INTRAHOUSEHOLD HEALTH CARE FINANCING STRATEGY AND THE GENDER GAP IN INDIA

ABAY ASFAW

(International Food Policy Research Institute)

STEPHAN KLASEN

(University of Göttingen)

FRANCESCA LAMANNA

(The World Bank and University of Göttingen)

Acknowledgements

We would like to thank Monica Das Gupta, Michael Grimm, Joachim Winter, and workshop participants at IFPRI and the University of Göttingen as well as two anonymous referees for helpful comments on previous versions of the paper. Funding from the German Science Foundation in support of this work is gratefully acknowledged.

INTRAHOUSEHOLD HEALTH CARE FINANCING STRATEGY AND THE GENDER GAP: EMPIRICAL EVIDENCE FROM INDIA

SUMMARY

The 'missing women' dilemma in India has sparked a growing interest in investigating gender discrimination in the provision of health care services in the country. However, no studies have directly examined gender discriminations in the health care financing behavior of households. This study uses the 52nd Indian National Sample Survey and a censored bivariate probit model to shed some light on this important but overlooked issue. The results of the study reveal that while there is no significant difference in the probability of using current income to finance the inpatient health expenses of boys and girls, there is a sizable and significant gender gap in the probability of using scarce financial resources. *Ceteris paribus*, the probability of households to sell assets, borrow money or to use current savings to cover the inpatient costs of girls is respectively 1.4, 3.2, and 4.3 percent less than that of boys. The results reveal that the observed difference in health care utilization and mortality between boys and girls in the country can be partly explained by the intrahousehold gender discrimination in allocating scarce financial resources for health care. This implies that easing the budget constraints of households or devising some type of health insurance schemes may help to reduce the gender gap in health care utilization.

KEY WORDS: gender discrimination, health care finance, censored bivariate probit, India.

INTRODUCTION

In India, as in several other countries in South and East Asia, female mortality rates, relative to male rates, are extremely high; this is particularly the case among children. This has sparked a growing interest in policies and policy instruments to reduce excess female mortality in the country. As a result there has been a proliferation of papers focusing on gender discrimination in the region (e.g. Miller, 1981; Sen, 1990; Coale, 1991; Muhuri and Preston, 1991; Klasen, 1994; Klasen and Wink, 2003; Croll, 2001; Das Gupta, 2005). Authors have concentrated their research on gender discrimination in nutrition, labour markets, education, and other opportunities (Das Gupta, 1987; Behrman, 1988; Basu, 1989; Kurz and Johnson-Welch, 1997; Hazarika, 2000; Choudhury et al., 2000; Pande, 2003). Recently, researchers have also focused on sex-selective abortion in India (Booth, et al., 1994; Khan et al., 1996; Sudha & Arnold, 1999; Arnold, et al., 2002). Several researchers have also examined gender discrimination in the provision of health care services in the region (Chen et al., 1981; Miller, 1981; Ganatra & Hirve, 1994; Hill and Upchurch, 1995; Rajeshwari, 1996; Das Gupta, 1987; Harriss, 1989; Sood and Nagla, 1994; Hill and Upchurch, 1995; Rajeshwari, 1996; Kurz and Johnson-Welch, 1997; Ellen and Hunt, 2000; Gangadharan and Maitra, 2000; Jatrana, 2003).

In a separate literature, some authors have also examined the health care financing strategies and coping mechanisms of households in developing countries (Chen et al., 1981; Jayawardene et al., 1993; Haddad and Reardon, 1993; Klasen, 1996; Seeley et al., 1995; Sauerborn et al., 1996; Wilkes et al., 1997; Konradsen, et al., 1997; Adams et al., 1998; Fabricant et al., 1999; Lucas and Nuwagaba, 1999; Mutyambizi et al., 2002; Skarbinski et al., 2002; Chuma, 2007). To our knowledge, however, there are no studies linking the two literatures, i.e. investigating intrahousehold gender discrimination in health care financing strategies.

In this study, we examine how the health care financing strategies of households varies by gender in India. The study focuses on infants and children (aged from 1 day to nine years) for three reasons. First, excess female mortality is particularly high in this age group. Second, compared to adults and teenagers the chance of children to get medical care depends entirely on the decision of their parents. This helps us to clearly examine intrahousehold gender bias in health care financing mechanisms. Third, focusing on children will also reduce biological differences in medical need and exposure to risks (occupation, pregnancy, gender violence, old age, etc.) that may potentially affect the chances of being hospitalized. However, to account for differences in differential income augmentation roles of boys and girls, we have included a variable that shows whether the child is working in any income generating activities.[1] We also explicitly focus on hospitalization expenses because inpatient treatment is more expensive than outpatient treatments in India. For instance, in our sample the average inpatient cost per person was nearly 15 times higher than the average outpatient cost.

Our hypothesis is that households are more likely to discriminate against girls under tightened resource constraints than under normal conditions. In other words, we hypothesize that parents are less likely to borrow money or sell assets to finance the inpatient health expenses of girls than that of boys.

The remaining part of the paper is organized as follows. The next section sketches the analytical approach and the econometric specification of the study. Section 3 illustrates the data set used and the measurement issues. Section 4 presents the results of the study while section 5 concludes.

ANALYTICAL APPROACH

In this study, we hypothesize that there is gender discrimination in the health care financing strategies of Indian households and this discrimination is more pronounced when households face tight resource constraints. In other words, we hypothesize that parents dig more deeply into their pockets to hospitalize their sons than their daughters. The theoretical framework for this hypothesis is presented in Appendix 1. It shows that under conditions of son preference and declining marginal utility of health care spending, the differences in health care spending would be particularly large under tight resource constraints.

Estimating the relationship between gender and the health care financing strategy of households is very complex. Parents should first decide whether a child was sick and given sickness, whether to take him/her to a health care provider or not. Based on the recommendation of the health care provider they will then decide whether to hospitalize the child or not. Therefore, the probability of observing health care financing mechanism

[1] Out of 163,205 children covered by the survey 0.61 percent boys and 0.58 percent of girls were involved in such activities.

$j\ (j = 1,...,J)$ for child $i\ (i = 1,...,I)$ can be expressed as a product of at least three probabilities:

$$P(f_{ij} = 1) = P(sick_i = 1) \times P(hosp._i = 1 / sick_i) \times P(f_{ij} = 1 / hosp_i.) \qquad (1)$$

Where f_{ij} is health care financing option j, $P(sick_i)$ is the probability of child i is sick, $P(hosp._i)$ is the probability that child i will be hospitalized.

