Preliminary-Comment Welcome

Intra-household Bargaining and Investment in Child Health

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Abstract

In this paper I investigate the intra-household bargaining process and investment in children's health using Nigerian Demographic and Health Survey data for 2003. I introduce new and direct measures of empowerment which reflect a wife's relative say in different decision making contexts. To correct the potential bias from the endogeneity of the empowerment measure, an instrumental variables approach is used. Religion and prevalence of polygyny in the neighborhood are used as instruments for the empowerment variables. Mother's empowerment has a positive and significant impact on the long run health of her child. The decision making process in the household does not appear to be unitary, the husbands and wives have varying preferences and abilities in enforcing their tastes. This study also sheds light on the fact that empowerment is multidimensional and control of economic resources may not be the sole determinant of women's empowerment in the developing world.

Keywords: Nigeria, Bargaining Power, Intra-Household Analysis, Child Health, Factor Analysis

JEL Classification: D13, I21, O12

I. Introduction

Women's empowerment is advocated by the World Bank and the United Nations as a prominent and important channel for improving child health, increasing school enrollment, reducing gender disparity and poverty and thus promoting growth and better governance[1]. Economists and sociologists have long been interested in the intra-household decision making process, specially how wife's preferences, if different from her husband, get reflected in the household decision making process and affect the outcome of interest, ranging from child health and education outcomes to expenditure on food and clothing etc.

Early research on intra-household resource allocation was founded on the "unitary" or the "common preference models", based on the notion that all the members of the household share the same preference or a single benevolent dictator acts for the good of the entire household. The second fundamental assumption of the unitary model is that individuals in the household pool their resources. In this type of model, inequitable allocations result from differing returns to investment in different family members. However, empirical evidence casts serious doubt on this type of characterization of the decision making process of the household in both developed and developing countries. An alternative to the unitary models are collective models that capture the idea that differing preferences across household members could create a conflict in allocation decisions and result in allocations different than indicated by the unitary case (Chiappori, 1992, 1997). One objective of this paper is to empirically test whether the decision making process in the household, particularly investment in children follows a unitary or collective models, that is whether the father and mother have varying preferences and abilities (bargaining power) in enforcing their tastes[2].

[1] Millennium Development Goals Report 2005.UN: http://unstats.un.org/unsd/mi/pdf/MDG%20Book.pdf

[2] Collective models (Chiappori 1992, 1997) assumes that intra-household allocations entail Pareto efficient outcomes but do not directly address the question of how individual preferences lead to collective choice. Two sub-classes of collective models put more structure on the decision making process, namely, cooperative and non-cooperative bargaining models. In cooperative approach, individuals choose between marriage and divorce depending on the utility associated with each state with marriage generating a surplus (Manser and Brown, 1980, McElroy and Horney, 1981). In this model the utility from divorce treated as a threat point which is external to the marriage. While in "separate spheres" or non-cooperative models (Lundberg and Pollak, 1993), the threat point is internal to the model. This approach is based on the assumption that an individuals actions are conditional on actions of others, they cannot enter into binding and enforceable contracts with each other. The allocation under these models may not always be Pareto efficient. Even though the exact nature of the bargaining process and ultimate equilibrium may take different forms in these bargaining models, the underlying intuition is the same which suggests that household allocation decisions result from a bargaining process in which members allocate resources according

Controlling for household permanent assets status, human resources of the parents and other community variables, the relative bargaining power of the wife in the household should not have a differential impact on child health under the assumptions of unitary model. One of the goals of this paper is to test this prediction.

A critical problem facing the researchers is how to measure the bargaining power of wives. An accurate measure of bargaining power is difficult to obtain because of its multi-dimensionality. Also, one particular indicator may not represent underlying bargaining power across different cultures. Since it can be derived from various sources, like education, economic independence, socio-cultural norms, laws of the country, and family background, it is not easy to summarize the whole concept of bargaining power with one single measure. The impact of women's relative status, measured by various variables, e.g., female share of income and assets, assets brought into marriage, relative education and age etc. on various demographic and economic outcomes have been well researched for both developed and developing countries. These measures of bargaining power introduced in literature are different from each other and have substantial difference in the effects on the same outcome variable (Varadharajan, 2003). One particular indicator may not be applicable to all cultures, even within one country. Thus not all of these measures can be generalized as an indicator of female autonomy across different countries or societies. It is puzzling to see that the measures introduced in the literature are all proxies of the same underlying concept of "bargaining power".

In this paper, I construct new measures of empowerment which reflect a woman's relative status in the different decision making contexts. It is not necessary that a wife would have the same amount of control/power in all the decisions the household makes and these may have varying effect on the health of the children. This paper uses direct measures of bargaining power of women created from self reported status on various household decisions and activities. The measures were created using factor analysis of 19 variables that reflect a women's relative status in the household. Factor analysis revealed that three factors should be retained. These three factors capture various dimensions of her bargaining power: her mobility, her vulnerability and women's control over household's resource allocation. Usually in household surveys, the household head or the husband

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to their individual preference. See, Thomas, Contreras and Frankenberg (2002) and Pollak (2005) for details about bargaining models.

reports all the information about the family members. Thus the variables used to proxy women's bargaining power may suffer from systematic measurement errors. Since women themselves report about their status in various decision making contexts, the bargaining measures in this paper do not suffer from such problems. Female autonomy or empowerment in a developing country context is generally defined as ability to control her own life, ability to access resources and information to make informed and independent decisions to ensure her own wellbeing and the wellbeing of other family members. It also reflects freedom from any coercion, violence and constraints on physical mobility. It is interesting to find that data determined three factors need to be retained and these three factors captures the three most important aspect of bargaining power of women in the developing world.

I investigate the impact of these measures on the long run indicator of children's health, height for age. I also use other measures of children's health, e.g., weight for height, weight for age, the likelihood of getting vaccinated and receiving vitamin A drop etc. and see whether the bargaining measures have differential impact on different outcomes. I also investigate whether the these measures have any significant influence over the mother's own health seeking behavior and use likelihood of receiving prenatal care, having trained professional at the time of child birth, and delivering the baby in a proper medical facility as dependent variables. Since these three bargaining measures capture three distinct aspects of bargaining power, their impact may vary by outcome investigated, as some aspect may be more important in case of some outcome than others. If this is the case it will reinforce the fact that using one indicator may not adequately capture these separate dimensions of bargaining power of women in the developing world. A mother may have financial autonomy but if she has restricted mobility (due to various social taboo or customs) or has fear of domestic violence, she may have to compromise the health of her child by failing to avail proper health facilities which are most often free[3]. Focusing on one single aspect (mostly studies consider economic decision making power proxied by various income/wealth/asset variables) is likely to miss out on other important part of intra-household decision making process

Finally, finding appropriate instruments for these bargaining measures pose as the major hurdle as the usual measures of wife's bargaining power are most likely to be to endogenous to the

[3] Vaccination drive, Vitamin A drive in developing countries.

outcome of interest. The commonly suggested measures in the literature may reflect the same underlying processes that determine the outcome variables, e.g., investment in children's health and education, accessing health care services for herself and the child, expenditures toward food and clothing etc. In order to correct the potential bias from the endogeneity of the empowerment measures, instrumental variable approach is used. Religion and prevalence of polygyny in the neighborhood are used as instruments for the empowerment variables. The extent of polygynous unions in the neighborhood is correlated with a woman's status within the household via community values and norms regarding gender roles, but is unlikely to have an impact on the health of the child. Religion also plays an important role in determining women's status in the household, and thus can also act as instrument for mother's relative say in the child health matters. We control for mother's education which is endogenous due to the fact that mothers who acquire education are innately more able and motivated, given female school enrollment is very low in the developing countries. We use mother's birth cohort interacted with her childhood place of residence as instruments for endogenous mother's education with the assumption that these instruments would capture the relevant time school supply[4]. The results from the regression analysis indicate that mother's empowerment measures have positive and significant impact on long run health of her child. Households do not follow unitary model of decision making process. The impact of the bargaining measures varies by the outcomes, underscoring the multidimensionality of bargaining measures. Results also reveal that the impact of bargaining measures do not vary by the gender of the child.

The paper is organized as follows. Section II analyzes the possible mechanisms through which bargaining power of the mother affects the investment in child health. Section III outlines the various bargaining measures used in the literatures and discusses the direct indicators used in this paper that are constructed through factor analysis. Section IV presents description of the data and the variables used in the regression analysis. The estimation procedure is discussed in section V. The results from the multivariate analysis are presented in section VI. Section VII deals with the robustness of the results and paper concludes in section VIII.

II. Why a Mother s Empowerment Matter?

[4] See Ahmeded and Iqbal (2006) for a detailed discussion about instruments used for mother's education.

Extensive research has been done investigating the possible effect of female autonomy on fertility; however, a growing body of research has also begun to examine how women's bargaining power within the household affect the health and well being of women and the children. Following Thomas, Contreras, Frankenberg (2002) and Rubalcava and Thomas (2000), the derived demand function for child health resulting from a household optimization program, depends on the distribution of power within the household; household provided health and nutritional inputs, local health environment and genetic endowments of the child, the prices, and an unobservable component reflecting heterogeneity in tastes and health production technology. Holding household income constant, child health will be invariant to changes in distribution of bargaining strengths of household members under the unitary model. Rejection of the unitary model would indicate that bargaining power of the mother has differential impact on child health.

It is important to understand the processes through which mother's empowerment influence the health of her child. In many societies, socio-cultural norms dictate that men and women have separate and distinct roles within the household; with women being primarily responsible for food production and child care (Caldwell and Caldwell 1993). In a resource-constrained household, men and women may have conflicting priorities over resource use. There are some evidence suggesting that women put more priority on food, clothing and health needs of the household members where as earnings of men are siphoned to meet their individual demand for alcohol, tobacco, recreational and consumer goods (Abadian, Sousan 1996; Jacobson 1992). The connection between malnutrition of children and diversion of income by males to personal consumption has been evident in Belize, Guatemala, Mexico, Indian Subcontinent, and some African countries (Carr, 1985. Blumber, 1990; Ascadi and Ascadi, 1987). Since mothers are primary caregiver, they are also more likely than their husbands to be aware of the health status of their children and to avail medical treatment in need (Caldwell 1986). A mother with more bargaining power is thus assumed to have greater control in household resources to invest in the health of the children.

Empowerment has several aspects, namely, control over resources, mobilization of interpersonal networks and basic attitudinal attributes (Quisumbing and Mallucio, 1999). An empowered mother as indicated by her relative status in the household compared to her husband, exercises more control over the family budgets and can direct resources towards investment in

human capital of children, are more confident and capable of taking timely informed decisions regarding vaccination and food and nutrition intake. She is more likely have control over fertility and birth spacing, and enjoy greater mobility and less likely to suffer from domestic violence. She has more control over her own health choices enabling her to access prenatal and post natal care leading to better health for herself and thus ensure a safe, secured and quality environment for her child. Mobility is an important aspect of female empowerment in the developing world and is positively associated child health outcome (Basu, 1992). This is because freedom from constraints on physical mobility enables a woman to acquire proper information, goods and services (e.g. participation in vaccination and Vitamin A drive, availing professional medical care in need). Domestic violence has been identified as an important indicator of child health status in the household. Violence impedes women's economic and social development and capacity of self-determination. A woman who is subject to frequent physical abuse is vulnerable and unable to influence household decisions and may have to compromise own and child health because of fear of violence and abuse. It is clear that bargaining power has different dimensions and each aspect may have a different impact on child health. Consideration of the multidimensionality of bargaining measures is very important in terms of policy interventions for child wellbeing.

