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The Effect of Women's Intrahousehold Bargaining Power on Child Health Outcomes in Bangladesh

Abstract

Trends in developing economies suggest that as relative female intrahousehold bargaining power improves, consumption preferences favor basic needs which promote child welfare. This study seeks to examine whether greater household bargaining power by Bangladeshi women is related to an improvement the health of their children. Results suggest that certain aspects of bargaining power, including female participation in decision-making about child health care, large household purchases and daily needs, are associated with larger child height-for-age z-scores. There exists a positive correlation between children in families where their mothers have decision-making authority and child health outcomes.

Keywords

Intrahousehold Bargaining, Child Malnutrition, Bangladesh

Cover Page Footnote

Thank you to Professor Raykar, Professor Sparber, Professor Castilla, and Professor Mandle.

1. INTRODUCTION / MOTIVATION

Although the last three decades have witnessed a 20 percent reduction in the proportion of malnourished children in developing countries, about 160 million children under five years of age—almost one-third of the developing world's children—are still malnourished (WHO 1999; Smith and Haddad 2000). One region of the world particularly afflicted with tremendously high malnutrition rates is South Asia. The first few years of a child's life are the most crucial to his or her intellectual and physical development, and health indicators function as strong predictors of long-term nutritional status and productivity (Smith and Haddad 2000). Without proper nutrition in childhood, a person's potential to rise from poverty is weakened due to lost time and lost labor, which result in lost income.¹

The nature of gender relations—relations of power between women and men—is not easy to grasp in its full complexity. The bargaining power of men and women instrumentally shape the resource allocation decisions households make, and husbands and wives use their bargaining power to convey priorities in allocation.

This paper studies women's intrahousehold bargaining power as a tool to improve child health outcomes. Relative female decision-making authority in households has a demonstrated impact on expenditure allocation and on child welfare. Increasing the share of household income controlled by women, either through their own earnings or cash transfers, changes spending in ways that benefit children (World Bank 2011). There exists an established link in the literature between women's participation in household expenditure decisions and an allocation of resources which benefit children (Duflo 2000; Thomas 1990). Perhaps this association between improved intrahousehold bargaining power and allocation of resources also extends to real health outcomes for children.

This paper provides insights into the relationship between women's bargaining power and the health outcomes of their children. In this paper, bargaining power, the variable of interest, is measured based on the mother's role in making certain household decisions as reported by the child's mother. Factors include decisions about child health care, decisions about purchases for daily household needs, and decisions regarding major household purchases.² The dependent variable is child height-for-age, which is considered a long-run measure of nutritional status and an adequate proxy to measure a child's chronic

¹ See section 5 Results/Discussion for a more comprehensive analysis of the impact of height on labor market outcomes.

² For a more detailed discussion of the variable of interest, see section 4.2 Bargaining Power.

nutritional status.³ The data come from Bangladesh, one of the poorest, most densely populated countries in the world. This study has meaningful implications for policy and will contribute to the growing literature which finds evidence supporting increased female bargaining power as a method to promote equality and improve child health outcomes. Bangladesh is a Muslim-majority, patriarchal country where women occupy subordinate roles. If women's taking more authority in the decision-making process at the household level in fact contributes to a healthier population, then this is worthwhile to study. The policy implications suggest targeting women to indirectly address the high incidence of youth malnutrition rates in Bangladesh.

Expanding off the established connection between improved female bargaining power and resource allocation, this paper asks if the impact on resource allocation translates to actual child health outcomes. Also, the focus of this paper is on very young children where the mother is the main caregiver. The health of a young child is largely determined by his or her mother's actions. Is there a link to her relative decision-making power at the household level and child health outcomes?

The results suggest that certain aspects of bargaining power, including female participation in decision-making about child health care, large household purchases and daily needs, are sometimes associated with larger child height-for-age z-scores. There exists a positive correlation between children in families where their mothers have decision-making authority and child health outcomes. Additionally, the study reaffirms other important variables which are associated with improvements in child health outcomes.

2. LITERATURE REVIEW

Traditionally, economists and policy makers have tended to view the household as a unit which pools income and allocates resources for consumption, production, and investments as if it had a single set of preferences. This is called the unitary model. There is no discussion of relative male and female bargaining power if the household is viewed as a single decision-maker. Only if preferences differ systematically between women and men can we observe differences in the effects of men's and women's bargaining power on household economic outcomes. However, the literature has well established that the unitary model of the household is generally rejected (Thomas 1990; Hoddinott and Haddad 1995). Empirical evidence suggests that individuals within households have

³ For a more detailed discussion of the dependent variable, see section 4.1 Height-for-Age.

heterogeneous preferences. The collective model allows for intrahousehold differences in preferences and enables bargaining power to play a role in spending decisions. This study builds on the collective model's foundation by not treating the household as a single economic actor and accounting for individual preferences.⁴

Within the bargaining approach, intrahousehold interaction is characterized as containing elements of both cooperation and conflict. Household members cooperate insofar as cooperative arrangements make each of them better off than noncooperation. However, there exist outcomes which favor one party at the other's expense, exposing the underlying conflict between those cooperating. Which outcome will emerge depends on the relative bargaining power of the household members (Agarwal 1997).

The most common testable hypotheses associated with this model are to predict that exogenous sources of income such as non-labor income should be spent in the same manner in expenditure decision-making as an extension of the collective model. Thomas (1990) finds that income controlled by the mother has a bigger effect on her family's health than income in the hands of the father. His model is structured so that unearned income is separately measured. The null hypothesis states that when income is pooled, the ratio of maternal to paternal income effects should be equal. When household income is pooled and allocated to maximize welfare, theoretically income under the jurisdiction of mothers and fathers should have the same impact on demand. He finds that it does not; the impact of unearned income on child survival was twenty times greater if the income was brought in by the mother than if it was brought in by the father. Using family nutrition data from Brazil, Thomas (1990) rejects the hypothesis of equality of parent income effects. This study reinforces the collective model's assumption that men and women have different preferences (Thomas 1990).

Quisumbing and Maluccio (2000) explore the unitary versus collective models of the household, suggesting that the unitary household model is not a good approximation to household behavior. Using assets at marriage as indicators of intrahousehold bargaining power, they find that more assets brought to the marriage by women relative to men increases education expenditure shares in Bangladesh and South Africa (Quisumbing and Maluccio 2000).