Each factor represents the path towards observing health care financing option j and gender discrimination can be observed at *P(sick), P(hosp/sick)* or at both paths. However, the health care financing outcome j can be observed only for hospitalized children and therefore sample selection may be an issue. If there is a systematic difference between hospitalized and non-hospitalized children, studying the health care financing decision of households based on only hospitalized children, may lead to a sample selection bias. Presumably, parents are more likely to choose boys for hospitalization given sickness (as is the case in our data, see Asfaw et al. 2007b) and therefore the observed children may not be random. This means that factors that affect the decision of parents to hospitalize children are more likely to be correlated with factors that affect the health care financing strategies of households. In fact, regression results based on hospitalized children alone can be biased and inconsistent (Greene, 2003, 2006; Wynand et al., 1981). To overcome the sample selection bias, we select a probit sample selection model also called the Heckman probit model introduced by Wynand et al. (1981). This model closely reflects the sequential decision processes and helps us to include both hospitalized and non-hospitalized children in the estimation procedure[2].

Among various estimation options available for estimating sample selection models, we select the probit sample selection model for various reasons. First, compared to other options such as multinomial logit and multinomial probit, the probit selection model is appropriate since it does not require mutually exclusive categories for the dependent variable. Second, compared to other natural alternative models such as conditional logit and bivariate probit models, it does not assume that factors affecting the hospitalization decision also affect the health care financing strategy decisions. The

[2] However, there could be systematic differences in acknowledging children's illnesses on the part of parents. Since we do not have information on this issue, we could not control the selection bias that might arise at this level.

probit selection model explicitly assumes that some of the factors influencing the hospitalization decision must differ from the factors that affect the financing decision.

In our data set, we do not have information whether the child was sick or not before hospitalization. What we have is whether the child was hospitalized for treatment during the last 365 days preceding the date of the survey, the expenses incurred, and the ways these expenses were financed. Let f_{ij} represents the observed level of health expenditure for child i financed through health care financing strategy j, and it is related to a latent variable f_{ij}^* in the following way:

$$f_{ij} = \begin{cases} 1 \;\; if \;\; f_{ij}* > 0 \\ 0 \;\; otherwise \end{cases} \qquad (2)$$

Let us also assume that

$$f_{ij} = \alpha + x'\beta + \mu \;\; where \;\; \mu \sim N(0,1) \qquad \text{(outcome equation)} \qquad (3)$$

Where x is a vector of factors that determines the probability of using health care financing strategy j for child i , and μ is the error term.

However, $f^*_{ij} > 0$ only if child i is hospitalized. Assume that h_i shows whether the child was hospitalized or not and is given by:

$$h_i = \omega + z'\varphi + \varepsilon \quad where \;\; \varepsilon \sim N(0,1) \qquad \text{(the selection equation)} \qquad (4)$$

Where z is a vector of variables that affect the likelihood of hospitalization of a child i

Then,

$$f_{ij} = \begin{cases} 1 \; if \; f_{ij}^* > 0 \;\&\; h_i = 1 \\ 0 \; if \; f_{ij}* \leq 0 \;\&\; h_i = 1 \\ . \;\; otherwise \end{cases} \quad \text{and } h_i = \begin{cases} 1 \;\; if \;\; h_i* > 0 \;\; if \; the \; child \; is \; hospitalized \\ 0 \;\; if \;\; h_i* \leq 0 \;\; otherwise \end{cases} \qquad (5)$$

Finally, the probability of observing health care financing strategy j conditional on whether or not the child i is hospitalized is given by:

$$E[f_{ij} / x, f_{ij} \;\; is \;\; observed] = E[f_{ij}^* / x, h_i = 1] = \alpha + x'\beta + \tau\lambda) \qquad (6)$$

where $\lambda = \frac{\rho\phi(-\omega - z'\varphi)}{[\Phi(-\omega - z'\varphi)}$, ϕ is the density and Φ the cumulative density functions of the standard normal distribution, and $\rho = corr(\mu, \varepsilon)$.

In the special case where ρ=0, the conditional probability of observing health care financing option j can be examined using a standard probit model. Equation (6) is similar to equation (3) but now adjusted for the selection bias. The selection term λ allows us to examine the effect of various variables including gender on the probability that a child is hospitalized and the probability that health care financing mechanism j will be used (see Greene 2006, Wynand et al., 1981). If ρ is significant, there is evidence of sample selection and a likelihood function that includes λ should be maximized. The log-likelihood function of the model is then defined as:

$$\ln L(\beta,\varphi,\rho) = \sum_{f_{ij}=1,\, h_i=1} \ln[\Phi_2(x'\beta, z'\varphi, \rho)] + \sum_{f_{ij}=1,\, h_i=0} \ln[\Phi_2(-x'\beta, z'\varphi, -\rho)] + \sum_{f_{ij}=0} \ln[1-\Phi 1(z'\varphi)] \quad (7)$$

SOURCES OF DATA AND MEASUREMENT OF VARIABLES

In this study we use the 52nd Indian National Sample Survey (NSS) data set. Since 1950, the National Sample Survey Organization of India has been collecting major information on socio-economic conditions of the population as well as economic and operational features of informal enterprises and establishments (Saha, 2002). The 52nd round data was collected between July 1995 and June 1996. Two-stage stratified sampling procedure was adopted. At the first stage, 7,663 rural villages and 4,991 urban blocks were identified all over the country and at the second stage 71,284 rural and 49,658 urban households were surveyed.

Among other things, the data set contains extensive information on out and inpatient health care utilization and expenditure, particulars of sources of finance for meeting health expenses, mortality, and other health care related information for both rural and urban households. For this study we use the data on the incidence of hospitalization (inpatient care) during the last 365 days before the survey, the inpatient medical and non-medical expenses for each hospitalized person, and the sources of finance used to pay the expenses. Out of the total respondents with positive inpatient health expenditure, 55 percent used only one, 25 % two, and the remaining 20% used three or more financing mechanisms[3]. The dependent variables are therefore measured as dichotomous variables. In a sensitivity analysis, the dependent variables are also measured as shares of total inpatient health expenditure.

The explanatory variables can be divided into individual, household, and access (supply side) variables. The first group captures the characteristics of the child (age and sex), and the second describes the character of the decision maker or the household in general (income[4], family size, sources of drinking water and educational level of the household head). The access variables include user fees, transport costs, distance, and waiting time costs. Unfortunately, direct information is not available on most of the access variables. Therefore, we use medical expenses to measure prices and transport cost to approximate distance. We compute district level median values of medical and transport costs and we use these median values for each individual within the district irrespective of individual characteristics. Similar approaches are used by Hallman (1999), Li (1996), and Dor (1986) to measure user fees.

Hospital prices are computed from average medical costs. Due to lack of data, the severity of illness, which may also affect the hospitalisation decision of households, is not included in the analysis. If parents tend to hospitalize girls only in the case of severe medical conditions (compared to boys), the absence of this variables can underestimate the effect of the gender variable (girls=1). Findings from Asfaw et al. (2007a, b) suggests that this is indeed the case so that the effects reported likely understate the discrimination in health care financing strategies (see also below). Table 1 presents the descriptive statistics of the variables used in the analysis. Distance to the nearest hospital is approximated by the average transport cost at the primary sampling unit (PSU) level as a proxy for distance. We checked the validity of this variable by comparing the average transport costs of rural and urban PSUs.

