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GENDER GAP IN PARENTS' FINANCING STRATEGY FOR HOSPITALIZATION OF THEIR CHILDREN: EVIDENCE FROM INDIA

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SUMMARY

The 'missing women' dilemma in India has sparked great interest in investigating gender discrimination in the provision of health care in the country. No studies, however, have directly examined discrimination in health-care financing strategies in the case of severe illness of sons versus daughters. In this paper, we hypothesize that households who face tight budget constraints are more likely to spend their meager resources on hospitalization of boys rather than girls. We use the 60th round of the Indian National Sample Survey (2004) and a multinomial logit model to test this hypothesis and to throw some light on this important but overlooked issue. The results reveal that boys are much more likely to be hospitalized than girls. When it comes to financing, the gap in the usage of household income and savings is relatively small, while the gender gap in the probability of hospitalization and usage of more onerous financing strategies is very high. *Ceteris paribus*, the probability of boys to be hospitalized by financing from borrowing, sale of assets, help from friends, etc. is much higher than that of girls. Moreover, in line with our theoretical framework, the results indicate that the gender gap intensifies as we move from the richest to poorest households. Copyright © 2009 John Wiley & Sons, Ltd.

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1. 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 occurrence 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). The authors have concentrated their research on gender discrimination in nutrition, labor 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;

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Sudha and Ranjan, 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 and 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). As a large portion of total health-care costs is borne by households, such inequalities are largely related to household decisions about who to grant access to such health care.

In a separate literature, numerous authors have also examined the health-care financing strategies and coping mechanisms of households in developing countries (Chen *et al.*, 1981; Jayawardene, 1993; Haddad and Reardon, 1993; Klasen, 1996; Seeley *et al.*, 1995; Sauerborn *et al.*, 1996a,b; Wilkes *et al.*, 1997; Konradsen *et al.*, 1997; Adams *et al.*, 1998; Fabricant *et al.*, 1999; Lucas and Nuwagaba, 1999; Mutyambizi, 2002; Skarbinski *et al.*, 2002; Chuma *et al.*, 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 household strategies for health-care financing of hospital stays vary by gender in India. The study focuses on infants and children (aged from 1 day to 9 years) for three reasons. First, excess female mortality is particularly high in this age group. Second, compared with adults and teenagers, children's medical care depends entirely on their parent's decisions. This circumstance helps us to examine clearly intrahousehold gender bias in health-care financing mechanisms. Third, focusing on children also reduces differences in medical need due to biology and exposure to risks (occupation, pregnancy, gender-specific exposure to violence, old age, etc.) that potentially affect the chances of hospitalization.[1] Additionally, for children under 10 years, the disparity in the contribution to household income of boys and girls that, in turn, might affect the health-care decision of households, is very small. In our data, very few children (0.14% of boys and 0.11% of girls) are involved in income-generating activities and the difference between boys and girls is not statistically significant. Furthermore, we focus explicitly 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 17 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. Among various financial sources available to cover children's inpatient costs, using households' own income or savings is assumed to be least onerous. Other sources of finance – borrowing, selling assets such as draught animals, ornaments and other physical assets, and asking for help from relatives and friends – are considered as more scarce financial resources and imply considerably greater sacrifice and long-term costs. In India, particularly in the rural areas where credit markets are not well developed, borrowing money has huge transaction costs and carries high interest rates; falling into debt can therefore promote a long-term downward trajectory. Still today, as Ramachandran and Swaminathan (2001; p. 1) point out, 'the Indian peasant is born in debt, lives in debt and dies in debt.' The short- and long-term implications of selling assets also compromise future well-being; the moral price and the future indirect costs of financial help from friends and relatives pose similar serious problems and obligations. We, therefore, hypothesize that parents are less likely to use such scarce resources to finance the inpatient health expenses of girls rather than boys.

The paper is organized as follows: Section 2 sketches the analytical approach and the econometric specification of the study. Section 3 illustrates the data set used and the measurement issues involved. Section 4 presents the results of the study and Section 5 concludes.

[1]We do, however, consider below the issue that even in this age group, hospitalization needs may differ, possibly due to different behavioral patterns of boys versus girls.

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2. ANALYTICAL APPROACH

In this study, we hypothesize that there is gender discrimination in the health-care financing strategies of Indian households and that this discrimination is more pronounced when households face tight resource constraints. In other words, we hypothesize that parents are more willing to use costly and onerous financing sources (despite their long-term costs) to hospitalize their sons rather than their daughters.

The theoretical basis for this hypothesis can be derived from a normally behaved utility function with respect to health expenditures of sons and daughters. Our objective is to study 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,

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

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

where $U(\cdot)$ 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.

Since we are dealing with children under the age of ten, we reasonably assume that both boys and girls have a similar health status, i.e. the probability of being sick, hospitalized, etc., is comparable.[2] 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 *et al*., 2003; Das Gupta, 2005; and the literature cited there). This preference implies that parents' utility of investing in boys' health is higher than the utility of investing in girls ($U(x_b) > U(x_g)$). This preference holds if $\gamma < 1$. The marginal utility functions are given by $\partial U(x_b)/\partial x_b = x_b^{-1/\sigma}$ and $\partial U(x_g)/\partial x_g = \gamma x_g^{-1/\sigma}$ for boys and girls, respectively.

