440	0.0557	-0.0168	-0.148	0.0428	0.104	-1.570	0.672
	(0.374)	(0.0774)	(0.196)	(-0.158)	(-0.209)	(0.143)	(0.629)	(-0.259)	(0.810)
child_male	-0.125**	-0.127+	-0.127**	-0.0542*	-0.0678	-0.0636	-0.129**	-0.279	-0.198+
	(-3.992)	(-1.734)	(-2.605)	(-2.172)	(-0.959)	(-1.366)	(-3.288)	(-0.490)	(-1.652)
age	-0.170**	-0.170**	-0.170**	-0.0769**	-0.0739**	-0.0745**	-0.0714**	-0.0349	-0.0491
	(-25.66)	(-11.00)	(-13.68)	(-14.91)	(-4.602)	(-6.093)	(-8.697)	(-0.259)	(-1.465)
age2	0.00280**	0.00280**	0.00280**	0.00131**	0.00122*	0.00125**	0.00194**	0.000812	0.00135
	(15.83)	(6.480)	(8.563)	(9.489)	(2.568)	(3.832)	(8.851)	(0.197)	(1.504)
second child	-0.120*	-0.121+	-0.120*	-0.0590	-0.0587	-0.0616	-0.0519	-0.0595	-0.0609
	(-2.507)	(-1.834)	(-2.440)	(-1.556)	(-1.345)	(-1.514)	(-0.865)	(-0.193)	(-0.507)
third child	-0.176**	-0.175*	-0.175**	-0.115*	-0.0966	-0.107+	-0.169*	0.179	-0.0510
	(-3.098)	(-2.432)	(-2.616)	(-2.530)	(-0.925)	(-1.837)	(-2.370)	(0.139)	(-0.243)
forth more	-0.268**	-0.267**	-0.266*	-0.279**	-0.279**	-0.258*	-0.261**	-0.341	-0.0109
	(-4.294)	(-4.198)	(-2.570)	(-5.533)	(-4.762)	(-2.394)	(-3.359)	(-0.669)	(-0.0296)
Schooling_Ratio	-0.00176	-0.000731	-0.00162	0.0222*	0.0368	0.0231*	0.00592	0.175	0.0279
	(-0.147)	(-0.0108)	(-0.125)	(2.327)	(0.483)	(2.263)	(0.415)	(0.289)	(0.648)
AV_Schooling Yrs	0.0421**	0.0430	0.0424**	0.0448**	0.0549	0.0478**	0.0194**	0.161	0.0557
	(7.865)	(0.872)	(3.347)	(10.39)	(1.075)	(3.616)	(2.890)	(0.319)	(1.120)

beat_unfaithful	0.000834	0.120		-0.0369	1.670		-0.0698	24.81	
	(0.0243)	(0.0145)		(-1.322)	(0.190)		(-1.617)	(0.280)	
allow_market	0.0353		-0.0518	0.0633*		-0.806	0.126**		-9.118
	(0.937)		(-0.0144)	(2.119)		(-0.208)	(2.645)		(-0.738)
mother_age	0.104**	0.104*	0.103**	0.0830**	0.0930	0.0796**	0.0509+	0.232	0.00673
	(4.473)	(2.114)	(4.158)	(4.467)	(1.636)	(3.169)	(1.846)	(0.349)	(0.0821)
mother_age2	-0.00146**	-0.00147+	-0.00145**	-0.00121**	-0.00136	-0.00111*	-0.000894+	-0.00383	0.000255
	(-3.621)	(-1.735)	(-2.765)	(-3.729)	(-1.500)	(-1.962)	(-1.899)	(-0.354)	(0.140)
flushtoilet	0.215**	0.219	0.217*	0.173**	0.203	0.188*	-0.00297	0.353	0.121
	(2.748)	(1.097)	(2.058)	(2.651)	(1.221)	(1.993)	(-0.0317)	(0.261)	(0.457)
time_water	-0.000889	-0.000826	-0.000849	-0.00110+	-0.000778	-0.00116	0.000847	0.00438	-0.00030
	(-1.086)	(-0.599)	(-0.891)	(-1.678)	(-0.458)	(-1.430)	(0.870)	(0.323)	(-0.123)
electricity	0.0464	0.0520	0.0471	0.0775*	0.166	0.0838*	-0.0277	1.246	0.0785
	(1.159)	(0.132)	(0.709)	(2.456)	(0.362)	(2.186)	(-0.565)	(0.274)	(0.466)
radio	0.0451	0.0462	0.0464	0.0255	0.0328	0.0375	0.0542	0.188	0.164
	(1.205)	(1.012)	(0.884)	(0.862)	(0.709)	(0.625)	(1.155)	(0.355)	(0.945)
TV	0.158**	0.156	0.157+	0.146**	0.115	0.130+	0.0666	-0.330	-0.130
	(3.298)	(1.332)	(1.814)	(3.878)	(0.710)	(1.663)	(1.138)	(-0.229)	(-0.450)
fridge	0.0604	0.0712	0.0681	0.0632	0.191	0.139	-0.249+	1.538	0.495
	(0.516)	(0.129)	(0.197)	(0.654)	(0.298)	(0.406)	(-1.868)	(0.241)	(0.473)
bicycle	-0.0389	-0.0421	-0.0396	0.0221	-0.0105	0.0222	-0.0500	-0.507	-0.0690
	(-1.088)	(-0.249)	(-1.086)	(0.772)	(-0.0620)	(0.734)	(-1.104)	(-0.309)	(-0.746)
hh_SC	-0.196**	-0.198	-0.194*	-0.0690+	-0.106	-0.0518	-0.00745	-0.537	0.192
	(-4.095)	(-1.001)	(-2.079)	(-1.751)	(-0.519)	(-0.594)	(-0.123)	(-0.280)	(0.656)
hh_ST	-0.186**	-0.189	-0.185*	-0.188**	-0.238	-0.176*	-0.00157	-0.655	0.160
	(-3.245)	(-0.821)	(-2.418)	(-4.111)	(-0.905)	(-2.322)	(-0.0220)	(-0.277)	(0.617)
hh_Other	-0.131**	-0.132	-0.129	-0.0737*	-0.0892	-0.0518	-0.111+	-0.414	0.0878
	(-2.914)	(-0.957)	(-1.165)	(-2.047)	(-0.926)	(-0.486)	(-1.935)	(-0.368)	(0.303)
Hindu	0.0921	0.0772	0.0822	-0.236*	-0.398	-0.340	-0.336*	-2.429	-1.437
	(0.718)	(0.0997)	(0.189)	(-2.565)	(-0.496)	(-0.738)	(-2.406)	(-0.326)	(-0.952)
Muslim	0.0799	0.0579	0.0701	-0.202+	-0.462	-0.305	-0.244	-3.763	-1.301
	(0.562)	(0.0467)	(0.170)	(-1.923)	(-0.354)	(-0.681)	(-1.539)	(-0.301)	(-0.898)
Christian	0.239+	0.232	0.230	0.0622	0.0121	-0.0185	0.0360	-0.658	-0.883
	(1.778)	(0.919)	(0.635)	(0.634)	(0.0477)	(-0.0498)	(0.236)	(-0.258)	(-0.691)
Sikh	0.204	0.187	0.208	-0.596**	-0.837	-0.576*	-0.534	-4.384	-0.419
	(0.745)	(0.140)	(0.625)	(-3.013)	(-0.658)	(-2.428)	(-1.498)	(-0.316)	(-0.537)
BIMARU	-0.126	-5.400	-5.348+	-0.127	-5.388	-4.744	0.780**	-19.07	-7.216
	(-1.317)	(-0.857)	(-1.875)	(-1.568)	(-0.807)	(-1.551)	(6.211)	(-0.283)	(-0.750)
South	-0.0310	-0.106	-0.0663	0.0359	-0.320	0.245	0.130	-7.852	0.421
	(-0.298)	(-0.0395)	(-0.298)	(0.433)	(-0.113)	(1.126)	(1.015)	(-0.280)	(0.582)
West	-0.0902	-1.903	-1.865**	-0.268**	-2.181	-1.633**	-0.104	-8.416	-0.393
	(-0.692)	(-0.776)	(-4.507)	(-2.675)	(-0.828)	(-4.765)	(-0.668)	(-0.316)	(-0.365)
foodprice	0.00396+	-0.222	-0.221	0.00514**	-0.221	-0.213	0.00869**	-0.580	-0.358
	(1.932)	(-1.149)	(-1.624)	(3.274)	(-1.073)	(-1.424)	(3.668)	(-0.286)	(-0.758)
East		-10.18	-10.16		-9.673	-9.658		-22.08	-17.02
		(-1.411)	(-1.616)		(-1.268)	(-1.402)		(-0.294)	(-0.784)
Constant	-3.017**	69.03	68.79	-3.729**	67.79	65.82	-3.076**	177.5	116.3
	(-4.198)	(1.160)	(1.559)	(-6.714)	(1.070)	(1.355)	(-3.738)	(0.286)	(0.758)
Observations	11,917	11,913	11,913	12,528	12,524	12,524	13,182	13,178	13,178
R-squared	0.213	0.212	0.212	0.142	-0.127	0.084	0.058	-24.048	-2.716

Robust t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix Table A3(b) Quantile Regression for Z Score of Children: Height for Age, Rural 1998-9

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Z score - 4.0	Z score - 3.0	Z score - 2.0	Z score - 1.0	Z score - 0	Z score 1.0	Z score 2.0	Z score 3.0
	8%	20.8%						
	extremel	severely	43.5%					
VARIABLES	y stunted	stunted	stunted	68.4%	85.1%	93.4%	96.92%	98.5%
hhsize	-0.00993	-0.0161**	-0.0159**	-0.00769	-0.00585	-0.00531	-0.0159	-0.0607*
	(-1.140)	(-2.661)	(-2.647)	(-1.116)	(-0.929)	(-0.501)	(-1.161)	(-2.530)
child5_share	0.0913	0.0917	-0.0616	0.108	0.0728	0.0206	-0.0838	-0.770
	(0.409)	(0.519)	(-0.395)	(0.695)	(0.428)	(0.0658)	(-0.214)	(-0.998)
child_male	-0.186**	-0.193**	-0.153**	-0.0691+	-0.0177	0.00262	-0.0342	-0.417*
	(-3.034)	(-4.845)	(-4.255)	(-1.932)	(-0.387)	(0.0439)	(-0.322)	(-2.431)
age	-0.101**	-0.131**	-0.162**	-0.183**	-0.200**	-0.223**	-0.256**	-0.234**
	(-7.737)	(-15.11)	(-22.34)	(-24.26)	(-20.93)	(-13.35)	(-12.14)	(-8.718)