Table I. Descriptive Statistics of the Variables Used in the Analysis (52nd round)

[3] If for instance, household *i* uses only current saving it gets one for current saving and zero for all other options. On the other hand, if household j uses current income, current saving and borrowing, one is given for current income, current saving and borrowing options.

[4] Income is approximated by the poverty status of the household. Households in the lowest income quartile are considered as poor households.

RESULTS

Descriptive results

Before presenting the results of the probit selection model, let us examine the bivariate pattern of health care financing strategies of households[5]. Out of the 163,586 children covered by the survey, 2.02 percent are hospitalized for treatment during the last 365 days preceding the date of the survey. As expected, a higher share of boys than girls is hospitalized. In line with findings from the literature and related studies we have undertaken using these data (e.g. Hazarika, 2000; Asfaw et al., 2007a), 2.46 percent of boys are hospitalized compared to 1.54 percent of girls and the difference is statistically significant ($p < 0.001$). Regarding the length of stay in the hospital, there is no difference by sex.[6]

Households have used five financing sources to pay for the hospitalization costs of their children. Nearly 45% of households have used their current income and 36% their current saving to finance the inpatient health expenses of children. On the other hand, 29% of households have borrowed money and nearly 4% have sold their asset to finance the inpatient health expenditure of children.

Figure I presents the share of households using different financing mechanisms by sex of the child. Consistent with our theoretical framework and hypothesis, households are less likely to invest scarce resources to finance the hospitalization costs of girls. While the percentage of households who use their current income to finance the inpatient health expenses of boys and girls is statistically the same (46.7% for girls and 44% for boys), there is a sizable gender difference in the allocation of other scarce resources. For instance, the percentage of households who use their saving and borrow money to finance the inpatient health expenses of boys was 12.87 and 15.08 % higher than that of girls, respectively. The most striking difference is observed in the case of sale of asset. The percentage of households who have sold their asset to finance the hospitalization costs of

[5] Since parents were less likely to affect the gender of their children (at least in 1996 where sex-selected abortion was not very common), factors that affect the gender composition of the family are less likely to be correlated with factors that affect the financing choices of households (Garg and Morduch 1998). Therefore, the bivariate results can be taken seriously.

[6] This further supports the contention that girls are at least as sick as boys when reaching hospital. Findings in Asfaw et al. (2007a, b) suggest that they are indeed sicker.

boys is 52 % higher than that of girls. All these differences are also statistically significant at 1% level.

Figure I. Financing mechanisms by gender

Figure II. Financing mechanisms by gender and location

Figure III. Financing mechanisms by gender of the child and income

The patterns remain quite similar between urban and rural and between poor and non-poor households as shown in Figures II and III. Of particular note is, however, that the poor, as would be expected, are more likely to borrow funds, sell assets, or use other sources to finance the hospital stay of a boy. In contrast, the poor are mostly only willing to pay for hospitalization of a girl if they can finance it out of current income. Thus the gender gap is intensified among the poor, where the resource constraints are particularly binding. These bivariate results, therefore, highlight the gender gap in intrahousehold utilization of scarce resources to finance the inpatient health expenditure of children in India. The next important question is whether these results will stay or disappear when we apply rigorous econometric analysis that controls for other variables and addresses the sample selection problem.

Econometric results

Equation (7) is maximized to examine the gender gap in the probability of using different health care financing resources controlling for endogenous sample selection problem. One of the major problems in estimating a bivariate sample selection model is finding a convincing exclusion restriction for the model. In other words, estimating equation (7) requires instruments that directly affect the hospitalization decision but not directly the financing decision of households. We used relation of the child to the household head, age of the child, number of children and the availability of clean water in the household to identify the financing equations.

These variables are selected as instruments because they are less likely to have direct influences on the financing choice of households but are factors in determining the probability of hospitalization. Other variables remaining constant, own sons and daughters are more likely to be hospitalized than other children. The number of children in the family, age of the child, and the availability of clean water also affect the hospitalization decision of parents but not directly their financial decisions. Infants are more likely to be hospitalized than older children but age of the child is not likely to affect directly the financing choices of households. The availability of clean water is also likely to affect the likelihood of hospitalization but not directly the financial decisions of households. The relevance of the exclusion variables was also tested. The F test shows that the four variables are jointly significant in the first equation revealing that the instruments are relevant in explaining the hospitalization outcome. These variables were also included in the second stage equations to test their exogeneity. Most of the variables were individually and jointly insignificant in explaining the four financing option equations. In addition to these variables, all factors that affect the financing decision of parents are included in the hospitalization decision equation. We use the Huber/White/sandwich estimator to compute the heteroscedasticity-adjusted standard errors. [7]

Table II presents the determinants of being hospitalized (selection equation) and Table III presents the results of the probit model with sample selection for the four financing options of households. For the sake of comparison, the simple probit results for the four financing options are also shown in Appendix II. In half of the equations, ρ is statistically significant indicating that the null hypothesis of no correlation between error terms of the financing options and the hospitalization equations is rejected. This means that estimating the determinants of health care financing strategies of households without controlling for sample selection bias may generate biased results. The chi^2 results also verify the joint significance of the variables.

Table 2. Probit selection model results: selection equation

All the instrumental variables are individually and jointly significant and take the expected sign in the hospitalization (selection) equation. Biological children were more

[7] STATA software was used to estimate the model. STATA also computes standard errors that are adjusted for the additional variance from the IMR term.

likely to be hospitalized compared to other children (grand children, nephews, nieces, etc.). As the number of children in the family increased, the chance of a child to be hospitalized decreased. Children that had access to clean water (tape and well) were less likely to be hospitalized than children without access to clean water, *ceteris paribus*. Consistent with expectations, children from literate, rich, and urban households were more likely to be hospitalized than children from illiterate, poor, and rural households. As expected, the sex variable carries important weight in the hospitalization decision of households, suggesting considerable gender bias in access to hospital treatment between girls and boys. Similar studies conducted in India using the same data set also found statistically significant gender differences in the place of death and hospitalization between girls and boys, even when controlling for gender differences in illness rates (Asfaw et al., 2007a, b).