III. Measure of Bargaining Power:

The intra-household bargaining literature has suggested several measures of bargaining power of women and investigated their impact on educational attainment, health status of the next generation. Traditionally in economic literature, "bargaining power" of a member of the household is determined by the share of resources contributed by that member. Various economic resources have been used as proxies of bargaining power, e.g. public transfer and welfare receipts (Lundberg, Pollak and Wales, 1997; Rubalcava and Thomas 1997); income shares of women (Hoddinott and Haddad 1995); unearned income (Thomas 1990; Schultz 1990); inheritance (Quisumbing 1994); assets brought into marriage (Thomas et al. 1997; Quisumbing and Maluccio, 2003), and current assets (Doss 1996).

Most of these mentioned measures are not perfect representation of women's bargaining power. In many developing countries female participation in the formal labor market is low. Since women do not work for wage, it is difficult construct a measure of income share of female. Even if

they work in family owned agricultural farms, it is very difficult to disentangle their marginal contribution to total produce. It is also very important to recognize the endogeneity of labor income as it reflects time allocation and is jointly determined with household production of children's health. Some studies used unearned income as a proxy for bargaining power. But this may be of some concern if unearned income is interest payments from assets accumulated during working life, pensions and unemployment and/or other benefits as they are associated inter-temporal labor supply decisions. Moreover, unearned income may systematically change consumption and labor suppy behavior and tastes, making it endogenous in the child health production function.

Again assets brought into marriage may be good proxies of bargaining power as these are exogenous to decision making process within marriage in some cultures, e.g., Indonesia.[5] But in other cultures, particularly in South Asia, asset brought into the marriage are often dowries and are not controlled by the wives. Social norms, marriage and divorce laws are very important when using this measure of bargaining power. Moreover, this measure may be influenced by assortative mating and selection in the marriage market making it endogenous to out come of interest (Foster 1996, Quisumbing and Maluccio, 1999). The validity of current assets as proxies of bargaining measure is questionable as it is correlated with asset accumulation decision and preference within the marriage. It may be difficult to separate out the relative shares of spouses depending on the marriage laws of the country, as they may be jointly controlled by spouses. Some researchers also used relative education and age difference of spouses as indicator of bargaining power (Handa 1996, Thomas 1994) but these may result in biased estimates due to endogeneity arising out of assortative mating.

Thus the validity of any measure of bargaining power crucially depends on the exogeneity of the measure and also how relevant the measure is in a particular culture. A woman may be empowered in some spheres but not in others. It is very complex to define and construct a quantitative index of such a multi-dimensional concept. A highly educated woman may not necessary possess a larger share of household assets or bring a significant amount of assets or property into the marriage. In developing countries dowry payments are usually associated with the idea of compensation for poor marriage market qualities, like beauty and education. A woman bringing in a larger share of assets into the marriage may not necessarily have more bargaining

[5] Women in Indonesia control the assets and preserve the right to them in case the marriage dissolves.

power in the household. The meaning of empowerment changes from one setting to another and also varies by region, and culture. It is multi-dimensional; some aspect exerts more significant impact than others on the outcome of interest.

Varadharajan (2003) used several measures of bargaining measures, namely, female share of income, female share of assets accumulated during marriage, female share of assets brought into marriage, relative family background, relative education and relative age and investigated their individual impact on three outcomes: child enrollment rates, child health status and budget shares on food. It was evident from his paper that there is substantial inconsistency in the effect of different bargaining power measure on the outcome variable. In some cases the relation between the three outcome variables and the bargaining measures had desired signs while in others they were insignificant, indicating that one variable cannot sufficiently proxy the latent bargaining power which has multiple dimensions. Moreover, he found the measures of bargaining power to be weakly correlated with each other. He used factor analysis to create two indicator of bargaining power, capturing economic and social dimensions, from all the above proxies. His paper sheds light on the fact that women's empowerment cannot be adequately summarized by a single measure because of its multidimensionality.

In this paper I construct direct measures of women's bargaining power from self reported status on various household activities and decisions using factor analysis. A total of 19 such variables were used in the factor analysis. There are seven variables in Nigerian Demographic and Health Survey (NDHS 2003) which reflect women's relative bargaining power in a household's economics decision making process. They solely or jointly make decisions in the following cases: about their own health, large and daily household purchases, child health care and education, visiting friends and family and food to be cooked each day. Respondents were asked who had final say in these decisions. Women who claimed that they independently or with consultation with their husband or other family members decided on these issues, assumed to have some bargaining power in the household decision making process. Others, who reported that the decisions were taken solely by the husband or other family members, were assumed to have little or no autonomy in these economic decisions of the households.

There are six other variables in DHS Nigeria that reflect the degree of difficulty in getting medical help for herself. The questions were whether she knew where to go, whether it was a problem for her to get permission, to get money for treatment, to travel alone, and whether distance was a problem for her. The categories of responses were "big problem", "small problem" and "no problem". Women who reported "small" or "no problem" were assumed to enjoy greater autonomy and freedom of movement.

The data set also contains six questions about women's opinion about domestic violence. Respondents were asked whether they believe wife beating is justified if she goes out without telling the husband; neglects the children; argues with husband; refuses to have sex; burns food or food is not cooked. The more she reports "yes", the less is her relative autonomy in the household. She is more vulnerable and may compromise her own and child health in fear of violence and abuse.

We create the autonomy measure using factor analysis from these 19 variables[6].

III.1 Factor Analysis (FA)

Factor analysis is a statistical technique which explains a set of observed variables in terms of a smaller number of latent variables called factors. These latent factors are assumed to account for the correlations among observed variables. Thus the common covariate of all these economic decision making, opinion about violence and permission variables would capture the latent bargaining power of women. I do not assume at the outset that one factor would overwhelmingly explain the entire common covariance matrix of these 19 variables. On the contrary, I let the data

[6] There are several papers use similar variables (say in various activities, mobility variables etc) either individually or as a summation of these variables to create an index to study influence of religion and region in determining female autonomy in India and Pakistan (Jejeebhoy and Sather, 2001); to investigate impact of women's autonomy on child survival in Muslim and non-Muslim countries in Asia (Ghuman, 2003); to understand the determinants of empowerment in five Asian countries (Mason and Smith, 2003); to study the investment in child human capital in Egypt (Roushdy, 2004); to investigate women's autonomy and health care utilization in Northern India and to analyze the women's status and domestic violence in Bangladesh (Koening et al., 2003). These papers did not capture the underlying latent bargaining power from these variables through factor analysis (except for Jejeebhoy and Sather, 2001). Most importantly, none of these papers corrected the biases arising from the endogeneity of the autonomy indices.

determine the number of factors to be retained and try to interpret them according to the factor loadings of the variables[7].

One important assumption regarding FA in this paper is that the latent concept/concepts of intra-household bargaining power can be derived from the self reported claims of the respondents in regard to various household decisions. Since the respondent herself is reporting about her status in these decisions, the assumption is not unreasonable. Moreover, in household surveys, usually the household head reports about other members of the household. Thus other indicators like wages of the woman, assets brought into marriage, education and age might also suffer from systematic measurement error problem. The direct measures of female empowerment indices in this paper were created using a woman's own account of her relative status in various household decisions making process, her freedom of movement and her opinion about domestic violence, thus unlikely to suffer from mentioned measurement problem.

Table 3.1 shows the results of the factor analysis. The first panel is the table of factors. It lists the eigenvalues of the correlation matrix in ascending order. The third column shows the difference between the adjacent eigenvalues. A sudden drop in this number suggests that subsequent eigenvalues are just sampling noise. The second panel displays the factor loading matrix which only reports three factors as the eigenvalues of the other factors are negative or less than one[8]. Looking at the proportion column in the first panel we see that the first factor captures 46 percent, the second factor 30 percent and the third factor 23 percent of the common variance in the 19 variables. Both the Kaiser-Guttman (only the eigenvalues that are greater than one) and Scree plot[9] (the curve levels off after the eigenvalue) suggest that we keep only three factors.

The first factor relies mostly on the variables indicating respondent's relative say in large and daily household purchases and final say in child's health and education. This factor can be termed as

[7] We use factor analysis instead of principle component analysis as the latter imposes the restriction that all the components completely explain the correlation structure among the variables. Factor analysis, accounts for the covariance of these variables in terms of a much smaller number of common covariates (factors). Factor analysis does not force the common factors to explain the entire covariance matrix. That is it allows the individual-variable specific influences to explain the remaining variances.

[8] See Kaiser-Guttman rule and Scree plot in the appendix for retaining the number of factors.

[9] See appendix for the Scree plots for factor analysis.

economic measure of bargaining power. The permission and violence variables have little weight in this factor. This factor score is called empowerment.

The second factor loads the "opinion about violence" variables highly and positively and it explains most of the variance among these variables. It uses almost equal amount of all of the measures used. The factor score is called violence.

The third factor captures mostly the permission variables and the other variables have very little weights in this factor. This factor loads highly on per4 and per5 indicating that distance and traveling alone in getting medical help is a concern for the respondent. This factor thus reflects mobility aspect of empowerment. The generated factor score is called permission.

The factor analysis of these 19 variables results in three retained factor that captures basically three dimensions of women's status in a household. This paper studies the separate impact of each of these dimensions of bargaining measure on children's long run health outcome. Also alternative indicators of children's health are used as dependent variables. The impact of the bargaining measures on the health seeking behavior of the mother in terms of availing prenatal care, assistance at birth and appropriate delivery place are also investigated. The effect of these measures as they capture different dimensions of bargaining power may vary by the outcome and thus reinforce the fact that one proxy of bargaining power like assets or education may not be sufficient to capture all of the different dimensions.

IV. Nigeria: Data and Descriptive Statistics

Recently Demographic and Health Surveys for some countries have collected some variables that reflect women's relative position in the household decision making process. Nigerian DHS (2003) is an ideal choice to analyze the relation between human capital investments in children and mother's bargain power within the household, as it contains several dimensions of women's relative status within the household. Moreover, most research investigating this relationship in the developing world mostly focused on South Asia. Not much is known about female autonomy in Africa and its impacts on child health outcomes. The choice of using Nigerian data is also motivated by the choice of instruments. Since mother's bargaining index and education are endogenous in the

child health production functions, paucity of suitable instruments handicap the literature in investigating the effect of mother's empowerment on child health. In this paper, I use prevalence of polygyny in the neighborhood and religion of the mother as an instrument for her bargaining power measures. I construct instruments for mother's education using the fact that there was a large variation in the education policy and the public investment in education in Nigeria (See Ahmed and Iqbal, 2006). The DHS data sets not only have a wide array of child anthropometrics measurements enabling to investigate short term versus long term child health outcomes but also contains a plethora of health seeking behavior variables for women themselves.