age2	0.00141**	0.00193**	0.00272**	0.00315**	0.00344**	0.00394**	0.00435**	0.00320**
	(4.414)	(8.379)	(13.27)	(15.67)	(13.28)	(8.647)	(8.056)	(4.303)
second child	-0.126	-0.164**	-0.176**	-0.179**	-0.121+	-0.0872	-0.0249	-0.0201
	(-1.570)	(-2.629)	(-3.473)	(-3.089)	(-1.906)	(-0.831)	(-0.191)	(-0.0955)
third child	-0.0745	-0.182*	-0.245**	-0.193**	-0.271**	-0.241*	-0.0811	0.483+
	(-0.799)	(-2.465)	(-3.495)	(-3.111)	(-4.396)	(-2.058)	(-0.468)	(1.745)
forth more	-0.236+	-0.275**	-0.352**	-0.366**	-0.322**	-0.192	0.0300	0.365
	(-1.955)	(-3.219)	(-4.997)	(-4.885)	(-3.550)	(-1.301)	(0.174)	(1.066)
Schooling_Ratio	0.0277	0.0183	-0.00162	-0.00940	0.00407	0.00550	-0.0177	-0.0284
	(1.035)	(1.189)	(-0.126)	(-0.677)	(0.259)	(0.228)	(-0.762)	(-0.632)
AV_Schooling Yrs	0.0416**	0.0551**	0.0490**	0.0470**	0.0398**	0.0310**	0.0175	0.0303
	(3.768)	(8.449)	(8.125)	(7.934)	(5.328)	(2.904)	(1.073)	(1.215)
beat_unfaithful	0.0290	0.0161	0.0128	-0.0168	0.0355	0.0620	-0.139	-0.474**
	(0.464)	(0.369)	(0.319)	(-0.416)	(0.688)	(0.844)	(-1.341)	(-2.693)
allow_market	0.0607	0.0701	0.0318	-0.00761	0.0725	0.0794	-0.0939	4.70e-05
	(0.918)	(1.425)	(0.800)	(-0.170)	(1.302)	(1.001)	(-0.798)	(0.000256)
mother_age	0.0609+	0.106**	0.128**	0.101**	0.113**	0.117*	0.0969	0.0719
	(1.704)	(3.480)	(4.821)	(3.585)	(3.347)	(2.360)	(1.381)	(0.625)
mother_age2	-0.000764	-0.00170**	-0.00193**	-0.00135**	-0.00154**	-0.00160+	-0.00116	-0.00129
	(-1.293)	(-3.293)	(-4.096)	(-2.730)	(-2.779)	(-1.863)	(-0.910)	(-0.702)
flushtoilet	0.204	0.264**	0.146	0.199*	0.230*	0.242	0.265	0.0232
	(1.181)	(2.920)	(1.629)	(1.999)	(1.976)	(1.498)	(1.217)	(0.0763)
time_water	-0.00150	-0.00170	-0.000822	-0.00170*	-0.000500	1.09e-05	-0.000934	0.00138
	(-1.513)	(-1.586)	(-1.110)	(-2.071)	(-0.442)	(0.00658)	(-0.316)	(0.314)
electricity	0.0933	0.0451	0.0555	0.0671	0.00258	-0.00346	0.170	0.224
	(1.195)	(0.906)	(1.042)	(1.401)	(0.0412)	(-0.0418)	(1.103)	(1.116)
radio	-0.00610	0.0629	0.0322	0.0504	0.0720	0.0766	0.0215	0.00214
	(-0.0779)	(1.165)	(0.699)	(1.150)	(1.338)	(0.980)	(0.208)	(0.0102)
TV	0.184+	0.194*	0.180**	0.157**	0.184**	0.184*	0.154	-0.0403
	(1.854)	(2.459)	(3.519)	(2.775)	(2.613)	(2.012)	(1.079)	(-0.167)
fridge	0.196	0.0742	0.0521	-0.0344	0.0215	0.182	0.0124	-0.336
	(1.098)	(0.416)	(0.379)	(-0.243)	(0.120)	(1.012)	(0.0483)	(-0.727)
bicycle	0.0493	-0.0481	0.0310	-0.0485	-0.0734	-0.131+	-0.107	0.0800
	(0.728)	(-0.994)	(0.642)	(-1.057)	(-1.559)	(-1.761)	(-0.990)	(0.455)
hh_SC	-0.129	-0.170**	-0.271**	-0.201**	-0.189**	-0.179*	-0.138	0.0619
	(-1.258)	(-2.752)	(-5.394)	(-3.626)	(-2.993)	(-2.053)	(-0.957)	(0.235)
hh_ST	-0.254**	-0.241**	-0.274**	-0.208**	-0.121	-0.106	0.167	0.00127
	(-2.920)	(-3.239)	(-4.526)	(-3.331)	(-1.255)	(-0.935)	(0.930)	(0.00460)
hh_Other	-0.0784	-0.0340	-0.128*	-0.113*	-0.159*	-0.268**	-0.194+	0.0506
	(-0.853)	(-0.614)	(-2.540)	(-2.301)	(-2.286)	(-3.178)	(-1.665)	(0.216)
Hindu	-0.233	-0.183	-0.0682	-0.0946	0.108	0.438*	0.513	0.476
	(-0.884)	(-1.425)	(-0.460)	(-0.766)	(0.567)	(2.113)	(1.599)	(1.024)
Muslim	-0.243	-0.221	-0.148	-0.122	0.0776	0.378	0.667+	0.745
	(-0.919)	(-1.405)	(-0.854)	(-0.926)	(0.373)	(1.606)	(1.811)	(1.339)
Christian	-0.0389	0.115	0.0746	0.0317	0.184	0.519+	0.598	1.029+
	(-0.141)	(0.850)	(0.449)	(0.209)	(0.883)	(1.955)	(1.607)	(1.833)
Sikh	0.167	0.0423	0.358	-0.0873	0.108	0.435	0.141	2.705
	(0.352)	(0.116)	(0.911)	(-0.308)	(0.277)	(0.965)	(0.138)	(1.240)
BIMARU	-0.0140	-0.223+	-0.317**	-0.209+	-0.135	-0.0591	0.230	0.958*
	(-0.0730)	(-1.804)	(-2.587)	(-1.908)	(-0.955)	(-0.289)	(0.806)	(2.465)
South	0.514*	0.291+	-0.0538	-0.0847	-0.202	-0.384+	-0.435	0.0533
	(2.068)	(1.826)	(-0.409)	(-0.741)	(-1.155)	(-1.786)	(-1.429)	(0.0976)
West	0.280	-0.0563	-0.260+	-0.239	-0.205	-0.345	0.410	1.210*
	(1.364)	(-0.322)	(-1.767)	(-1.580)	(-1.015)	(-1.050)	(1.103)	(2.000)
foodprice	-0.00424	-0.00403	0.00215	0.00337	0.00746**	0.00999*	0.0130*	0.0147+
	(-1.240)	(-1.201)	(0.924)	(1.395)	(2.584)	(2.483)	(2.209)	(1.764)
Constant	-2.888*	-1.934	-3.015**	-2.223**	-2.915**	-2.986*	-2.536	-1.072
	(-2.297)	(-1.539)	(-3.688)	(-2.865)	(-2.973)	(-2.251)	(-1.263)	(-0.341)
Observations	11,917	11,917	11,917	11,917	11,917	11,917	11,917	11,917

t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix Table A3(c): Quantile regression for Z Score of Children: Weight for Age, 1998-9

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Z score -4.0	Z score -3.0	Z score -2.0	Z score -	Z score -	Z score	Z score	Z score

VARIABLES	4.2% extremely underweight	14.8% severely underweight	38.4% underweight	1.0 69.6%	0 90.5%	1.0 97.3%	2.0 99.3% overweight	3.0 99.8% obese
hhsize	-0.0111	-0.00926	-0.00842	0.000479	0.00392	-0.000321	0.00827	-0.0101
	(-1.123)	(-1.505)	(-1.332)	(0.0896)	(0.762)	(-0.0349)	(0.587)	(-0.280)
child5_share	-0.465+	-0.241	-0.113	-0.0247	0.0649	0.228	0.604+	0.908
	(-1.857)	(-1.298)	(-0.946)	(-0.175)	(0.450)	(1.119)	(1.780)	(1.456)
child_male	0.0335	-0.0800*	-0.0913**	-0.0459	-0.0351	-0.0192	-0.104	-0.177
	(0.481)	(-1.966)	(-2.788)	(-1.519)	(-1.044)	(-0.343)	(-1.344)	(-1.129)
age	-0.0339*	-0.0282**	-0.0558**	-0.0799**	-0.0930**	-0.108**	-0.160**	-0.232**
	(-2.459)	(-3.399)	(-8.173)	(-12.28)	(-12.65)	(-10.84)	(-6.563)	(-5.336)
age2	0.000678+	0.000315	0.000843**	0.00135**	0.00161**	0.00184**	0.00283**	0.00451**
	(1.906)	(1.500)	(4.767)	(7.667)	(7.985)	(6.786)	(4.491)	(3.916)
second child	-0.141	-0.113	-0.0736	-0.0801+	-0.0582	-0.0700	-0.174	0.0175
	(-1.416)	(-1.582)	(-1.614)	(-1.781)	(-1.112)	(-0.956)	(-1.431)	(0.0848)
third child	-0.202	-0.109	-0.111+	-0.179**	-0.131*	-0.166	-0.0494	0.142
	(-1.576)	(-1.456)	(-1.665)	(-3.162)	(-2.192)	(-1.520)	(-0.273)	(0.551)
forth more	-0.391**	-0.321**	-0.277**	-0.284**	-0.270**	-0.228*	-0.330	-0.0793
	(-2.611)	(-3.678)	(-4.283)	(-4.678)	(-3.940)	(-2.165)	(-1.573)	(-0.300)
Schooling_Ratio	0.0649**	0.0364*	0.0272**	0.00654	0.0221	0.0118	0.00631	-0.0423
	(3.157)	(2.384)	(3.150)	(0.637)	(1.422)	(0.612)	(0.197)	(-0.826)
AV_Schooling Yrs	0.0420**	0.0603**	0.0505**	0.0396**	0.0383**	0.0276**	0.0252	0.0291
	(3.826)	(8.692)	(7.981)	(8.392)	(7.278)	(3.249)	(1.639)	(1.197)
beat_unfaithful	-0.141+	-0.0290	-0.0317	-0.0124	0.00586	-0.0400	-0.0283	-0.0248
	(-1.835)	(-0.678)	(-0.896)	(-0.352)	(0.175)	(-0.750)	(-0.267)	(-0.124)
allow_market	0.142+	0.124*	0.0672+	0.0382	0.0878*	0.0107	0.126	0.0989
	(1.810)	(2.474)	(1.803)	(1.068)	(2.323)	(0.182)	(1.205)	(0.532)
mother_age	0.120*	0.122**	0.105**	0.103**	0.0751**	0.0369	0.0627	-0.0848
	(2.018)	(4.273)	(4.993)	(4.413)	(2.655)	(0.860)	(0.807)	(-0.675)
mother_age2	-0.00183+	-0.00200**	-0.00170**	-0.00155**	-0.00104*	-0.000366	-0.000638	0.00205
	(-1.829)	(-4.160)	(-4.619)	(-3.952)	(-2.166)	(-0.475)	(-0.471)	(0.891)
flushtoilet	0.134	0.0714	0.142	0.205**	0.183*	0.235*	0.519+	0.445
	(1.070)	(0.610)	(1.544)	(3.192)	(2.085)	(2.077)	(1.789)	(1.123)
time_water	-0.000608	-0.00200*	-0.00182**	-0.00127	-0.00107	-0.000546	0.000819	-0.00405
	(-0.394)	(-2.125)	(-2.635)	(-1.535)	(-1.378)	(-0.435)	(0.275)	(-1.011)
electricity	0.257**	0.173**	0.0686+	0.103*	0.0493	-0.0113	-0.0495	0.0662
	(3.011)	(3.141)	(1.830)	(2.492)	(1.292)	(-0.180)	(-0.420)	(0.318)
radio	0.0192	0.0565	0.00693	-0.0109	0.0358	0.0403	0.0608	0.305
	(0.234)	(1.180)	(0.183)	(-0.368)	(0.798)	(0.656)	(0.635)	(1.458)
TV	0.298**	0.154*	0.168**	0.126**	0.129**	0.164+	0.0778	0.264
	(2.997)	(2.280)	(3.649)	(2.720)	(3.064)	(1.943)	(0.629)	(1.096)
fridge	0.0375	0.139	0.194*	0.138	-0.0180	0.0242	-0.0510	0.191
	(0.0969)	(0.809)	(2.007)	(1.166)	(-0.151)	(0.165)	(-0.120)	(0.279)
bicycle	0.0836	0.0892+	0.0532	0.0310	0.00802	-0.0288	-0.0269	-0.203
	(0.963)	(1.828)	(1.409)	(0.860)	(0.194)	(-0.476)	(-0.249)	(-0.961)
hh_SC	-0.0427	-0.132+	-0.156**	-0.0877+	-0.0776	-0.0692	-0.0627	0.143
	(-0.399)	(-1.911)	(-3.158)	(-1.703)	(-1.377)	(-0.805)	(-0.498)	(0.550)
hh_ST	-0.275*	-0.147*	-0.243**	-0.249**	-0.204**	-0.197*	-0.168	-0.313
	(-2.207)	(-2.037)	(-4.456)	(-4.537)	(-3.542)	(-2.118)	(-1.157)	(-1.213)
hh_Other	0.0171	-0.0695	-0.105*	-0.128**	-0.0945+	-0.144+	-0.173	-0.194
	(0.183)	(-1.397)	(-2.401)	(-3.018)	(-1.900)	(-1.926)	(-1.372)	(-0.779)
Hindu	-0.233	-0.309*	-0.293+	-0.331**	-0.313*	-0.0831	0.353	0.215
	(-0.820)	(-2.203)	(-1.894)	(-2.783)	(-2.299)	(-0.660)	(1.272)	(0.473)
Muslim	-0.0324	-0.199	-0.230	-0.299*	-0.366*	-0.0301	0.197	0.227
	(-0.104)	(-1.270)	(-1.457)	(-2.388)	(-2.536)	(-0.190)	(0.630)	(0.405)
Christian	0.170	0.0162	0.0293	-0.0240	-0.0151	0.144	0.796**	0.539
	(0.541)	(0.117)	(0.167)	(-0.230)	(-0.114)	(0.927)	(2.703)	(1.199)
Sikh	-0.0783	-0.365	-0.603**	-0.915**	-0.815**	-0.719+	-0.372	-1.389+
	(-0.109)	(-1.489)	(-2.742)	(-2.838)	(-2.723)	(-1.703)	(-0.589)	(-1.712)
BIMARU	-0.488**	-0.376*	-0.530**	-0.102	0.173	0.291*	0.687*	0.882*
	(-2.980)	(-1.981)	(-6.478)	(-1.202)	(1.481)	(1.994)	(2.466)	(2.109)
South	0.130	0.249+	-0.0121	-0.0129	0.00275	-0.0350	0.290	-0.735
	(0.446)	(1.873)	(-0.143)	(-0.139)	(0.0231)	(-0.211)	(0.719)	(-1.266)
West	0.125	0.611**	0.233	-0.0392	-0.0526	-0.248	-0.623+	-1.905**
	(0.301)	(3.362)	(1.240)	(-0.286)	(-0.286)	(-1.355)	(-1.677)	(-4.383)
foodprice	0.00125	0.00404	0.00478**	0.00587**	0.00536*	0.00505+	0.00582	0.0241*
	(0.223)	(1.252)	(2.714)	(3.410)	(2.190)	(1.795)	(0.722)	(2.238)
Constant	-5.993**	-5.785**	-4.457**	-3.849**	-2.567**	-1.101	-1.159	-2.725
	(-2.731)	(-5.421)	(-6.834)	(-6.170)	(-2.889)	(-1.033)	(-0.420)	(-0.797)
Observations	12,528	12,528	12,528	12,528	12,528	12,528	12,528	12,528