DISCUSSION

Our primary objective is to examine the gender gap in the health care financing strategies of households. Therefore, our main interest lies on the estimated gender impacts on the financing options equation, which are presented in Table III. Before examining the gender variable, let us examine the coefficients of the control variables. As might be expected, households in the poorest quintile were less likely to finance the inpatient health expenditure of their children from current income or saving. Compared to rural households, urban households were less likely to borrow money, to use saved money, or to sell their asset to finance their children inpatient health expenditure. As expected, literate households were more likely to use their current income or saved money and less likely to borrow money or to sell asset to finance the inpatient health expenses of children compared to illiterate households. Children's stay in a hospital also affected the financing strategy of households. Households whose children stayed in a hospital for more than a month were more likely to sell their asset or to borrow money than households whose hospitalized children discharged within less than a month. The coefficients of the child occupation variable is mostly insignificant but carries a negative coefficient in the borrowing equation suggesting that, *ceteris paribus*, households with working children are less likely to rely on borrowing, possibly because they have higher current incomes. Since very few children in the data set actually work, one should not, however, overinterpret this finding. The coefficients of the hospital price variable take the expected sign in all equations but are significant only in the case of the borrowing equation.

Table 3. Probit selection model results

Consistent with our hypothesis and the bivariate results, the sex variable is statistically insignificant in the current income equation suggesting that gender does not have a significant impact on the probability of households to use their current income to finance the inpatient health expenses of their children. However, gender affects the probability of households to sell asset, borrow money or to use their current savings to finance the inpatient health expenditure of children. For the sake of interpretation, the marginal effect of gender (*P(financing option j =1| hospitalization=1)*) is computed and presented in last row of Table III. The results show that all other things remaining constant, the probability of Indian households to sell their asset in order to finance the inpatient health care expenditure of girls (given hospitalization) is 1.54 percent less than that of boys. The gender gap is more striking in the case of using borrowed and saved money. All other things remaining constant, households are 3.7 and 4.4 percent less likely to borrow money and to use their savings, to finance the inpatient health costs of girls than boys, respectively.

The robustness of these results is also examined by measuring the four dependent variables as shares from the total health expenditure and estimating all equations simultaneously using seemingly unrelated regression (SUR) model. This approach captures the relative magnitude of each financing mechanism and addresses the dependence of one financing mechanism on the others[8]. The results of the SUR model are presented in Table IV. The coefficients of most of the variables remain the same. The gender variable is now positive and significant in the share of current income equation suggesting that in the case of a girl, the share of current income is significantly higher. But as before it is negative and significant in the case of the other three share

[8] The basic limitation of this model is that it can't address the selection bias problem.

equations. All other things remaining constant, the share of hospital expense from asset sale is 1.4 percent less for girls compared to boys. The gender gap is still more striking in the case of using borrowed and saved money. *Ceteris paribus*, the shares of borrowed money and current saving from the total health expenditure are 3.2 and 4.3 percent lower for girls than for boys, respectively.

We also ran further regressions where we, separately, interacted the sex of the child with poverty status as well as with long hospital stays. When interacting sex with poverty status, it turns out that the gender gap in financing options is larger among the poor. The poor are significantly less likely to rely on savings, borrowing, or asset sales when a girl is hospitalized than when a boy is hospitalized. This conforms well to our theoretical model where we hypothesized that the gender gaps in financing options will be particularly large for those where the budget constraints are particularly tight (see appendix 1). Interactions with long stay also show that in the case of long hospital stays (as a proxy of severity of illness), parents are more willing to use savings, borrowing, and sell asset to finance the expenditures for boys than for girls.[9]

These results thus strongly support our theoretical framework presented in Appendix 1 and shade new light on our knowledge of gender discrimination in the health care behavior of households. Gender of children does not have statistically significant impact on the probability of households to use current income to finance the inpatient health expenses of children. However, gender exerts statistically significant influence on the probability of households to use relatively scarce resources such as borrowed and saved money.

These results clearly show new aspects of gender discrimination in responding to health shocks by financially constrained households. Not only are girls less likely to be hospitalized, but households in India are also very cautious in using expensive financing mechanisms to finance the inpatient health care costs of girls compared to boys. As the budget constraint becomes tighter, households tend to give more priority to boys than to girls. These results may also indicate that the observed high gender gap in mortality, morbidity, and health care utilization in India can be partly explained by closely examining the health care financing strategies of households. Households who face tight

[9] The results are available on request.

budget constraint are more likely to favor boys than girls in their hospitalization decision. In other words, being a girl is likely to decrease the chances of getting scarce financial resources allocated for hospitalization, controlling for all other variables. The corollary of these results is that other things remaining constant, the gender gap in the hospitalization of girls and boys can be narrowed if households were less constrained by tight budgets and high costs of hospitalization.

This may also indicate that the gender gap in hospitalization of children and consequently the gender gap in mortality can be narrowed if more households could finance the inpatient health expenses of children from their current income. Therefore, apart from gender related education, easing the financial burden of hospitalization could help to reduce the observed gender gap in hospitalization between boys and girls in India. Promoting different health care financing mechanisms such as community health insurance schemes or decreasing the price of hospitalization may help to reduce the gender gap in hospitalization and consequently the unbalanced sex ratio in the country.

Finally, further research is clearly warranted in this area. As we could not control for the selection biases that might be associated with differences in the parental reports of children's illnesses, further research should be directed at this stage of the decision-making process. Second, the severity of illness, which affects both the probability of hospitalization and the health care financing strategy of households are, due to data constraints, not fully captured in our analysis and would be an important refinement in future work.

REFERENCES

Adams, A., Cekan, J, and Sauerborn, R. 1998. Towards a Conceptual Framework of Household Coping: Reflections from Rural West Africa. Africa: Journal of the International African Institute, 68 (2): 263-283.

Arnold, F., Kishor, S. and Roy, T.K. 2002. Sex-Selective Abortions in India. Population and Development Review 28 (4): 759–785.

Asfaw, A., Klasen, S., and Lamanna, L. (2007a). Intrahousehold Gender Disparities in Children's Medical Care before Death in India. *IZA discussion paper* no. 2586.

Asfaw, A., Klasen, S., and Lamanna, L. (2007b). Cite the 1986-96 paper as a mimeographed here. Washington, Dc.

Basu, A.M. 1989. Is Discrimination in Food Really Necessary for Explaining Sex Differences in Childhood Mortality? Population Studies 43(2): 193-210.

Behrman, J.R. 1988. Intrahousehold Allocation of Nutrient in Rural India: Are Boys Favoured? Do Parents Exhibit Inequality Aversion? Oxford Economic Papers 40(1): 32-54.

Booth B.E, Verma M. and Beri R.S. 1994. Fetal sex determination in infants in Punjab, India: Correlations and implications. BMJ; 309: 1259–61.

Chen, L.C., Huq, E., and D'Souza, S. 1981. Sex bias in the family allocation of food and health care in rural Bangladesh. Population and Development Review 7(1): 55-70.

Choudhury, K.K, Hanifi, A.M., Rasheed, S. and Bhuiya, A. 2000. Gender Inequality and Sever Malnutrition among Children in a Remote Rural Areas of Bangladesh. J Health Popul Nutr 18(3): 123-130.