Nigerian DHS (2003) is a nationally-representative household survey containing the relevant health variables for our analysis. A total of 7985 women in the age range of 15-49 were interviewed from 7225 households in Nigeria. Height and weight measurements of all children (4189) born in five years preceding the survey were collected. We dropped some observations which have height, weight, age of the children and information on parental education, age and bargaining variables missing. This leaves us a sample of total 3602 children. NDHS also collects information on household characteristics, region of residence, parent and child characteristics, educational attainment, religion, and different health measures of the children.

In our study we use height for age Z score (HAZ) as our indicator of child's health as HAZ reflects long run health capital of the child[10]. Summary statistics of the variables used in the estimation are presented in table 3.2.

About 49 percent of the mothers do not have any formal education, and 24 percent have primary level education. Fathers on an average have 6 years of education. 37 percent of our sample population lives in an urban area. 57% of the mother's grew up in villages. About 58% women in the sample are Muslims and 41% are Christians respectively.

[10] Z score is the difference between the value for an individual and the median value of the reference population for the same age or height divided by the standard deviation of the reference population. The reference standard is one that is recommended by WHO. Z Score=(hi –hmed, g)\Stdmed

Lifetime permanent income of the household is an important determinant of the long run health status of the child and should be included in the health regression to control for the income effect. As the data on permanent income is rarely available to the researchers, current income or current expenditure is often used as proxy. But there is an obvious measurement error when current income is used[11]. Again, total income of the household is likely to be endogenous to the household health decisions (participation and hours are jointly determined with health inputs). To avoid this bias often non labor income and wealth information of the household is used as a proxy of permanent income. Unfortunately, NDHS 2003 did not collect any income or expenditure data We used father's education as a proxy for household permanent income. NDHS also collected a host of household asset information ranging from ownership of television, radio, to a bicycle, scooter as well as dwelling characteristics such as source of drinking water, type of sanitation facilities and type of material for house's floor and roof. A wealth index is also constructed by NDHS using these asset information and principle component analysis[12]. But due to the endogeneity of the wealth index it is not used as a control. However, alternative specifications were run using the wealth index as a proxy for permanent income/measure of living standards of the household and the results are very similar adding to the robustness of the results[13].

Access to health facilities and neighborhood living conditions are important determinants of child health in developing countries. Unfortunately NDHS 2003 did not collect any information about availability of health personnel, health facilities or any indicators of community living conditions. But the survey included questions such as whether the mother received prenatal care, whether she was visited by family planning worker in the last 12 months, and whether the household have piped water inside the household etc. These are all binary variables. Information from these

[11] People sometimes conceal their income. Also income from agriculture, self employment has accounting issues. Moreover, in household surveys, sometimes one person responds about income earned by all the household members, leading to measurement problems.

[12] Each asset is assigned a weight (factor score) generated through principle component analysis and the resulting asset scores were standardized in relation to a standard normal distribution with a mean of zero and standard deviation of one. Each household was then assigned a score for each asset, and the scores were summed for each household. This index has been consistent with expenditure and income measure and tested for several countries. *Nigeria Demographic and Health Survey 2003*.National Population commission and ORC Macro, 2004

[13] Filmer and Pritchett (2001) showed that the wealth index consistently has less measurement error for 4 Asian countries than consumption expenditure as a proxy for long run wealth in analyzing the relationship household's wealth and children's school enrolment. Sahn and Stifel (2003) also found the wealth index to a much better proxy for long run economic welfare of the household compared to the household expenditure data as the latter has measurement issues because of the reliance on recall data, the large share of goods consumed from home production and suspect price deflators..

variables was used to construct variables that are reasonable proxies for access and availability of the health services and the standard of living conditions in the neighborhood. Higher percentage of mothers receiving prenatal care, frequent visit by family planning worker in each neighborhood would indicate the availability of health facilities in the locality. Again, higher percentage of households receiving treated piped water is assumed to be a good proxy of better living standard in the neighborhood. The NDHS 2003 had about 365 clusters covering all the administrative units of Nigeria. A cluster level measure of accessibility and availability of health services for each household i in cluster j was generated by averaging these variables over all the households in the cluster j excluding the household i within each cluster. These variables were calculated using the whole NDHS sample of all women ages 15-49.

V. Estimation

Following Thomas, Contreras and Frankenberg (1999) and Quisumbing and Maluccio (1999) I estimate the child health demand as a function of child's characteristics, parental characteristics including mother's bargaining power measures and the household and the neighborhood controls.

The reduced form child health demand function takes the following form:

$$H_{ij} = \beta_o + \beta_1 C_{ij} + \beta_2 F_j + \beta_3 M_j + \beta_4 N_j + \beta_5 E_j + \varepsilon_{ij}$$

where, H_{ij} is the height for age of the ith child in household j; C_{ij} is the vector of child characteristics such as age in months, gender, age squared; M and F are vectors of mother's and father's human and physical capital respectively such as education, age, and E is the mother's empowerment measures; N is a vector of household and community characteristics that includes proxies for health service accessibility, community living conditions and region and location dummies and e_{ij} is the error term.

To identify the causal effect of empowerment measures on child health outcomes, we need to correct for the endogeneity of these indices arising through mother's unobservable attributes such as ability and motivation and self determination etc. Prevalence of polygyny and religion is used as

instruments for empowerment[14]. According NDHS final report (2003), 36 percent of the married women are in polygynous unions (27 percent reporting the presence of only one co-wife, while 9 percent reported to have two or more co-wives)[15]. Again it is observed that in Northern part of Nigeria, both culture and Muslim traditions encourage polygyny, while in the Christian dominated South, monogamous unions are more acceptable. But polygyny is not uncommon among Christians. It is reasonable to argue that women is monogamous unions are more empowered and enjoy more bargaining power in the household compared to women in polygynous unions.

The extent of polygyny in the neighborhood of the women is correlated with her relative status in the household via the neighborhood externalities (role models), community values and norms about gender roles etc., but is unlikely to be associated with child's health. Anthropological evidence indicates that community level cultural and contextual factors are important in determining individual woman's relative status within marriage, particularly in cases of intimate partner violence across cultures (Counts, Brown and Campbell, 1992), Levinson 1989). Societal and cultural norms govern gender roles; impose segregated and asymmetric restrictions on all aspect of women's lives and behavior. Extent of polygynous unions in the neighborhood captures gender relations and norms and rules governing women's behavior and thus identifies a woman's bargaining power in the household production of child health[16]. Religion also plays an important role in determining women's role in the household. The social institution of *Purdah* in muslim countries, i.e., the social, economic and physical seclusion of women are the tragic realities of woman in the developing world (Amin 1997, Mandelbaum 1988, Ghuman 2003). Muslim and Christian dummies were used as instruments with traditional and animist and other religion as the omitted category with the assumption that Christian women enjoy more bargaining power relative to Muslim women.

[14] Extent of polygyny in the neighborhood is measured as percent of polygynous unions in the neighborhood over all the household in cluster j excluding the respondent's household i. The respondents were asked the respondents were asked whether there are co-wives residing in the household or not". This variable was used to calculate the percentage of polygynous unions in the neighborhood.

[15] Traditionally women in Nigeria are married to the husband's lineage. The senior wife enjoys a more privileged position and enjoys authority over junior wives. Seniority is determined by marriage rank, not by age. (See Oni, 1996).

[16] It is possible that polygynous households would migrate to neighborhoods with high polygyny and this selection would undermine the usefulness of the instruments. In developing world, people are tied to their ancestral homes and mostly rural to urban migration is observed.

The interaction between mother's childhood place of residence and mother's birth cohort generates the instruments for endogenous mother's education. The education policy in Nigeria went through major changes in the last 50 years. Construction of schools accelerated at different rate in different time periods in different regions. Thus the interaction between mother's birth cohorts and childhood place of residences (urbanicity) are likely to explain the school supply in the relevant time when the mother was attending school[17].

Before discussing the results, it is important to test the validity of the instruments. To assess the explanatory power of the identifying instruments from the first stage regression, F tests are conducted for their joint significance and the results are shown in the lower panel of table 3.3-3.5 and table 3.7 for other dependent variables. The null hypothesis of no explanatory power is resoundingly rejected at 1 percent or better with p values of 0.000 in case of all specifications. Bound, Baker and Jaeger (1995) expressed concern about weak instruments bias if the F stat is not close to 10. Staiger and Stock (1997) further suggested that the value of F stat should be close to 10 as rule of thumb to signal strong explanatory power. The F statistics for identifying instruments for education are all greater than 10 in all specification but that for bargaining measures drop below 10 for some of the models for some of the indices. The F statistics that are below 10 are close to 5 indicating that the instruments fare well compared to the criteria generated by Bound, Baker and Jaeger (max relative bias is between 1-9%). All of the F statistics indicate that the instruments are jointly significant at 1 percent or better. Results from the Hansen-Sargent J statistics for over-identification[18] and Wu-Hausman F test and Durbin-Wu-Hausman chi-sq test for endogeneity[19] are presented in the lower panel of table 3.3-3.5 and in table 3.7. It is evident that the instruments pass the over-identification test for all specification for the empowerment indices and last specification reported in column 7 of permission and violence indices in tables 3.4 and 3.5 respectively.. Since the estimated reported in these columns are specification of interest, the instruments can be considered as valid instruments and are appropriately excluded from the second stage regressions. The reported estimates are robust from the heteroskedasticity of the error term.

[17] See Ahmed and Iqbal (2006) for a detail discussion on the motivation behind the use of these instruments.
[18] Hansen-Sargent J stat for over identification: Ho:the instruments are uncorrelated with the error term and are correctly excluded from the stage two regression; Ha:the instruments are correlated with the error term and are incorrectly excluded from the main(stage two) regression.
[19] Wu-Hausman F test and Durbin-Wu-Hausman chi-sq test: Ho: Regressors are exogenous, i.e. OLS should be employed and Ha: Regressors are endogenus, i.e. Instrumental variables (2SLS) regression should be employed

VI. Results:

Table 3.3 to table 3.5 present ordinary least square (OLS) and instrumental variables (IV) estimates of the determinants of the child health production functions. In table 3.3, the effect of empowerment index on children's long run health indicator height for age is presented. Table 3.4 shows the impact of permission index and table 3.5 depicts the relationship between the violence index and a children's long term health. In column 2, 3 and 4 of these tables only child's characteristics and parent's characteristics are included, i.e., the estimates from basic specifications. In column 5, 6 and 7, the household asset index, community and region dummies are included. Since Wu-Hausman specification test favors IV estimates over OLS for all the regressions, I will focus mostly on the IV results.