t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix TableA3(d): Quantile regression for Z Score of Children: Weight for Height

VARIABLES	(1) Z score - 4.0 2.0% extremely wasted	(2) Z score - 3.0 6.4% severely wasted	(3) Z score - 2.0 18.5% wasted	(4) Z score - 1.0 46.2%	(5) Z score - 0 77.6%	(6) Z score 1.0 93.1%	(7) Z score 2.0 97.5%	(8) Z score 3.0 99.0%
Hhsize	0.000528	0.00225	-0.00646	0.000687	0.00937	0.0313*	0.00958	-0
	(0.0480)	(0.216)	(-0.873)	(0.131)	(1.461)	(2.518)	(0.924)	(-5.05e-05)
child5_share	-0.0199	0.158	-0.0555	-0.0679	-0.0256	0.147	0.105	-0
	(-0.0643)	(0.571)	(-0.295)	(-0.503)	(-0.171)	(0.529)	(0.332)	(-0.000258)
child_male	-0.0289	-0.0920	-0.132**	-0.128**	-0.0834**	-0.100	-0.108	0
	(-0.362)	(-1.591)	(-3.073)	(-3.747)	(-3.069)	(-1.531)	(-1.286)	(2.40e-05)
Age	0.00674	0.00613	0.00272	-0.0178**	-0.0489**	-0.133**	-0.0499	-0
	(0.435)	(0.513)	(0.317)	(-2.728)	(-7.846)	(-7.779)	(-1.371)	(-0.000230)
age2	0.000276	0.000568+	0.000500*	0.000753**	0.00134**	0.00303**	0.00121	0
	(0.609)	(1.647)	(2.278)	(4.328)	(8.101)	(7.184)	(1.351)	(0.000139)
second child	0.131	0.0471	-0.0249	-0.0191	-0.0808+	-0.0919	-0.0561	-0
	(1.025)	(0.488)	(-0.369)	(-0.417)	(-1.748)	(-0.858)	(-0.528)	(-0.000808)
third child	-0.000273	0.0993	0.0143	-0.0553	-0.190**	-0.276*	-0.110	-0
	(-0.00180)	(0.857)	(0.188)	(-0.900)	(-3.040)	(-2.296)	(-0.848)	(-0.00213)
forth more	-0.138	-0.0749	-0.0840	-0.115+	-0.225**	-0.365**	-0.128	-0
	(-0.861)	(-0.586)	(-0.969)	(-1.757)	(-3.285)	(-2.980)	(-0.823)	(-0.00150)
Schooling_Ratio	0.0324	0.0623**	0.0401*	0.0136	0.0201	0.00560	-0.0321	0
	(0.863)	(2.655)	(2.394)	(1.140)	(1.412)	(0.260)	(-0.858)	(0.000715)
AV_Schooling Yrs	0.0384**	0.0531**	0.0376**	0.0307**	0.0170**	0.00883	-0.00674	-0
	(3.708)	(4.920)	(5.234)	(5.587)	(2.750)	(0.834)	(-0.651)	(-7.58e-05)
beat_unfaithful	-0.156+	-0.0631	-0.0380	-0.0782*	-0.0461	-0.0553	-0.0458	-0
	(-1.832)	(-0.815)	(-0.710)	(-2.508)	(-1.436)	(-0.773)	(-0.586)	(-0.000473)
allow_market	0.188*	-0.0183	0.0746	0.0663+	0.105*	0.162*	0.104	-0
	(2.381)	(-0.243)	(1.328)	(1.710)	(2.331)	(2.405)	(1.471)	(-4.39e-05)
mother_age	0.0386	0.0162	0.0177	0.0133	0.0617*	0.0783*	0.0289	0
	(0.795)	(0.363)	(0.538)	(0.589)	(2.219)	(2.282)	(0.582)	(0.00813)
mother_age2	-0.000339	-0.000163	-0.000317	-0.000301	-0.00111*	-0.00135*	-0.000539	-0
	(-0.430)	(-0.210)	(-0.543)	(-0.771)	(-2.261)	(-2.346)	(-0.617)	(-0.00780)
flushtoilet	-0.163	-0.0656	0.0321	0.112	0.0807	0.116	-0.152	-0
	(-0.713)	(-0.419)	(0.279)	(1.429)	(0.780)	(0.825)	(-0.706)	(-4.86e-05)
time_water	0.00315	0.000417	-0.00165	0.000447	-0.000572	-0.000563	0.000891	-0
	(1.634)	(0.243)	(-1.515)	(0.673)	(-0.737)	(-0.366)	(0.599)	(-8.08e-05)
electricity	0.220*	0.204**	-0.00557	0.0421	0.0177	-0.0207	-0.0672	-0
	(1.962)	(3.259)	(-0.0995)	(0.974)	(0.404)	(-0.298)	(-0.514)	(-0.000896)
radio	-0.0634	0.00180	-0.0575	-0.0370	0.0437	0.0943	0.0463	-0
	(-0.707)	(0.0249)	(-1.041)	(-0.853)	(1.096)	(1.303)	(0.534)	(-0.000179)
TV	-0.0207	0.209*	0.140+	0.0818	0.0872*	-0.0762	-0.00243	0
	(-0.138)	(2.288)	(1.940)	(1.611)	(1.996)	(-0.858)	(-0.0195)	(5.89e-05)
fridge	0.390	0.123	0.154	-0.0619	-0.131	-0.327	-0.246	-0
	(1.530)	(0.473)	(0.758)	(-0.591)	(-1.100)	(-1.486)	(-0.795)	(-0)
bicycle	0.194**	0.0693	0.0604	0.0274	-0.0173	-0.0171	-0.0777	0
	(2.728)	(1.146)	(1.161)	(0.843)	(-0.412)	(-0.266)	(-0.955)	(0.000210)
hh_SC	0.0848	-0.0478	-0.133+	-0.0254	-0.0172	0.0389	-0.0320	0
	(0.762)	(-0.557)	(-1.814)	(-0.484)	(-0.292)	(0.383)	(-0.351)	(0.000206)
hh_ST	-0.213+	-0.0847	-0.0966	-0.103+	-0.114+	0.0726	-0.0302	0
	(-1.671)	(-0.854)	(-1.122)	(-1.906)	(-1.909)	(0.635)	(-0.288)	(0.000442)
hh_Other	-0.0569	-0.0170	-0.145*	-0.0390	-0.0825	-0.154+	-0.106	0
	(-0.517)	(-0.222)	(-2.212)	(-0.804)	(-1.607)	(-1.950)	(-0.848)	(0.000380)
Hindu	-0.495	-0.384	-0.390**	-0.319**	-0.352*	-0.274	-0.154	0
	(-1.214)	(-1.401)	(-2.585)	(-2.846)	(-2.411)	(-1.548)	(-0.473)	(0.00136)
Muslim	-0.285	-0.272	-0.293+	-0.207+	-0.208	-0.171	-0.240	0
	(-0.662)	(-0.962)	(-1.819)	(-1.669)	(-1.302)	(-0.848)	(-0.711)	(0.000728)
Christian	0.0427	-0.331	-0.228	-0.0377	0.0711	0.0886	0.260	0
	(0.0952)	(-1.224)	(-1.429)	(-0.320)	(0.500)	(0.392)	(0.717)	(0)
Sikh	-0.180	-0.309	-0.825**	-0.859**	-0.856*	-0.338	0.750	0
	(-0.304)	(-0.740)	(-3.362)	(-3.138)	(-2.191)	(-0.439)	(0.589)	(0)
BIMARU	-0.105	-0.492**	-0.523**	-0.0981	0.570**	2.603**	3.914**	0
	(-0.322)	(-2.821)	(-3.546)	(-0.814)	(5.043)	(5.134)	(6.296)	(0)
South	0.476	0.184	0.284	0.0353	-0.0434	-0.141	0.879	0