Chuma, Jane., Gilson, Lucy., and Molyneux, Catherine. 2007 Treatment-seeking behaviour, cost burdens and coping strategies among rural and urban households in Coastal Kenya: an equity analysis. Tropical Medicine & International Health 12 (5): 673–686.

Coale, J. A. 1991. Excess female mortality and the balance of the sexes in the population: An estimate of the number of 'missing females'. Population and Development Review 17(3): 517-523.

Croll, E. 2001. Endangered Daughters: Discrimination and Development in Asia. London and New York: Routledge.

Das Gupta, M. 1987. Selective discrimination against the female child in rural Punjab, India. Pop Dev Rev, 13(1): 77-100.

Das Gupta, M. 2005. Explaining Asia's "Missing Women": A New Look at the Data. Population and Development Review 31 (3): 529-535.

Das Gupta, M., Zhenghua, J., Zhenming, X., Bohua, L., Chug, W., and Hwa-Ok, B. 2003. Why is son preference so persistent in East and South Asia? A cross-country study of China, India and the Republic of Korea. Journal of Development Studies 40(2): 153-187.

Dor, Avi. 1986. The Demand for Health Care in the Ivory Coast: The Role of Income, Time, and Policy Implications. Ph. D. Dissertation, The City University of New York.

Ellen, A. and Hunt, K. (Eds. 2000. Gender Inequalities in Health, Open University Press.

Fabricant SJ, Kamara CW, Mills A. 1999. Why the poor pay more: household curative expenditures in rural Sierra Leone. Int J Health Plann Manag *14:* 179–199.

Ganatra, B.R. and Hirve, S.S. 1994. Male Bias in Health Utilisation for under fives. Bulletin of the WHO 72 (1): 101-104.

Gangadharan, L. & Maitra, P. 2000. Does Child Mortality Reflect Gender Bias? Evidence from Pakistan, Indian Economic Review 35 (2) pp. 113-131.

Garg, A. and Morduch, J. 1998. Sibling rivalry and the gender gap: evidence from child health outcome in Ghana.

Greene, W. 2003. Econometric Analysis. Prentice Hall, New Jersey.

Greene, W. 2006. 'Censored Data and Truncated Distributions' in Mills, T. & Patterson, K. (Eds.) The Handbook of Econometrics, Vol. 1, Palgrave, London: 695-734.

Haddad, L. and Reardon, T. 1993. Gender bias in the allocation of resources within the household in Burkina Faso: a disaggregated outlay equivalent analysis. Journal of Development Studies 29(2): 260-276.

Hallman, Kelly. 1999: Child Health Care Demand in a Developing Country: Unconditional Estimates from the Philippines. FCND Discussion Paper No. 70. International Food Policy Research Institute, Washington D.C., USA.

Harriss, B. 1989. Differential child mortality and Health Care in South Asia. Journal of Social Studies 44 (April): 2-123.

Hazarika, G. 2000. Gender Differences in Children's Nutrition and Access to Health Care in Pakistan. The Journal of Development Studies, 37 (1): 73-92.

Hill, K., and D.M., Upchurch, 1995. Gender Differences in Child Health: Evidence from the Demographic and Health Surveys. Population and Development Review, 21(1): 127-151.

Jatrana, S. 2003. Explaining Gender Disparity in Child Health in Haryana State of Inida. Asian Meta Center Research Paper Series 16. Also available at http://www.populationasia.org/Publications/ResearchPaper/AMCRP16.pdf

Jayawardene R, 1993. Illness perception: social cost and coping-strategies of malaria cases. Soc Sci Med 37: 1169–1176.

Khan, M.E., Barge, S. & Philip, G. 1996. Abortion in India: An Overviews. Social Change. 26(3 & 4): 208-225.

Klasen, S. 1994. Missing Women Reconsidered. World Development, 22(7): 1061-71.

Klasen, S. and C: Wink. 2003. Missing women: Revisiting the debate. Feminist Economics

Klasen, S., 1996. Nutrition, Health and Mortality in Sub-Saharan Africa: Is There a Gender Bias? The Journal of Development Studies, 32(6): 913-32.

Konradsen F, van der Hoek W, Amersinghe PH, Amerasinghe FP, Fonseka KT, 1997. Household responses to malaria and their costs: a study from rural Sri Lanka. Trans R Soc Trop Med Hyg 91: 127–130.

Kurz, K.M. and Johnson-Welch, C. 1997. Gender bias in health care among children 0-5 years: opportunities for child survival programs. Arlington, VA: BASICS.

Li, I. Masako. 1996. The Demand for Medical Care: Evidence from Urban Areas in Bolivia. LSMS Working Paper, no. 123. The World Bank, Washington, D.C.

Lucas, H. and Nuwagaba, A. 1999. Household Coping Strategies in Response to the Introduction of User Charges of Social Services: A Case Study on Health in Uganda IDS Working Papers – 86.

Miller, B. 1981. The Endangered Sex: Neglect of Female Children in Rural North India. Ithaca: Cornell University Press.

Muhuri, P.K. and Preston, S.H. 1993. Effects of family composition on mortality differentials by sex among children in Matlab, Bangladesh Population and Development Review

Mutyambizi, V. 2002. An Exploratory Study of the Resources and Coping Strategies of Poor Urban Households Affected by HIV/AIDS in Harare. Cape Town, South Africa: School of Economics, University of Cape Town.

Pande, R. 2003. Selective Gender Differences in Childhood Nutrition and Immunization in Rural India: The Role of Siblings. Demography 40(3): 395-418.

Rajeshwari, S. 1996. Gender bias in utilisation of health care facilities in rural Haryana. Economic and Political Weekly, 31(1): 489-494.

Saha, V. 2002. Salient Features of NSS Consumer Expenditure Surveys 51st - 54th Rounds. India: Workshop on Poverty Measurement, Monitoring and Evaluation, January 11-12.

Sauerborn R, Adams A, Hien, M. 1996. Household strategies to cope with the economic costs of illness. *Soc Sci Med 43:* 291–301.

Sauerborn, R., P. Berman, and A. Nougtara. 1996. Age bias, but not gender bias, in the intra-household resource allocation for health care in rural Burkina Faso. Health Transition Review 6: 131-145.

Seeley, J., Kajura, E., and Mulder, D. 1995**.** Methods used to study household coping strategies in rural South West Uganda. Health Policy and Planning; 10(1): 79-88

Sen, A. 1990. More than 100 million women are missing. New York Review of Books, 20 December: 61-66.

