Analyzing the Determinants of Child Nutrition in Rural Bangladesh: Application of Quantile Regression

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Abstract

Despite recent success in achieving major development goals, Bangladesh still lags behind in respect of reducing the incidence of child undernutrition which usually causes illness, poor physical and cognitive development, or even death. Recognizing the importance of child nutrition stated in the Sustainable Development Goals, the Government of Bangladesh is keen on making success in reducing child malnutrition in the country, especially in the rural areas. In this respect, it is imperative to understand what determines child nutrition and whether or not the child nutrition determining factors exert similar effects at different points of the distribution of child nutrition. By using data from three rounds of a nationally representative rural household survey, this paper finds that child's gender, age, and birth weight, parents' education and their health, household's socioeconomic status, and availability of local health care facility are crucial in determining child nutrition. Furthermore, quantile regression results suggest that the effects of these determinants tend to vary across different points of the nutritional status. Nonetheless, parents' health and birth weight seem to have strong influence which is consistent throughout the distribution of child nutritional status. Thus, the findings of this paper have policy relevance, which is worthy of the attention of the national and international development partners in Bangladesh.

Keywords: Nutritional status, Rural children, Quantile regression

Introduction

Undernutrition among children is a matter of big concern to policymakers, especially of the developing countries, for it profoundly affects how children survive, grow, and develop (UNICEF, 2019). Importantly nutrient deficiency in children is likely to impair their cognitive development and physical productivity, thereby resulting in high economic and social costs. In Bangladesh, about 28 percent of children under age 5 are stunted and about 23 percent of children are underweight (BBS & UNICEF, 2019). Such a high incidence of child undernutrition has been persisting in the country despite the country's success in attaining the major Millennium Development Goals (GoB, 2015). In view of this context, the Government of Bangladesh is committed to intensifying direct nutrition interventions in line with the movement on scaling up nutrition (FPMU, 2018).

As the national policymakers in Bangladesh are inclined to tackle widespread child undernutrition, it is important not only to know what determines the child nutritional status and but also to understand whether the determining factors exert different effects across different points of nutritional status. While there is relative abundance in the literature pertaining to determinants of child nutrition in Bangladesh (Bhagowalia et al., 2010, 2012; Das & Rahman, 2011; Hossain, 2020b, 2020a; Rah et al., 2010; Range et al., 1997; Srinivasan et al., 2013; Zongrone et al., 2012); studies that have analyzed the fact that nutritional status determining factor may have differential effects depending on what point of the distribution is being examined are scanty. Therefore, this paper intends not only to analyze the determinants of child nutrition but also to document whether or not the determinants have different effects on different points of the nutritional status.

This paper contributes to the literature in three distinct ways. First, this study generates evidence to suggest that ignoring the fact that child nutrition determining factors may have differential effects would be erroneous, which has policy relevance. Second, this study generates evidence on whether child nutrition

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status has been improving over time in Bangladesh by drawing on a sample of 3-round pooled cross-sectional and nationally representative household surveys. Third, this study finds evidence to suggest that in rural Bangladesh non-food inputs e.g., parents' health and household's socioeconomic status are more crucial in determining child nutrition than other factors perceived as determinants of child nutrition.

Methods

Source of data and sample

Bangladesh Integrated Household Survey (henceforth, BIHS) which has been conducted by the International Food Policy Research Institute (IFPRI) provides the data for this study. This BIHS is a nationally representative rural household survey (IFPRI, 2016) and it contains anthropometric information for all surveyed households members. Until now, three rounds of the survey have been conducted by the IFPRI since 2011 and all of the rounds have provided data for this study. It should be noted that child related key information e.g., place of delivery, birth weight, breastfeeding, and so on is collected only for a young child (up to 2 years) of the households. There are 802, 579, and 535 such children respectively in the first, second, and third round of the BIHS. These children are not the same children across the survey rounds implying that the sample is pooled cross-sectional in nature. Thus, the sample of this research consists of 1,916 rural children from the three rounds of the BIHS.