	(1.426)	(1.054)	(1.619)	(0.409)	(-0.441)	(-0.582)	(1.133)	(0)
West	-0.0341	-0.568**	-0.492**	-0.504**	-0.143	0.201	1.433*	0
	(-0.0987)	(-2.962)	(-2.671)	(-3.600)	(-1.141)	(0.562)	(2.269)	(0)
foodprice	-0.00327	0.00462	0.00392	0.00767**	0.00850**	0.0119*	0.0440**	0
	(-0.485)	(1.398)	(1.193)	(3.279)	(4.999)	(2.243)	(4.864)	(0)
Constant	-4.132+	-5.173**	-3.539**	-3.514**	-3.356**	-2.972+	-10.57**	5**
	(-1.806)	(-3.879)	(-3.504)	(-4.393)	(-5.145)	(-1.823)	(-3.245)	(22.89)
Observations	13,182	13,182	13,182	13,182	13,182	13,182	13,182	13,182

t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix 4 Details of Regression Results based on NHHS-3 (2005-6)

Appendix Table A4(a): OLS/2SLS for Z Score of Children, NFHS-3, 2005-6, Rural

VARIABLES	(1) OLS Height for Age	(2) IV Height for Age	(3) IV Height for Age	(4) IV Height for Age	(5) OLS Weight for Age	(6) IV Weight for Age	(7) IV Weight for Age	(8) IV Weight for Age	(9) OLS Weight for Height	(10) IV Weight for Height	(11) IV Weight for Height	(12) IV Weight for Height
hhsize	-0.00691	-0.0133+	-0.00756	-0.0355	-0.00205	-0.00796	-0.00432	0.00903	0.00934*	0.00851	0.00807	0.0749
	(-1.255)	(-1.782)	(-1.193)	(-0.478)	(-0.513)	(-1.340)	(-0.863)	(1.463)	(2.083)	(1.576)	(1.286)	(0.710)
child5_share	-0.407**	-0.486**	-0.275	-0.218	0.0555	-0.0437	-0.0715	-0.0228	0.303**	0.272*	0.155	-0.0780
	(-2.887)	(-2.952)	(-0.854)	(-0.470)	(0.525)	(-0.327)	(-0.343)	(-0.203)	(2.666)	(2.207)	(0.665)	(-0.126)
child_male	-0.110**	-0.121**	-0.103**	-0.0701	-0.0628**	-0.0781**	-0.0621*	-0.0738**	-0.0367	-0.0414	-0.0337	-0.111
	(-3.683)	(-3.687)	(-3.221)	(-0.722)	(-2.811)	(-2.884)	(-2.279)	(-3.120)	(-1.504)	(-1.627)	(-0.998)	(-0.873)
age	-0.154**	-0.154**	-0.150**	-0.152**	-0.0550**	-0.0538**	-0.0605**	-0.0559**	0.00262	0.00256	-0.00842	-0.00373
	(-23.48)	(-22.31)	(-10.51)	(-16.33)	(-11.71)	(-10.04)	(-6.114)	(-11.67)	(0.494)	(0.479)	(-0.569)	(-0.306)
age2	0.00273**	0.00274**	0.00259**	0.00274**	0.000962**	0.000962**	0.00112**	0.000950**	9.58e-05	0.000103	0.000404	8.98e-05
	(16.44)	(15.62)	(6.393)	(14.87)	(8.006)	(6.991)	(4.089)	(7.733)	(0.724)	(0.771)	(1.003)	(0.412)
second child	-0.0112	0.0125	-0.0151	-0.0255	-0.102**	-0.0695	-0.0964*	-0.0905**	-0.124**	-0.116**	-0.124*	-0.0988
	(-0.258)	(0.246)	(-0.321)	(-0.461)	(-3.014)	(-1.573)	(-2.370)	(-2.592)	(-3.389)	(-2.903)	(-2.455)	(-1.342)
third child	-0.0978+	-0.0805	-0.0803	-0.0899	-0.104*	-0.0844+	-0.141*	-0.112**	-0.0787+	-0.0755	-0.142	-0.117
	(-1.789)	(-1.353)	(-0.890)	(-1.247)	(-2.495)	(-1.694)	(-2.021)	(-2.604)	(-1.739)	(-1.633)	(-1.464)	(-1.253)
forth more	-0.200**	-0.183**	-0.122	-0.142	-0.148**	-0.124*	-0.231+	-0.167**	-0.0718	-0.0713	-0.227	-0.208
	(-3.275)	(-2.788)	(-0.552)	(-0.849)	(-3.241)	(-2.280)	(-1.700)	(-3.474)	(-1.453)	(-1.425)	(-1.117)	(-0.921)
Schooling_Ratio	0.00427	0.0124	-0.00473	0.0167	0.00546	0.0155	0.0139	-0.000124	0.00891	0.0112	0.0198	-0.0243
	(0.421)	(1.019)	(-0.216)	(0.402)	(0.668)	(1.526)	(0.878)	(-0.0142)	(0.972)	(1.110)	(1.045)	(-0.444)
AV_Schooling Yrs	0.0283**	0.0162	0.0169	0.0332*	0.0334**	0.0193*	0.0464*	0.0301**	0.0215**	0.0184*	0.0417	0.00597
	(5.610)	(1.485)	(0.561)	(2.047)	(8.636)	(2.161)	(2.309)	(7.419)	(5.149)	(2.473)	(1.523)	(0.244)
beat_unfaithful	**0.0455**		**-1.634**		**0.0156**		**2.067**		**-0.0512+**		**3.019**	
	(1.316)		**(-0.358)**		**(0.604)**		**(0.701)**		**(-1.850)**		**(0.789)**	
allow_market	**0.0551+**			**-1.748**	**-0.00379**			**0.787****	**-0.0467+**			**4.154**
	(1.673)			**(-0.365)**	**(-0.154)**			**(2.775)**	**(-1.759)**			**(0.625)**
health_scheme	**-0.0204**	**4.092**			**0.0412**	**5.267+**			**0.0245**	**1.224**		
	(-0.220)	**(1.254)**			**(0.528)**	**(1.865)**			**(0.309)**	**(0.558)**		
mother_age	0.117**	0.114**	0.0955	0.218	0.0445*	0.0361+	0.0906	0.0125	-0.00515	-0.00780	0.0515	-0.224
	(4.788)	(4.387)	(0.935)	(0.905)	(2.566)	(1.799)	(1.549)	(0.554)	(-0.269)	(-0.406)	(0.669)	(-0.638)
mother_age2	-0.00177**	-0.00177**	-0.00140	-0.00314	-0.000716*	-0.000669*	-0.00151	-0.000336	9.56e-07	1.61e-05	-0.000973	0.00286
	(-4.209)	(-4.016)	(-0.795)	(-0.998)	(-2.426)	(-2.006)	(-1.510)	(-0.948)	(0.00297)	(0.0501)	(-0.749)	(0.618)
time_water	0.000742	0.000544	0.000215	-0.00138	-0.00101	-0.000988	-0.00141	-0.000681	-0.00109	-0.00104	-0.00184	0.000617
	(-0.802)	(-0.563)	(-0.144)	(-0.590)	(-1.490)	(-1.313)	(-1.370)	(-0.968)	(-1.469)	(-1.385)	(-1.230)	(0.215)
electricity	-0.0589	-0.0196	-0.0860	-0.0189	-0.0774*	-0.0281	-0.0567	-0.105**	-0.0684+	-0.0578	-0.0325	-0.167
	(-1.337)	(-0.360)	(-0.958)	(-0.159)	(-2.382)	(-0.643)	(-1.023)	(-2.987)	(-1.884)	(-1.390)	(-0.474)	(-1.002)
radio	0.0387	0.0343	0.0796	0.0465	0.0421	0.0318	-0.000735	0.0381	0.0186	0.0144	-0.0588	-0.00628

	(1.106)	(0.898)	(0.719)	(1.165)	(1.578)	(0.972)	(-0.0110)	(1.391)	(0.638)	(0.482)	(-0.636)	(-0.119)
TV	0.0198	0.0230	0.0241	0.0408	0.0345	0.0327	0.0115	0.0160	-0.00313	-0.00438	-0.0218	-0.0580
	(0.469)	(0.509)	(0.476)	(0.500)	(1.090)	(0.880)	(0.270)	(0.491)	(-0.0906)	(-0.126)	(-0.383)	(-0.517)
fridge	0.195**	0.0767	0.132	0.242+	0.104*	-0.0365	0.204	0.0994*	0.0169	-0.0140	0.148	-0.0934
	(3.186)	(0.666)	(0.662)	(1.775)	(2.168)	(-0.369)	(1.543)	(2.064)	(0.332)	(-0.180)	(0.860)	(-0.457)
bicycle	0.0364	0.0245	0.0480	0.00416	-0.0292	-0.0450	-0.0354	-0.00602	-0.110**	-0.113**	-0.117*	-0.0245
	(1.051)	(0.648)	(1.026)	(0.0416)	(-1.122)	(-1.407)	(-0.927)	(-0.225)	(-3.932)	(-3.896)	(-2.543)	(-0.191)
flushtoilet	-0.0115	-0.0438	-0.0534	0.0162	0.0738*	0.0308	0.129	0.0721*	0.0505	0.0429	0.138	0.0151
	(-0.246)	(-0.781)	(-0.374)	(0.206)	(2.115)	(0.645)	(1.640)	(2.049)	(1.317)	(1.045)	(1.177)	(0.167)
wealth_index	0.152**	0.0962+	0.125	0.161**	0.142**	0.0683	0.178**	0.138**	0.0744**	0.0583	0.122+	0.0580
	(6.601)	(1.905)	(1.622)	(4.402)	(8.263)	(1.550)	(3.253)	(7.816)	(3.943)	(1.623)	(1.843)	(1.443)
hh_SC	-0.224**	-0.225**	-0.226**	-0.162	-0.141**	-0.147**	-0.160**	-0.184**	-0.0419	-0.0445	-0.0653	-0.226
	(-4.712)	(-4.402)	(-4.210)	(-0.829)	(-3.888)	(-3.394)	(-3.462)	(-4.637)	(-1.068)	(-1.124)	(-1.149)	(-0.797)
hh_ST	-0.0968	-0.120+	-0.124	0.0292	-0.143**	-0.177**	-0.127+	-0.219**	-0.141**	-0.152**	-0.100	-0.456
	(-1.644)	(-1.828)	(-1.369)	(0.0801)	(-3.228)	(-3.250)	(-1.867)	(-4.293)	(-2.987)	(-3.035)	(-1.071)	(-0.929)
hh_Other	-0.159**	-0.144**	-0.120	-0.165**	-0.0478	-0.0348	-0.112	-0.0596+	0.00500	0.00826	-0.0878	0.00406
	(-3.753)	(-3.075)	(-0.975)	(-3.454)	(-1.502)	(-0.892)	(-1.316)	(-1.819)	(0.145)	(0.232)	(-0.778)	(0.0657)
Hindu	0.269*	0.340*	0.345	-0.0266	-0.0652	0.0287	-0.133	0.0710	-0.142	-0.111	-0.243	0.593
	(2.226)	(2.392)	(1.413)	(-0.0322)	(-0.670)	(0.231)	(-0.897)	(0.651)	(-1.306)	(-0.932)	(-1.196)	(0.514)
Muslim	0.212	0.310+	0.375	-0.207	-0.0554	0.0741	-0.222	0.145	-0.0616	-0.0207	-0.306	0.949
	(1.632)	(1.939)	(0.819)	(-0.176)	(-0.536)	(0.543)	(-0.809)	(1.126)	(-0.533)	(-0.156)	(-0.845)	(0.595)
Christian	0.0699	0.282	0.122	0.0323	-0.0580	0.203	-0.0505	-0.0143	0.0488	0.114	0.0354	0.257
	(0.487)	(1.245)	(0.750)	(0.134)	(-0.524)	(1.079)	(-0.403)	(-0.125)	(0.380)	(0.651)	(0.203)	(0.791)
Sikh	0.289	0.339+	0.363	-0.120	0.0157	0.0785	-0.00443	0.241	-0.0528	-0.0210	-0.104	1.008
	(1.609)	(1.708)	(1.547)	(-0.0992)	(0.114)	(0.469)	(-0.0241)	(1.538)	(-0.364)	(-0.139)	(-0.440)	(0.612)
BIMARU	0.296**	-4.537+	0.374	-6.271	-0.575**	-4.347*	-11.77*	-0.548**	-0.562**	-0.00231	-2.561	12.00
	(3.071)	(-1.938)	(0.0680)	(-0.486)	(-8.019)	(-2.152)	(-2.336)	(-3.769)	(-7.398)	(-0.00143)	(-0.571)	(0.676)
South	0.538**	-5.731*	0.689	-8.320	0.180*	-4.936*	-14.85*	-0.187+	-0.135	0.508	-3.354	16.25
	(5.486)	(-1.987)	(0.0871)	(-0.489)	(2.299)	(-1.986)	(-2.163)	(-1.784)	(-1.570)	(0.255)	(-0.523)	(0.695)
East	0.354*	-4.727+	0.154	-5.009	0.182	-4.375+	-11.52*	-0.595**	0.148	0.767	-0.672	10.64
	(2.066)	(-1.732)	(0.0380)	(-0.486)	(1.452)	(-1.852)	(-2.486)	(-5.446)	(1.076)	(0.408)	(-0.204)	(0.752)
West	-0.0737	-5.225*	-0.311	-8.853	-0.158*	-4.078*	-11.87*	-0.0338	-0.101	0.292	-3.134	15.64
	(-0.709)	(-2.532)	(-0.0460)	(-0.524)	(-2.019)	(-2.305)	(-2.134)	(-0.166)	(-1.203)	(0.202)	(-0.574)	(0.673)
sugarpr	0.187**	-1.802*	0.343	-2.768	0.124**	-1.471+	-4.841*	0.0261	0.0390	0.235	-1.298	5.440
	(5.917)	(-2.027)	(0.116)	(-0.488)	(5.232)	(-1.925)	(-2.016)	(0.769)	(1.534)	(0.382)	(-0.542)	(0.698)
eggspr	-0.0247+	-0.108*	0.0105	-0.123	0.000349	-0.0794+	-0.218+	0.00169	-0.00283	0.00489	-0.0710	0.212
	(-1.938)	(-2.023)	(0.0692)	(-0.562)	(0.0345)	(-1.700)	(-1.860)	(0.183)	(-0.250)	(0.128)	(-0.573)	(0.709)
cerealspr	0.00111	-0.203	0.247	0.402	0.00217	-0.335	-0.892**	-0.145**	0.00624	0.122	0.157	-0.235
	(0.133)	(-0.618)	(1.437)	(0.728)	(0.331)	(-1.176)	(-2.610)	(-3.564)	(0.878)	(0.531)	(0.885)	(-0.306)
Constant	-5.376**	43.54+	-12.62	54.35	-4.485**	38.09+	122.1*	0	-1.828**	-8.214	24.06	-120.3
	(-6.455)	(1.687)	(-0.191)	(0.455)	(-7.114)	(1.709)	(2.100)		(-2.669)	(-0.462)	(0.446)	(-0.734)
Observations	13,218	13,218	13,342	13,342	13,704	13,704	13,827	13,827	13,059	13,059	13,174	13,174
R-squared	0.168	0.061	0.014	-0.014	0.139	-0.165	-0.279	0.073	0.062	0.046	-0.830	-1.664