Skarbinski, J., Walker, H. K., Baker, L. C., Kobaladze, A., Kirtava, Z., Raffin, T. A. 2002. Journal of the American Medical Association, 287(8): 1043-1049

Sood, A.K. and Nagla, B.K. 1994. The Extent and Pattern of Utilisation of Health Services by Rural Women - A Study in District Rohtak, Haryana. Indian Journal of Preventive and Social Medicine 25(3&4): 110-117.

Sudha, S. and Ranjan, S.I. 1999. Female demographic disadvantage in India 1981-1991: sex selective abortions and female infanticide, Development and Change 30(3): 585-618.

Wilkes A, Hao Y, Bloom G, Xingyuan G, 1997. Coping with the Costs of Severe Illness in Rural China. Brighton, United Kingdom: Institute of Development Studies. IDS Working Paper No. 58.

Wynand P.M.M. van de Ven and Bernard M.S. van Praag. 1981. The Demand for Deductibles in Private Health Insurance: A Probit Model with Sample Selection. Journal of Econometrics, 17: 229-252.

Appendix I. Theoretical framework

We hypothesize that there is gender discrimination in the health care financing behavior of Indian households and this gap is more evident when households face binding resource constraints. The theoretical base for this hypothesis can be derived from a normally behaved utility function[10]. Our objective is to concentrate on the insights that the model provides into gender bias in the health care demand behavior of households under tight budget constraints. Assume a utility function given by:

$$U(x_b) = \frac{\sigma}{\sigma - 1} x_b^{\frac{\sigma-1}{\sigma}} \text{ for } \sigma > 1 \quad (1)$$

$$U(x_g) = \gamma \frac{\sigma}{\sigma - 1} x_g^{\frac{\sigma-1}{\sigma}} \text{ for } \sigma > 1 \quad (2)$$

Where *U(.)* is a well behaved utility function (differentiable, strictly quasi-concave, and strictly monotonic) and x_b and x_g represent health expenditure for boys and girls, respectively.

In India, due to economic, cultural and other factors, parents seem to prefer boys to girls (see Hazarika, 2000; Arnold et al., 2002; Das Gupta, 2005; and the literature cited there. This implies that parents' utility of investing on boys' health is higher than the utility of investing on girls $(U(x_b) > U(x_g)$. This preference holds if $\gamma < 1$. The marginal utility functions are given by $\partial U(x_b)/\partial x_b = x_b^{-\frac{1}{\sigma}}$ and $\partial U(x_g)/\partial x_g = \gamma x_g^{-\frac{1}{\delta}}$ for boys and girls, respectively.

Figure IV plots these marginal utility functions. Consistent with the diminishing marginal utility theory, the slope of both curves are negative and the marginal utility from investing on boys' health is higher than that of girls for every level of health expenditure

[10] Garg and Morduch (1998) have also used a linear model to explain similar arguments.

but the gap declines as the level of health care spending increases. This can be seen from the slope of the marginal utility curve. For any value of $\gamma < 1$,

$$|\partial^2 U(x_b)/\partial x_b^{\,2}| = \frac{1}{\sigma} x_b^{-\frac{1+\sigma}{\sigma}} > |\partial^2 U(x_g)/\partial x_g^{\,2}| = \gamma \frac{1}{\sigma} x_g^{-\frac{1+\sigma}{\sigma}} \tag{3}$$

Figure IV. Marginal utility from health care expenditure for boys and girls

If the resource constraint is not binding, parents are more likely to spend more money on health care expenditure of both boys and girls up to the point where the marginal benefit equals the marginal cost and (depending on the slope of the budget constraint) points such as *A* and *B* can be chosen. The gender gap under non-binding resource constraint is therefore given by the difference between x_b^{nbc} and x_g^{nbc}. Under this condition, the gender gap in health expenditure still exists (because $\gamma < 1$) but its magnitude is relatively small. In contrast, under condition of a binding budget constraint, the health care expenditure would be less than the level of expenditure under non-binding constraint and points such as *C* and *D* can be chosen by parents (again depending on the new budget line. Under this situation, the gender gap in the health expenditure will be given by the line $x_b^{bc}\ x_g^{bc}$ which is greater than $x_b^{nbc}\ x_g^{nbc}$. Therefore, households who face tight budget constraints are more likely to spend the meager resource on boys than on girls. This implies that resource constraints can exacerbate the gender gap in health care expenditure of households. This holds true as long as $\partial U(x_b)/\partial x_b > \partial U(x_g)/\partial x_g$ *and* $|\partial^2 U(x_b)/\partial x^2{}_b| > |\partial^2 U(x_g)/\partial x^2{}_g|$. However, different scenarios could be observed if the slope of the marginal utility curve for girls is steeper than that of boys.

Appendix II. Probit results without controlling sample selection bias

Table I. Descriptive Statistics of the Variables Used in the Analysis (52nd round)

Variable (for children under ten years old)	(1996)
Sex of the household head (1 male and 0 otherwise)	0.94
Age of the household head	42.32
Education (1 if the head is literate and 0 otherwise)	0.45
Social status (1 if scheduled caste or tribes & 0 otherwise)	0.33
Urban (1 if the household is located in urban areas and 0 otherwise)	0.35
Total number of children under ten	163,585
Age of the child: girls	4.24
: boys	4.27
Percentage of children hospitalized (1 year before the survey) for treatment: girls	1.54
: boys	2.46
Percentage of children hospitalized for more than a month: girls	22.71
: boys	22.61
Percentage of children engaged in income generating activities (%): girls	0.58
: boys	0.61
Median district level hospital prices per hospitalized child (INR)	848.00
Average in-patient expenditure per hospitalized child per day	288.80
Median district level transport cost to the nearest hospital (INR) (proxy for distance)	152.00
Share of households using current income (1 if cur. income was used))	0.45
Share of households using saving (1 if current saving was used))	0.36
Share of households using sale of asset* (1 if asset was sold))	0.04
Share of households using borrowing (1 if borrowing was used))	0.29
Share of households using other financing strategy (1 if other sources were used))	0.08
Share of current income from the total hospital expenditure (%)	35.44
Share of current saving from the total hospital expenditure (%)	30.19
Share of borrowing from the total hospital expenditure (%)	26.07
Share of asset sale from the total hospital expenditure (%)	2.90
Share of other sources from the total hospital expenditure (%)	5.40
Average number of children in the household	3.60
Clean water (1 if access to clean drinking water & 0 otherwise)	0.74
Poor (lowest income quartile)	0.25
Per capita monthly expenditure (INR)	347.80

* Sale of asset includes sale of animal, ornament, and other assets.
Source: Computed from the 52nd Indian NSS