The key dependent variable in this study is children's nutritional status, which is measured and expressed by anthropometric indicators including height-for-age Z score (HAZ) and weight-for-age Z score (WAZ). Another indicator of child undernutrition is the weight-for-height Z score. In the nutrition literature (NIPORT & ICF, 2019) it is known that inadequate height-for-age reflects the cumulative effect of chronic malnutrition, and a height below 2 standard deviations of the median height of the WHO reference population of a particular gender and age is considered stunted. Likewise, a weight below 2 standard deviations from the median weight of the WHO reference population of a particular gender and age is considered underweight. Inadequate weight-for-height indicates acute or recent nutritional deficiency and a weight-for-height below 2 standard deviations of the median weight-for-height of the age and gender-specific WHO reference population indicates wasting. Because in the sample the incidence of wasting is considerably less in comparison with the incidence of stunting and underweight, this study focuses on the latter two anthropometric indicators. Interested readers are referred to the WHO manual (WHO, 2006) for knowing further about the HAZ and WAZ. The computation of the HAZ and WAZ has been done using STATA macro, provided by the WHO (WHO, n.d.).

Analytical technique

Studies that have analysed the determinants of child nutrition tend to follow multiple linear regressions based on Ordinary Least Squares (OLS), which estimates the mean value of the child nutritional status (dependent variable) on the basis of a set of independent variables. However in the case when the dependent variable is skewed or is subject to outliers, linear multiple regression fails to capture the pattern in the data (Nguyen, 2021). In such a context, quantile regression is an ideal alternative to linear multiple regression, which allows one to view each point in the conditional distribution of child nutritional status (Erica, 2020). Furthermore, as this research is interested in exploring the effect of determinants of child nutrition across different points of the distribution of child nutrition, a quantile regression analysis approach has been adopted in this study.

The linear multiple regression model $y_i = \beta' X_i + \varepsilon_i$ requires minimizing the sum of the squared error terms as $\sum_i^N (y_i - \hat{y}_i)^2$. Unlike the linear multiple regression, the quantile regression model minimizes a weighted sum of the positive and negative error terms as $q \sum_{y_i > \hat{\beta}_q' x_i} |y_i - \hat{\beta}_q' X_i| + (1-q) \sum_{y_i < \hat{\beta}_q' x_i} |y_i - \hat{\beta}_q' X_i|$ where q denotes a quantile level (0<q<1) (Cameron & Trivedi, 2009).

Results and discussion

First of all, summary statistics of the variables of interest are presented in the following Table 1. There are 1,916 children in the sample and the mean value of weight-for-age Z score and height-for-age Z score clearly reveals that the sample children are moderately underweight and stunted. In the sample, about 49 percent of children are girls and on average the children are 11 months old. The mean of birth order is 2.6 which indicates that the sample children are either the second or the third child of their parents. On average, the mean birth weight is about 3 kg and about 97 percent of the sample children are being currently breastfed. Mothers are shorter than fathers, as expected. However, mothers' education level is higher than that of the fathers. The sample households consist of members between 4 and 5 and on average, their dietary diversity score reflects that they consume 8 to 9 food groups. About 83 percent of households have access to supply water whereas about 36 percent of households use sanitary toilets. Of the sample households, about 29 percent of households have their child born at health care facilities. As many as 12 percent of the sample households belong to the poorest quantile, on the other hand, 31 percent of households belong to the richest quintile. With regard to the community characteristics, it can be seen that about 48 percent of children live in villages that do not have any health care facilities. The sample comprises children from three different rounds of the BIHS. For instance, about 42 percent of children are from the first round and the remaining children are from the second and third rounds, with the share of the third round being the least. Additionally, the geographical distribution of the sample children is also shown in Table 1.