These models embodying the bargaining approach provide a useful framework for analyzing gender relations, shedding light on how gender

⁴For more general models of household decision-making, see McElroy and Horney (1980); Browning and Chiappori (1998). In these collective models, the relative power of household members plays a central role in shaping household decisions.

asymmetries within a household are structured and modified. The nature of gender relations—relations of power between women and men—is not easy to grasp in its full complexity. For instance, most models characterize these dynamics as a form of "bargaining," but fail to articulate the complex range of factors, especially qualitative ones, that might determine bargaining power (Agarwal 1997). Agarwal cautions that models and policies could go amiss if intrahousehold dynamics are assumed (as they often are) to exist in isolation, without examining the extrahousehold socioeconomic and legal institutions within which households are embedded. Women's bargaining power within the home is clearly associated with their situation outside it. Perhaps developmental policies toward improving women's earning capacity and expanding women's opportunity have to potential to reduce unequal treatment in the household (Agarwal 1997).

Since women are primary caregivers of children in many cultures, many studies of development policies have found supportive evidence of female higher decision power translating into better child outcomes. Literature on the Old Age Pension (OAP) program in South Africa has shown that children living in extended families benefit from the pensions received by their grandmothers. Duflo (2000) evaluates the effect of pension transfer on children's nutritional status and finds that the height-for-age z-scores of younger girls are increased by 1.16 standard deviation units and the weight-for-height z-scores by 1.19 standard deviation units. However, the effect is not significant for boys. Duflo (2000) finds that the Old Age Pension program had a substantial effect on the nutrition of young girls, and the effect was stronger when the pension was received by a woman. Duflo (2000) suggests that if improving children's nutrition is a policy objective, targeting public transfers to women rather than to men might be preferable (Duflo 2000).

Another example of a program which highlights the importance of income in the hands of women is the Mexican PROGRESA program. In this program, payments are made to women conditional on their children attending school and on their participation in a health care monitoring and food supplementation program. The program has been shown to have significant effects on children's health, nutrition, and education (Behrman and Skoufias 2006). The findings in the literature suggest that policies targeted towards women can generate immediate consequences by either improving a women's voice in the household or contributing to an improvement in human capital investments in children. There is strong evidence that women tend to shift a larger shares of spending on goods which promote child welfare if they are able to control a bigger share of household resources (Behrman and Skoufias 2006).

A few discussion papers sponsored by the International Food Policy Research Institute (IFPRI) discuss resource allocation in Bangladesh. Quisumbing and Briere (2000) examine how differences in the bargaining power of husband and wife affect the distribution of expenditures in Bangladesh, finding further support for the hypothesis that increased resources controlled by women are often allocated towards children.

Another IFPRI project brief furthers the study of parental resource control. The study suggests that women with more assets, income, or education have greater bargaining power in the household because they have more options outside of the household. The bargaining power of men and women instrumentally shape the resource allocation decisions households make. Husbands and wives use their bargaining power to convey priorities in allocation, and the study suggests that improving a woman's bargaining power and access to resources will increase household expenditure on children (IFPRI Project Brief 1, 2000 and IFPRI Project Brief 3, 2000). These papers find that both male and female asset ownership at marriage is strongly determined by the human capital of husband and wife and by the characteristics of their origin families.

Additionally, an understanding of important causes of malnutrition is imperative for the relevance of my model. South Asia is a region plagued by chronic youth malnutrition. Osmani (1997) suggests that variables such as women's status may be key in understanding the prevalence of malnutrition in South Asia. He attempts to explain why South Asia's child malnutrition rate is so much higher than Sub-Saharan Africa's, despite almost equal poverty rates, higher food availability in South Asia, and comparable levels of public provision of health and sanitation services. The author concludes that particular factors, such as the low status of women in South Asia, are important determinants of malnutrition and stunted height (Osmani 1997).

Women's educational attainment has been connected to child health outcomes both directly and as a way to gauge the woman's autonomy in the household. The education level of women, the main caretakers of children in Bangladesh, has several potential positive effects on the health of their children. Abu-Ghaida and Klasen (2004) find that more educated women are more capable of processing information, using health care facilities, and keeping their living environment clean. However, women's relatively lower status in Bangladesh restricts their capacity to act in their own and their children's best interests. The authors indicate women's status relative to men (rather than their absolute status) as an important factor, especially for resource control in households. Women are more likely to allocate marginal resources to the interests of their children than

are men; however, the lower their autonomy and control over resources, the less able they are to do so (Haddad, Hoddinott, and Alderman 1997).

3. DATA

The data used in this report is from the 2007 Bangladesh Demographic and Health Survey (BDHS), a nationally representative sample survey designed to provide an empirical analysis on basic national indicators of social progress. The survey focuses on health-related information, including fertility, childhood mortality, contraceptive knowledge and use, maternal and child health, nutritional status of mothers and children, awareness of AIDS, and domestic violence. Since 1984, the Demographic and Health Survey program has conducted more than 100 nationally representative household surveys in more than 50 countries. This survey is the fifth in a series of national-level population and health surveys conducted in Bangladesh as part of the global Demographic and Health Surveys (DHS) program. Data collection took place over a five-month period from March 24, 2007 to August, 11 2007. Both urban and rural areas were surveyed.

Despite the many advantages of the Demographic and Health Survey, one of its limitations is the absence of an income or expenditure variable, which is generally regarded as an important measure of welfare and empowerment. It does, however, include a wealth index, a variable which measures relative living standards. This allows for some analysis of the effects of wealth on various health and nutrition indicators (Hoddinott and Haddad 1995).

This is a non-experimental study which uses retrospective data about decisions mothers make in the household. This paper focuses on 5,169 children under five years of age for whom plausible anthropometric data were available. Since this paper is conceptualizing women's bargaining power in relation to her bargaining with her spouse, only those children with both parents' information available in the survey are included. 65% of the households are rural. The average number of family members per household is 6.41, while the average number of children under 5 per household is 1.34. 49.6% of the children are female, while 50.4% are male. Over 90% of the households are Muslim.⁵ See Table 1.1-1.5 for a more detailed look at the summary statistics.