Robust t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix Table A4(b): Quantile regression for Z Score of Children: Height for Age NFHS-3, 2005-6, Rural

VARIABLES	(1) Z score -4.0 8% extremely stunted	(2) Z score -3.0 20.8% severely stunted	(3) Z score -2.0 43.5% stunted	(4) Z score -1.0 68.4%	(5) Z score -0 85.1%	(6) Z score 1.0 93.4%	(7) Z score 2.0 96.92%	(8) Z score 3.0 96.92%
hhsize	-0.0121	-0.0147	-0.00869	-0.0140*	-0.0190**	-0.00147	0.0226	0.0697+
	(-0.928)	(-1.641)	(-1.364)	(-2.364)	(-2.918)	(-0.107)	(1.174)	(1.877)
child5_share	-0.277	-0.132	-0.252+	-0.262	-0.599**	-0.571*	-1.345**	-0.861
	(-0.878)	(-0.701)	(-1.734)	(-1.567)	(-3.299)	(-2.153)	(-2.696)	(-1.099)
child_male	-0.242**	-0.182**	-0.113**	-0.0731*	-0.0636	-0.00650	-0.110	-0.197
	(-3.396)	(-4.233)	(-3.483)	(-2.279)	(-1.498)	(-0.116)	(-1.078)	(-1.131)
age	-0.0176	-0.104**	-0.145**	-0.183**	-0.197**	-0.218**	-0.205**	-0.175**
	(-1.331)	(-11.01)	(-20.77)	(-28.33)	(-25.64)	(-17.43)	(-9.003)	(-4.982)
age2	-0.000202	0.00168**	0.00257**	0.00341**	0.00367**	0.00410**	0.00370**	0.00254**
	(-0.639)	(7.367)	(14.18)	(20.05)	(18.62)	(12.52)	(6.493)	(2.742)
secondchild	0.00974	-0.0707	-0.0482	-0.0213	0.00178	0.0355	0.113	-0.342
	(0.0921)	(-1.152)	(-1.113)	(-0.450)	(0.0283)	(0.390)	(0.784)	(-1.407)
thirdchild	-0.157	-0.204*	-0.155*	-0.120*	-0.00837	0.00727	0.0421	0.0685
	(-1.435)	(-2.310)	(-2.337)	(-2.146)	(-0.108)	(0.0598)	(0.251)	(0.205)
forthmore	-0.316*	-0.403**	-0.299**	-0.187**	-0.0841	-0.0617	-0.125	-0.128
	(-2.201)	(-4.673)	(-4.405)	(-3.040)	(-0.990)	(-0.487)	(-0.700)	(-0.359)
MF_Ed_Share	0.0688**	0.0306*	0.0104	-0.00604	-0.0175	-0.00783	-0.0199	-0.0669
	(4.810)	(2.307)	(0.991)	(-0.507)	(-1.127)	(-0.314)	(-0.614)	(-0.922)
AV_Ed_Yrs	0.0381**	0.0428**	0.0399**	0.0345**	0.0277**	0.0140	-0.00199	-0.0425
	(3.030)	(5.700)	(6.956)	(7.304)	(3.999)	(1.553)	(-0.121)	(-1.395)
beat_unfaithful	-0.0398	-0.0683	-0.0291	0.0448	0.0995+	0.188*	0.354**	0.365+
	(-0.606)	(-1.351)	(-0.751)	(1.300)	(1.917)	(2.573)	(2.771)	(1.864)
allow_market	0.0200	0.0568	0.0284	0.0604+	0.0247	0.0963	0.161	0.125
	(0.276)	(1.270)	(0.727)	(1.669)	(0.533)	(1.373)	(1.326)	(0.683)
health_scheme	-0.232	0.132	0.0131	0.0413	-0.0936	-0.0103	0.127	-0.220
	(-0.728)	(0.904)	(0.124)	(0.417)	(-0.463)	(-0.0596)	(0.397)	(-0.523)
mother_age	0.177**	0.146**	0.128**	0.114**	0.0996**	0.123+	0.140+	0.0138

	(3.444)	(4.072)	(4.730)	(4.870)	(2.967)	(1.911)	(1.719)	(0.107)
mother_age2	-0.00289**	-0.00227**	-0.00201**	-0.00178**	-0.00139*	-0.00172	-0.00202	-0.000204
	(-3.403)	(-3.758)	(-4.233)	(-4.274)	(-2.395)	(-1.540)	(-1.425)	(-0.0984)
time_water	-0.00384*	-0.00216+	-0.00218*	-0.000722	-0.000238	0.00178	-0.000958	-0.00158
	(-2.152)	(-1.700)	(-1.965)	(-0.779)	(-0.174)	(0.910)	(-0.374)	(-0.296)
electricity	-0.175*	-0.0341	-0.00811	0.0125	-0.00913	-0.0798	-0.189	0.0165
	(-2.091)	(-0.509)	(-0.166)	(0.230)	(-0.150)	(-0.923)	(-1.372)	(0.0665)
radio	0.0208	0.0562	0.0601	0.0530	0.0346	-0.0426	-0.0509	0.293
	(0.246)	(1.080)	(1.338)	(1.334)	(0.898)	(-0.587)	(-0.421)	(1.356)
tv	0.130	0.0634	0.00600	0.00322	0.0700	0.0650	-0.0960	-0.138
	(1.312)	(1.173)	(0.127)	(0.0708)	(1.232)	(0.824)	(-0.721)	(-0.562)
fridge	0.0977	0.155+	0.0994	0.177**	0.271**	0.345*	0.310+	0.365
	(0.525)	(1.944)	(1.533)	(2.578)	(2.884)	(2.316)	(1.700)	(1.082)
bicycle	0.232**	0.131*	0.0626+	0.00602	-0.00129	-0.0211	-0.184	-0.247
	(2.851)	(2.460)	(1.708)	(0.167)	(-0.0269)	(-0.277)	(-1.498)	(-1.136)
flushtoilet	-0.00398	0.0445	-0.00308	0.0161	-0.0331	0.0181	-0.0179	0.221
	(-0.0339)	(0.643)	(-0.0615)	(0.323)	(-0.566)	(0.179)	(-0.100)	(0.706)
wealth_index	0.127**	0.159**	0.162**	0.159**	0.121**	0.130**	0.154*	0.117
	(2.583)	(4.987)	(6.037)	(6.942)	(4.307)	(2.614)	(2.096)	(0.802)
hh_SC	-0.230*	-0.249**	-0.249**	-0.210**	-0.246**	-0.176+	-0.264	0.153
	(-2.123)	(-3.790)	(-4.187)	(-3.492)	(-3.230)	(-1.774)	(-1.508)	(0.513)
hh_ST	-0.240+	-0.156+	-0.172*	-0.0845	-0.0791	0.0250	0.144	0.824*
	(-1.780)	(-1.880)	(-2.356)	(-1.319)	(-0.883)	(0.194)	(0.759)	(2.161)
hh_Other	-0.112	-0.163*	-0.158**	-0.134**	-0.187**	-0.203*	-0.183	-0.0661
	(-1.175)	(-2.412)	(-3.501)	(-2.962)	(-3.323)	(-2.500)	(-1.330)	(-0.293)
Hindu	0.192	0.0657	0.176	0.376**	0.210	0.565*	0.739+	0.499
	(0.619)	(0.408)	(1.380)	(2.997)	(1.533)	(1.994)	(1.936)	(0.753)
Muslim	-0.0449	-0.0170	0.126	0.345*	0.109	0.589*	0.941*	0.831
	(-0.134)	(-0.0924)	(1.043)	(2.575)	(0.763)	(2.153)	(2.262)	(1.098)
Christian	0.463	0.0293	0.122	0.118	-0.0820	-0.0161	-0.125	0.522
	(1.597)	(0.158)	(0.738)	(0.721)	(-0.553)	(-0.0511)	(-0.294)	(0.722)
Sikh	0.153	0.178	0.218	0.517*	0.332	0.751*	0.809	0.140
	(0.373)	(0.631)	(1.158)	(2.483)	(1.609)	(2.057)	(1.521)	(0.158)
BIMARU	-0.0685	-0.105	-0.205*	-0.266**	-0.440**	-0.489*	-0.899**	-1.025+