Table 1. Summary statistics of the variables of interest

Variables	**Mean or share**	**Std. Dev.**
Weight-for-age Z score	-1.193	1.207
Height-for-age Z score	-1.261	1.582
Girl=1, otherwise 0	48.75%	-
Child’s age (months)	11.371	6.597
Child’s age squared	172.788	157.374
Birth order	2.646	1.403
Birth weight (kg)	2.975	0.324
Currently breastfed=1, otherwise 0	97.28%	-
Mother’s education (years)	5.003	3.427
Mother’s height (cm)	150.616	5.997
Father’s education (years)	3.255	3.807
Father’s height (cm)	162.193	5.448
Father is missing=1, otherwise 0	17.01%	-
Household size	4.782	1.427
Dietary diversity score**	8.688	1.811
HH has access to supply water=1, otherwise 0	83.46%	-
HH has sanitary toilet=1, otherwise 0	35.75%	-
Child delivery place: Health facility=1, otherwise 0	28.71%	-
Asset quintile: Poorest	31.26%	-
Asset quintile: Poor	23.22%	-
Asset quintile: middle	19.31%	-
Asset quintile: rich	14.66%	-
Asset quintile: richest	11.53%	-
Health care facility is absent in the village=1, otherwise 0	48.06%	-
Round:2012=1, otherwise 0	41.85%	-
Round:2015=1, otherwise 0	30.22%	-

Table 1. (Continued)

Variables	Mean or share	Std. Dev.
Round:2018=1, otherwise 0	27.92%	-
Barisal=1, otherwise 0	7.98%	-
Chottogram=1, otherwise 0	16.33%	-
Dhaka=1, otherwise 0	31.47%	-
Khulna=1, otherwise 0	10.38%	-
Rajshahi=1, otherwise 0	8.61%	-
Rangpur=1, otherwise 0	8.87%	-
Sylhet=1, otherwise 0	16.33%	-
Observations	1,916	-

**Dietary diversity score is reported at the household level and it consists of total number of food groups that are consumed by members of the households during the past week of the survey. Consistent with the nutrition literature (Swindale & Bilinsky, 2006), dietary diversity score encompasses the following twelve food groups: cereal, potato, vegetables, fruits, meat, organ meat, eggs, fish, beans, dairy, oil, and sugar.

Table 2 and Table 3, respectively present the regression results of the determinants of height-for-age and weight-for-age. In both Tables, column 1 represents determinants estimated by the linear multiple regression and columns 2 through 4 represent the determinants estimated through quantile regression at 25th, 50th, and 75th quantile of the HAZ and WAZ.

Having had a glance at the regression results of Table 2, it becomes evident that child's gender, age, birth weight, mother's education, mother's height, and father's height are significantly associated with children's height. This significance seems to be consistent both in linear multiple regression and quantile regressions; however, the size of the coefficients on these variables tend to vary at different quantiles (see appendix Figure 1).

Gender difference in HAZ tends to be significant at the 25th and 50th quantiles, but at the upper distribution of the HAZ there does not seem to be any significant gender difference. Child's age has an inverse significant relationship with HAZ and the significance of age squared imply non-linearity between age and height of children. The size of the coefficient on age is pretty similar across the quantiles. Likewise, the effect of birth weight is statistically highly significant on HAZ and the effect seems considerably greater in magnitude in the 75th quantile as opposed to 25th and 50th quantiles. Parents' own nutritional status has a rather pronounced effect on children's height, which is well evident in Table 2. Although the effect of mothers' height tends to be similar in all quantiles, the effect of the father's height varies across the distribution of HAZ. Another important determinant of children's HAZ is the mothers' education which is found to be significant at 5 percent level of significance at the bottom quantile; but its effect tends to diminish at the upper quantiles. Since mothers are directly involved in childcare and are the primary caregiver to children, it is no surprise that the education of mothers appears to be relatively important for child nutrition as opposed to the fathers education.

Also, it is evident from Table 2 that there are some variables which did not appear significant in the OLS but they are significant at the different distribution of the HAZ. Such variables include household dietary diversity score; improve toilet facilities, place of child's delivery, household's socioeconomic status, and availability of health care facility at the village.