Figure 1 plots these marginal utility functions. Consistent with the diminishing marginal utility theory, the slopes of both curves are negative and the marginal utility from investing in boys' health is higher than that of girls for every level of health expenditure, 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 $\gamma < 1$,

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

If the resource constraint is not binding, parents are more likely to spend additional money on health-care expenditure for 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 a non-binding resource constraint, therefore, is 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 a binding budget constraint condition, health-care expenditure would be less than expenditure under a 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 health expenditure will be given by the line $x_b^{bc}\ x_g^{bc}$, which is greater than $x_b^{nbc}\ x_g^{nbc}$. Households who face tight budget constraints, therefore, are more likely to spend the meager resource on boys rather than girls.[3] This result implies that resource constraints can exacerbate the gender gap in household health-care expenditure, which holds true as long as

$$\partial U(x_b)/\partial x_b > \partial U(x_g)/\partial x_g \quad \text{and} \quad |\partial^2 U(x_b)/\partial x_b^2| > |\partial^2 U(x_g)/\partial x_g^2|$$

[2]We discuss the empirical relevance of the assumption below.

[3]Different scenarios, however, could be observed if the slope of the marginal utility curve for girls is steeper than that of boys, which would imply not only a shift, but a different shape of the utility function.

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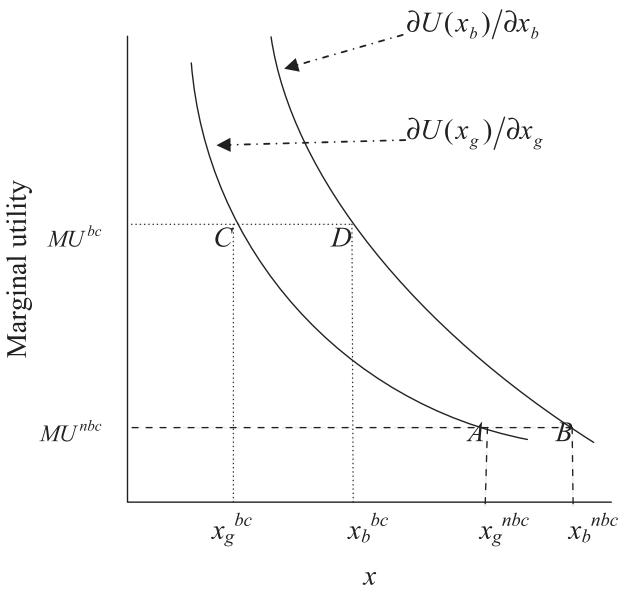

Figure 1. Marginal utility from health-care expenditure for boys and girls, where bc represents binding constraint and nbc the non-binding constraint

Estimating the relationship between gender and the health-care financing strategy of households is very complex. Households are expected to make several decisions in sequence, and others simultaneously. Some of the these decisions include identifying the health status of the children, the need for hospitalization, the availability of resources, the health financing strategy, etc. Since most of the decisions are interdependent, one decision cannot be made without taking the outcome of the other decision into account. For instance, the decision whether or not to hospitalize a child depends on the availability of resources and the options for a financing strategy.

Various issues should also be considered in estimating the impact of gender on health-care financing strategy of households. First, there can be serious bias in the probability of household reporting of children's health status. Pokhrel (2007) and Pokhrel and Sauerborn (2004) have shown that different factors can affect parental behavior in reporting children's illnesses. Second, health-care financing outcomes 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 household decisions on health-care financing based on only hospitalized children may lead to a sample selection bias. Presumably given sickness, parents are more likely to hospitalize boys (as is the case in India, see Asfaw *et al.*, 2007b); consequently the observed hospitalized children may not be random. This means factors that affect the decision of parents to hospitalize children can be correlated with factors that affect household strategies for health-care financing. In fact, regression results based on hospitalized children alone can be biased and inconsistent (Greene, 2003, 2006; Wynand *et al.*, 1981). Some authors try to overcome this problem by assuming that factors affecting the health status of individuals are not correlated with factors affecting their health-care demand behavior. Others address this problem by jointly estimating the illness and the health-care demand functions (Akin *et al.*, 1998; Rous and Hotchkiss, 2003). While such approaches are clearly important in this context and also generate interesting findings about the determinants of illness, provider choice and health expenditures, one of the basic problems is properly identifying the health status/illness equation, where instruments that satisfy the necessary properties are not easy to find.

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In this study, we address the sample selection and the potential endogeneity of the hospitalization decision variable by considering all children in the sample in a nominal outcome framework. Since our particular interest is to examine whether gender affects the intrahousehold strategies to finance hospitalization of children under tight budget constraints, compared with those who were not hospitalized, the problem can be appropriately modeled using multinomial logit (MNL) specification. Under this model, the non-hospitalized children are considered as one distinct category together with other children who were hospitalized and used different sources of finance. This structure helps us to control for the endogeneity of household decisions on hospitalization and it rules out the selection bias problem. We argue that this approach is also preferable to multistage estimation procedures, such as a censored bivariate probit model, since the decision of households to hospitalize their sick children and to decide on the financing strategy to cover the hospitalization costs are usually made simultaneously, as parents are unlikely to agree to very costly hospitalization without having a sense of how they will finance this.[4]

All children are divided into five mutually exclusive groups: not hospitalized; hospitalized and financed through income and savings; hospitalized and financed through borrowing; hospitalized and financed through sale of assets and help from friends and relatives; and finally, hospitalized and financed through a combination of income and savings, borrowing or help from friends and relatives. Among various outcomes, these five categories are created based on tests for combining dependent categories. Two categories m and n are indistinguishable if the odds of category m versus category n are not affected by any of the explanatory variables. A Wald or an LR test (Long and Freese, 2003) can test this hypothesis. If the null hypothesis cannot be rejected, we combine the two categories. In addition, we test the independence of irrelevant alternative assumptions of the MNL model using the Hausman and Small and Hsiao tests.