	(-0.262)	(-0.761)	(-1.970)	(-2.682)	(-3.102)	(-2.400)	(-2.943)	(-1.882)
South	0.339	0.217	0.346**	0.421**	0.543**	0.908**	1.207**	0.983+
	(1.354)	(1.603)	(2.910)	(3.750)	(3.681)	(4.501)	(4.063)	(1.732)
East	-0.447	-0.00526	0.312+	0.377+	0.251	0.668+	1.699**	1.006
	(-0.977)	(-0.0233)	(1.782)	(1.932)	(1.085)	(1.823)	(2.700)	(1.190)
West	-0.223	-0.356*	-0.346**	-0.573**	-0.641**	-0.663**	-0.375	0.469
	(-0.753)	(-2.408)	(-3.577)	(-4.844)	(-4.377)	(-2.656)	(-0.695)	(0.797)
sugarpr	0.161	0.111*	0.112**	0.166**	0.254**	0.314**	0.345**	0.268
	(1.437)	(2.351)	(3.169)	(4.343)	(5.150)	(4.236)	(3.197)	(1.418)
eggspr	-0.00872	0.00593	-0.0163	-0.0225	-0.0307+	-0.0516*	-0.0812+	-0.152+
	(-0.260)	(0.483)	(-1.071)	(-1.542)	(-1.738)	(-2.399)	(-1.774)	(-1.808)
cerealspr	0.0186	0.0146	0.00307	0.00469	-0.000988	0.0110	-0.0462	-0.0214
	(0.879)	(0.948)	(0.306)	(0.470)	(-0.0926)	(0.578)	(-1.550)	(-0.435)
Constant	-10.07**	-7.058**	-5.052**	-4.880**	-4.721**	-5.443**	-3.688	2.333
	(-4.135)	(-6.108)	(-5.447)	(-4.956)	(-3.698)	(-3.072)	(-1.376)	(0.547)
	13,218	13,218	13,218	13,218	13,218	13,218	13,218	13,218

t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix Table A4(c): Quantile regression for Z Score of Children: Weight for Age NFHS-3, 2005-6, Rural

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Z score -4.0	Z score -3.0	Z score -2.0	Z score -1.0	Z score -0	Z score 1.0	Z score 2.0	Z score 3.0
	4.2%	14.8%						
	extremely	severely	38.4%				99.3%	99.8%
VARIABLES	underweight	underweight	underweight	69.6%	90.5%	97.3%	overweight	obese
hhsize	0.0120	0.00674	-0.00602	-0.00701	0.000438	-0.00455	-0.00953	-0.0398+
	(0.809)	(0.789)	(-1.136)	(-1.596)	(0.0746)	(-0.604)	(-0.709)	(-1.888)
child5_share	0.213	0.292	0.120	0.0206	-0.0116	-0.339	-0.290	-1.153+
	(0.542)	(1.410)	(0.934)	(0.175)	(-0.0939)	(-1.552)	(-0.749)	(-1.886)
child_male	-0.0169	-0.0385	-0.0904**	-0.0648*	-0.0410	-0.0213	-0.0270	-0.192
	(-0.232)	(-0.821)	(-3.341)	(-2.427)	(-1.384)	(-0.467)	(-0.329)	(-1.480)
age	0.0257+	-0.0131+	-0.0389**	-0.0589**	-0.0711**	-0.0876**	-0.123**	-0.150**
	(1.748)	(-1.651)	(-6.245)	(-11.02)	(-12.11)	(-9.261)	(-6.776)	(-7.355)
age2	-0.000374	0.000145	0.000607**	0.000984**	0.00121**	0.00160**	0.00241**	0.00306**
	(-1.021)	(0.707)	(3.736)	(7.333)	(7.976)	(6.316)	(5.087)	(5.500)
second child	-0.0253	-0.148*	-0.115**	-0.126**	-0.0531	-0.0924	-0.226	-0.196
	(-0.197)	(-2.180)	(-2.608)	(-3.368)	(-1.142)	(-1.460)	(-1.518)	(-0.948)
third child	-0.108	-0.152+	-0.142**	-0.155**	-0.0902	-0.0779	-0.0764	0.409
	(-0.669)	(-1.682)	(-2.643)	(-3.028)	(-1.516)	(-0.911)	(-0.431)	(1.355)
forth more	-0.0982	-0.138	-0.253**	-0.215**	-0.117+	-0.0722	-0.156	0.0204
	(-0.646)	(-1.481)	(-4.051)	(-4.000)	(-1.738)	(-0.735)	(-0.908)	(0.0807)
Schooling_Ratio	-0.0279	0.0208	0.00852	0.00418	0.00859	0.0252	-0.00790	0.00845
	(-0.832)	(1.185)	(0.854)	(0.455)	(0.705)	(1.476)	(-0.272)	(0.124)
AV_Schooling Yrs	0.0544**	0.0513**	0.0335**	0.0283**	0.0267**	0.0306**	0.00800	-0.0184
	(3.064)	(6.988)	(5.718)	(6.096)	(4.802)	(4.204)	(0.553)	(-0.926)
beat_unfaithful	-0.0125	-0.0508	0.00442	0.0118	0.0350	0.0599	0.0742	-0.0836
	(-0.169)	(-1.018)	(0.121)	(0.399)	(0.880)	(1.178)	(0.711)	(-0.560)
allow_market	0.0319	0.0383	0.0220	-0.0115	-0.0455	-0.0412	0.0202	0.201
	(0.303)	(0.751)	(0.677)	(-0.413)	(-1.335)	(-0.657)	(0.240)	(1.210)
health_scheme	0.0848	0.0214	-0.00635	0.0607	-0.0208	0.139	0.479	0.117
	(0.476)	(0.183)	(-0.0556)	(0.903)	(-0.151)	(0.670)	(1.324)	(0.247)
mother_age	0.0201	0.0208	0.0561*	0.0738**	0.0269	0.0683+	0.116	-0.118
	(0.345)	(0.662)	(2.453)	(3.297)	(1.076)	(1.808)	(1.476)	(-1.137)
mother_age2	-0.000266	-0.000470	-0.000881*	-0.00119**	-0.000313	-0.00105+	-0.00181	0.00182
	(-0.267)	(-0.918)	(-2.195)	(-3.161)	(-0.722)	(-1.661)	(-1.343)	(1.074)
time_water	-0.000245	-0.00153	-0.00150+	-0.00172*	0.000912	0.00164	0.00438	0.00243
	(-0.138)	(-1.317)	(-1.719)	(-2.031)	(-0.763)	(1.446)	(1.284)	(0.539)
electricity	-0.0288	-0.0965	-0.00330	-0.0883*	-0.0857+	-0.141*	-0.117	-0.350+
	(-0.257)	(-1.519)	(-0.0842)	(-2.158)	(-1.778)	(-2.481)	(-1.141)	(-1.904)
radio	0.187+	0.0446	0.0199	0.0730*	0.0517	0.00395	-0.0323	-0.220+
	(1.847)	(0.875)	(0.554)	(2.430)	(1.421)	(0.0679)	(-0.309)	(-1.764)
TV	0.0837	0.0597	0.0217	0.0525	0.00514	0.0233	0.0948	0.368*
	(0.640)	(1.018)	(0.450)	(1.418)	(0.137)	(0.277)	(0.797)	(2.096)
fridge	0.0745	0.140	0.0845	0.0858+	0.184*	0.0835	-0.148	0.294
	(0.400)	(1.365)	(1.417)	(1.744)	(2.385)	(0.818)	(-0.736)	(1.006)
bicycle	0.0586	0.0654	0.0212	-0.0525+	-0.0505	-0.122*	-0.213+	-0.192
	(0.708)	(1.231)	(0.516)	(-1.827)	(-1.520)	(-2.276)	(-1.781)	(-1.166)
flushtoilet	0.267+	0.149*	0.120**	0.0382	-0.0243	0.0377	0.265+	0.354+
	(1.842)	(2.353)	(2.714)	(1.018)	(-0.458)	(0.447)	(1.746)	(1.861)
wealth_index	0.0154	0.116**	0.151**	0.163**	0.148**	0.166**	0.178*	0.132
	(0.209)	(3.684)	(5.970)	(7.914)	(5.796)	(4.525)	(2.380)	(1.207)
hh_SC	-0.166	-0.152*	-0.183**	-0.122**	-0.156**	-0.171*	-0.0501	-0.214
	(-1.305)	(-2.160)	(-3.762)	(-2.580)	(-3.262)	(-2.270)	(-0.341)	(-1.062)
hh_ST	-0.317*	-0.293**	-0.228**	-0.157**	-0.0743	0.116	0.142	-0.0688
	(-2.182)	(-3.980)	(-3.857)	(-3.200)	(-1.376)	(1.158)	(0.857)	(-0.231)
hh_Other	-0.0686	-0.0204	-0.0394	-0.0593	-0.0423	-0.0384	-0.0740	-0.198
	(-0.593)	(-0.345)	(-0.967)	(-1.510)	(-1.079)	(-0.565)	(-0.615)	(-1.244)
Hindu	0.0539	0.0686	0.0246	-0.0239	-0.114	-0.209	0.183	0.0622
	(0.168)	(0.487)	(0.198)	(-0.149)	(-1.039)	(-1.010)	(0.311)	(0.0860)
Muslim	-0.0699	-0.000322	-0.0433	0.00175	-0.0569	-0.0646	0.273	0.141
	(-0.200)	(-0.00232)	(-0.332)	(0.0109)	(-0.461)	(-0.295)	(0.451)	(0.190)
Christian	-0.380	-0.196	-0.109	0.0357	-0.0360	-0.0655	0.292	0.206
	(-1.006)	(-1.058)	(-0.756)	(0.211)	(-0.304)	(-0.239)	(0.494)	(0.273)
Sikh	-0.128	-0.0379	-0.00324	0.116	-0.0271	0.215	0.931	0.912
	(-0.279)	(-0.133)	(-0.0184)	(0.686)	(-0.148)	(0.717)	(1.471)	(1.224)
BIMARU	0.192	0.115	0.162	-0.0105	-0.0184	-0.0673	0.0116	0.00629
	(0.673)	(0.757)	(1.418)	(-0.123)	(-0.206)	(-0.458)	(0.0418)	(0.0175)
South	0.365	0.367**	0.196*	0.0197	0.152	0.167	1.166**	2.186**
	(1.361)	(2.864)	(1.968)	(0.234)	(1.266)	(0.894)	(2.833)	(3.327)

East	0.173	0.168	0.425*	0.183	0.233	-0.136	-0.431	0.211
	(0.303)	(0.758)	(2.408)	(1.354)	(1.291)	(-0.466)	(-0.647)	(0.191)
West	-0.0901	0.0883	-0.121	-0.207+	-0.187	-0.325+	0.0846	0.790
	(-0.273)	(0.645)	(-1.039)	(-1.885)	(-1.592)	(-1.885)	(0.254)	(1.200)
sugarpr	0.132	0.196**	0.150**	0.124**	0.0902**	0.0381	0.0640	0.370**
	(1.342)	(4.227)	(4.747)	(4.341)	(2.579)	(0.844)	(0.778)	(2.730)
eggspr	0.00297	0.0165	-0.0141	-0.00470	0.00509	0.0150	0.105	-0.0554
	(0.0828)	(0.976)	(-1.213)	(-0.537)	(0.293)	(0.582)	(1.503)	(-0.484)
cerealspr	-0.0149	-0.0151	-0.00524	0.000838	0.00719	0.0184	0.0371	0.0430
	(-0.595)	(-1.184)	(-0.552)	(0.100)	(0.831)	(1.140)	(1.318)	(0.796)
Constant	-8.019**	-8.020**	-5.763**	-4.492**	-2.582**	-1.301	-4.245+	-0.811
	(-3.061)	(-6.970)	(-6.446)	(-6.516)	(-2.855)	(-1.022)	(-1.903)	(-0.199)
Observations	13,704	13,704	13,704	13,704	13,704	13,704	13,704	13,704

t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix Table A4(d): quantile regression for Z Score of Children: Weight for Height, NFHS-3, Rural