Table 2. Estimates of the height-for-age Z score model (HAZ)

Variables	**(1) OLS**	**(2) 25th**	**(3) 50th**	**(4) 75th**
Girl=1, otherwise 0	0.130* (0.067)	0.153* (0.081)	0.203** (0.084)	0.098 (0.060)
Child’s age (months)	-0.159*** (0.021)	-0.143*** (0.020)	-0.157*** (0.025)	-0.184*** (0.030)
Child’s age squared	0.004*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.004*** (0.001)
Birth order	-0.023 (0.029)	-0.016 (0.049)	-0.024 (0.044)	-0.020 (0.026)
Birth weight (kg)	0.416*** (0.118)	0.357*** (0.115)	0.364*** (0.111)	0.458*** (0.125)
Currently breastfed=1, otherwise 0	0.339* (0.197)	0.174 (0.272)	0.236 (0.270)	0.257 (0.256)
Mother’s height (cm)	0.039*** (0.006)	0.037*** (0.005)	0.040*** (0.005)	0.040*** (0.005)
Mother’s education	0.025** (0.013)	0.039** (0.017)	0.015 (0.011)	0.024* (0.014)
Father’s height (cm)	0.031*** (0.006)	0.034*** (0.010)	0.040*** (0.007)	0.029*** (0.009)
Father’s education	-0.003 (0.012)	0.005 (0.011)	-0.011 (0.011)	-0.012 (0.011)
Father is missing=1, otherwise 0	0.077 (0.105)	0.127 (0.101)	0.040 (0.132)	-0.062 (0.097)
Size of the household	-0.027 (0.028)	-0.030 (0.039)	-0.038 (0.045)	-0.044 (0.037)
Dietary diversity score	0.011 (0.022)	0.037* (0.020)	0.020 (0.022)	0.008 (0.023)
HH has access to supply water=1, otherwise 0	0.020 (0.100)	0.082 (0.168)	0.049 (0.113)	0.104 (0.126)
HH has sanitary toilet=1, otherwise 0	0.064 (0.073)	0.143* (0.082)	0.099* (0.058)	0.070 (0.062)
Child delivery place: Health facility=1, otherwise 0	0.128 (0.081)	-0.019 (0.089)	0.135** (0.068)	0.239*** (0.092)
Asset quintile: poor	0.038 (0.091)	0.096 (0.081)	0.071 (0.079)	0.240*** (0.089)
Asset quintile: middle	0.041 (0.099)	0.064 (0.154)	0.097 (0.103)	0.124 (0.107)
Asset quintile: rich	0.010 (0.110)	-0.003 (0.104)	0.061 (0.119)	0.053 (0.135)
Asset quintile: richest	0.117 (0.129)	0.139 (0.184)	0.215 (0.159)	0.188 (0.140)
Health care facility is absent in the village=1, otherwise 0	-0.038 (0.067)	-0.062 (0.084)	-0.115* (0.067)	0.018 (0.067)
Round:2015=1, otherwise 0	0.580*** (0.089)	0.483*** (0.126)	0.454*** (0.118)	0.587*** (0.094)
Round:2018=1, otherwise 0	0.380*** (0.092)	0.487*** (0.146)	0.349*** (0.116)	0.172* (0.094)
Chottogram=1, otherwise 0	0.110 (0.143)	0.118 (0.174)	0.039 (0.136)	-0.091 (0.189)
Dhaka=1, otherwise 0	-0.008 (0.133)	0.073 (0.223)	0.035 (0.154)	-0.141 (0.187)
Khulna=1, otherwise 0	0.094 (0.161)	0.237 (0.263)	0.147 (0.150)	-0.154 (0.218)
Rajshahi=1, otherwise 0	-0.335** (0.167)	-0.244 (0.216)	-0.224 (0.146)	-0.574*** (0.214)
Rangpur=1, otherwise 0	0.063 (0.161)	0.138 (0.305)	0.078 (0.176)	-0.244 (0.251)

Table 2. (Continued)

Variables	(1) OLS	(2) 25th	(3) 50th	(4) 75th
Sylhet=1, otherwise 0	0.146 (0.150)	0.105 (0.255)	0.179 (0.138)	-0.042 (0.197)
Intercept	-13.044*** (1.273)	-14.260*** (1.627)	-14.426*** (0.955)	-11.730*** (1.054)
Observations	1,916	1,916	1,916	1,916
R-squared/Pseudo R-squared	0.212	0.133	0.136	0.153

Note: Robust standard errors are in parenthesis. ***, **, and * respectively indicates significant at 1%, 5%, and 10% level of significance.

