Research

A contingent valuation study to estimate the parental willingness-to-pay for childhood diarrhoea and gender bias among rural households in India

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Abstract

We used contingent valuation technique to estimate the parental willingness to pay for an episode of diarrhoea among 324 children of both sexes aged between five and seven years in two rural villages of Chennai in India. The aim was to examine if there was any gender bias in the parental willingness to treat children for a diarrhoeal episode, and if so to what extent. The willingness to pay was specified as a hedonic function of the duration and severity of an episode, and of parents' socioeconomic characteristics. The findings suggest that parents were willing to pay more to protect their male child compared to the female child suffering from a diarrhoeal episode. The median willingness to pay to avoid an episode for male and female children were calculated at Rs. 33.7 (approx. US$ 0.72) and Rs. 25.2 (approx. US$ 0.54) respectively – a difference of around 34%. After adjusting for the greater duration and severity of the illness, it was found that the difference between the two medians increased to 51%.

Introduction

Contingent valuation (CV) is a survey-based hypothetical and direct method to estimate monetary valuations of effects of health technologies [1]. The validity of CV to elicit monetary valuations of health care provisions has been adequately established in the literature [2-6]. There have been several attempts to use the contingent valuation technique to estimate the willingness to pay for various health services [4,7-9]. Many of these studies have tried to estimate the value placed by individuals to protect them from illnesses. Very few studies, however, have looked at the willingness to pay (WTP) for valuing someone else's health state (e.g., parental, household or societal willingness to pay).

In Nigeria, a study compared the theoretical validity and predictive validity of the binary with follow-up questions technique and the bidding game, using hypothetical and actual WTP for insecticide-treated nets [7]. The study found that consistent slightly higher mean and median WTP amounts were elicited where the bidding game was used. The study suggested that an appropriate WTP elicitation method should be developed to represent the bargaining process in normal market situations in rural Nigeria. It recommended that such an indigenous technique would help improve the predictive validity of the contingent valuation method.

Agee and Crocker [10] calculated parental WTP to minimize the risk of neurological impairments due to lead exposure among children, and used a revealed preference

approach based on the parents' decision to obtain a chelation therapy for their child. They, however, failed to estimate WTP to reduce risks of adult neurotoxicity that are smaller than risks among children.

Viscusi et al. [11] used CV to estimate WTP to avert the risk of injury from using household pesticides. The study indicated that parents place more value on their children's lives compared to their own lives. However, the study failed to recognize the effects of parental altruism and the severity of injuries.

Papatheofanis [12] used CV to estimate WTP for PET among suspected lung cancer patients. A self-administered questionnaire was used, and included questions on demographic information, perceived risk of malignancy, and perceived life expectancy given a diagnosis of malignancy. Respondents were asked to indicate their WTP for PET in US dollars.

Finally, Liu et al. [13] used CV to estimate mother's WTP for her own and her child's health in Taiwan. The study used a structured bidding process questionnaire to capture maternal WTP. The results suggest that mother's WTP for her child's health was higher than that for her own health. The study, however, did not take into account the altruistic maternal nature in the analysis, which could partly justify higher maternal WTP for her child's health.

In this paper, we aimed to apply the contingent valuation technique to estimate the parents' willingness to pay for their child's diarrhoeal episode in rural India. The main objective was to explore whether or not parents' systematically valued their children differently on the ground of their child's gender, and if so to what extent does this valuation-based discrepancy exists between genders. It was hypothesized that different parental behaviour towards seeking treatment for their child on the ground of gender would have serious social policy implications. The undervaluation of female children by parents when it comes to treating a disease may elicit the direction and extent of other important parental valuations that may have major impacts on societal development, such as parental valuation about education, human rights, social justice and gender equity.

Methods

Data were collected during May-June and November-December of 2000 to capture the possible seasonal effects of diarrhoea. Two rural villages north of Chennai in Tamilnadu Province were selected. The two villages were adjacent to each other and had two rural dispensaries each. The sample cluster was chosen in such a manner that households would be at equidistance from either of the two dispensaries. This was done in order to minimize

WTP contamination due to distance and transportation. The sample population was randomly drawn and consisted of 250 households with children from both sexes. Households with two children (one boy and one girl) between five and seven years of age were only included in the sample. It was speculated that there might be differences in valuation if one child was a seven-year old and the other was a three-year old. In total, there were 324 children in the study population.

We used two questionnaires for data collection. We used a structured questionnaire with open-ended fields to obtain the socioeconomic information including income, employment and household ownership related information, health status including previous history of diarrhoea in the preceding three months, duration and severity, etc. The definition of diarrhoea, its symptoms, duration, and severity were properly explained to each household respondent. WTP for an episode of diarrhoea was asked to both parents (mother and father), and a mean value was calculated and used as the parental WTP in the analysis.