Table 3.3 shows that the indices of mother's empowerment have positive and significant impact on child health in all the specifications. It is interesting note that in table 3.3, when mother's education is included in the regression, the impact of empowerment index is reduced implying that education is an important determinant of mother's bargaining power. Again comparing column 4 and 7, it is observed that inclusion of proxies for health services and regional dummies reduces the impact of empowerment.

The notion of relative bargaining power has no significance in the decision making process of the household under the unitary model. Since mother's empowerment measures have significant impact on child health outcomes, it implies that bargaining position of a woman relative to a man has a different impact on the investment in child health. Thus it can be concluded that "unitary" model is rejected by the Nigerian data.

The other control variables in table 3.3 show expected signs. The common pattern of initial decline, followed by a rise of health with age is observed in the results (Glewwe, 1999). There is no evidence of discrimination against girls. On the contrary there is a girl premium which not uncommon for a girl child below 5 years of age in Nigeria. This result is attributed to better endowment of health at the initial stages of life for girl children (Lavy et al. 1996).

Table 3.4 shows the impact of permission indices on child health. The permission indices capture the mobility aspect of female autonomy. The less a mother reports that getting medical help, knowing where to go, traveling alone, and distance to the medical center is not a problem for her, the less constrained she is in terms of physical mobility, the more she is able to make decisions on her own about getting treatment and other medical services. The results indicate that the permission index have positive and significant impact on child health. That is mothers who do not require permission to get help, do not consider the distance and traveling alone is a problem, are not physically constrained. They can ensure timely and proper treatment and vaccination for children which ensures better health. The signs of the other control are similar to table 3.3. Percentage of mothers receiving prenatal care and percentage of households having access to piped water in the neighborhood capture the impact of accessibility of health services and better living standard respectively. These have positive and significant impact on child health in all the three tables.

Table 3.5 shows the impact of mother's opinion about domestic violence on child health. The more a mother agrees that it is justified for a husband to physically abuse the wife for reasons as burning food, arguing, going out without his consent, refusing to have sex, not caring for children and the cooked food is not tasty etc., the less empowered she is. This index reflects her vulnerability and insecurity. The index has a negative impact on child health. When a mother herself is vulnerable and unsecured, she is not capable to secure the environment for her children. The impact of education in column 7 positive and significant. Wealth index has positive impact on health. Access to health services and piped water has positive influence on child health.

The results in this paper are consistent with the existing literature. Dyson and Moore (1983) found lower female status is associated with higher rates of fertility, greater infant and child mortality, and higher female to male infant mortality in Northern part of India. Caldwell (1986), Varadharajan (2003) , Durrant and Sather (2000) and Roushdy (2004) also found similar results. Durrant and Sather (2000) found that the fear of violence and access to financial resources are more important than 'decision making authority regarding children' in affecting child health.

I re-estimated table 3.3 to table 3.5 using weight for age and weight for height of the child, the likelihood of being vaccinated, receiving vitamin A doses, as the dependent variables. Only the

last specification from table 3 (or 4 or 5) for each of the four outcomes are reported in columns 2, 3, 4 and 5 respectively in the top panel of table 3.6.

Even though, all most all the bargaining measures have expected signs for all the child health outcomes, it is observed that not all bargaining measures have similar impact on all the outcome variables. Empowerment index capturing economic decision making role of the mother has positive and significant impact on weight for age of the child but no such impact is found on the likelihood of getting vaccinated and receiving vitamin A capsules. The United Nations, and The World Bank are working with developing countries to provide universal coverage for vaccination to children again six diseases and also for providing vitamin A to prevent night blindness free of monetary cost[20]. Thus the empowerment index having no impact on the probability of receiving vaccination and vitamin A is not unexpected. The most interesting result is that the permission indices, reflecting the mobility of the mother, affect the likelihood of receiving vaccination and Vitamin A positively and significantly. A mother's freedom from physical constraints is the major determinant for the child to receive any vaccination for the six killer diseases and to participate in the vitamin A drive. Vulnerability of the mother is negatively associated with the all the health outcomes but has significantly affect only child height for age. These results underscore the multidimensionality of bargaining power. It has different aspects and each have distinct impact on different outcomes. The fact that not all the measures have similar effects on the different health variables, provides evidence that one measure like assets, or income cannot fully capture all the aspects of bargaining power of mothers in the household.

This fact is strengthen by the observation that inclusion of education in column 7 of table 3.4 reduces the impact of permission indices but unlike the cases of empowerment indices, the education variable itself has positive and significant impact on child health. The empowerment index captures the aspect of economic decision making, control of family budgets while permission indices captures mobility aspects of female autonomy. Mother's education in table 3.4 captures the economic aspect of bargaining power. These results indicate that different aspects of bargaining

[20] In Nigeria, like many developing countries, the federal government along with international development agencies and local NGOs provide primary health care services free of cost. These immunization teams are either permanently stationed in a community or had mobile vaccination operation in each community or had a national immunization campaign in a particular day in the whole country. See http://www.unicef.org/immunization/index_polio.html

power have differential impact on various child health outcomes and underscore the importance of studying different dimensions of bargaining power.

VI.1 Health Seeking Behavior of the Mother

Since bargaining measures comprise various aspects of a woman and her relative status in relation to others in the household, the effect of a woman's status on the demographic variables might change with the outcome investigated. Another set of outcome variables, namely a woman availing post and prenatal care during pregnancy are often used in the literature to demonstrate the effect of a woman's bargaining power in intra-household resource allocation. In this paper, I investigate three outcome variables indicating a woman's own health seeking behavior. They are likelihood of receiving prenatal care, receiving trained assistance at child birth and choosing an appropriate and safe delivery place during child birth. Instrumental variable technique is used to correct for the endogeneity of bargaining measures, where the first stage is run using ordinary least squares and the second stage is run as a linear probability model. The regression results are reported respectively in columns 6, 7 and 8 in the first panel of table 3.6. The empowerment and permission indices do not show any discernable impact on the likelihood of having trained personnel during child birth and on the choice of delivery place. But violence indices are negatively associated with the probability of delivering the baby in a medical center and having professional assistance at birth. That is it is less likely for vulnerable and unsecured mothers to have trained person at the time of delivery.

The effect of bargaining measures on the likelihood of receiving prenatal care is reported in column 6 of the top panel in table 3.6. The more a mothers reports "it is justifiable to be beaten by the husband" for various reasons, the less likely that she will receive any prenatal care. These vulnerable mothers can not direct household resources for investment in her health and the health of the unborn child. Empowerment measures do not have and significant impact on the likelihood of receiving prenatal care. Permission measures are positively and significantly associated with utilization of prenatal care. Control over resources, freedom of movement and violence all have expected relationship with utilization of prenatal care, but women's autonomy as measured by permission and violence measures reflecting freedom of movement and vulnerability of a woman

respectively appears to be the major determinants of maternal health care utilization. Bloom et al. (2001) also witnessed similar results in Northern India.

The results again sheds light on the fact that "autonomy" is not a homogeneous construct and cannot be represented accurately by a single measure. This analysis of a mother's health seeking behavior during pregnancy and child birth suggests that certain dimensions of a woman's bargaining measures are important than others for the variable of interest. Women, who are most vulnerable and most probably suffer abuse by husbands and other family members, are less likely to receive any type of care during pregnancy and child birth. These mother do not have any say in household decisions, cannot direct any resources toward investment in her health and child health. In Nigeria six in ten mothers receive prenatal care from a trained professional, nurses and midwives and about one third of the mothers do not receive any antenatal care[21]. At least four antenatal visits are recommended during pregnancy. It is not surprising to find that permission indices reflecting mobility of the mother to have a very strong impact on the likelihood of receiving prenatal care.

[21] Table 9.1 in the Final Report of Demographic and Health Survey, Nigeria (2003)

VI.2 Gender Discrimination*:*

Traditionally for developing countries, a strong son preference has been documented in the literature. One of the hypotheses of this paper is that more empowered mothers would not discriminate against their daughters. Mothers are more egalitarian and if she has relatively more control over household decision making, she would invest equally in sons and daughters. If mothers have more bargaining power, and are more economically secured, she does not need to differentially treat sons for old age security. Usually in the developing world mothers do not have much bargaining power and fathers treat sons differentially than daughters as the sons bear the family name and provide old age support.

I split the sample by the sex of the child and re-estimated the reduced form child health demand function involving all the three indices of bargaining power. The results are reported in column two in the second panel of table 3.6. The empowerment and permission indices are not statistically significant but have expected signs. The results show that a mother who is vulnerable and finds it is justifiable to beaten by husband for various reasons have a significant and negative impact on the health of the girl child. Her influence on the health of her sons is negative but is not statistically significant.

To sum up the gender specific results, it is observed that the impact of empowerment index do not vary by the gender of the child. But vulnerable mothers fail to provide a secure environment for the children, particularly for girl children. Mother's education has significant impact on health of daughters. Thomas (1994) also found mother's education have significant impact on daughter's height and attributed it to efficiency in child rearing technology, i.e., it might be more efficient for mothers to spend more time with daughters[22].

VII. Robustness Check:

In order to check the robustness of the results all the tables were reestimated with wife's rank number as an instrument for bargaining measures following Pitt et al. (2006) and the results

[22] Not reported in this paper. These results can be found in www.students.washington.edu/meherun/research

show very similar pattern[23]. I also created three indices using factor analysis from each individual group (7 variables for empowerment, 6 variables for violence and 6 variables for permission). The results are reported in table 3.8 and are very similar but stronger both in terms of magnitude and statistical significance than the ones discussed earlier. These results add to the robustness of the findings of this paper.

VIII. Conclusion:

This paper reinforces the fact that because women's status has multiple facets, varies by context, not all aspect of women's bargaining power will play an identical role in the various household investment decisions. Several measures of women's relative bargaining power have been introduced in the literature to investigate their impact on different demographic outcomes, but none of them are perfect and cannot be generalized to capture bargaining power in different cultures. In this paper, I introduce new and direct measures of empowerment which reflect a wife's relative say in the different decision making context, her mobility and opinion of domestic violence. I investigate the impact of these bargaining measures constructed using factor analysis on the long term health status of her children. To correct for the potential bias from the endogeneity of the empowerment measures, instrumental variable approach is used. Religion and prevalence of polygyny in her neighborhood are used as instruments for the empowerment variables. The results indicate that mother's empowerment measures have positive and significant impact on the long run health of her child. The decision making process in the household does not follow a unitary model, the husbands and the wives have varying abilities in enforcing their tastes. The results also reveal that the impact of bargaining measures do not vary by the gender of the child except for the vulnerability index. Additional dependant variables were used to confirm the robustness of the results.