Now looking at the regression results presented in Table 3, it becomes evident that child's age, birth weight, mother's height, mother's education, father's height, place of child's delivery, and socioeconomic status are significantly associated with children's weight. The significance of these variables seems to be consistent both in linear multiple regression and quantile regressions; however, the size of the coefficients on these variables tend to vary at different quantiles (see appendix Figure 2).

Child's age has an inverse significant relationship with WAZ and the significance of age squared imply non-linearity between age and weight of children. The size of the coefficient on age is pretty similar at the lower and the upper quantiles with the size being slightly higher in the median quartile. Similarly, the effect of birth weight is statistically highly significant on WAZ and the effect seems almost identical across the quantiles. Parents' own nutritional status has been once again proved to have a rather pronounced effect on children's weight. Although the effect of mothers' height tends to be similar in all quantiles; the effect of the father's height varies across the distribution of WAZ. Mother's education is still found to be significant but only at the bottom quantile and relatively weakly significant. Similar to what is found in the case of HAZ, the effect of mothers' education tends to diminish at the upper quantiles. Evidently, the father's education also appears to have some significance in children's weight at the lower end of the distribution. Place of birth i.e., whether the child was born at birth giving facility seems to have some influence on children's weight at the 50th quantile, although it does not have any significant effect on the other quantiles. In addition, it is evident from Table 3 that the unavailability of health care facilities at the village is significantly inversely associated with children's weight, which was not captured in the OLS estimates, pointing to the necessity of analyzing the effect at different distributions of the nutritional status.

Table 3. Estimates of the weight-for-age Z score model (WAZ)

Variables	(1) OLS	(2) 25th	(3) 50th	(4) 75th
Girl=1, otherwise 0	0.077 (0.053)	0.062 (0.077)	0.036 (0.076)	0.066 (0.064)
Child's age (months)	-0.066*** (0.016)	-0.059** (0.024)	-0.071*** (0.021)	-0.059*** (0.019)
Child's age squared	0.001* (0.001)	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)
Birth order	-0.042* (0.024)	-0.034 (0.036)	-0.037 (0.038)	-0.037 (0.035)
Birth weight (kg)	0.477*** (0.085)	0.480*** (0.090)	0.478*** (0.129)	0.477*** (0.131)
Currently breastfed=1, otherwise 0	0.153 (0.182)	0.257 (0.243)	0.083 (0.158)	-0.090 (0.351)
Mother's height (cm)	0.031*** (0.005)	0.032*** (0.007)	0.034*** (0.006)	0.034*** (0.006)
Mother's education	0.019** (0.009)	0.023* (0.012)	0.014 (0.013)	0.006 (0.012)
Father's height (cm)	0.018*** (0.005)	0.019*** (0.006)	0.025*** (0.004)	0.018*** (0.007)
Father's education	0.009 (0.008)	0.022* (0.013)	0.010 (0.010)	0.009 (0.008)
Father is missing=1, otherwise 0	0.160** (0.077)	0.187* (0.112)	0.150 (0.096)	0.281*** (0.086)

Table 3. (Continued)