4. MODEL SPECIFICATION

⁵ Religion is not included as a control in the model as the low variation in respondents' self-reported religious affiliation (>90% Muslim) did not meaningfully impact the coefficients on the bargaining power variables.

This paper contains four models to specify the relationship between mother's status in the household and child health outcomes. Each model expands the scope of consideration for what contributes to child health. Each of these models takes the following form:

$$\text{ChildHealth}_{ij} = \beta_0 + \beta_1 (\text{BargainingPower}_{ij}) + \alpha_1 (X_{ij}) + e_{ij}$$

Where ChildHealth_{ij} is the height-for-age z-score for child i in household j . $\text{BargainingPower}_{ij}$ is the key variable of interest for the mother of child i in household j , represented by three measurements of whether the mother jointly or unilaterally participates in making certain household decisions.⁶ Matrix X_{ij} includes all controls and e_{ij} captures the idiosyncratic errors. The main focus of this paper is on the estimate of β_1 and the expectation is that $\beta_1 > 0$. The coefficient on BargainingPower, β_1 , does not represent the causal impact of mother's bargaining power on child health outcomes. This paper solely intends to estimate the significant determinants of child health by assessing interesting correlations. While we cannot speak to causality in this story, the regression results shed light on variables which are associated with positive or negative improvements in child health in Bangladesh.

Model 1 is the most parsimonious model, including only the most basic variables pertaining to the child and mother in addition to the key variables of interest. In Model 1, X_{ij} includes only child and mother characteristics, including if the child is female, the child's birth order, the mother's age in years, the mother's educational attainment in years, and the mother's BMI in Kg/m^2 .

Model 2 expands the specifications by including two variables which capture some measure of the mother's participation in economic activity. These variables include whether the mother belongs to a microfinance program and whether the mother has worked in the past twelve months.

To Model 2 we add variables to capture factors at the household level which vary across households. This is Model 3. In Model 3, X_{ij} includes the variables in Model 2 plus controls for household characteristics, such as if the head of household is female, if the household is rural, and the wealth index variable as a measure of household income. These variables control for household level characteristics to account for possible sources of heterogeneity.

⁶ For more information on the variables of interest, see section 4.2 Bargaining Power.

Finally we add the husband's characteristics, as perhaps information about the husband may drive investments in child health.⁷ The matrix X_{ij} in Model 4 includes all of the controls in Model 3 and additionally, variables which assess attributes of the husband. These variables include husband's age in years and husband's educational attainment in years. Because this sample was determined by children whose heights were measured and for whom information on both parents was available, the sample size remains the same (5,169 observations) in the four models. The models include these controls to avoid omitted variables bias; they also serve to aid the examination of what contributes to improvements in child health outcomes.

4.1 Height-For-Age

A common measure of malnutrition is the anthropometric status of under-five-year-old children. Height for age is considered a long-run measure of nutritional status and an adequate proxy to measure a child's chronic nutritional status. Height-for-age was selected as the dependent variable for this research because of its potential responsiveness to bargaining power in the household. In developing countries, human growth deficiencies are caused primarily by two preventable factors- inadequate food and infections. Genetic factors become important in adolescence, so the height of a young child, given his or her age, depends on the accumulated investment in nutrition and healthcare over the child's life (Duflo 2000). Inadequate nutrition in childhood has significant and permanent implications for long-term physical development as well as the development of cognitive skills. This in turn impacts productivity, which affects labor market opportunities and national output (Duflo 2000).

Low height-for-age, which is called "stunting," refers to a situation in which children are shorter than expected for their age and gender group in the reference population due to past chronic nutritional deficiency. Stunting and its effects typically become permanent. Most stunting occurs between 6 and 24 months of age, and stunting after 24 months of age generally reflects the interaction of nutrition and infection at earlier ages (Martorell and Habicht 1986). Stunted children may never regain the height lost as a result of stunting, and most children will never gain the corresponding body weight (Omilola 2010).

⁷ The data is not explicit about whether the wife's current husband is the child's father. However, virtually all women in the sample have been married for more than 5 years to her current spouse. We cannot say with certainty that these men are the children's fathers, but the information on the husband corresponds to the male figure who is married to the child's mother and who has been in the household for at least 5 years. There are about 200 women (5%) who have been married more than once and of those 200, there are 8 women who have been married for fewer than 5 years.

Height-for-age is typically expressed as a z-score. Labeling a child as having impaired growth implies some means of comparison with a reference child of the same age and gender. The DHS database uses as a basis for comparison across countries the National Center for Health Statistics (NCHS) growth reference. The NCHS reference population consists of a group of well-nourished American children and functions as a benchmark. Using standardized z-scores enables ease of comparability across different studies (World Health Organization 1983). Through the use of a standard reference population as a point of comparison, z-scores are a statistical measure of the distance from the median expressed as a proportion of the standard deviation.

$$\text{Z-score} = \frac{(\text{Observed value}) - (\text{Median value of the reference value})}{(\text{Standard deviation of the reference population})}$$

Relatively short children log negative z-scores while tall children record positive z-scores. The commonly used cut-off point to identify severely malnourished children is a measurement of 2 SD below the median of the reference group (Alderman, Hoozevee, and Rossi 2005). The mean height-for-age Z-score for this dataset is -1.54 (SD=1.28), significantly lower than zero, the expected value for the reference distribution. This implies that the entire distribution has shifted downward, suggesting that a lot of the children have inadequate heights for their age. About 20% of the sample includes children with stunted growth, which means -2 standard deviations from the mean. See Figure 1 for the distribution of the dependent variable.

4.2 Bargaining Power

Bargaining power is difficult to directly quantify. Recent literature on intrahousehold resource allocation has focused on several factors that influence bargaining power and how households allocate resources. For example, Agarwal (1997) writes that relative bargaining power within the household perhaps could be revealed in who participates in decision-making and about what. Hence, women who participate in decision-making may be said to have greater bargaining strength than those excluded from such decision-making altogether.

The variables of interest in this model are based on the mother's role in making certain household decisions as reported by the child's mother. The questions contained in the survey that are being used to measure women's bargaining power are:

- Who usually makes decisions about child health care?