The MNL model can be formally presented as follows: let y_i be the unordered categorical dependent variable that takes one of the values from 1 to J, where J is the total number of categories (in our case 5). The stochastic component is given by $y_i \sim$ multinomial $(y_i|\pi_{ij})$, where $\pi_{ij} = \Pr(y_i = j)$ for $j = 1,\ldots,J$. The systemic component, which is also the predicted probability for each category, is given by $E(y) = \pi_{ij} = \exp(x_i\beta_j)/\sum_{k=1}^{J}\exp(x_i\beta_k)$, where x_i is the vector of explanatory variables for observation i, and β_j is the vector of coefficients for category j.

3. SOURCES OF DATA AND MEASUREMENT OF VARIABLES

In this study, we use the 60th Indian National Sample Survey (NSS) data set. Since 1950, the NSS Organization of India has been collecting household-level data on socio-economic conditions of the population, as well as economic and operational features of informal enterprises and establishments (Saha, 2002). The 60th round data was collected between January and June 2004, adopting a two-stage stratified sampling procedure. Among other things, the data set contains extensive information on outpatient and inpatient health-care utilization and expenditure, details on sources of finance for meeting health expenses, figures on mortality and other health-care related information for both rural and urban households. This study uses the data on the incidence of hospitalization (inpatient care) during the last 365 days before the survey, inpatient medical and non-medical expenses for each hospitalized person, and sources of financing these expenses.

Households used four different financing sources: household income and savings, borrowing, contributions from friends and relatives, and sale of assets including sale of ornaments, other physical

[4]It may be argued that since households may not know the amount of money needed to hospitalize their children, the hospitalization and consequently the sources of finance decisions might be made sequentially. However, in reality, households have some experience about how much hospitalization costs and they know their capability and income sources to decide whether to hospitalize their sick children or not. We thank one of the reviewers for this idea.

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Table I. Descriptive statistics of the variables used in the analysis (60th round)

Variable (for children under 10 years old)	(2004)
Sex of the household head (1 male and 0 otherwise)	0.93
Age of the household head	44.74
Relation of the child to the head (1 if the head is the father/mother of the child)	0.62
Education (1 if the head is literate and 0 otherwise)	0.62
Social status (1 if scheduled tribes, caste or other backward class and 0 otherwise)	0.70
Urban (1 if the household is located in urban areas and 0 otherwise)	0.31
Sex of the child (1 girl and 0 otherwise)	0.48
Age of children	
Girls	4.63
Boys	4.61
Percentage of children hospitalized (1 year before the survey) for treatment	
Girls	0.62
Boys	1.02
Percentage of children engaged in income generating activities (%)	
Girls	0.11
Boys	0.15
Average number of children in the household	2.67
Median district level hospital prices per hospitalized child (INR) (proxy for user fees)	2457
Median district level transport cost to the nearest hospital (INR) (proxy for distance)	195
Percentage of households used different financing mechanisms for their children	
Household income/saving	53.86
Borrowing	12.00
Sale of asset and contribution from friends/relatives	4.57
Income/saving, borrowing and help from friends/relatives	29.57
Per capita monthly expenditure (INR)	565
Total umber of observations	73395

Source: Computed from the 60th Indian NSS.

assets, animals, etc. Some households used a combination of these four financing options. As previously shown, in addition to the non-hospitalized option, this study uses four mutually exclusive financing options identified for hospitalized children based on tests for combining dependent categories. Excluding the non-hospitalized children, 54% of households financed children's hospitalization expenses from their income/savings, 12% from borrowing, 5% from sale of assets and contributions and 29% from income and savings, borrowing or help from friends and relatives.[5]

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 and family size of the household plus the social status, educational level and gender of the household head). The access variables include user fees and transport costs. Unfortunately, direct information is not available on most of the access variables. We use medical expenses, therefore, to measure prices and transport cost to approximate distance. We compute district-level median values of medical and transport costs and use these median values for each individual within the district irrespective of particular characteristics. Hallman (1999), Ii (1996) and Dor (1986) use similar approaches to measure user fees. Since information on the severity of illness could not be observed for non-hospitalized children, this variable is not included in the analysis. Table I presents the descriptive statistics of the variables used in the analysis.

As expected, a higher share of boys than girls are hospitalized. In line with findings from the literature and from related studies undertaken using the 52nd round data (e.g. Hazarika, 2000; Asfaw *et al*., 2007a), 1.02% of boys are hospitalized compared with 0.62% of girls, and the difference is

[5]This last financing option is a combination of different financing strategies. From these different mixes, the share of current income/saving and borrowing was more than two-thirds and the share of current income/saving and help from friends/relatives was less than one-third. The results should therefore be interpreted in this context.