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Z score -4.0 2.0% extremely	Z score -3.0 6.4% severely	Z score -2.0 18.5%	Z score -1.0	Z score -0	Z score 1.0	Z score 2.0	Z score 3.0
VARIABLES	wasted	wasted	wasted	46.2%	77.6%	93.1%	97.5%	99.0%
hhsize	0.0291+	-0.00664	-0.000605	0.0106+	0.0111**	0.00955	0.00333	0.0320
	(1.672)	(-0.510)	(-0.0787)	(1.884)	(2.618)	(1.445)	(0.293)	(1.214)
child5_share	0.134	0.318	0.200	0.244	0.405**	0.391*	-0.0582	-0.0220
	(0.305)	(1.014)	(1.056)	(1.592)	(3.818)	(2.337)	(-0.157)	(-0.0422)
child_male	-0.0589	-0.111+	-0.141**	-0.103**	-0.0303	-0.00709	0.0962	0.165
	(-0.705)	(-1.792)	(-3.402)	(-3.429)	(-1.107)	(-0.201)	(1.480)	(1.278)
age	0.0423*	0.0548**	0.0365**	0.0252**	-0.00109	-0.0178*	-0.0619**	-0.146**
	(2.486)	(3.742)	(4.309)	(3.939)	(-0.187)	(-2.305)	(-3.379)	(-4.554)
age2	-0.000718	-0.000693+	-0.000298	-0.000238	0.000140	0.000263	0.000942*	0.00278**
	(-1.522)	(-1.878)	(-1.345)	(-1.471)	(0.980)	(1.364)	(2.145)	(3.637)
second child	-0.0661	-0.0846	-0.0799	-0.115*	-0.118**	-0.134**	-0.183*	-0.301+
	(-0.515)	(-0.850)	(-1.201)	(-2.495)	(-3.037)	(-2.720)	(-2.051)	(-1.674)
third child	0.00492	-0.0110	0.0281	-0.0946+	-0.107+	-0.127*	0.0902	0.0157
	(0.0336)	(-0.0876)	(0.414)	(-1.811)	(-1.872)	(-2.037)	(0.667)	(0.0649)
forth more	0.151	0.0976	0.0480	-0.124*	-0.125*	-0.104	0.0440	-0.0330
	(1.023)	(0.732)	(0.595)	(-2.069)	(-2.036)	(-1.433)	(0.286)	(-0.136)
Schooling_Ratio	0.0325	0.0241	0.00455	0.00215	0.00526	0.0233+	0.0170	0.0107
	(1.218)	(1.428)	(0.313)	(0.184)	(0.446)	(1.940)	(0.744)	(0.284)
AV_Schooling Yrs	0.0384**	0.0552**	0.0392**	0.0190**	0.0162**	0.0141*	0.0188+	0.00877
	(3.135)	(4.158)	(5.476)	(3.526)	(3.347)	(2.453)	(1.708)	(0.442)
beat_unfaithful	0.0999	-0.0823	-0.0542	-0.0771+	-0.0249	-0.0508	-0.158*	-0.319*
	(1.150)	(-1.031)	(-1.210)	(-1.944)	(-0.798)	(-1.283)	(-2.167)	(-2.411)
allow_market	0.0509	-0.113	-0.0636	-0.0312	-0.0331	-0.0367	-0.0203	0.0734
	(0.567)	(-1.532)	(-1.575)	(-0.963)	(-1.043)	(-0.918)	(-0.324)	(0.489)
health_scheme	0.578*	0.0378	-0.0464	-0.0182	0.0566	0.0103	0.0718	-0.272
	(2.333)	(0.270)	(-0.388)	(-0.146)	(0.613)	(0.0796)	(0.360)	(-0.827)
mother_age	-0.0706	0.0149	-0.0271	0.00613	0.00353	0.0100	-0.138*	0.0333
	(-1.485)	(0.283)	(-0.895)	(0.268)	(0.152)	(0.318)	(-2.385)	(0.317)
mother_age2	0.001000	-0.000351	0.000305	-0.000158	-9.43e-05	-0.000265	0.00221*	-0.000607
	(1.191)	(-0.404)	(0.600)	(-0.403)	(-0.251)	(-0.504)	(2.237)	(-0.342)
time_water	-7.60e-05	-0.00310	-0.00221+	-0.00225**	-0.000923	-0.000737	0.00309	0.00359
	(-0.0311)	(-1.526)	(-1.940)	(-2.595)	(-1.006)	(-0.608)	(1.396)	(0.962)
electricity	0.119	0.0745	0.0205	-0.0869*	-0.0391	-0.0781	-0.240**	-0.376
	(1.039)	(0.931)	(0.323)	(-2.343)	(-1.107)	(-1.584)	(-2.602)	(-1.562)
radio	-0.197+	-0.0317	0.0559	0.0118	-0.000626	0.0210	0.0186	0.0917
	(-1.727)	(-0.389)	(1.178)	(0.350)	(-0.0197)	(0.559)	(0.237)	(0.616)
TV	0.0457	0.0909	0.0312	0.0165	-0.0202	-0.0607	-0.0504	-0.0387
	(0.399)	(0.887)	(0.564)	(0.387)	(-0.521)	(-1.237)	(-0.581)	(-0.254)
fridge	0.00531	0.0339	0.202*	-0.0108	0.0176	-0.0587	0.0253	-0.309
	(0.0280)	(0.211)	(2.502)	(-0.188)	(0.298)	(-0.668)	(0.198)	(-1.343)
bicycle	0.162	0.0274	0.00840	-0.0588+	-0.0942**	-0.212**	-0.312**	-0.401*
	(1.511)	(0.366)	(0.183)	(-1.719)	(-2.849)	(-5.143)	(-4.316)	(-2.379)
flushtoilet	0.139	0.00190	0.0446	0.0736	0.0498	-0.0237	0.0144	0.120
	(0.884)	(0.0181)	(0.731)	(1.612)	(1.169)	(-0.384)	(0.129)	(0.620)
wealth_index	-0.0377	0.0219	0.0281	0.0787**	0.0859**	0.133**	0.120*	0.0993
	(-0.586)	(0.477)	(0.874)	(3.471)	(3.818)	(4.404)	(2.357)	(1.007)
hh_SC	0.0650	0.0999	-0.0339	-0.0636	-0.0539	0.0155	-0.0236	-0.179

	(0.413)	(0.875)	(-0.483)	(-1.409)	(-1.391)	(0.236)	(-0.210)	(-0.901)
hh_ST	0.0882	-0.0390	-0.129	-0.172**	-0.150**	-0.163*	0.0129	0.138
	(0.549)	(-0.313)	(-1.641)	(-3.349)	(-2.661)	(-2.248)	(0.0772)	(0.526)
hh_Other	0.166	0.174	0.0655	0.00413	-0.0173	-0.0219	-0.0242	-0.171
	(1.270)	(1.609)	(1.027)	(0.105)	(-0.448)	(-0.393)	(-0.249)	(-0.917)
Hindu	0.154	0.165	0.117	-0.122	-0.0768	-0.192	-0.755**	0.0692
	(0.662)	(0.599)	(0.558)	(-1.010)	(-0.619)	(-1.083)	(-2.594)	(0.156)
Muslim	0.159	0.0729	0.134	-0.0810	0.0133	-0.0246	-0.580+	0.286
	(0.647)	(0.256)	(0.628)	(-0.627)	(0.101)	(-0.131)	(-1.939)	(0.586)
Christian	-0.0252	0.0221	0.146	0.0283	0.163	0.0404	-0.395	-0.182
	(-0.0938)	(0.0702)	(0.660)	(0.208)	(1.117)	(0.194)	(-1.316)	(-0.395)
Sikh	-0.414	0.0968	0.0848	-0.0758	0.0540	-0.0960	-0.608	0.360
	(-0.814)	(0.251)	(0.351)	(-0.454)	(0.267)	(-0.390)	(-1.518)	(0.681)
BIMARU	-0.228	-0.117	0.0538	-0.0354	-0.0168	-0.0545	-0.109	-0.0552
	(-0.834)	(-0.547)	(0.495)	(-0.339)	(-0.176)	(-0.473)	(-0.442)	(-0.103)
South	-0.0439	-0.491*	-0.300*	-0.153	-0.253**	-0.0724	0.155	0.860
	(-0.180)	(-2.350)	(-1.971)	(-1.460)	(-2.641)	(-0.525)	(0.611)	(1.217)
East	-0.491	-0.316	-0.00653	0.0611	0.309+	0.217	0.162	0.619
	(-1.155)	(-0.810)	(-0.0308)	(0.340)	(1.839)	(0.925)	(0.385)	(0.741)
West	0.130	-0.210	0.0565	0.00901	-0.147	-0.114	-0.343	-0.592
	(0.510)	(-0.919)	(0.353)	(0.0930)	(-1.424)	(-0.913)	(-1.435)	(-1.363)
sugarpr	-0.0689	0.0166	0.0283	0.0734*	0.0241	0.0628+	0.0584	-0.0218
	(-0.600)	(0.245)	(0.738)	(2.347)	(0.879)	(1.752)	(0.635)	(-0.178)
eggspr	0.0611*	0.0314	0.0378+	0.00351	-0.0198+	-0.0105	-0.0270	-0.00945
	(2.417)	(1.179)	(1.798)	(0.248)	(-1.768)	(-0.492)	(-0.863)	(-0.0825)
cerealspr	0.0259	0.0265	0.0138	0.00687	-0.00607	0.0146	0.00988	0.0641
	(1.254)	(1.441)	(1.148)	(0.763)	(-0.808)	(1.267)	(0.475)	(1.108)
Constant	-4.820+	-6.125**	-4.571**	-3.629**	-0.799	-0.896	4.091+	3.004
	(-1.794)	(-3.594)	(-4.093)	(-4.914)	(-1.117)	(-0.814)	(1.689)	(0.674)
Observations	13,059	13,059	13,059	13,059	13,059	13,059	13,059	13,059

t-statistics in parentheses
** p<0.01, * p<0.05, + p<0.1

Appendix 5 Details of Regression Results –NCAER Data

Appendix Table 5(a) Determinants of Child Wasting: OLS and Quantile Regression - NCAER 1993

	(1)	(2)	(3)	(4)	(5)	(6)
		Quantile Regression[$]				
Explanatory Variables	**Ordinary Least Squares**	**Severely Malnourished**	**Acutely Malnourished**	**Slightly Malnourished**	**Malnourished**	**Normal**
		-3.72(4.80)[a]	-2.41(15.1)[a]	-1.49(29.5)[a]	-0.55(49.5)[a]	1.22(80.2)[a]
Mother's Age	0.01	-0.03	-0.03	-0.01	0.00	0.09
	(0.80)	(-1.11)	(-0.79)	(-0.47)	(0.08)	(3.01)**
Mother's Age Squared	-0.00	0.00	0.00	0.00	-0.00	-0.00
	(-1.23)	(0.76)	(0.41)	(0.03)	(-0.44)	(-3.14)**
BIMARU[1]	-0.20	-0.40	-0.19	-0.34	-0.26	0.01
	(-1.84)+	(-1.59)	(-0.97)	(-2.28)*	(-2.37)*	(0.09)
South	-0.53	-0.24	-0.10	-0.64	-0.66	-0.65
	(-4.82)**	(-0.93)	(-0.52)	(-4.35)**	(-5.29)**	(-4.04)**
East	-0.22	-0.56	0.12	-0.24	-0.30	-0.19
	(-1.67)+	(-1.76)+	(0.54)	(-1.45)	(-2.00)*	(-0.97)
Price of Sugar	-0.00	-0.00	-0.00	0.00	-0.00	-0.00
	(-0.95)	(-0.76)	(-0.35)	(0.06)	(-0.27)	(-1.01)
Price of Eggs	0.00	0.00	0.00	0.00	0.00	0.00
	(1.51)	(0.20)	(0.15)	(0.26)	(0.83)	(1.56)
Price of Cereals	0.00	0.00	0.00	0.00	0.00	0.00
	(2.28)*	(0.99)	(1.37)	(0.94)	(1.79)+	(1.36)
Hindu	0.70	0.76	0.33	0.23	0.84	1.27