Table II. Probit selection model results: selection equation

Variable	Dependent variable: hospitalization	
	Coefficient	Standard error
Poor	-0.304***	0.022
Urban	0.149***	0.016
Head literate	0.099***	0.016
Sex of the head	-0.040	0.030
Age of the head	0.002**	0.001
Sex of the child	-0.192***	0.015
Low caste	0.010	0.016
Income earning child	-0.096	0.106
Ln Hospital price	-0.087***	0.021
Biological child	0.106***	0.026
Number of children	-0.037***	0.005
Age of the child	-0.018***	0.002
Clean water	-0.034*	0.017
Distance to hospital	-0.058***	0.019
Constant	-1.577***	0.114
Number of observation	162464	
Joint significance of the four exclusion Variables:		
Chi^2	143.59	
Prob > chi2	(0.000)	

Robust standard errors in parentheses

* Significant at 10%; ** significant at 5%; *** significant at 1%

Source: Computed from the 52^{nd} Indian NSS

Table III. Probit selection model results: outcome equation

Variable	Dependent variables: inpatient financing options			
	Current income	Current saving	Borrowing	Sale of asset
Poor	-0.184**	-0.353***	0.109	-0.168
	(0.080)	(0.066)	(0.125)	(0.148)
Urban	0.115***	-0.094	-0.277***	-0.393**
	(0.043)	(0.064)	(0.069)	(0.168)
Head literate	0.133***	0.162***	-0.455***	-0.092
	(0.041)	(0.040)	(0.065)	(0.105)
Sex of the head	0.292***	0.051	0.159	-0.149
	(0.094)	(0.081)	(0.104)	(0.137)
Age of the head	0.002	-0.001	-0.013***	-0.008**
	(0.002)	(0.001)	(0.002)	(0.003)
Long stay in hospital	-0.083*	-0.065	0.231***	0.347***
	(0.044)	(0.043)	(0.056)	(0.116)
Sex of the child	-0.046	-0.205***	-0.112*	-0.266***
	(0.055)	(0.041)	(0.066)	(0.082)
Low caste	0.032	-0.103**	-0.071	0.129
	(0.042)	(0.045)	(0.054)	(0.087)
Income earning child	0.390	-0.201	-0.751*	0.526
	(0.300)	(0.285)	(0.407)	(0.398)
Ln Hospital price	-0.083	-0.063	-0.088***	0.004
	(0.059)	(0.192)	(0.021)	(0.126)
Constant	-1.959***	-1.766***	-0.072	-2.238***
	(0.328)	(0.341)	(0.753)	(0.628)
Athrho	0.7193***	0.778***	0.618	0.626
	(0.294)	(0.304)	(0.574)	(0.567)
ρ	0.616***	0.652*	0.550	0.555
LR test of indep. eqns. (ρ=0): $\chi^2(1)$	5.98	6.52	1.16	0.392
No of obs.	162464	162464	162464	162464
Censored obs.	159174	159174	159174	159174
Uncensored obs.	3290	3290	3290	3290
Log pseudo-likelihood	-17836	-17719	-16089	-17453
Wald (2 (10)	61	109	53.56	52.91
(Pr.> chi2)	(0.000)	(0.000)	(0.000)	(0.000)
$Pr(f_{ij}=1 \mid h_i=1) = Pr(f_{ij}=1, h_i=1)/Pr(h_i=1)$ in %		-4.410	-3.658	-1.540

Robust standard errors in parentheses
* Significant at 10%; ** significant at 5%; *** significant at 1%
Source: Computed from the 52nd Indian NSS

Table IV. Seemingly unrelated regression results

Variable	Dependent variables: Share from the total hospital expenditure			
	Current income	Current saving	Borrowing	Sale of asset
Poor	0.049**	-0.075***	0.031	-0.001
	(0.024)	(0.023)	(0.021)	(0.008)
Urban	0.072***	-0.026*	-0.068***	-0.026***
	(0.015)	(0.014)	(0.013)	(0.005)
Head literate	0.048***	0.045***	-0.130***	-0.009*
	(0.016)	(0.015)	(0.014)	(0.005)
Sex of the head	0.091***	0.004	0.039	-0.008
	(0.030)	(0.029)	(0.027)	(0.010)
Age of the head	0.002***	0.001	-0.003***	-0.000**
	(0.001)	(0.001)	(0.001)	(0.000)
Long stay in hospital	-0.069***	-0.051***	0.053***	0.017***
	(0.017)	(0.016)	(0.015)	(0.006)
Sex of the child	0.038**	-0.022*	-0.026**	-0.010**
	(0.015)	(0.010)	(0.013)	(0.005)
Low caste	0.018	-0.064***	-0.025*	0.004
	(0.017)	(0.016)	(0.015)	(0.005)
Income earning child	0.224**	-0.029	-0.168*	0.004
	(0.111)	(0.105)	(0.098)	(0.037)
Ln Hospital price	-0.075***	-0.017	0.073***	0.002
	(0.023)	(0.022	(0.020)	(0.007)
Constant	0.101**	0.235***	0.396***	0.061***
	(0.045)	(0.043)	(0.040)	(0.015)
No of observations	3290	3290	3290	3290
Parameters	10	10	10	10
RMSE	0.414	0.391	0.363	0.136
R-sq	0.030	0.019	0.061	0.017
Chi2	101.32	64.80	212.3	58.40
P	0.000	0.000	0.000	0.000

Robust standard errors in parentheses

* Significant at 10%; ** significant at 5%; *** significant at 1%

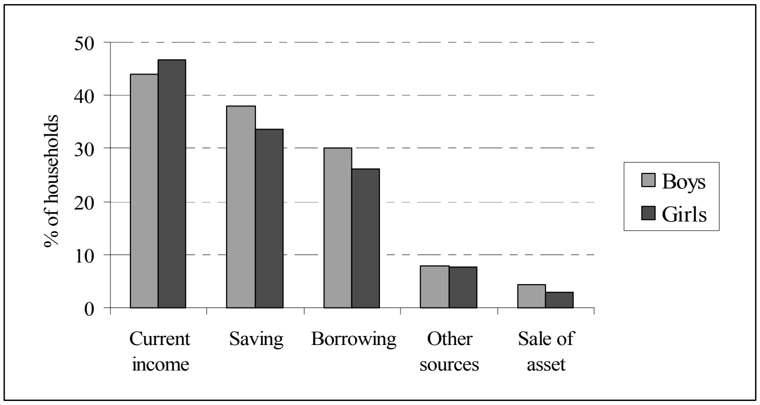
Source: Computed from the 52nd Indian NSS