The results of the study would have important policy implications. If there is a differential impact mother's relative bargaining power on child health outcomes, policy reforms (laws regarding dowry, property, marriage etc.) and interventions (micro-credit, NGO activities, non-formal education food for education program etc.) can have differential influence the intra-household

[23] The detailed results can be found in www.students.washington.edu/meherun. These instruments do not fare well in terms of F stats from the first stage regressions and also in terms of over identification tests of exogeneity.

decision making process and thus the health outcome of the next generation. Since different dimensions of women's bargaining power have different impact on child health and use of professional care during pregnancy and birth, different policy interventions or empowerment programs can reap desired results. The success of some micro credit program in changing the dynamics of women's position in the household have been documented (Schuler and Hashemi, 1994, Pitt et al. 1990). But, a rise in the empowerment of women is likely to conflict with established social norms regarding gender roles and may give rise to domestic violence. Thus careful consideration is needed for policy formulation for greater empowerment of women.

References

Abadian, Sousan, (1996) "Women's Autonomy and Its Impact on fertility" World Development, 24(12):1793-1809.

Ahmed, Meherun and Kazi Iqbal (2006), "Mother's Education and Child Health: Is There Any Threshold?" Mimeo, University of Washington.

Amin, S. (1997), "The Poverty-Purdha Trap In Rural Bangladesh: Implications for Women's Role in the Family", *Development and Change*, 28:213-233.

Angrist, Joshua D. and Alan B. Krueger. 1991. "Does Compulsory School Attendance Affect Schooling and Earnings?" *Quarterly Journal of Economics*, 106(4):979-1014.

Ascadi, G and G. J. Ascadi, (1987) " Safe Motherhood in Soutj Asia: Sociocultural and Demographic aspects of Maternal Health" Background paper prepared for Safe Motherhood Conference, Lahore, Pakistan.

Basu, A. 1992, Culture, the Status of Women and Demographic Behavior. Clarendon Press, Oxford.

Bloom, Shelah S., David Wypij and Monica Das Gupta, (2001), "Dimensions of Women's Autonomy and the Influence on Maternal Health Care Utilization in a North Indian City, Demography, 38(1):67-78.

Blumberg, Rae Lesse, (1990), "Gender Matters: Involving Women in Development in Latin America and the Caribbean"; Paper prepared for the Agency for International Development Bureau for Latin America and the Caribbean, USAID, Washington DC.

Bound, J.; D Jaeger; and R. Baker (1996) , " Problems with Instrumental Variables Estimation when the Correlation Between the Instruments and the Endogeneous Explanatory Variable is Weak" , *Journal of American Statistical Association*. 90, 443-450.

Caldwell, John C, (1986), "Routes to Low Mortality in Poor Countries", *Population and Development Review*, 12(2):171-220.

Caldwell, John C. and Patricia Caldwell, (1993), "Roles of Women, Families and Communities in Preventing Illness and Providing Health Services in Developing Countries," in J.N. Gribble and S. H. Preston (eds.), *The Epidemiologic Transition: Policy and Planning Implications for Developing Countries*, Washington D.C., National Academy Press:252-271.

Card, David, 1995, "Using Geographic Variation in College Proximity to Estimate the Return to Schooling," in *Aspects of Labor Market Behaviour: Essays in Honour of John Vanderkamp*, ed. By Louis N. Christofides, E. Kenneth Grant, and Robert Swidinsky. Toronto: University of Toronto Press, 201-222.

Card, David, 2001, "Estimating the Return to Schooling: Progress on Some Persistent Econometric Problems", *Econometrica*, 69(5), 1127-1160.

Carr, Marilyn, (1985), "Technologies for Rural Women: Impact and Dissemination," in Iftikhar Ahmed (Ed.), *Technology and Rural Women :Conceptual and Empirical Issues*, George Allen and Unwin, London.

Chiappori, Pierre-Andre, (1988), "Rational Household Labor Supply", *Econometrica*, 56(1):63-89.

Chiappori, Pierre-Andre, (1992), "Collective Labor Supply and Welfare", *Journal of Political Economy*, 100(3):437-67.

Chiappori, Pierre-Andre, (1997), "Introducing Household production in Collective Models of Labor Supply", *Journal of Political Economy*, 105(1):191-209.

Countries? Evidence from Morocco." *Journal of Human Resources*. 34(1): 124-159.

Counts, D.A., J.K. Brown and J.C. Campbell(1992), *Sanctions and Sanctuary : Cultural Perspectives on the Beating of Wives*. Boulder: Westview Press.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika. 16, 297-334.

Doss. C. 1996. "Testing Among Models of Intra Household Resource Allocation.", World Development, 24(10):1597-1609.

Durrant, Valerie and Zeba Sathar (2000), "Greater Investment in Children Through Women's Empowerment: A key to Demographic Change in Pakistan?"Working paper 137, National Research Council, Washington DC.

Dyson, Tim and Mick Moore, "On kinship Structure, female autonomy, and Demographic Behavior in in India" *Population and Development Review*, 9(1):35-60.

Filmer, D. and L. Pritchett. 2001. "Estimating Wealth Effect Without Expenditure Data-or Tears: An Application to Educational Enrollments in States of India.", Demography, 38(1):115-132.

Foster, Andrew. (1996), "Analysis of Household Behavior when Households Choose Their Members: Marriage Market Selection and Human Capital Formation in Rural Bangladesh", Mimeo, University of Pennsylvania.

Ghuman, Sharon J, (2003), "Women's Autonomy and Child Survival: A comparison of Muslim and Non-Muslims in Four Asian Countries", Demography, 40(3):419-436.

Glewwe, Paul. 1999. "Why Does Mother's Schooling Raise Child Health in Developing

Griliches, Zvi, 1977, "Estimating the Returns to Schooling: Some Econometric Problems," *Econometrica*, 45, 1-22.

Haddad, H. and J. Hoddinott, 1995, "Does Female Income Share Influence Household Expenditures? Evidence from Cote D'Ivoire." Oxford Bulletin of Economics and Statistics, 57(1):77-96.

Handa, S.. 1996. "Maternal Education and Child Attainment in Jamaica: Testing the Bargaining Power hypothesis." Oxford Bulletin of Economics and Statistics, 57(1):77-96

Harmon, Colm; and Ian Walker, 1995, "Estimates of the Economic Return to Schooling for the United Kingdom", *American Economic Review*, 85, 1278-1286.

Hatcher, L. (1994). A step-by-step approach to using the SAS(R) system for factor analysis and structural equation modeling. Cary, NC: SAS Institute.

Jacobson, J. (1992)"Gender Bias: Roadblock to sustainable development", World Watch Working Paer 110, World Watch, Washington DC.

Jejeebhoy, Shireen J. and Zeba Sathar, (2001), "Women's Autonomy in India and Pakistan: the Influence of Religion and Region", Population and Development Review, 27(4):687-712.

Koenig, Michael A., Saifuddin Ahmed, Mian Bazle Hossain and A.B.M. Khorshed Alam Mazumder, (2003), :Women's Status and Domestic Violence in Rural Bangladesh: Individual and Community Level Effects", Demography:40(2):269-288.

Kusago T and B. Barham. 2001. "Preference Heterogeneity, bargaining Power, and Intra-Household Decision Making in Rural Malaysia. World Development, 29(7):1237-1256.

Lavy, Victor, John Strauss. Duncan Thomas and Philippe de Vreyer. 1996 . "Quality of Health Care, Survival and Health Outcomes in Ghana" *Journal of Health Economics*, 15: 333-357.

Levinson, D. (1989), *Family Violence in Cross-Cultural Perspectives*. Newberry Park, CA: Sage.

Lundberg, S. and R. Pllak and T Wales. 1997. "Do Husbands and Wives Pool Their Resources? Evidence from United Kingdom Child Benefit.", Journal of Human Resources, 32(3):463-480.

Lundberg, S. and R. Pollak (1993), "Separate Spheres Bargaining and the Marriage Market", *Journal of Political Economy*, 101(6):988-1010.

Mandelbaum, D.G. (1988), *Women's Seclusion and Men's Honor: Sex Roles in North India, Bangladesh and Pakistan*. Tuscon. University of Arizona Press.

Manser, M. and M. Brown (1980), "Marriage and Household Decision Making: A Bargaining Analysis", *International Economic Review*, 21(1):31-44.

Mason, Karen Oppenhein; and Herbert L. Smith, (2003); "Women's Empowerment and Social Context: Results from Five Asian Countries", Unpublished manuscript, University of Pennsylvania.

McElroy, Marjorie and Mary Jean Horney, (1981), "Nash-Bargained Household Decision: Toward a Geeneralization of the Theory of Demand", *International Economic Review*, 22:333-347.

Nunnaly, J. (1978). Psychometric theory. New York: McGraw-Hill.

Oni, Jacob B. (1996), " Qualitative Exploration of Intra-Household Variations in Treatment of Child Illness in Polygynous Yoruba Families: the Use of Local Expressions", *Health Transition Review* 6(1): 57-69.

Pitt, Mark M., Mark Rosenzweig, and Md. Nazmul Hassan, (1990), "Productivity, Health, and Inequality in the Intrahousehold Distribution of Food in Low-Income Countries", American Economic Review, 80(5):1139-1156.

Pitt, Mark M., Mark R. Rosenzweig, and Md. Nazmul Hassan.(2006) "Sharing the Burden of Disease: Gender, the Household Division of Labor and the Health Effects of Indoor Air Pollution" , manuscript, Brown University

Pollak, Robert (2005), "Bargaining Power in Marriage: Earnings, Wage Rates and Household Production", Mimeo, Washington University in St. Louis.

Quisumbing, A. 1994. "Intergenerational Transfers in Philippine Rice Villages: Gender Differences in Traditional Inheritance Customs", Journal of Development Economics, 43(2):167-195.

Quisumbing, A.and John A. Maluccio, (1999), "Intrahousehold Allocation and gender Realtions: New Empirical Evidence", Policy Research Report on Gender and Development , Working Paper Series, No 2, The World Bank.

Quisumbing, A.and John A. Maluccio, (2003), "Resources at Marriage and Intrahousehold Allocation: Evidence from Bangladesh, Ethiopia, Indonesia and South Africa", *Oxford Bulletin of Economics and Statistics*, 65(3):283-328.

Roushdy, Rania (2004),"Intrahousehold Resource Allocation Egypt: Does Women's Empowerment Lead to Greater Investment in Children?", Population Council; West Asia and North Africa Region.

Rubalcava, R and D. Thomas, (2000), "Family Bargaining and Welfare", mimeo, UCLA.

Sahn, D. and D. Stifel (2003), "Exploring Alternative Measures of Welfare in the Absence of Expenditure Data", *Review of Income and Wealth*. 49(4):463-489.

Schultz, T.P., (1990), "Testing the Neoclassical Model of Family Labor Supply and Fertility." Journal of Human Resources, 25(4):599-634.

Staiger, Douglas and James Stock, 1997, "Instrumental Variables Regression with Weak Instruments", *Econometrica*, 65, 557-586.

Strauss, J. A. and Duncan Thomas. 1995. "Human Resources: Empirical Modeling of Household and Family Decisions." In Handbook of Development Economics, Jere Behrman and T. N. Srinivasan Ed. Amsterdam: North Holland.
Thomas, D. 1990. "Intra-Household Resource Allocation: An Inferential Approach". Journal of Human Resources, 25(4):635-664.