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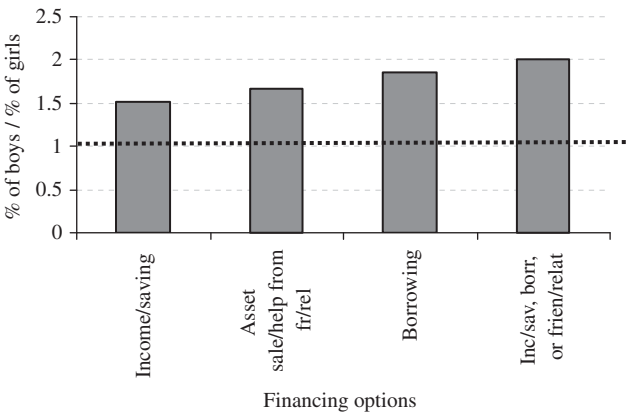

Figure 2. Ratio of percentage of hospitalized boys and girls by sources of finance. *Source*: computed from the 60th round Indian NSS

statistically significant ($p<0.001$). Given hospitalization, however, there is no statistically significant gender difference in the duration of stay in hospital. This suggests that it appears unlikely that boys are more severely ill when hospitalized; in fact, findings from Asfaw *et al*. (2007b) suggest that, given need, boys are more likely to be hospitalized.[6] Please also note that hospitalization is quite expensive, relative to monthly per capita expenditures.

4. RESULTS

4.1. Descriptive results

Figure 2 presents the ratio of the percentage of hospitalized boys and girls by sources of finance. The bold horizontal line indicates equal proportion in utilization of different sources of finance for hospitalized boys and girls. As boys are more likely to be hospitalized than girls, it is not surprising that the ratio is above one for all financing strategies. More interesting are, however, the differences between the different financing strategies. Consistent with our theoretical framework and hypothesis, households are particularly less likely to rely on more onerous financing strategies to finance the hospitalization costs of girls. The graph illustrates clearly increasing gender gap in resource utilization as we move from less expensive to relatively expensive and more onerous sources of finance. For instance, the percentage of hospitalized boys financed through borrowing is 1.8 times higher than that of girls, and most of these differences are statistically significant at the 1% level.

The patterns remain quite similar between poor and non-poor households as shown in Figure 3. Of particular note is, however, that the poor, as would be expected, are more likely to borrow funds, sell assets and get help from friends and relatives to finance a boy's hospital stay. For instance, in poor households, the percentage of boys whose inpatient health expenses were financed through sale of assets, help from friends and relatives, and borrowing is five and six times higher than that of girls, respectively. In contrast, the percentages of boys and girls in poor households whose expenses are financed through household income and savings are almost equal. This implies where resource constraints are particularly binding the gender gap in financing strategies intensifies.

These bivariate results, therefore, highlight the gender gap in intrahousehold utilization of scarce resources to finance children's inpatient health expenditure in India. The next important question is

[6]The absence of a difference in stay also suggests that the hospital stays of boys end up costing parents more, which might justify more drastic financing options.

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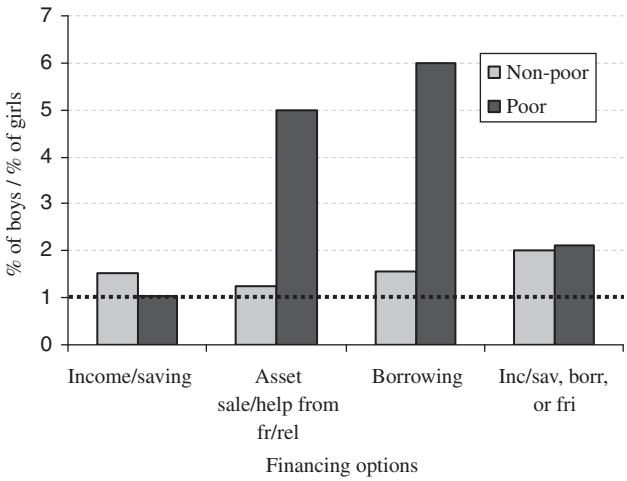

Figure 3. Ratio of percentage of hospitalized boys and girls by source of finance and income of the household. *Source*: computed from the 60th round Indian NSS

whether these results stay or disappear when we apply rigorous econometric analysis that controls for other variables and addresses the sample selection and endogeneity problems.

4.2. Econometric results

An MNL model is estimated to examine the gender gap in the probability of using different health-care financing resources. As shown above, inclusion of the non-hospitalized children in the analysis avoids the endogeneity and sample selection problems associated with the hospitalization decision. The MNL model, however, has one limitation: the assumption of the independence of irrelevant alternatives. We use the Hausman and Small and Hsiao tests to examine whether adding or deleting outcomes affect the odds among the remaining outcomes. The results showed that the odds (outcome-m versus outcome-n) are independent of other alternatives.