	(2.54)*	(1.57)	(0.79)	(0.75)	(3.63)**	(2.07)*
Muslim	0.50	0.73	0.22	0.15	0.65	0.92
	(1.70)+	(1.34)	(0.49)	(0.46)	(2.49)*	(1.46)
Christian	0.87	0.97	0.46	0.65	0.97	1.29
	(2.36)*	(1.40)	(0.88)	(1.59)	(2.27)*	(1.65)+
Sikh	0.54	1.46	1.12	0.38	0.49	0.76
	(1.67)+	(2.24)*	(2.18)*	(1.02)	(1.70)+	(1.18)
Distance to Water	-0.00	-0.00	0.00	-0.00	-0.00	-0.00
	(-1.78)+	(-0.74)	(0.23)	(-1.68)+	(-1.80)+	(-0.90)
Household owns toilet	-1.14	-2.57	-2.23	-1.65	-1.57	-1.25
	(-0.96)	(-1.68)+	(-1.12)	(-1.08)	(-0.89)	(-0.74)
Log of per capita income	0.13	-0.04	0.12	0.17	0.09	0.19
	(2.65)**	(-0.49)	(1.71)+	(3.05)**	(1.56)	(2.50)*
Toilet * Income	0.15	0.33	0.30	0.21	0.20	0.17
	(1.05)	(1.78)+	(1.25)	(1.12)	(0.95)	(0.79)
Child's Sex (Male)	-0.12	-0.09	-0.23	-0.23	-0.12	-0.09
	(-1.84)+	(-0.67)	(-2.36)*	(-2.98)**	(-1.62)	(-0.92)
Child's Age	-0.00	0.00	0.00	0.00	-0.02	-0.01
	(-0.12)	(0.08)	(0.00)	(0.04)	(-0.49)	(-0.23)
Child's Age Squared	-0.01	0.02	0.02	0.00	-0.01	-0.04
	(-2.45)*	(1.74)+	(3.92)**	(0.67)	(-1.81)+	(-6.37)**
Household Size	-0.01	-0.03	-0.00	-0.00	0.00	0.01
	(-0.47)	(-1.31)	(-0.21)	(-0.20)	(0.07)	(0.27)
Proportion of kids < 5 years	0.49	-0.32	0.43	0.27	0.53	1.19
	(1.67)+	(-0.56)	(1.02)	(0.90)	(1.51)	(2.57)*
Scheduled Caste	-0.05	0.30	0.05	-0.11	-0.09	-0.02
	(-0.63)	(1.97)*	(0.48)	(-1.08)	(-0.96)	(-0.19)
Scheduled Tribe	0.17	0.28	0.04	-0.01	0.04	0.43
	(1.61)	(1.41)	(0.28)	(-0.08)	(0.31)	(2.60)**
Mother's Schooling Yrsucation/Father's Schooling Yrsucation	**0.00**	**-0.00**	**-0.01**	**0.01**	**-0.00**	**0.01**
	(0.34)	**(-0.23)**	**(-0.42)**	**(0.93)**	**(-0.08)**	**(0.45)**
(Mother's Schooling Yrsucation + Father's Schooling Yrsucation)/2	**0.02**	**0.03**	**0.00**	**0.01**	**0.03**	**0.04**
	(1.71)+	**(1.56)**	**(0.23)**	**(0.52)**	**(1.87)+**	**(2.36)***
Birth Order (Second Child)	-0.02	0.14	0.15	0.04	-0.03	-0.18
	(-0.25)	(0.77)	(1.17)	(0.45)	(-0.34)	(-1.31)
Birth Order (Third Child)	-0.04	0.16	0.25	0.10	-0.01	-0.33
	(-0.42)	(0.77)	(1.68)+	(0.82)	(-0.07)	(-1.98)*
Birth Order (Fourth or more)	-0.09	-0.16	0.06	-0.03	-0.03	-0.34
	(-0.82)	(-0.78)	(0.36)	(-0.23)	(-0.22)	(-1.90)+
Constant	-2.20	-3.22	-3.55	-2.45	-1.88	-3.18
	(-3.41)**	(-3.02)**	(-3.50)**	(-2.64)**	(-2.64)**	(-2.95)**

N	4089	4089	4089	4089	4089	4089
Adj. R^2	0.017	-	-	-	-	-
F-statistics	3.78	-	-	-	-	-
Log Likelihood	-8683.01	-	-	-	-	-

t statistics in brackets ----- + p<.10, * p<.05, ** p<.01; [$] Quantile regression standard errors are bootstrapped based on 500 replications; [a] The median z-score and the corresponding percentile for the group; [1] Base reference for location is North

Appendix Table 5(b) - Determinants of Child Wasting: OLS and Quantile Regression NCAER-2005

	(1)	(2)	(3)	(4)	(5)	(6)
		Quantile Regression				
Explanatory Variables	**Least Squares**	**Severely Malnourished**	**Moderately Malnourished**	**Normal 1**	**Normal 2**	**Normal 3**
		-3.74(3.35)[a]	**-2.48(10.60)[a]**	**-1.42(24.20)[a]**	**-0.50(45.6)[a]**	**1.05(78.5)[a]**
Mother's Age	-0.00	0.04	0.08	0.00	0.02	-0.02
	(-0.05)	(0.48)	(1.56)	(0.15)	(0.66)	(-0.42)
Mother's Age Squared	-0.00	-0.00	-0.00	-0.00	-0.00	0.00
	(-0.04)	(-0.59)	(-1.47)	(-0.24)	(-0.80)	(0.33)
BIMARU[1]	-0.50	-0.15	-0.39	-0.38	-0.42	-0.62
	(-6.21)**	(-0.76)	(-2.76)**	(-4.28)**	(-4.91)**	(-4.56)**
South	-0.63	-0.50	-0.70	-0.60	-0.59	-0.68
	(-7.26)**	(-2.22)*	(-4.52)**	(-6.13)**	(-6.53)**	(-4.73)**
East	-0.47	-0.20	-0.44	-0.46	-0.47	-0.51
	(-5.18)**	(-0.85)	(-2.91)**	(-4.44)**	(-4.99)**	(-3.50)**
Others	-0.26	0.60	-0.69	-0.62	-0.45	-0.34
	(-0.71)	(0.64)	(-1.45)	(-1.53)	(-1.24)	(-0.45)
Price of Sugar	-0.03	-0.08	-0.09	-0.04	-0.03	-0.01
	(-2.10)*	(-1.94)+	(-3.69)**	(-2.54)*	(-1.87)+	(-0.48)
Price of Eggs	-0.01	-0.01	-0.01	-0.00	0.00	-0.01
	(-1.34)	(-0.94)	(-1.30)	(-0.53)	(0.07)	(-0.44)
Price of Cereals	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(-3.86)**	(-1.44)	(-1.47)	(-2.30)*	(-2.36)*	(-2.73)**
Hindu	-0.41	0.42	-0.07	-0.06	-0.32	-1.05
	(-2.25)*	(1.09)	(-0.20)	(-0.32)	(-1.30)	(-2.16)*
Muslim	-0.27	0.26	-0.10	0.11	-0.17	-0.83
	(-1.36)	(0.59)	(-0.27)	(0.51)	(-0.65)	(-1.66)+
Christian	-0.42	-0.20	-0.73	-0.79	-0.59	-0.46
	(-1.31)	(-0.38)	(-1.05)	(-1.99)*	(-1.29)	(-0.73)
Sikh	-0.07	1.55	0.34	0.33	0.11	-1.00
	(-0.30)	(2.21)*	(0.86)	(1.16)	(0.39)	(-1.81)+
Distance to Water	0.00	0.00	-0.00	0.00	0.00	-0.00
	(0.10)	(0.28)	(-1.12)	(0.60)	(2.02)*	(-0.97)
Household owns toilet	-0.47	0.39	1.04	-0.93	-1.32	-1.42
	(-0.57)	(0.13)	(0.84)	(-0.85)	(-1.54)	(-1.18)
Log of per capita income	0.08	-0.00	0.13	0.07	0.08	0.09
	(2.50)*	(-0.02)	(2.14)*	(1.81)+	(2.51)*	(1.89)+
Toilet * Income	0.07	-0.03	-0.11	0.11	0.17	0.18
	(0.74)	(-0.10)	(-0.76)	(0.91)	(1.75)+	(1.35)
Child's Sex (Male)	-0.06	-0.15	-0.02	-0.07	-0.08	-0.05
	(-1.35)	(-1.18)	(-0.24)	(-1.34)	(-1.58)	(-0.71)
Child's Age	-0.55	0.03	0.00	-0.15	-0.62	-1.08
	(-6.85)**	(0.12)	(0.00)	(-1.41)	(-6.82)**	(-7.76)**
Child's Age Squared	0.13	0.01	0.05	0.05	0.15	0.23
	(5.46)**	(0.21)	(1.21)	(1.63)	(5.69)**	(6.04)**
Household Size	0.01	-0.00	-0.01	0.01	0.02	0.02

	(1.64)	(-0.28)	(-0.67)	(0.58)	(2.18)*	(1.32)
Proportion of kids < 5 years	-0.00	-0.26	-0.11	-0.11	0.13	-0.01
	(-0.00)	(-0.46)	(-0.32)	(-0.46)	(0.53)	(-0.03)
Scheduled Caste	-0.03	-0.12	0.09	-0.01	-0.02	-0.02
	(-0.52)	(-0.78)	(0.92)	(-0.15)	(-0.36)	(-0.33)
Scheduled Tribe	-0.08	-0.03	-0.10	-0.20	-0.25	0.04
	(-0.91)	(-0.12)	(-0.79)	(-2.15)*	(-2.40)*	(0.30)
Mother's Schooling Yrsucation/Father's Schooling Yrsucation	-0.03	-0.10	-0.08	-0.03	-0.02	-0.03
	(-0.61)	(-0.64)	(-1.13)	(-0.54)	(-0.33)	(-0.37)
(Mother's Schooling Yrsucation + Father's Schooling Yrsucation)/2	0.00	-0.05	0.05	0.04	-0.00	-0.01
	(0.15)	(-0.73)	(1.26)	(1.50)	(-0.10)	(-0.15)
Constant	1.40	-1.94	-1.96	-0.49	0.35	3.61
	(2.15)*	(-1.07)	(-1.65)+	(-0.64)	(0.48)	(3.15)**
N	6692	6692	6692	6692	6692	6692
Adj. R^2	0.031	-	-	-	-	-
F-statistics	8.33	-	-	-	-	-
Log Likelihood	-1.4e+04	-	-	-	-	-

t statistics in brackets ----- + p<.10, * p<.05, ** p<.01; [a] The median z-score and the corresponding percentile for the group; [1] Reference group for location is North