- Who usually makes decisions about making purchases for daily household needs?
- Who usually makes decisions about making major household purchases?

No information is provided about what constitutes a major purchase or a daily need. As for the types of decision-makers, the survey includes five categories: husband decides, wife decides, husband and wife jointly decide, someone else decides, and wife and someone else decide. I created three dichotomous variables to be used in the estimation equation. The constructed variables in the model take a value of one when the woman unilaterally or jointly contributes to the decision-making process. Together, these variables compose a general measure of the mother's agency in the household.⁸

Most households make their purchasing and health care decisions jointly. 74% of the mothers contribute to decisions about child health care, 61% of the women have some say in large purchases, and 67% participate in decisions regarding purchases of daily needs. 19% of women make child health care decisions unilaterally, 8% unilaterally make decisions about major household purchases, and 29% of women unilaterally make decisions about purchases for daily household needs. 26% of women in the sample are not involved in decisions regarding child health care, 39% the women have no decision-making power regarding large purchases, and 33% do not influence decisions about daily needs. This suggests that husbands are still dominating the decision making process in the household and wives have less power in general.

	Unilateral Decisions (%)	Joint Decisions (%)	Some Say (%)	No Say (%)	N
Child Health Care	19	55	74	26	4224
Large Purchases	8	53	61	39	4224
Daily Needs	29	38	67	33	4224

There are a few possible sources of endogeneity in the relationship between mother's power and child outcomes. A mother with high socio-economic

⁸ For this paper, the bargaining power variables reflect at least *some* female contribution in household decision-making. Intuitively, a unilateral decision perhaps holds more weight than a joint decision; however, equal weighting has been given to both unilateral and joint decisions to avoid assigning arbitrary importance. Including a joint decision as some measure of participation is perhaps a weaker measure, yet it allows for a broader definition of bargaining power. Results for unilateral bargaining power are not included.

status tends to be more powerful in family bargaining, and she may be more likely to invest in child human capital. Although some observable characteristics can be controlled for in the regression, estimates are still biased with unobservable characteristics. For instance, a well-endowed woman can bring more resources to the marriage through her high level of social capital and an outside social network, which may simultaneously enhance her power and her capacity to invest more in her children (Quisumbing and de la Briere 2000).

Social norms and custom-based gender discrimination in Bangladesh are another potential cause of endogeneity. In societies with patrilineal kinship and inheritance, women are limited to the domestic sphere with less bargaining power. Additionally, these areas tend to have stronger son preference and allocate more resources to sons. This may impact relative investments in child health, and this cultural preference may impact the models' estimates. Ideally, the model would look to identify sources of women's bargaining power which vary exogenously, such as assets at marriage or non-labor income; however, no such variable is available nor included in the model. This hypothetical variable which captures the mother's unobservable endowments that she brings into the marriage could perhaps more fully capture her bargaining power.

4.3 Maternal Education

Models of child health production emphasize the importance of the mother's education as well as her bargaining power. Greater education increases her health knowledge which improves her ability to promote the health of her children (World Bank 1993), and greater bargaining power increases her say over household resources which often leads to greater allocations to child health and nutrition, compared to their husbands. Because maternal education affects children's survival probability, the sample of living children over-represents children of educated mothers. Consequently, the effect of maternal education is likely to be slightly underestimated (Desai and Alva 1998). The results presented in this paper are not weighted to account for this underestimation. Educational attainment in the model is measured in years. The average educational attainment for mothers in the sample is 5.12 years (SD= 4.39). 25% have no education, 21% have incomplete primary education, 10% completed primary school, 28% have incomplete secondary education, 7% completed secondary school, and 9% have a higher educational background.⁹

⁹ In this study, maternal education functions as a control variable. Using dummy variables to represent various educational achievements (e.g., complete primary school, complete secondary

4.4 Wealth Index

Another important control in the model is the wealth index. The association between socioeconomic status and health status has been highly studied (Thomas 1994; Razzaque 2011). Rutstein and Johnson (2004) find that chronic child malnutrition as measured by the percent stunted among children under five years is also highly variable by wealth, with the level of stunting for the lowest quintile being almost nine times the level for the highest quintile in Peru.

For many economists, household income is the theoretical indicator of choice. However, it is extremely difficult to measure accurately in developing countries for a number of reasons—mainly because people do not know their income or only know it in broad ranges, earnings vary daily, weekly, or seasonally, and an earner may have several sources of income at one time.¹⁰ In the DHS survey data, the wealth index is a composite measure of a household's cumulative living standard. As a measure of economic status, wealth has several advantages. It represents a more permanent status than does either income or consumption. Also, in the DHS questionnaires, wealth is more easily measured (with only a single respondent needed in most cases) and requires far fewer questions than either consumption expenditures or income.

The wealth index is calculated using data on a household's ownership of selected assets, such as televisions and bicycles, materials used for housing, types of water access and sanitation facilities, and other characteristics that are related to wealth status. The wealth index places individual households on a continuous scale of relative wealth. DHS categorizes all interviewed households into five wealth quintiles to compare the influence of wealth on various health and nutrition indicators.¹¹ The wealth index allows for the isolation of problems particular to the poor, such as unequal access to health care, as well as those which pertain to the wealthy. The wealth index is particularly essential for this research, as the DHS data lacks detailed information about earnings and income. The wealth index enables the model to control for the extent to which household economic status affects child health outcomes. There are 4,145 households in the sample. About 19% are categorized as poorest, 20% fall into the poorer category,

school) was considered, but the coefficients on bargaining power were not affected so years of education as a continuous variable is utilized here.

¹⁰ For more information, see Rutstein and Johnson (2004).

¹¹ <http://www.measuredhs.com/topics/Wealth-Index.cfm>

19% are classified as middle, 19% are grouped as richer, and 23% are labeled as richest. By construction, each quintile has about 20% of the households.