Table II presents the MNL results. Note that all results are relative to children who were not hospitalized, the reference category. As expected, children from rich and urban households were more likely to be hospitalized and their expenses to be financed from households' income and savings; this is consistent with many of the studies mentioned above finding a fairly sizable income elasticity of health-care demand (e.g. Rous and Hotchkiss, 2003). Additionally, biological children were more likely to be hospitalized and to use relatively expensive sources of finances compared with other children, such as grandchildren. Other important results indicate that the probability of hospitalization decreases as family size increases; distance affects probability of hospitalization and using particular financing strategies more than user fees (though not all of the coefficients are statistically significant). Age of the child affects the probability of hospitalization and usage of different financing sources as shown by the negative and positive coefficients of the age and the age square variables, respectively. These results all appear quite plausible and qualitatively in line with findings from the literature.[7]

As expected, the sex variable is negative and statistically significant in most of the equations, suggesting considerable gender bias in access to hospital treatment between girls and boys, relative to non-hospitalized children. While this is the result of both the hospitalization and the financing decision, the difference in the coefficients suggests that the financing decision is also affected by the sex of the

[7]As our approach differs from most of the health-care demand literature in just considering one provider choice (hospitals) and by focusing on the financing strategy, the quantitative results cannot easily be compared with other studies.

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Table II. MNL results

	Dependent variables[a]			
	Hospitalized and expenses financed from			
Variable	Income/savings	Borrowing	Asset sale/help	Inc./sav., bor., help
Sex of child: Girl	−0.39***	−0.61**	−0.44	−0.71**
	(0.10)	(0.28)	(0.33)	(0.23)
Age of the child	−0.42***	−0.46**	−0.54**	−0.66***
	(0.09)	(0.16)	(0.20)	(0.11)
Age square of child	0.03**	0.03	0.03	0.05***
	(0.01)	(0.02)	(0.03)	(0.01)
Ln per capita exp.	0.82***	−0.17	0.20	0.49**
	(0.17)	(0.18)	(0.46)	(0.16)
Urban	0.25	0.56*	0.37	−0.18
	(0.25)	(0.28)	(0.51)	(0.20)
Head illiterate	−0.26*	−0.09	−1.04	−0.02
	(0.13)	(0.24)	(0.61)	(0.15)
Age of the head	0.05	−0.02	0.06*	0.02
	(0.03)	(0.02)	(0.03)	(0.04)
Age square of the head	−0.00*	0.00	−0.00	−0.00
	(0.00)	(0.00)	(0.00)	(0.00)
User fees	−0.06	0.03	0.23	0.10
	(0.05)	(0.10)	(0.12)	(0.08)
Scheduled tribe/caste	0.23*	0.43	1.07**	0.49*
	(0.10)	(0.32)	(0.38)	(0.21)
Female head	−0.41*	0.17	−0.58	0.12
	(0.17)	(0.65)	(1.03)	(0.28)
Distance to hospital	−0.11	−0.05	−0.11	−0.18
	(0.15)	(0.11)	(0.10)	(0.12)
Biological child	−0.01	1.12*	1.39**	0.14
	(0.22)	(0.47)	(0.44)	(0.28)
Number of children	−0.12	−0.04	−0.45*	−0.05
	(0.08)	(0.11)	(0.20)	(0.08)
	(0.09)	(0.16)	(0.20)	(0.11)
Constant	−9.17***	−4.86***	−11.59***	−7.51***
	(1.33)	(1.29)	(3.08)	(1.26)
Number of obs.	73 395			
Pseudo-R^2	0.06			
LR $\chi^2(52)$	11 0121.25			
Prob$>\chi^2$	0.0000			
Log pseudo-likelihood	−4346.4527			

[a]Not hospitalized children are the base category.
Robust standard errors in parentheses. *Significant at 10%; **significant at 5%; ***significant at 1%. *Source*: Computed from the 60th Indian NSS.

child. The negative coefficients are much larger (in absolute terms) for borrowing and a combination of financing strategies than for using current incomes and savings suggesting that parents are particularly reluctant to use these more onerous strategies to hospitalize their daughters. Similar studies conducted in India using the 52nd NSS data set (1994/1995) 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).

5. DISCUSSION AND CONCLUSION

Our primary objective is to examine the gender gap in the household strategies for health-care financing. Our main interest, therefore, lies in the impact of gender on hospitalization and on the usage of different resources to finance the hospitalization costs.

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For the sake of interpretation, the predicted probabilities of boys and girls to be hospitalized and to receive different financing options ($P(category\ j = 1|x)$) relative to all children who were not hospitalized are computed by keeping all other explanatory variables at their mean values.

Figure 4 presents these predicted probabilities and the percentage differences between boys and girls relative to non-hospitalized children. The left axis measures the percentage differences in predicted probabilities between boys and girls and the right axis measures the levels of predicted probabilities. As the figure illustrates, the probability of girls to be hospitalized and to use various health-care financing options is very low compared with boys. For instance, the probability of girls to be hospitalized and to use household income and savings is 0.29% compared with 0.42% for boys. The same holds for other financing options.

The percentage gap, however, is particularly large in the case of more onerous financing strategies. To see this clearly, consider the percentage gaps in the probability of being hospitalized and using different resources between boys and girls, plotted in the left axis of Figure 4. As the shaded bars show, the percentage difference between boys and girls in the probability of being hospitalized and using different financing options increases as we move from readily available financial resources to relatively scarce and expensive sources. For instance, the probability of boys to be hospitalized and to use borrowed money and a combination of other expensive financing sources is twice as high as that of girls. This suggests that the gender gap is more pronounced when using scarce resources.