Thomas, D. 1994. "Like Father Like Son: Like Mother Like Daughter: Parental Resources and Child Health." Journal of Human Resources, 29(4):950-988.

Thomas, D., Dante Contreras and Elizabeth Frankenberg (1997), "Child Health and Distribution of Household Resources at Marriage", Mimeo, Rand, UCLA

Thomas, D., Dante Contreras and Elizabeth Frankenberg (2002), "Distribution of Power within the Household and Child Health", Mimeo, Rand.

Varadharajan, Sowmya, (2003); "The Pitfalls of Nargaining Power in Intra-Household Analysis", Mimeo, Department of Economics, Cornell University.

Appendix

Technical Note on Factor Analysis

In common factor analysis a small number of factors are extracted to account for the inter-correlation among the measured variables. This helps to identify the latent dimensions that explain most of the correlations among variables. We have a set of bargaining measure variables, $x_{1j},.....,x_{Nj}$. We want q common factors which accounts for most of the covariance of the measured variables, x_N.

The standardized vector of observed variables can be expressed as a function of correlation of variables and uniqueness associated with each variable.

$$x = fA' + e$$

where,

A=Nxq factor loading matrix represents the correlation coefficient s between N variables and q factor factors. The squared factor loading is the percent of variance in that variable explained by the factor.

$f = 1xq$ matrix of factors

e=1xN vector of uncorrelated errors with covariance equal to the uniqueness matrix, ψ, which is NxN diagonal matrix.

The variance of bargaining measures x, denoted by Z is composed into two parts

$$z = AA' + \psi$$

The factor scores can be obtained by (regression scoring, Thomson 1951)

$$\hat{f} = A'Z^{-1}x$$

The scores are the indices that are estimates of components.

A very similar statistical procedure to factor analysis is PCA which accounts for the maximum portion of the variance present in the original set of variables. PCA is typically applied when the researcher instead of using all variables, wants to use some indices that contain all the information present in the measures is the PCA which derives a small number of components accounting for the variability found in a relatively large number of variables. There are major differences between PCA and FA. In FA, it is assumed that the variance of a single variable can be decomposed into a common variance shared by all observed variables and a unique variance particular to a variable.

While in FA, only the common variance of the measured variables are taken into account, Principle components are defined simply as a linear combinations of all observed variables and PCA makes no distinction between common and unique variance. PCA contains both common and unique variance.

Determining the number of factors in FA:

The most commonly used criteria in determining the optimal number of factors to be extracted are Kaiser-Guttman rule and the scree test.

The Kaiser-Guttman rule states that the number of factors to be extracted should be equal to the number of factors having eigenvalues (variance) greater than 1.

A Scree plot illustrates the rate of change in the magnitude of eigenvectors for the factors. The point where eigenvalues gradually levels off indicates the maximum number of factors to be retained.

Description of bargaining variables:

Decision making about hh activities (economic decision making)
sayoh: Final say on own health care (scale 0/1)
saylp: Final say on making large household purchases
saydp: Final say on making household purchases for daily needs
say_vfam: Final say on visits to family or relatives
sayf: Final say on food to be cooked each day
sayh: Final say about children's health care
sayed: Final say about children's education

There some variables reflecting their view about domestic violence. Whether they believe wife beating is justified if

Vio1: Wife beating justified if she goes out without telling him (scale 0/1_)
Vio2: Wife beating justified if she neglects the children
Vio3: Wife beating justified if she argues with him
Vio4: Wife beating justified if she refuses to have sex with him
Vio5: Wife beating justified if she burns the food
Vio6: Husband justified to hit/beat wife if the food is not cooked

Subordination : Need to seek Permission for own health care
Per1: Getting medical help for self: know where to go
Per2: Getting medical help for self: getting permission to go (scale 0/1)
Per3: Getting medical help for self: getting money needed for treatment
Per4: Getting medical help for self: distance to health facility
Per5: Getting medical help for self: having to take transport
Per6: Getting medical help for self: not wanting to go alone

Table 3.1: Factor Analysis/Correlation:

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	4.76018	1.66472	0.4599	0.4599
Factor 2	3.09546	0.67077	0.2991	0.7590
Factor 3	2.42469	2.00230	0.2343	0.9933
Factor 4	0.42239	0.09463	0.0408	1.0341
Factor 5	0.32776	0.04721	0.0317	1.0657
Factor 6	0.28055	0.06596	0.0217	1.0928
Factor 7	0.21459	0.16878	0.0207	1.1136
Factor 8	0.04581	0.06082	0.0044	1.1180
Factor 9	-0.01501	0.00992	-0.0015	1.1166
Factor 10	-0.02493	0.02715	-0.0024	1.1141
Factor 11	-0.05208	0.03418	-0.0050	1.1091
Factor 12	-0.08626	0.02079	-0.0083	1.1008
Factor 13	-0.10705	0.00882	-0.0103	1.0904
Factor 14	-0.11587	0.02322	-0.0112	1.0792
Factor 15	-0.13909	0.00899	-0.0134	1.0658
Factor 16	-0.14807	0.01993	-0.0143	1.0515
Factor 17	-0.16800	0.00909	-0.0162	1.0353
Factor 18	-0.17709	0.01083	-0.0171	1.0182
Factor 19	-0.18792	.	-0.0182	1.0000

Factor Loading (Pattern Matrix) and Unique Variances

Variable	Factor 1	Factor 2	Factor 3	Uniqueness
Sayh	0.8339	-0.0385	-0.0021	0.3031
Sayed	0.8334	-0.0472	0.0161	0.3029
Sayoh	0.6920	-0.1493	0.0404	0.4972
Sayf	0.6077	-0.118	0.0094	0.6181
Say_vfam	0.6582	0.0130	-0.0050	0.5665
Saylp	0.7535	-0.0910	0.0151	0.4238
Saydp	0.7219	-0.1623	0.0426	0.4507
Vio_1	-0.1987	0.6706	-0.0430	0.5090
Vio_2	-0.0762	0.7783	-0.0495	0.3860
Vio_3	-0.0525	0.7991	-0.0568	0.3554
Vio_4	-0.1082	0.7395	-0.0674	0.4369
Vio_5	-0.0467	0.8371	-0.0542	0.2941
Vio_6	-0.0384	0.8338	-0.0595	0.2998
Per_1	0.0533	-0.0874	0.6277	0.5955
Per_2	0.0890	-0.0852	0.5753	0.6539
Per_3	-0.0584	-0.0676	0.6162	0.6123
Per_4	-0.0188	-0.0393	0.7815	0.3874
Per_5	0.0166	-0.0846	0.7562	0.4207
Per_6	0.0782	-0.0841	0.6169	0.6063

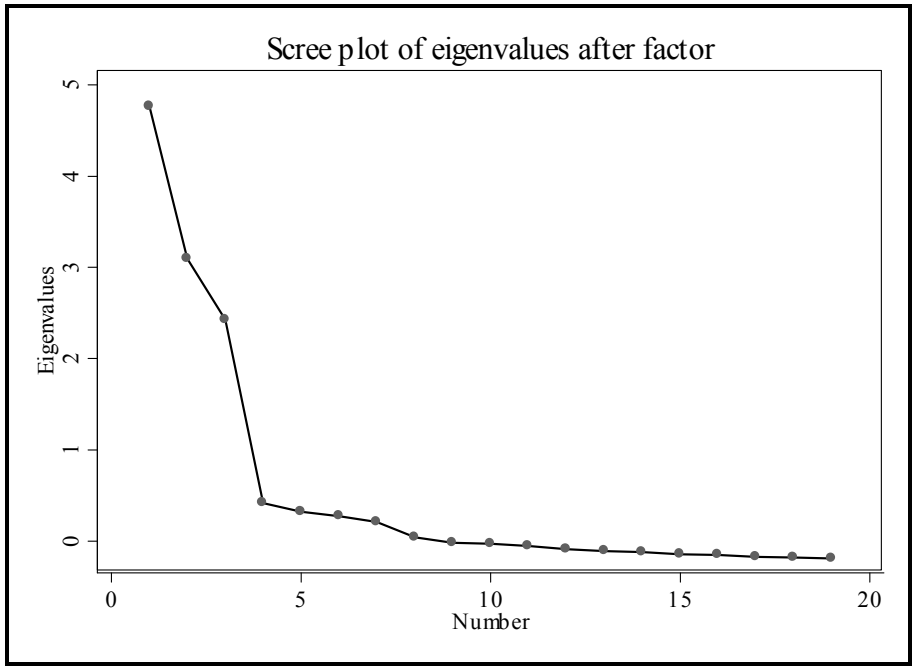

Figure 3.1: Screeplot for Eigenvalues after the factor analysis of the 19 variables