4.5 Working

Women's participation in economic activities has been studied as a pathway to increased empowerment and raised status in the household as an earner. In Bangladesh, however, as in many patriarchal societies, there is substantial under-reporting of women's economic activity (Mahmud and Tasneem 2011). Non-recognition of women's economic activity not only leads to undervaluation of women's economic contribution but also contributes to their lower status in society relative to men. The types of work women are involved in are often overlooked by women themselves (Mahmud and Tasneem 2011). Sen (1990) argues that women who earn cash have more bargaining power than those who are solely housewives, because of, among other things, the cultural devaluation of housework. Women's entry into wage labor could thus be one way of increasing their intrahousehold bargaining power not just directly, but indirectly, by increasing the perceived legitimacy of their claims. 1,128 women in the sample (27%) have worked in the past 12 months, and 84.5% of working women are paid in cash or in cash and in kind. Becker (1981) suggests that women's employment or raise in economic share in the family may increase allocation to household resources to them but may not necessarily upgrade their decision-making power.

4.6 Body Mass Index

This paper uses body mass index (BMI) to capture the mother's health status. BMI, which is also known as Quetelet's Index, is defined as weight in kilograms divided by the square of height in meters. Unlike the nutritional status of children, the evaluation of nutritional status of women does not require a reference table from a well-nourished population. The BMI of well-nourished adult women ranges from 18.5 to 25.0. A BMI higher than 25.0 indicates obesity or what is sometimes called over-nutrition. A BMI lower than 18.5 is considered to be an indicator of energy deficiency or low food intake, which can be used to assess malnutrition (Omilola 2010). There are important reasons why mother's BMI has been included as a control variable. The nutritional status of women can have serious consequences for their children's birth weights and for infant mortality (Omilola 2010). The literature has well-documented that the BMI of an adult can serve as a good proxy for current nutritional status (Sen 1990; Strauss and Thomas 1998). The average mother's BMI in this sample is 20.43 (SD=

3.35). The mother's BMI in the data is measured at the time of the survey, not at the time of her children's birth. While an imperfect measure, it crudely captures the mother's health status and controls for the effects of the mother's health on child health (under the assumption that BMI should not drastically change over the 5 year period).

4.7 Microfinance

Women's participation in microfinance programs has been viewed as an important channel for increasing women's subordinate status within the household. The literature suggests that participation in microfinance programs improves women's empowerment and intrahousehold bargaining power. Similar to the working variable which captures the mother's formal work experience, microfinance participation aims to capture another facet of women's participation in the market. The microfinance variable is a dichotomous variable which takes the value one if the mother belongs to at least one microfinance program. The programs include Grameen, BRAC, Asha, Proshika, and BRBD. 28% of the women in the sample belong to at least one microfinance program.

5. RESULTS / DISCUSSION

Table 2 presents the OLS regression estimates which analyze the effect of women's decision-making status on their children's health. There exists a positive correlation between children in families where their mothers have decision-making authority and height-for-age ratios. The coefficient on the bargaining power variable which captures whether the mother participates in decisions about large purchases is consistently significant at the 1% level and positively correlated with child health outcomes. As the variables of interest are dichotomous, their interpretation is a description of contrasts of one category relative to another. In Model 1, the coefficient implies that children with mothers who participate in making large household purchases are on average 0.118 standard deviation units taller than children whose mothers do not participate, *ceteris paribus*. As more control variables are added, the coefficient on the variable describing participating in decisions about large purchases does not vary substantially in magnitude. There is little to no evidence, however, for a relationship between child health and other female bargaining power variables. In Model 1, whether a mother makes decisions about daily needs is significant at the 10% level. This variable loses its explanatory power as more specifications are added to the model. The effect of

whether the mother makes decisions regarding child health care is small and not significant.

Overall, the findings from these models are consistent with the literature. Mother's education, a continuous variable measured in years, is positively related to height-for-age ratios. For every additional year of mother's education, we can expect child height to increase on average by 0.091 standard deviations, holding all other regressors constant. Also, mother's BMI is consistently statistically significant across the models and also positively associated with child health. In Model 1, on average, female children are 0.085 standard deviations shorter than their male counterparts. This is significant at the 5% level. As more variables are included, the coefficient capturing the relative disadvantage of female children slightly decreases in magnitude. In Model 4, for example, the coefficient tells us that on average, female children are 0.077 standard deviations shorter than their male counterparts, holding all else constant. Being a rural child also is associated with lower height-for-age z-scores, although this effect is not statistically significant.

The coefficients on the wealth index are all negatively correlated with the dependent variable with respect to the highest wealth quintile. The wealthiest quintile is the reference group, as using this category best exploits and most clearly demonstrates the negative relationship between wealth status and health outcomes. The coefficient magnitudes decrease as living standards rise, which is consistent with the literature. They are all highly statistically significant, suggesting the strong relationship between income and child health outcomes. When variables measuring attributes of the child's father are added in Model 4, the impact of wealth on child health decreases. We still see the wealth index as highly statistically and economically significant, yet the magnitudes of the coefficients of each quintile relative to the richest quintile decrease in absolute value. For example, in Model 3, the coefficient on the wealth index of children from the poorest households tells us that on average, these children are 0.41 standard deviations shorter than their counterparts in the wealthiest quintile, holding everything else constant. In Model 4, the coefficient on children from households designated poorest reads that on average, children from the poorest households are 0.13 standard deviations shorter than their counterparts from the richest families, holding everything else constant.

Wealth (the proxy for income) matters less once we take husband's education into account. Perhaps this is because husband's education is in some way measuring his labor market outcomes, and therefore captures some of the

explanatory power of the wealth index. The significance of the mother's education on child health outcomes falls in magnitude once add husband's characteristics to the model, especially the variable which captures the husband's years of education. This suggests the importance of parental education. Definitely the women's education matters as it remains significant at the 1% level, but when the model controls for husband's education, the coefficient on the women's education reduces in magnitude.

Interestingly, the microfinance variable is negatively associated with the dependent variable and is consistently statistically significant at the 1% level across the four models. The negative correlation between microfinance participation and child health outcomes is surprising. The literature and empirical evidence suggests that participation in microfinance schemes increases women's intrahousehold agency by providing a source of income and increasing exposure to outside social networks. Women's participation in microfinance programs has been viewed as an important channel for increasing women's subordinate status within the household. In Model 3, before controlling for household wealth, this negative correlation may be explained by the fact that the poorest households have the highest likelihood of eligibility for participation in microfinance programs. In the bottom quintile, 36% of the children have mothers in a microfinance program. In the 2nd quintile, 33% of children do. In the 3rd quintile, 31% do, in the 4th, 26% do, and in the top wealth quintile, only 14% of children have mothers in a microfinance program. The trend suggests that participation in microfinance programs is negatively correlated with accumulated assets. While this initially seems counter-intuitive, in light of the strong wealth story to explain child health outcomes, the sign on microfinance becomes a little more understandable. However, the variable continues to be negatively significant after controlling for wealth.