Appendix II. Probit results without controlling sample selection bias

Variable	Dependent variables: inpatient expenditure financing options			
	Current income	Saving	Borrowing	Asset sale
Poor	-0.006	-0.210***	0.122	-0.022
	(0.073)	(0.076)	(0.077)	(0.122)
Urban	0.042	-0.226***	-0.284***	-0.533***
	(0.046)	(0.047)	(0.050)	(0.095)
Head literate	0.090*	0.126**	-0.460***	-0.164*
	(0.048)	(0.049)	(0.052)	(0.088)
Sex of the head	0.381***	0.092	0.161	-0.157
	(0.095)	(0.096)	(0.103)	(0.159)
Age of the head	0.005***	-0.000	-0.013***	-0.008**
	(0.002)	(0.002)	(0.002)	(0.004)
Long stay in hospital	-0.095*	-0.072	0.232***	0.409***
	(0.053)	(0.054)	(0.056)	(0.089)
Sex of the child	0.074	-0.117**	-0.105**	-0.205**
	(0.046)	(0.047)	(0.050)	(0.090)
Low caste	0.039	-0.130**	-0.071	0.146
	(0.050)	(0.052)	(0.054)	(0.091)
Income earning child	0.516	-0.212	-0.749*	0.646
	(0.349)	(0.349)	(0.407)	(0.434)
Ln Hospital price	-0.034	0.023	0.273***	0.063
	(0.070)	(0.213)	(0.075)	(0.137)
Constant	-0.746***	-0.429***	0.028	-1.198***
	(0.140)	(0.143)	(0.149)	(0.255)
No. of observations	3290	3290	3290	3290
Log likelihood	-2246.63	-2129.93	-1859.65	-496.97
Wald chi2(10)	34.03	59.90	219.19	83.35
Prob > chi^2	0.000	0.000	0.000	0.000
Pseudo R^2	0.01	0.02	0.06	0.08
$Pr(f_{ij}=1)$ in %		-4.37	-0.34	-1.29

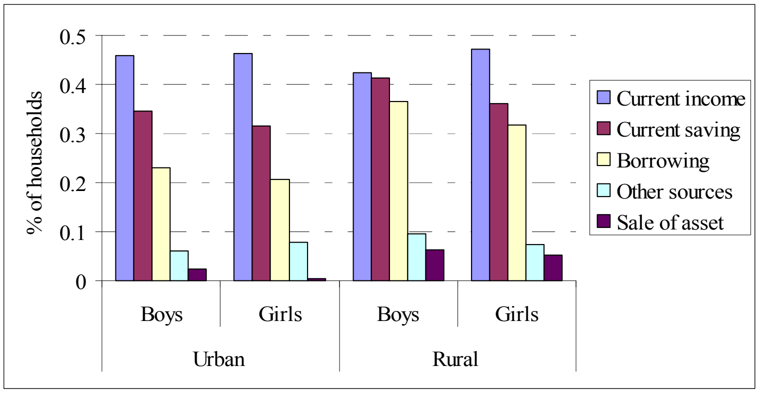
Robust standard errors in parentheses
* Significant at 10%; ** significant at 5%; *** significant at 1%
Source: Computed from the 52nd Indian NSS

Figure I. Financing mechanisms by gender



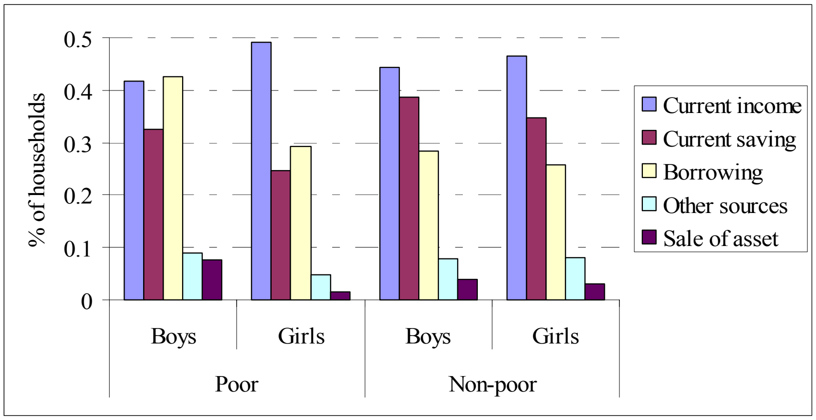
Source: Computed from the 52nd round Indian NSS

Figure II. Financing mechanisms by gender and location



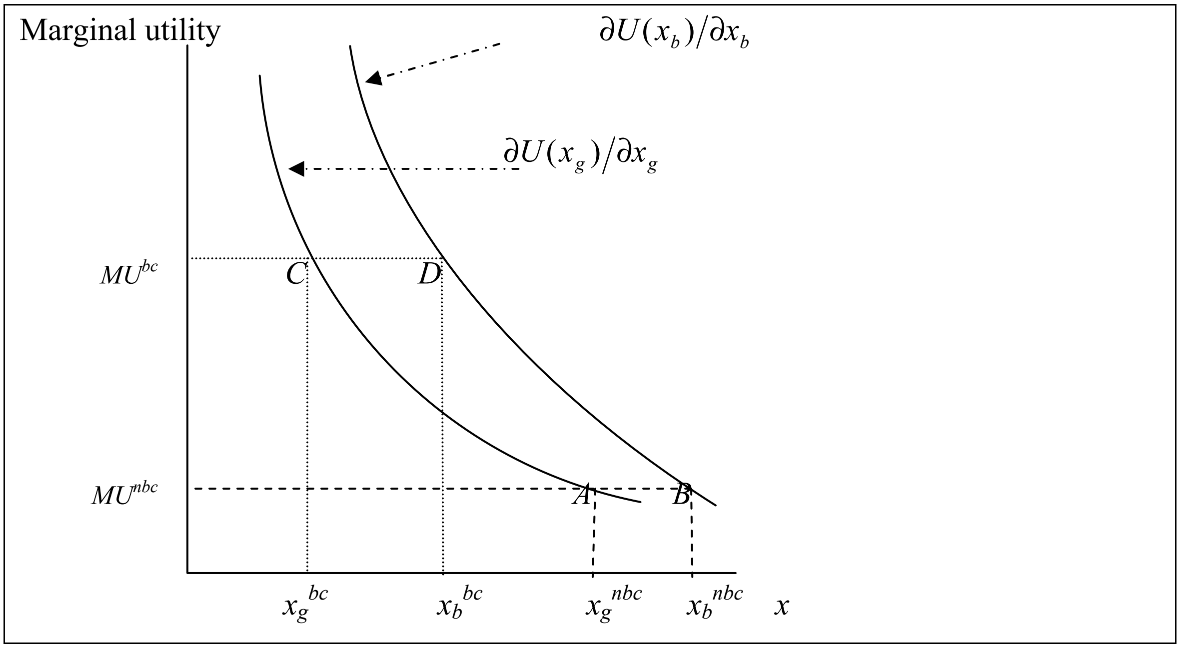
Source: Computed from the 52nd round Indian NSS

Figure III. Financing mechanisms by gender of the child and income



Source: Computed from the 52nd round Indian NSS

Figure IV. Marginal utility from health care expenditure for boys and girls



Where *bc* represents binding constraint and *nbc* non-binding constraint.