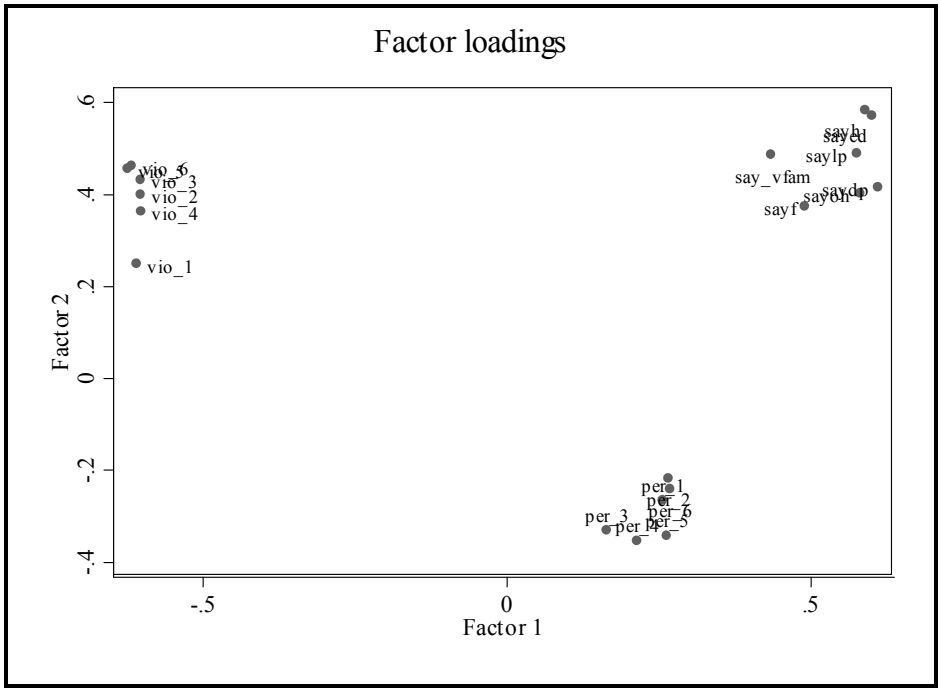

Figure 3.2: Factor Loadings of the 19 Variables

Table 3.2: Descriptive Statistics

Name of the Variable	Mean	Std. Deviation
HAZ	-1.508	1.82
Empowerment Alpha	2.73	0.821
Empowerment Factor	-0.001	0.869
Empowerment Principle Component	0.006	1.851
Permission Alpha	1.54	0.57
Permission Factor	-0.048	0.904
Permission Principle Component	-0.103	1.79
Violence Alpha	0.449	0.403
Violence Factor	-0.024	0.954
Violence Principle Component	-0.053	2.01
Girl	0.497	0.499
Age in Months	27.103	16.971
Father's Age	39.727	9.877
Father's Education	6.14	5.65
Mother's Education	4.235	4.857
Mother's Age	28.881	6.747
Urban Area, % of population	36.962	0.465
Division, % of population (NE)	0.245	0.424
Division, % of population (NW)	0.27	0.467
Division, % of population (SE)	0.08	0.256
Division, % of population (SS)	0.12	0.314
Division, % of population (SW)	0.12	0.306
Division, % of population (NC)	0.18	0.318
% of Mother Grew Up in Village	57.103	0.493
% of Mother Grew Up in Town	31.219	0.461
% of Mother Grew Up in a Metropolitan City	11.676	0.315
% of Mother born in 1953-59	3.106	0.177
% of Mother born in 1960-69	24.381	0.423
% of Mother born in 1974-1978	53.106	0.499
% of Mother born in 1969-1973	19.404	0.395
Mother has no education	49.001	0.500
Mother has 1-3 years of Education	4.273	0.182
Mother has 4-6 years of Education	19.733	0.392
Mother has 7-9 years of education	8.383	0.275
Mother has 10-12 years of education	15.568	0.363
Mother has13+ years of education	4.001	0.190
Religion of the Mother: Christian	40.119	0.4832
Religion of the Mother: Muslim	58.274	0.4861
Religion of the Mother: Animist/Traditionalist	0.01	0.132
Religion of the Mother: Other	0.002	0.040
% of households in the neighborhood having Piped Water	16.292	0.277
% of mothers in the neighborhood receiving prenatal care	64.641	.331
% of mothers in the neighborhood visited by family planning worker	4.341	.067
N	3602	

Table 3.3: Impact of Empowerment Index on Child Health

	OLS	IV_I	IV_II	OLS	IV_I	IV_II
Empowerment	0.163	1.506	1.117	0.066	1.054	0.752
	(0.000)**	(0.000)**	(0.000)**	(0.112)	(0.000)**	(0.007)**
Mother's Education	0.085		0.056	0.036		0.034
	(0.000)**		(0.110)	(0.000)**		(0.486)
Girl	0.175	0.243	0.226	0.154	0.203	0.191
	(0.011)*	(0.003)**	(0.003)**	(0.020)*	(0.006)**	(0.006)**
Age in months	-0.101	-0.108	-0.106	-0.104	-0.107	-0.106
	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**
Age2	0.001	0.001	0.001	0.001	0.001	0.001
	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**
Father's Education	0.023	0.035	0.015	0.001	0.004	-0.004
	(0.003)**	(0.000)**	(0.377)	(0.943)	(0.672)	(0.795)
Father's Age	-0.003	0.004	0.003	-0.005	-0.001	-0.001
	(0.524)	(0.488)	(0.493)	(0.239)	(0.843)	(0.805)
Mother's Age	0.024	-0.012	-0.004	0.017	-0.002	0.003
	(0.001)**	(0.198)	(0.610)	(0.008)**	(0.828)	(0.702)
Urban area				-0.090	-0.035	-0.053
				(0.346)	(0.734)	(0.587)
Piped water (%)				0.246	-0.120	0.018
				(0.085)+	(0.504)	(0.931)
Visit by FP (%)				0.279	-0.587	-0.346
				(0.554)	(0.349)	(0.554)
Prenatal Care (%)				0.173	0.101	0.082
				(0.263)	(0.562)	(0.647)
F test (d.f.)						
Empowerment		67.79	16.34		18.77	6.01
		(3,3592)	(14, 3581)		(3,3582)	(14, 3571)
P Value		[0.0000]	[0.0000]		[0.0000]	[0.0000]
Mother's edu			51.24			14.36
			(14, 3581)			(14, 3571)
P Value			[0.0000]			[0.0000]
Wu-Hausman Test		133.41	35.23		25.13F	6.53
		F(1,3594)	F(2,3592)		(1,3584)	F(2,3582)
		[0.00000]	[0.00000]		[0.00000]	[0.00000]
Dubin-Wu-Hausman		128.96	69.31		25.09	13.09
Test		Chi-sq(1)	Chi-sq(2)		Chi-sq(1)	Chi-sq(2)
		[0.00000]	[0.00000]		[0.00000]	[0.00000]
Overidentification		0.099	69.31		0.102	14.02
Test		Chi-sq(2)	Chi-sq(2)		Chi-sq(2)	Chi-sq(12)
		[0.9517]	[0.1930]		[0.9500]	[0.3006]
Constant	-1.322	-0.132	-0.481	-0.421	0.484	0.159
	(0.000)**	(0.602)	(0.078)+	(0.056)+	(0.150)	(0.679)
Observations	3602	3602	3602	3602	3602	3602
R-squared	0.176			0.238		

Robust p values in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

Table 3.4: Impact of Permission Index on Child Health

	OLS	IV_I	IV_II	OLS	IV_I	IV_II
Permission	0.010	1.839	0.942	0.029	0.463	0.756
	(0.793)	(0.000)**	(0.006)**	(0.480)	(0.416)	(0.036)*
Mother's Education	0.092		0.294	0.036		0.126
	(0.000)**		(0.000)**	(0.000)**		(0.001)**
Girl	0.166	0.124	0.203	0.151	0.143	0.160
	(0.018)*	(0.191)	(0.011)*	(0.023)*	(0.036)*	(0.025)*
Age in months	-0.100	-0.100	-0.102	-0.103	-0.104	-0.105
	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**
age2	0.001	0.001	0.001	0.001	0.001	0.001
	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**
Father'ss education	0.023	-0.000	-0.048	0.001	0.017	-0.015
	(0.004)**	(0.989)	(0.001)**	(0.946)	(0.104)	(0.289)
Father's Age	-0.004	-0.011	0.007	-0.005	-0.006	-0.000
	(0.394)	(0.071)+	(0.183)	(0.204)	(0.157)	(0.943)
Mother's age	0.028	0.015	0.021	0.018	0.023	0.020
	(0.000)**	(0.128)	(0.008)**	(0.004)**	(0.002)**	(0.006)**
Urban area				-0.092	-0.110	-0.129
				(0.336)	(0.276)	(0.209)
piped_water				0.269	0.214	0.345
				(0.059)+	(0.149)	(0.033)*
Visit_byFP				0.360	0.035	-0.313
				(0.442)	(0.958)	(0.591)
per_prenat				0.177	0.312	0.129
				(0.253)	(0.087)+	(0.487)
F test (d.f.)						
Permission		5.48	18.67		5.25	7.24
		(3, 3592)	(14, 3581)		(3, 3582)	(14, 3571)
P Value		[0.0009]	[0.0000]		[0.0013]	[0.0000]
Mother's edu			51.24			14.36
			(14, 3581)			(14, 3571)
P Value			[0.0000]			[0.0000]
Wu-Hausman Test		15.33	37.55		7.57	6.43
		F(1,3594)	F(2,3592)		F(1,3584)	F(2,3582)
		[0.00009]	[0.00000]		[0.00595]	[0.00162]
Dubin-Wu-Hausman		15.30	73.80		7.59	12.89
Test		Chi-sq(1)	Chi-sq(2)		Chi-sq(1)	Chi-sq(2)
		[0.00009]	[0.00000]		[0.00585]	[0.00158]
Overidentification Test		99.61	24.87		14.34	13.78
		Chisq(2)	Chisq(12)		Chisq(2)	Chisq(12)
		0.0000]	[0.0154]		[0.0008]	[0.3148]
Constant	-1.461	-0.321	-2.073	-0.476	-0.419	-0.694
	(0.000)**	(0.319)	(0.000)**	(0.030)*	(0.074)+	(0.006)**
Observations	3602	3602	3602	3602	3602	3602
R-squared	0.170			0.237		

Robust p values in parentheses
+ significant at 10%; * significant at 5%; ** significant at 1%

Table 3.5: Impact of Violence Index on Child Health

	OLS	IV_I	IV_II	OLS	IV_I	IV_II
Violence	-0.024	-0.957	-0.774	-0.039	-1.595	-0.611
	(0.515)	(0.065)+	(0.000)**	(0.324)	(0.011)*	(0.010)**
Mother's Education	0.092		0.235	0.037		0.087
	(0.000)**		(0.000)**	(0.000)**		(0.023)*
Girl	0.165	0.191	0.208	0.152	0.195	0.177
	(0.018)*	(0.021)*	(0.006)**	(0.022)*	(0.021)*	(0.011)*
Age in months	-0.100	-0.098	-0.101	-0.103	-0.102	-0.103
	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**
Age Squared	0.001	0.001	0.001	0.001	0.001	0.001
	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**	(0.000)**
Father's education	0.022	0.113	-0.020	0.001	0.026	-0.008
	(0.005)**	(0.000)**	(0.131)	(0.886)	(0.015)*	(0.574)
Father's Age	-0.004	-0.009	0.003	-0.005	-0.010	-0.004
	(0.396)	(0.104)	(0.597)	(0.201)	(0.069)+	(0.344)
Mother's Age	0.028	0.043	0.020	0.019	0.027	0.020
	(0.000)**	(0.000)**	(0.008)**	(0.004)**	(0.002)**	(0.005)**
Urban Area				-0.092	-0.023	-0.070
				(0.339)	(0.847)	(0.482)
Piped Water (%)				0.265	0.098	0.274
				(0.062)+	(0.549)	(0.078)+
Visit by FP (%)				0.345	0.655	0.393
				(0.460)	(0.267)	(0.411)
Prenatal care (%)				0.211	1.503	0.573
				(0.187)	(0.003)**	(0.036)*
F test (d.f.)						
Empowerment		31.80	11.11		6.65	4.15
		(3, 3592)	(14,3581))		(3, 3582)	(14, 3571)
P Value		[0.0000]	[0.0000]		[0.0000]	[0.0000]
Mother's edu			51.24			14.36
			(14, 3581)			(14,3571)
P Value			[0.0000]			[0.0000]
Wu-Hausman Test		83.82	28.24		7.87	10.36
		F(1,3594)	F(2,3592)		F(1,3584)	F(2,3582)
		[0.0000]	[0.0000]		[0.00505]	[0.00003]
Dubin-Wu-Hausman Test		82.11	55.79		7.89	20.73
		Chi-sq(1)	Chi-sq(2)		Chi-sq(1)	Chi-sq(2)
		[0.0000]	[0.0000]		[0.00495]	[0.00003]
Overidentification Test		41.52	38.59		12.98	6.14
		Chi-sq(2)	Chi-sq(12)		Chi-sq(2)	Chi-sq(12)
		[0.0000]	[0.0001]		[0.0015]	[0.9087]
Constant	-1.457	-1.852	-1.805	-0.500	-1.268	-0.915
	(0.000)**	(0.000)**	(0.000)**	(0.024)*	(0.002)**	(0.000)**
Observations	3602	3602	3602	3602	3602	3602
R-squared	0.170			0.237		