Perhaps trends in the literature are not so straight-forward. Microfinance promotes income-generating activities and microenterprises. The beneficiaries use the loan to supplement an ongoing source of income. Perhaps this practice has adverse effects on child health as microfinance participation diverts the mother's time from household activities. The children in the sample are very young, so perhaps microfinance exposes the underlying tension between the mother's reproductive and productive roles. Women's participation in microfinance programs may increase her status in the household; however, there is little correlation with her relative bargaining power and microfinance membership.

Low levels of investment in child health therefore have far-reaching consequences for economic growth, distribution, and welfare. Case and Paxson

(2008) examine the impact of height on labor market outcomes. They find that height is positively associated with cognitive ability, which is rewarded in the labor market by higher average earnings. Using data from the USA and UK, Case and Paxson find that the association between height and earnings is economically significant. For both men and women, the relationship is striking: a one-inch increase in height is associated on average with a 1.4 percent to 2.9 percent increase in weekly earnings, and a 1.0 percent to 2.3 percent increase in average hourly earnings. Their results also indicate that an increase in US men's heights from the 25th to the 75th percentile of the height distribution—an increase of four inches—is associated with an increase in earnings of 9.2 percent. Although men earn more than women at all heights, the increase in earnings with height is similar for men and women (Case and Paxson 2008). These trends also exist in developing countries. Vogl (2001) looks at labor market outcomes in Mexico and finds that height bestows advantages in cognitive skill, education, health, and earnings. His results imply that a one centimeter increase in height leads to wage gains of 2.1 percent and 2.9 percent for men and women, respectively (Vogl 2011). These numbers help to conceptualize the long-term returns to health. The literature examines the importance of height as it pertains to long-run productivity and wages, demonstrating the importance of investment in child health.

5.1 Heterogeneous Effects

The current sample includes all children aged 0-59 months old in both urban and rural areas. An interesting question is whether the empirical findings hold for subsamples such as urban vs. rural, girls vs. boys, infants (<12 months) vs. non-infants. Table 3 shows regression results for interactions of the bargaining power variables and certain sub-populations under the hypothesis that the relationship between bargaining power and child health outcomes varies by certain conditions, namely age of the child, geographical location, and gender of the child. If children in the different groups are somehow systematically different from their counterparts, it makes sense to run these interaction models. By incorporating dummy variables for group membership and interaction terms for group membership with the bargaining power variables, we can better identify what effects, if any, differ across groups. Because mother's participation in decisions regarding large purchases is consistently significant and robust throughout Model 1-4, only this measure of female bargaining power is used in the interaction results. Using one decision-making variable to generally represent relative power allows for a clearer, more digestible analysis.

Employing interaction terms was selected as the preferred method to examine different effects within groups. Sample selection issues may have been introduced running regressions with sub-populations. For example, there may be something particular and unobservable about the type of parents who have allowed a girl child to survive. Interaction terms control for if female children are systematically neglected. Likewise, there may be something unique and unobservable about parents whose infant child survives past infancy. We do not know the composition of natives and immigrants, especially in urban areas, so running just a rural or urban sample invites sample selection concerns also. The interaction terms indicate the difference in mother's bargaining power effects between groups (infant and non-infant, female children and male children, urban and rural) yet preserve the sample size.

Table 3 shows the results of the regression including the bargaining power variable associated with large purchases interacted with the infant dummy, female child dummy, and rural dummy relative to the baseline model (Model 4 of Table 2). Column two of Table 3 displays the regression of the interaction of the variable of interest with the infant dummy. The t-value on infant is highly significant implying that the intercepts do differ. For both infants and non-infants, mother's participation in decision-making is associated with an increase in height-for-age z-scores. The results submit that, for infants and non-infants with equal levels of material bargaining power, there is no additional advantage for infants if mothers participate in household decisions about large purchases.

Columns three and four in Table 3 indicate that there are not substantial differences in child health outcomes between genders with respect to maternal bargaining power and geographical location with respect to maternal bargaining power. The partial effect of height-for-age z-scores with respect to the interaction dummies does not depend on the magnitude of the bargaining power variables. None of the bargaining power variables nor the interaction terms is statistically significant in these models. Bargaining power is not related to child health in a different way when examining subgroups. Being female or being an infant or being rural matters in the expected way; however, given that, mother's decision-making authority has no impact vis-à-vis male or non-infants or urban children.

5.2 Fixed Effects

The fixed effects model changes the nature of the hypothesized question by asking how bargaining power affects child health in households encompassing joint families. A fixed effects model controls for household-level unobservables. It is possible that omitted family-level variables, including attitudes about women

and women's agency, are correlated with regressors, and thus their estimated effects on child health outcomes may be biased.

A unique feature of households in South Asia which can be exploited with a fixed effects model is the phenomenon of multi-generational families. A household could be composed of multiple nuclear families all led by the same head of household figure. Within this special subset of households with joint families, the fixed effects model allows us to ask if there are differences in child health outcomes with respect to the mother's bargaining power when male attitudes about women are held constant. Of course in joint families, measuring bargaining becomes much more complicated, as there are not just two adult interests competing.

Table 4 shows the results of the fixed effect regression. In the sample, there are 256 households with more than one mother present. The variation in the fixed effects model comes from these households. All household-level variables are dropped from the model. When the model controls for household-level features, the magnitude of the coefficient on women making decisions about child health care grows substantially larger and becomes statistically significant at the 10% level. Whether the mother participates in large purchase decisions loses its significance. The disadvantage of being a female child falls once household level effects are controlled for and becomes not significant. Interestingly, mother's age becomes highly negatively significant. Mother's education and father's education are no longer significant, despite their consistent significance in the other models. Also, whether the child's mother participates in a microfinance program loses its statistical significance.