Variables	(1) OLS	(2) 25th	(3) 50th	(4) 75th
Size of the household	-0.001 (0.022)	-0.019 (0.029)	0.001 (0.023)	0.016 (0.032)
Dietary diversity score	0.009 (0.017)	0.022 (0.025)	(0.015) (0.015)	-0.002 (0.018)
HH has access to supply water=1, otherwise 0	0.028 (0.076)	-0.038 (0.106)	-0.038 (0.075)	0.081 (0.084)
HH has sanitary toilet=1, otherwise 0	0.030 (0.055)	0.048 (0.089)	0.005 (0.068)	0.083 (0.062)
Child delivery place: Health facility=1, otherwise 0	0.131** (0.061)	0.097 (0.080)	0.111* (0.066)	0.077 (0.095)
Asset quintile: poor	0.204*** (0.072)	0.171* (0.096)	0.235*** (0.065)	0.288*** (0.087)
Asset quintile: middle	0.154** (0.077)	0.199*** (0.074)	0.186* (0.098)	0.208* (0.109)
Asset quintile: rich	0.174** (0.086)	0.131 (0.127)	0.253*** (0.090)	0.197* (0.108)
Asset quintile: richest	0.301*** (0.095)	0.337*** (0.078)	0.393*** (0.134)	0.363*** (0.080)
Health care facility is absent in the village=1, otherwise 0	-0.067 (0.052)	-0.166** (0.074)	-0.067 (0.048)	-0.046 (0.054)
Round:2015=1, otherwise 0	0.209*** (0.069)	0.118 (0.117)	0.146** (0.072)	0.159* (0.087)
Round:2018=1, otherwise 0	0.368*** (0.073)	0.378*** (0.142)	0.326*** (0.070)	0.233*** (0.088)
Chottogram=1, otherwise 0	0.044 (0.111)	-0.013 (0.175)	0.139 (0.118)	0.086 (0.146)
Dhaka=1, otherwise 0	-0.030 (0.103)	-0.100 (0.134)	0.010 (0.089)	-0.023 (0.167)
Khulna=1, otherwise 0	0.046 (0.122)	-0.016 (0.153)	0.093 (0.122)	0.140 (0.215)
Rajshahi=1, otherwise 0	-0.258** (0.125)	-0.280 (0.213)	-0.201* (0.117)	-0.228 (0.153)
Rangpur=1, otherwise 0	-0.174 (0.123)	-0.127 (0.220)	-0.055 (0.162)	-0.122 (0.215)
Sylhet=1, otherwise 0	-0.082 (0.116)	-0.179 (0.176)	-0.004 (0.100)	-0.004 (0.156)
Intercept	-10.250*** (1.069)	-11.381*** (1.284)	-11.750*** (1.081)	-9.795*** (0.951)
Observations	1,916	1,916	1,916	1,916
R-squared/ Pseudo R-squared	0.175	0.111	0.105	0.107

Note: Robust standard errors are in parenthesis. ***, **, and * respectively indicates significant at 1%, 5%, and 10% level of significance.

Besides these, there are two other notable points. First, in rural Bangladesh nutritional status of children tends to improve over time which has been indicated by the significant dummy on survey years both in Table 2 and 3. This is consistent with the national trend that the incidence of child undernutrition has been declining over the past years in Bangladesh. Second, consistent with the expectation, relative to the poorest socioeconomic groups, children in the rest of the socioeconomic groups tend to have significantly better nutritional status. The relationship between nutritional status and socioeconomic groups gets larger in magnitude at the upper distribution of WAZ.

Finally, Table 4 represents the tests of hypothesis whether or not the difference in the regression coefficients on the determinants across the quantiles is statistically significant. The relevant null hypotheses along with the associated F-stat and p-value have been presented in the following Table. Based on the p-value, which is zero up to three decimal points in all cases, it becomes evident that the regression coefficients significantly vary across the quantiles. This also justifies ignoring the fact that the determinants may have different effects on child nutrition at different points of the nutritional status would be misleading. Therefore, the policymakers should bear this in mind while preparing and implementing any policy interventions concerning child nutrition in rural Bangladesh.

Table 4. Test of equality of slope of different quantile regression

Hypothesis	Height-for-age Z score		Weight-for-age Z score	
	F-stat (19, 1886)	p-value	F-stat (19, 1886)	p-value
q25=q50	11.20	0.000	2.69	0.000
q25=q75	23.83	0.000	14.97	0.000
q50=q75	8.80	0.000	7.28	0.000

Since the issue of child malnutrition remains a major concern in Bangladesh, the policy documents of the government put great emphasis on improving the state of child health and nutrition, especially in the rural areas. Notably, the country's recent success in several development indicators has not been adequately translated into a reduction in child malnutrition. Importantly a success in this particular indicator will also mean that Bangladesh achieves internationally agreed on other broad development goals including Sustainable Development Goal (SDG) 2. In view of this, there is a need for designing and implementing evidence-based interventions towards improving child nutrition.