Robust p values in parentheses, + significant at 10%; * significant at 5%; ** significant at 1%

Table 3.6: Impact of the Three Bargaining Indices on Various Health Outcomes

	WAZ	WHZ	Vaccination	Vitamin A	Prenatal Care	Assistance at Birth	Delivery Place
Empowerment	0.549	0.134	-0.023	0.051	0.050	-0.051	0.055
	(0.013)*	(0.524)	(0.776)	(0.478)	(0.517)	(0.462)	(0.382)
Permission	0.608	0.251	0.101	0.133	0.137	-0.043	0.014
	(0.043)*	(0.377)	(0.066)+	(0.023)*	(0.083)+	(0.449)	(0.787)
Violence	-0.118	-0.292	0.001	-0.014	-0.306	-0.225	-0.171
	(0.546)	(0.191)	(0.986)	(0.879)	(0.045)*	(0.021)*	(0.048)*

Impact of the three bargaining indices on various health outcomes by the gender of the child

	HAZ	WAZ	WHZ	Vacci-nation	Vitamin A	Prenatal Care	Assis-tance at Birth	Delivery Place
Emp_Girl	0.355	0.225	0.029	-0.073	0.041	0.071	0.055	0.036
	(0.263)	(0.423)	(0.921)	(0.377)	(0.628)	(0.478)	(0.504)	(0.644)
Emp_Boy	0.522	0.414	0.134	0.014	0.075	-0.078	0.086	0.094
	(0.193)	(0.095)+	(0.583)	(0.889)	(0.402)	(0.383)	(0.301)	(0.203)
Permission_Girl	0.648	0.645	0.296	0.127	0.179	0.206	0.032	0.003
	(0.153)	(0.083)+	(0.325)	(0.118)	(0.041)*	(0.071)+	(0.672)	(0.972)
Permission_Boy	0.336	0.198	0.230	0.054	0.145	0.072	0.057	-0.002
	(0.344)	(0.528)	(0.453)	(0.475)	(0.093)+	(0.538)	(0.506)	(0.979)
Violence_Girl	-0.748	-0.210	0.352	-0.113	-0.042	-0.271	-0.132	-0.101
	(0.055)+	(0.467)	(0.333)	(0.177)	(0.729)	(0.095)+	(0.229)	(0.336)
Violence_Boy	-0.519	-0.133	0.039	0.146	0.027	-0.145	-0.191	-0.175
	(0.100)	(0.628)	(0.899)	(0.136)	(0.794)	(0.242)	(0.186)	(0.186)

Note: Each row represents a separate regression with the coefficient of interest reported in each row of the first column. The dependent variables are reported in the second row. Each regression includes (specification in column 7 in table 3/4/5) controls for child's age, age squared, sex, urban residence, division dummies, parent's age and education, neighborhood characteristics. Robust p values are in the parenthesis. + significant at 10%, *significant at 5% and **significant at 1%.

Table 3.7: F Statistics From the First Stage, Hausman Test and Overidentification Test

	WAZ	WHZ	Vaccination	Vitamin A	Prenatal Care	Assistance at Birth	Delivery Place
Empowerment							
F test_Emp	6.01 (14,3571)	6.01 (14,3571)	4.93 (14 2861)	5.69 (14,3441)	4.06 (14, 2337)	6.06 (14,3558)	6.06 ((14,3566)
P Value	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
F test_M EDU	14.36 (14,3571)	14.36(14,3571)	12.25(14,2861)	13.52 (14,3441)	9.68 (14, 2337)	14.29 (14,3558)	14.40 (14,3566)
P Value	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Wu-Hausman Test	11.16 F(2,3582)	3.95 F(2,3582)	2.71 F(2,2871)	3.86 F(2,3451)	3.147 F(2,2347)	17.32 F(2,3568)	11.25 F(2,3576)
P Valuse	[0.00001]	[0.01919]	[0.06649]	[0.08107]	[0.08626]	[0.00000]	[0.00001]
DWHausman	22.32 Chi-sq(2)	7.94 Chi-sq(2)	5.45 Chi-sq(2)	2.74 Chi-sq(2)	3.29 Chi-sq(2)	34.51Chi-sq(2)	22.49 Chi-sq(2)
P Value	0.00001	[0.01883]	[0.06535]	[0.09895]	[0.08413]	[0.00000]	[0.00001]
Over-ident Test	9.872Chi-q(12)	12.51Chisq(12)	19.23Chisq(12)	35.73Chisq(12)	23.06 Chisq(12)	24.34 Chisq(12)	25.44 Chisq(12)
P Value	[0.6272]	[0.4051]	[0.0830]	[0.0904]	[0.1272]	[0.1183]	[0.0128]
Permission							
F test_Per	7.24 (14, 3571)	7.24 (14, 3571)	7.30 (14,2861)	7.74 (14,3441)	4.56 (14,2337)	7.21 (14,3558)	7.26 (14,3566)
P Value	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
F test_M EDU	14.36 (14,3571)	14.36(14,3571)	12.25(14,2861)	13.52 (14,3441)	9.68 (14, 2337)	14.29 (14,3558)	14.40 (14,3566)
P Value	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Wu-Hausman Test	5.86 F(2,3582)	0.86 F(2,3582)	3.65 F(2,2871)	5.93 F(2,3451)	5.87 F(2,2347)	16.54 F(2,3568)	12.66 F(2,3576)
P Valuse	[0.00287]	[0.08067]	[0.07044]	[0.09267]	[0.08718]	[0.00000]	[0.00000]
DWHausman	11.75 Chi-sq(2)	9.74 Chi-sq(2)	5.33 Chi-sq(2)	4.88 Chi-sq(2)	3.76 Chi-sq(2)	32.98 Chi-sq(2)	25.30 Chi-sq(2)
P Value	[0.00280]	[0.08632]	[0.06925]	[0.09055]	[0.09407]	[0.0970]	[0.00000]
Over-ident Test	19.59Chisq(12)	16.56Chisq(12)	12.57Chisq(12)	24.19Chisq(12)	20.28Chisq(12)	23.28 Chisq(12)	24.60 Chisq(12)
P Value	[0.1751]	[0.1996]	[0.1425]	[0.0986]	[0.1619]	[0.0925]	[0.0168]
Violence							
F test_Vio	4.15 (14,3571)	4.15 (14,3571)	4.56 (14,2861)	4.09 (14,3441)	3.17	4.16 ((14,3558)	4.14 (14,3566)
P Value	[0.0076]	[0.0076]	[0.0011]	[0.0097]	[0.0099]	[0.0071]	[0.0079]
F test_MEDU	14.36 (14,3571)	14.36(14,3571)	12.25(14,2861)	13.52 (14,3441)	9.68 (14, 2337)	14.29 (14,3558)	14.40 (14,3566)
P Value	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Wu-Hausman Test	12.07 F(2,3582)	2.05 F(2,3582)	2.54 F(2,2871)	2.94 F(2,3451)	1.64 F(2,2347)	21.78 F(2,3568)	13.64 F(2,3576)
P Valuse	[0.00001]	[0.09871]	[0.07840]	[0.05275]	[0.09312]	[0.00000]	[0.00000]
DWHausman	24.12 Chi-sq(2)	4.12 Chi-sq(2)	5.12 Chi-sq(2)	5.91 Chi-sq(2)	3.31 Chi-sq(2)	43.30 Chi-sq(2)	27.23 Chi-sq(2)
P Value	[0.00001]	[0.09732]	[0.07713]	[0.05195]	[0.09053]	[0.00000]	[0.00000]
Over-ident Test	6.55Chi-sq(12)	15.55Chisq(12)	12.31Chisq(12)	15.81Chisq(12)	17.10Chisq(12)	15.14 Chisq(12)	12.35 Chisq(12)
P Value	[0.8856]	[0.2125]	[0.1342]	[0.1114]	[0.1458]	[0.2335]	[0.1454]

Table 3.8: Impact of Bargaining Measure (Factors Created from Individual Group of Questions) on Child Health Outcomes

	HAZ	WAZ	WHZ	Vaccination	Vitamin A	Prenatal Care	Assistance at Birth	Delivery Place
Empowerment	0.809	0.576	0.094	0.010	0.103	0.006	-0.012	0.139
	(0.018)*	(0.033)*	(0.713)	(0.922)	(0.265)	(0.943)	(0.888)	(0.077)+
Permission	0.782	0.613	0.152	0.102	0.153	0.178	-0.032	-0.002
	(0.025)*	(0.031)*	(0.486)	(0.065)+	(0.011)*	(0.035)*	(0.588)	(0.972)
Violence	-0.638	-0.240	0.249	0.013	-0.055	-0.218	-0.226	-0.209
	(0.008)**	(0.225)	(0.353)	(0.866)	(0.544)	(0.094)+	(0.016)*	(0.014)*
Impact of bargaining measure (factors created from Individual group of questions) on child health outcomes by gender of the child.								
	HAZ	WAZ	WHZ	Vaccination	Vitamin A	Prenatal Care	Assistance at Birth	Delivery Place
Emp_Girl	0.201	0.163	0.056	-0.048	0.088	0.103	-0.033	0.058
	(0.544)	(0.574)	(0.851)	(0.569)	(0.317)	(0.309)	(0.687)	(0.457)
Emp_Boy	0.413	0.385	0.183	0.002	0.067	-0.082	0.103	0.118
	(0.177)	(0.118)	(0.448)	(0.982)	(0.454)	(0.378)	(0.217)	(0.108)
Permission_Girl	0.800	0.726	0.021	0.136	0.223	0.286	-0.014	0.033
	(0.096)+	(0.055)+	(0.946)	(0.109)	(0.018)*	(0.032)*	(0.865)	(0.671)
Permission_Boy	0.351	0.156	0.187	0.079	0.154	-0.053	-0.073	-0.006
	(0.324)	(0.607)	(0.533)	(0.311)	(0.078)+	(0.656)	(0.395)	(0.941)
Violence_Girl	-0.727	-0.385	0.360	-0.159	-0.078	-0.285	-0.164	-0.161
	(0.065)+	(0.206)	(0.331)	(0.078)+	(0.553)	(0.094)+	(0.166)	(0.158)
Violence_Boy	-0.674	-0.270	-0.025	-0.216	0.024	-0.072	-0.196	-0.185
	(0.042)*	(0.328)	(0.932)	(0.029)*	(0.811)	(0.498)	(0.171)	(0.163)

Note: Each row represents a separate regression with the coefficient of interest reported in each row of the first column. The dependent variables are reported in the second row. Each regression includes (specification in column 7 in table 3/4/5) controls for child's age, age squared, sex, urban residence, division dummies, parent's age and education, neighborhood characteristics. Robust p values are in the parenthesis. + significant at 10%, *significant at 5% and **significant at 1%.