These results demonstrate that what determines child health in multi-generational families is more complicated. Cooperation and conflict models require more nuance. There are more resources in joint families which mothers in nuclear families do not have access to. Fewer mothers in joint families participate in microfinance programs. These households are wealthier and there are more working males under one roof. The need to borrow funds or take loans decreases as there are multiple sources of income within the household already. Also, there are more mothers present to care for children. A mother's time away from the household participating in microfinance programs may not have as severe an impact her child's health thanks to the presence of other mothers, grandparents, or other female figures. Why age becomes negatively significant is an interesting question. A more in-depth study of the household structure of joint families may prove to provide an answer. Are older or younger mothers responsible for taking

care of the children? In multi-generational families, young mothers have to contend with mother-in-laws and more senior female figures. It is unclear what the mechanism is, but within a household as the mother's age increases, the child's height-for-age ratio decreases. A complete analysis of the interesting dynamics of joint households' structure is limited by the data. There is a need for future exploration of women's roles within joint families and specifically joint families in Bangladesh.

6. CONCLUSION

This paper assumes a collective model of household bargaining to address the association between women's decision power and child health outcomes. The theoretical foundation predicts that when mothers have stronger preference for child quality than fathers, an increase in mother's bargaining power can benefit the child. This paper tests the theory's implications using 2007 household data from Bangladesh. The empirical evidence is consistent with the theory: women who enjoy decision-making power in the household, especially regarding large purchases, are associated with having children with better height-for-age ratios. Both theoretical prediction and empirical findings submit the importance of raising female intrahousehold power. This is particularly relevant for the developing countries where there is persistent gender inequality in the household.

This paper contributes to the body of literature discussing the importance of women's agency in households in relation to children's health, given the established link between women's control of household resources and consumption preferences favoring basic needs which promote child welfare. Women's empowerment and the promotion of gender equality are key ingredients to achieving sustainable development. Women's inequality as it translates to intrahousehold bargaining power affects child welfare, including rates of chronic malnutrition. Enhancing women's status leads to more investment in their children's education, health, and overall wellbeing. This study contributes to the existing literature on the subject because the effect of mother's participation in expenditure decisions as it relates to child malnutrition prevalence in Bangladesh is an area which has not been fully explored. If measures suggesting that increased rates of women's bargaining power do in fact improve children's health levels, then this is an important and relevant conclusion to consider when constructing policy to target the poor.

This study provides interesting fodder and an exciting opportunity for future study. This study's ability to capture the robust and complex nature of

intrahousehold bargaining power was limited by the data. In future studies about bargaining power and child health, perhaps more sophisticated panel data could better capture the dynamic nature of bargaining power. Additionally, an exogenous source of bargaining power such as non-labor income or assets at marriage could prove noteworthy. Also, it is important to examine the extrahousehold socioeconomic and legal institutions within which households are embedded, as women's bargaining power within the home is clearly associated with their situation outside it.

Various economic and social development indicators show that in the last 20 years, Bangladesh, a poor, Muslim-majority, patriarchal country, has made substantial progress towards gender equality. As Bangladesh turns 40, improvements in women's wellbeing and increased agency may be some of the most significant gains in the post-independence era.

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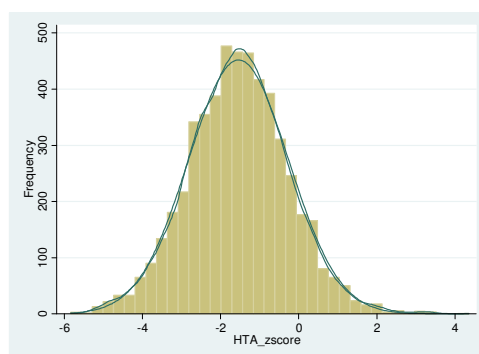
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Figure 1



The dependent variable, height-for-age z-scores, is normally distributed around mean -1.54.

Table 1.1 Child Summary Statistics

Children's Characteristics	Mean	Std. Dev.	Min.	Max.	Obs.
Height-for-Age (z-score)	-1.54	1.28	-5.84	4.35	5169
Child Age (months)	29.50	17.02	0	59	5169
Child Height (cms)	82.37	12.86	49	116.8	5169
Proportion of Female Children	0.50	0.50	0	1	5169
Proportion of Infants	0.20	0.40	0	1	5169

Table 1.2 Mother Summary Statistics

Mothers' Characteristics	Mean	Std. Dev.	Min.	Max.	Obs.
Age (yrs)	25.96	6.32	15	49	4224
Education (yrs)	5.12	4.39	0	17	4224
BMI (kg/m ²)	20.43	3.35	12.31	42.7	4224
Proportion Belonging to a Microfinance program	0.28	0.45	0	1	4224
Proportion Working	0.27	0.44	0	1	4224

Table 1.3 Female Bargaining Power Summary Statistics

Bargaining Power	Mean	Std. Dev.	Min.	Max.	Obs.
Proportion that Participates in Decisions re. Child Health Care	0.74	0.44	0	1	4224
Proportion that Participates in Decisions re. Large Purchases	0.61	0.49	0	1	4224
Proportion that Participates in Decisions re. Daily Needs	0.67	0.47	0	1	4224

Table 1.4 Household Summary Statistics

Household Characteristics	Mean	Std. Dev.	Min.	Max.	Obs.
Proportion Rural	0.65	0.48	0	1	3968
Proportion with Female Heads	0.09	0.28	0	1	3968
Wealth Index (1-5 scale)	3.05	1.44	1	5	3968

Table 1.5 Husband Summary Statistics

Husbands' Characteristics	Mean	Std. Dev.	Min.	Max.	Obs.
Age (yrs)	35.11	7.88	18	75	4224
Education (yrs)	5.12	4.94	0	17	4224

For all models: Robust standard errors in brackets; * significant at 10%;
 ** significant at 5%; *** significant at 1%; Models include child's birth order.