On the basis of the evidence of this paper, it has become clear that children's nutritional status is mainly determined by their parents' own health and birth weight. This implies that there is a strong influence of intergenerational transmission of genetic factors on determining children's nutritional status. Moreover, the significant positive association between parents' height with children's nutritional status is even consistent at the different distribution of the child nutrition. This further confirms the relative importance of parents' own health in determining children's nutritional status. Likewise, birth weight, which is generally a matter of how adequate nutrition mothers have received during pregnancy, has a strong influence on determining children's current nutritional status. Unlike socioeconomic factors whose effect varies across the distribution of child nutrition, the genetic variables exhibit a rather consistent effect no matter what particular point of the distribution we look at. Thus, parent level variables are more important than household, socioeconomic, and health environment-related factors in determining child nutrition.

Conclusion and policy recommendations

By using the quantile regression technique this paper has generated evidence to suggest that not all child health determining factors exert a similar effect on child nutrition, rather their effect varies considerably across the different points of the child nutritional status. Thus, different segments of child undernutrition may require segment-specific interventions. Nevertheless, parents' health and birth weight are found to have strong effects on child nutritional status, which is consistent across different distributional points. The policy implication of the paper is that nutrition enhancing interventions should be specifically focused on improving the nutritional status of parents and ensuring adequate nutrient intake of pregnant mothers in rural Bangladesh.

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Appendix

Figure 1. Quantile regression estimates for HAZ determinants

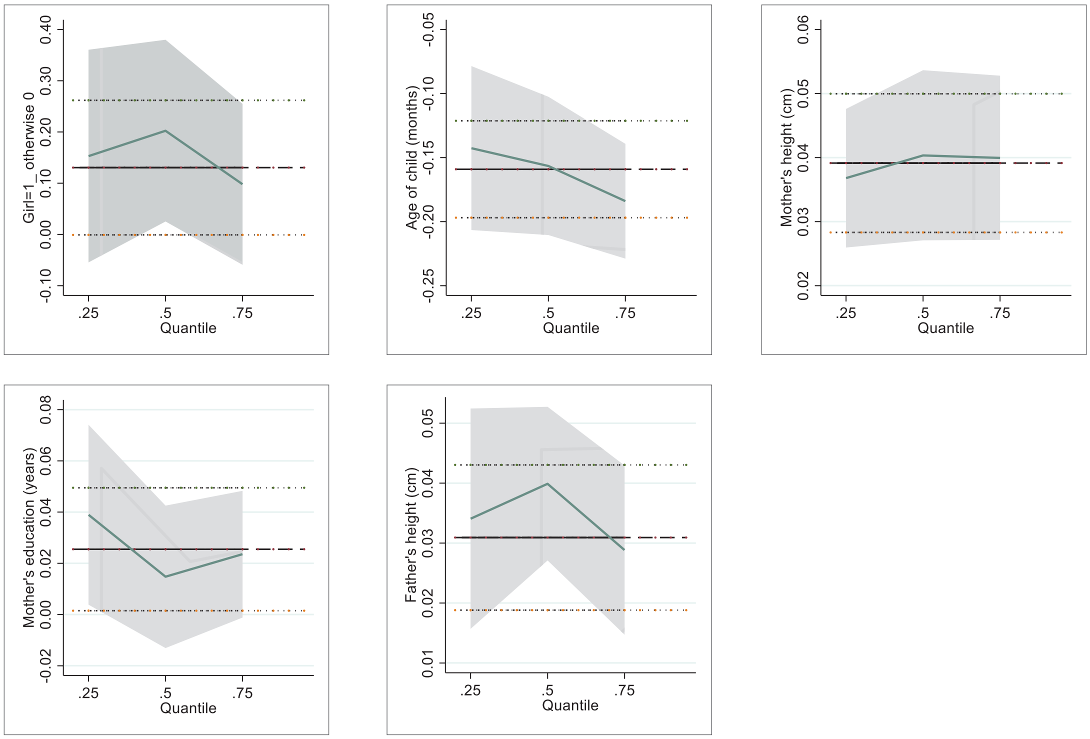

Figure 2. Quantile regression estimates for WAZ determinants