To further examine our hypothesis that resource constraints can exacerbate the gender gap, we examined the impact of gender on the probability of hospitalization and usage of different financing mechanisms by income. We expect the gender gap between rich and poor to be strong in the case of relatively tight or expensive resources. To illustrate this, we include an interaction term between gender and income in the MNL equation and then calculate the probability of boys and girls not to be hospitalized (the base category) and the probability to be hospitalized and to use different sources of finance for different income groups. The results are presented in Figure 5.

Panel (e) of Figure 5 shows the probability of boys and girls not to be hospitalized by income of the households. The graph indicates that the probability of no hospitalization declines as income increases. Across all income groups, girls are more likely not to be hospitalized when compared with boys, but the gender gap declines as income increases. Consistent with our theoretical framework and hypothesis, the gender gap in the probability of hospitalization and usage of income and savings is very low as shown in Panel (a) and partly in Panel (b) of Figure 5. As expected, the poor are also less likely to use these financing mechanisms frequently. The gender gap in the probability of children to be hospitalized and to use borrowed money or resources from sale of assets and contributions from friends and relatives is very high, as shown in panels (c) and (d). More interestingly, this gap increases at an increasing rate as we

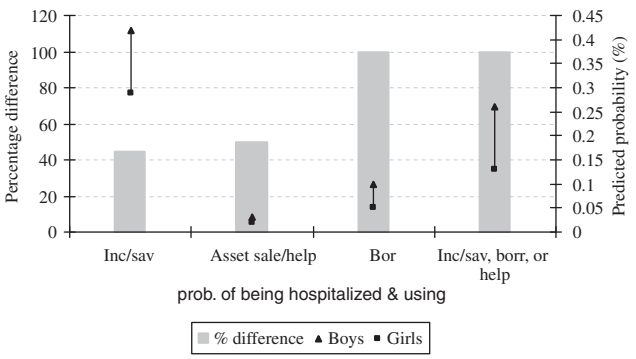

Figure 4. Predicted probability of hospitalization and utilization of difference sources of finance. *Source*: computed from the 60th round Indian NSS

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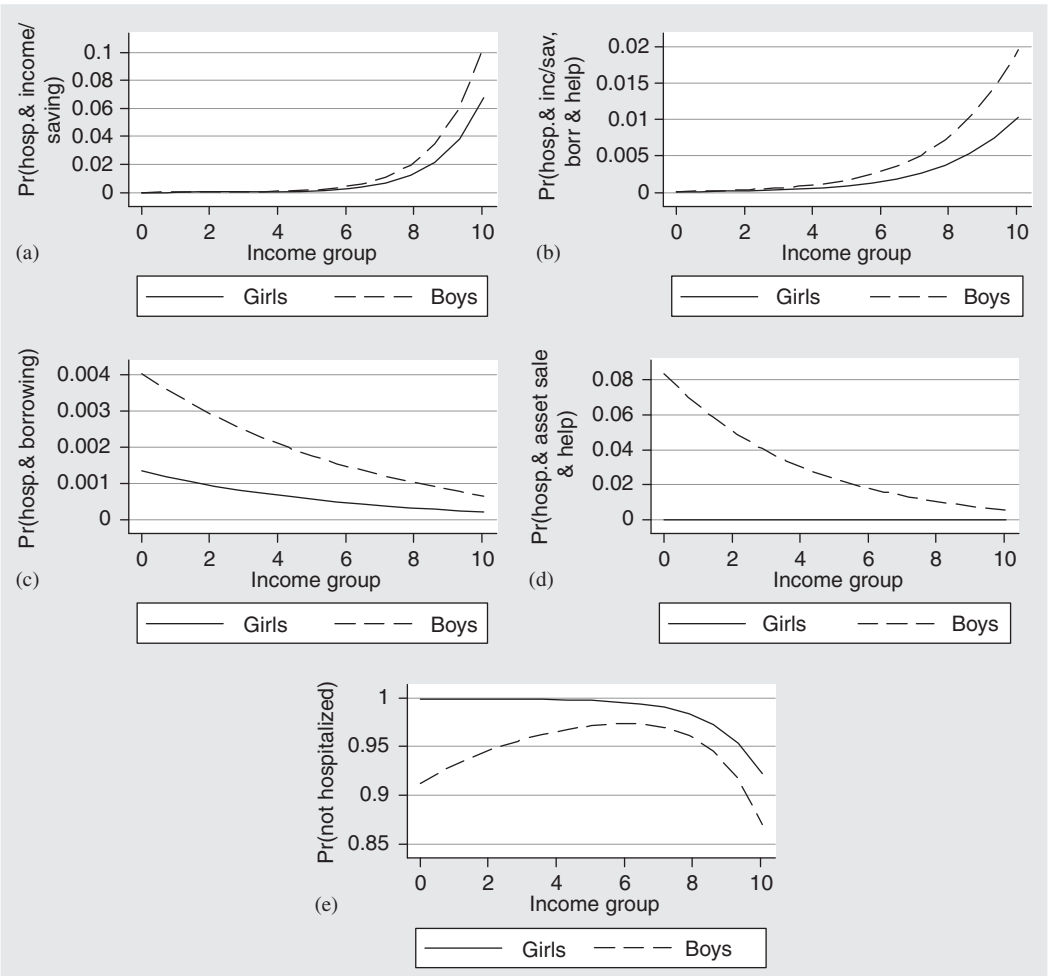

Figure 5. Predicted probabilities of different outcomes by income. *Source*: computed from the 60th round Indian NSS

move from the richest to the poorest households. 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.