Table 2 OLS Regression Results

Height to Age Z-Score	Model 1	Model 2	Model 3	Model 4
Participates in Decisions re. Child Health Care	0 [0.046]	0.002 [0.046]	0.007 [0.046]	0.014 [0.046]
Participates in Decisions re. Large Purchases	0.118 [0.043]***	0.116 [0.043]***	0.114 [0.043]***	0.118 [0.043]***
Participates in Decisions re. Daily Needs	0.078 [0.046]*	0.07 [0.046]	0.073 [0.045]	0.067 [0.045]
Female Child	-0.085 [0.034]**	-0.084 [0.034]**	-0.079 [0.034]**	-0.077 [0.034]**
Mother's Age	-0.001 [0.006]	-0.001 [0.006]	-0.005 [0.006]	-0.009 [0.007]
Mother's Years of Education	0.091 [0.020]***	0.09 [0.020]***	0.082 [0.020]***	0.073 [0.020]***
Educ*Age Interaction	-0.001 [0.001]	-0.001 [0.001]	-0.001 [0.001]*	-0.002 [0.001]**
Mother's BMI	0.055 [0.006]***	0.054 [0.006]***	0.041 [0.006]***	0.039 [0.006]***
Mother in Microfinance		-0.138 [0.039]***	-0.11 [0.039]***	-0.101 [0.039]**
Mother Working		0.001 [0.040]	0.02 [0.041]	0.025 [0.040]
Female Head of Household			0.047 [0.064]	0.039 [0.064]
Rural			-0.055 [0.041]	-0.063 [0.041]
1st Wealth Quintile			-0.407 [0.069]***	-0.313 [0.071]***
2nd Wealth Quintile			-0.319 [0.063]***	-0.233 [0.065]***
3rd Wealth Quintile			-0.246 [0.062]***	-0.185 [0.062]***
4th Wealth Quintile			-0.23 [0.055]***	-0.19 [0.055]***
Husband's Age				0.003 [0.004]
Husband's Years of Education				0.028 [0.005]***
Observations	5169	5169	5169	5169
R-squared	0.09	0.09	0.1	0.11

Table 3 Interaction Regression Results

Height to Age Z-Score	Base Model	Infant Interactions	Female Interactions	Rural Interactions
Participates in Decisions re. Child Health Care	0.014 [0.046]	0.002 [0.043]	0.013 [0.046]	0.014 [0.045]
Participates in Decisions re. Large Purchases	0.118 [0.043]***	0.121 [0.044]**	0.065 [0.053]	0.080 [0.062]
Participates in Decisions re. Daily Needs	0.067 [0.045]	0.057 [0.043]	0.066 [0.045]	-0.068 [0.0454]
Large Purchases Interaction		0.082 [0.101]	0.106 [0.069]	0.058 [0.072]
Female Child	-0.077 [0.034]**	-0.079 [0.032]**	-0.141 [0.054]**	-0.077 [0.034]**
Mother's Age	-0.009 [0.007]	0.004 [0.006]	-0.009 [0.007]	-0.009 [0.007]
Mother's Years of Education	0.073 [0.020]***	0.061 [0.020]***	0.073 [0.020]***	0.073 [0.020]***
Educ*Age Interaction	-0.002 [0.001]**	-0.001 [0.001]*	-0.002 [0.001]**	-0.002 [0.001]**
Mother's BMI	0.039 [0.006]***	0.038 [0.006]***	0.039 [0.006]***	0.039 [0.006]***
Mother in Microfinance	-0.101 [0.039]**	-0.053 [0.038]	-0.101 [0.039]**	-0.100 [0.039]**
Mother Working	0.025 [0.040]	0.049 [0.039]	0.025 [0.040]	0.024 [0.041]
Female Head of Household	0.039 [0.064]	-0.001 [0.061]	0.036 [0.064]	0.038 [0.064]
Rural	-0.063 [0.041]	-0.056 [0.039]	-0.065 [0.041]	-0.066 [0.080]
1st Wealth Quintile	-0.313 [0.071]***	-0.311 [0.068]***	-0.312 [0.071]***	-0.312 [0.071]***
2nd Wealth Quintile	-0.233 [0.065]***	-0.255 [0.062]***	-0.233 [0.065]***	-0.231 [0.065]***
3rd Wealth Quintile	-0.185 [0.062]***	-0.18 [0.060]***	-0.186 [0.062]***	-0.184 [0.062]***
4th Wealth Quintile	-0.19 [0.055]***	-0.184 [0.053]***	-0.190 [0.055]***	-0.186 [0.055]***
Partner's Age	0.003 [0.004]	0.007 [0.003]*	0.003 [0.004]	0.003 [0.004]
Partner's Years of Education	0.028 [0.005]***	0.025 [0.005]***	0.027 [0.005]***	0.028 [0.005]***
Infant		0.904 [0.061]***		
Observations	5169	5169	5169	5169
R-squared	0.11	0.18	0.11	0.11

Table 4 Fixed Effects Results

Height to Age Z-Score	Base Model	Fixed Effects Model
Participates in Decisions re. Child Health Care	0.014 [0.046]	0.318 [0.203]*
Participates in Decisions re. Large Purchases	0.118 [0.043]***	0.029 [0.223]
Participates in Decisions re. Daily Needs	0.067 [0.045]	0.076 [0.192]
Female Child	-0.077 [0.034]**	-0.014 [0.070]
Mother's Age	-0.009 [0.007]	-0.100 [0.027]***
Mother's Years of Education	0.073 [0.020]***	0.029 [0.083]
Educ*Age Interaction	-0.002 [0.001]**	0.001 [0.003]
Mother's BMI	0.039 [0.006]***	0.106 [0.023]***
Mother in Microfinance	-0.101 [0.039]**	-0.108 [0.237]
Mother Working	0.025 [0.040]	0.202 [0.292]
Female Head of Household	0.039 [0.064]	(dropped)
Rural	-0.063 [0.041]	(dropped)
1st Wealth Quintile	-0.313 [0.071]***	(dropped)
2nd Wealth Quintile	-0.233 [0.065]***	(dropped)
3rd Wealth Quintile	-0.185 [0.062]***	(dropped)
4th Wealth Quintile	-0.19 [0.055]***	(dropped)
Father's Age	0.003 [0.004]	0.01 [0.014]
Father's Years of Education	0.028 [0.005]***	0.007 [0.023]
Observations	5169	5169
Number of Groups		4145
R-squared	0.11	0.11