These results thus strongly support our theoretical framework presented in the analytical section and shed new light on our knowledge of gender discrimination in the health-care behavior of households. Gender exerts statistically significant influence on the probability of children to be hospitalized and on the household to finance from relatively scarce sources, such as borrowing and selling of assets. Moreover, the results indicate that this gender gap is exacerbated by poverty.

These results highlight new aspects of gender discrimination by financially constrained households in response to health shocks. Not only are girls less likely to be hospitalized, but also households in India are very cautious about using expensive mechanisms to finance the inpatient health-care costs of girls compared with boys. As the budget constraint becomes tighter, households tend to give more priority to boys than to girls. In particular, households who face tight budget constraints are more likely to favor boys than girls in their hospitalization decision. In other words, being a girl likely decreases chances for

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receiving scarce financial resources for hospitalization, controlling for all other variables. Thus, we show that apart from the 'standard' determinants of health-care demand and provider choice, such as incomes, prices, distance and provider quality (e.g. Rous and Hotchkiss, 2003, Akin *et al.*, 1998), in the Indian case sex of the patient appears to be one of the most important driver of health-care demand and expenditures, at least in the case of hospitals, the most costly form of health-care intervention.

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 are less constrained by tight budgets, as shown in Figure 4 and Panels (a) and (b) of Figure 5.

In addition to other several factors, these results imply that intrahousehold gender discrimination in allocating scarce financial resources for health care appears to be a contributing factor for the observed high gender gap in Indian child mortality, morbidity, hospitalization, etc. This may indicate that the gender gap in health-care utilization and consequently in mortality could be narrowed if more households could finance the health expenses of their children from relatively cheap sources of finance, such as from their income and savings.

As far as policy options to reduce this gender gap in India are concerned, our results suggest that easing the financial burden of catastrophic health problems that typically require hospitalization can help to reduce the observed gender gap in health-care utilization between boys and girls. Similarly, promoting different health-care financing mechanisms, such as various forms of health insurance programs that also reach the poor (e.g. pre-paid programs, micro-insurance programs or social health insurance approaches), or decreasing the price of hospitalization may help to reduce the gender gap in health-care utilization. A more drastic option would be to reduce the costs of hospitalization, or health care more generally, only in the case of girls to counter the parental incentives to discriminate against their daughters.[8] These actions could create sustainable financing options for lower income families, leading to better health outcomes and additionally to a more balanced sex ratio in the country.

While our study has highlighted one important mechanism of gender inequality in health access in India, further research should concentrate on modeling the entire chain of events from differential illness rates via sex-differentiated health-seeking behavior, gender discrimination in provider choice and expenditures. Some of these aspects we tackle in related papers (see Asfaw *et al.*, 2007a,b), but there is much more work needed to fully understand which stages in this chain of events are mostly responsible for this. Here it will be useful to also consider structural modeling approaches that study the entire chain of events that lead to the observed sizable gender bias in mortality.

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[8]Similar approaches have been taken to selectively promote the education of girls or the entrepreneurship of women (through micro-credit) in countries where they face fewer educational or income-earning opportunities, respectively. For a discussion, see King *et al.* (2008).

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REFERENCES

Adams A, Cekan J, Sauerborn R. 1998. Towards a conceptual framework of household coping: reflections from rural West Africa. *Journal of the International African Institute* **68**(2): 263–283.

Akin JS, Guilkey DK, Hutchinson PL, McIntosh MT. 1998. Price elasticities of demand for curative health care with control for sample selectivity on endogenous illness: an analysis for Sri Lanka. *Health Economics* **7**: 509–531.

Arnold F, Kishor S, Roy TK. 2002. Sex-selective abortions in India. *Population and Development Review* **28**(4): 759–785.

Asfaw A, Klasen S, Lamanna L. 2007a. Intrahousehold gender disparities in children's medical care before death in India. *IZA Discussion Paper No. 2586*.

Asfaw A, Klasen S, Lamanna L. 2007b. *Gender Inequality in Health Care Utilization in India between 1986 and 1996: Is There any Progress*? Mimeographed, Washington, DC.

Basu AM. 1989. Is discrimination in food really necessary for explaining sex differences in childhood mortality? *Population Studies* **43**(2): 193–210.

Behrman JR. 1988. Intrahousehold allocation of nutrient in rural India: are boys favoured? Do parents exhibit inequality aversion? *Oxford Economic Papers* **40**(1): 32–54.

Booth BE, Verma M, Beri RS. 1994. Fetal sex determination in infants in Punjab, India: correlations and implications. *British Medical Journal* **309**: 1259–1261.

Chen LC, Huq E, 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 KK, Hanifi AM, Rasheed S, Bhuiya A. 2000. Gender inequality and severe malnutrition among children in a remote rural areas of Bangladesh. *Journal Health, Population and Nutrition* **18**(3): 123–130.

Chuma J, Gilson L, Molyneux C. 2007. Treatment-seeking behaviour, cost burdens and coping strategies among rural and urban households in coastal Kenya: an equity analysis. *Tropical Medicine and International Health* **12**(5): 673–686.

Coale JA. 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*. Routledge: London and New York.

Das Gupta M. 1987. Selective discrimination against the female child in rural Punjab, India. *Population and Development Review* **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, 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 A. 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, New York, USA.

Ellen A, Hunt K. (eds). 2000. *Gender Inequalities in Health*. Open University Press: Buckingham.

Fabricant SJ, Kamara CW, Mills A. 1999. Why the poor pay more: household curative expenditures in rural Sierra Leone. *International Journal of Health Planning Management* **14**: 179–199.

Ganatra BR, Hirve SS. 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): 113–131.

Greene W. 2003. *Econometric Analysis*. Prentice-Hall: New Jersey.

Greene W. 2006. In Censored data and truncated distributions, Mills T, Patterson K. (eds). *The Handbook of Econometrics*, vol. 1. Palgrave: London; 695–734.

Haddad L, 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 K. 1999. Child health care demand in a developing country: unconditional estimates from the Philippines. *Food Consumption and Nutrition Division Discussion Paper 70*. International Food Policy Research Institute: Washington, DC.

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.

DOI: 10.1002/hec

Hill K, Upchurch DM. 1995. Gender differences in child health: evidence from the demographic and health surveys. *Population and Development Review* **21**(1): 127–151.
Ii M. 1996. The demand for medical care: evidence from urban areas in Bolivia. *Living Standards Measurement Study Working Paper 123*. World Bank: Washington, DC.
Jatrana S. 2003. Explaining gender disparity in child health in Haryana state of India. *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. *Social Science Medicine* **37**: 1169–1176.
Khan ME, Barge S, Philip G. 1996. Abortion in India: an overview. *Social Change* **26**(3 and 4): 208–225.
King E, Klasen S, Porter M. 2008. *Gender and Development*. Paper prepared for the 2008 Copenhagen Consensus Project.
Klasen S. 1994. Missing women reconsidered. *World Development* **22**(7): 1061–1071.
Klasen S. 1996. Nutrition, health and mortality in sub-Saharan Africa: is there a gender bias? *The Journal of Development Studies* **32**(6): 913–932.
Klasen S, Wink C. 2003. Missing women: revisiting the debate. *Feminist Economics* **9**: 263–300.
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. *Transactions of the Royal Society of Tropical Medicine and Hygiene* **91**: 127–130.
Kurz KM, Johnson-Welch C. 1997. *Gender Bias in Health Care among Children 0–5 Years*: *Opportunities for Child Survival Programs*. BASICS: Arlington, VA.
Long S, Freese J. 2003. *Regression Models for Categorical Dependent Variables Using Stata*. Stata Press: Texas.
Lucas H, 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*. Institute for Development Studies: Brighton.
Miller B. 1981. *The Endangered Sex*: *Neglect of Female Children in Rural North India*. Cornell University Press: Ithaca, NY.
Muhuri PK, Preston SH. 1991. Effects of family composition on mortality differentials by sex among children in Matlab, Bangladesh. *Population and Development Review* **17**: 415–434.
Mutyambizi V. 2002. *An Exploratory Study of the Resources and Coping Strategies of Poor Urban Households Affected by HIV/AIDS in Harare*. School of Economics, University of Cape Town: Cape Town, South Africa.
Pande R. 2003. Selective gender differences in childhood nutrition and immunization in rural India: the role of siblings. *Demography* **40**(3): 395–418.
Pokhrel S. 2007. Determinants of parental reports of children's illnesses: empirical evidence from Nepal. *Social Science and Medicine* **65**: 1106–1117.
Pokhrel S, Sauerborn R. 2004. Household decision-making on child health care in developing countries: the case of Nepal. *Health Policy and Planning* **19**(4): 218–233.
Rajeshwari S. 1996. Gender bias in utilisation of health care facilities in rural Haryana. *Economic and Political Weekly* **31**(1): 489–494.
Ramachandran VK, Swaminathan M. 2001. *Does Informal Credit Provide Security? Rural Banking Policy in India*. International Labour Office: Geneva.
Rous JJ, Hotchkiss DR. 2003. Estimation of the determinants of household health care expenditures in Nepal with controls for endogenous illness and provider choice. *Health Economics* **12**(6): 431–451.
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. 1996a. Household strategies to cope with the economic costs of illness. *Social Science and Medicine* **43**: 291–301.
Sauerborn R, Berman P, Nougtara A. 1996b. 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, 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 December* **20**: 61–66.
Skarbinski J, Walker HK, Baker LC, Kobaladze A, Kirtava Z, Raffin TA. 2002. The burden of out-of-pocket payments for health care in Tbilisi, Republic of Georgia. *Journal of the American Medical Association* **287**(8): 1043–1049
Sood AK, Nagla BK. 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 and 4): 110–117.

DOI: 10.1002/hec

Sudha S, Ranjan SI. 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. *IDS Working Paper 58*. Institute of Development Studies, Brighton.
Wynand van de Ven PMM, Bernard van Praag MS. 1981. The demand for deductibles in private health insurance: a probit model with sample selection. *Journal of Econometrics* **17**: 229–252.

DOI: 10.1002/hec