We used a binary-preference questionnaire with bidding options for valuation purposes. Each respondent was offered an initial bid of Rs. 10, followed by Rs. 25 and Rs. 35. The use of a common initial bid helped prevent any initial biases on the difference between valuations by different households. Three-point bidding was used, which meant that the bidding ended after the third bid with an open-ended question and the amount stated at that bid was the WTP [7].

We estimated the values to parents in rural Madras of protecting their children against a minor diarrhoeal episode using the contingent valuation. Parental values were captured through parents' willingness to pay (the mean WTP) to treat a diarrhoeal episode. In our analysis, the willingness to pay was specified as a hedonic function of the duration and severity of a diarrhoeal episode, and of parents' socioeconomic characteristics. Hedonic methods use regression analysis to adjust for quality changes in price indices. Correcting for changes in quality is essential in measuring the value of goods and services. The changes in willingness to pay values with changes in severity and duration of illness were also assessed through sensitivity analysis. In other words, we presented parents with different scenarios by varying the degree of severity and the length of an episode. The gender of child was used as a marker to examine if there was any difference in parental valuation as elicited by contingent valuation between the male and female child.

The willingness to pay to avoid an episode of diarrhoea among children was modelled as a linear function of the respondent's characteristics and the severity of illness. We

Table 1: Variable definitions and descriptive statistics

Variable	Definition	Mean (S.D.[A])
LINC	Log of monthly household income (Indian Rs.)	2,860 (0.522)
M_EDU	Years of mother's education	2.35 (1.078)
F_EDU	Years of father's education	3.70 (2.166)
MAGE	Mother's age	29.45 (3.989)
FAGE	Father's age	34.31 (3.778)
GEN	Gender of the child (male/female)	178 (Male); 146 (Female)
C_MALE	Dummy = 1 if child is male	0.549
C_AGE	Child's age	5.82 (Male); 5.54 (Female)
C_DUR	Duration of the last diarrhoeal episode	2.351 (6.878)
C_DOC	Dummy = 1 if child went to see a doctor	0.732
C_SCHL	No. of child's lost school days	0.665
F_WORK	No. of father's lost working days	0.448
F_CHRONIC	Dummy = 1 if father has a chronic disease	0.077
M_CHRONIC	Dummy = 1 if mother has a chronic disease	0.113
C_CHRONIC	Dummy = 1 if child has a chronic disease	0.166
VILL	Dummy = 1 if respondent resides in village 1	0.633

[a] S.D. values for dummy variables are omitted since they can be calculated from $\sqrt{(m-m^2)}$, where m is the fraction in the sample.

estimated the equation using the Maximum Likelihood method under the assumption that WTP was distributed log normally. Alternative distributional assumptions, such as logistic, exponential, and Weibull were rejected in favor of the lognormal distribution using a likelihood-ratio test. The explanatory variables are defined, and summary statistics are provided in Table 1.

Table 1 shows the socioeconomic characteristics included in the analysis. It was anticipated that the income effect would be positive on WTP. Additionally, it was expected that education (especially mother's education) and age could have positive effects on WTP for child health. The absence of any chronic disease was a proxy for the overall health status, and was captured by three dummy variables (i.e., F_CHRONIC, M_CHRONIC, C_CHRONIC). It was hypothesized that respondents with chronic disease would exhibit higher WTP to avoid an episode of diarrhoea if the marginal disutility of poor health was increasing [14]. The gender of the child was represented by C_MALE and C_FEMALE. Further, doctor's consultation was included to understand parental responsiveness to treatment of the disease.

The duration of illness was measured by the logarithm of the number of days of illness (e.g., Log_C_DUR). It was assumed that the disutility of illness would increase with the severity and duration. Severity was measured by the number of father's lost working days and the number of child's lost school days (e.g., F_WORK, C_SCHL).

Discussion

Unlike many studies involving contingent valuation tech-

Results

The regression model was specified for the two gender types. The regression estimates are provided in Table 2.

The results indicated that WTP increased with the household income, and there was gender bias against the male child as income level increased. Education had a positive effect on WTP with increased education level favouring the male child. WTP also increased with the duration and severity of illness.

In order to determine if the effects of illness duration and severity on WTP differed between male and female children, we used a likelihood-ratio test for the equality of illness coefficients between comparable specifications. The chi-square statistic for comparing duration, doctor-visit, father's work loss, and child's school loss coefficients was 23.42 (degrees of freedom = 5). However, the value was much higher than the appropriate critical value for the indicated degrees of freedom. Therefore, the hypothesis of parameter homogeneity between two sexes was rejected.

The median WTP for both groups of children were calculated at the corresponding sample means of the independent variables. Table 2 suggests that the median WTP for male and female child were Rs. 57.00 and Rs. 37.50, respectively. The calculation of 95% confidence interval around the median yielded ranges of Rs. 38.00 – 85.00 (i.e., US$ 0.72–1.82) and Rs. 25.00 – 54.00 (i.e., US$ 0.54–1.15) for male and female child, respectively.

nique to estimate WTP for individual health state, we used CV to gauge parental WTP for their child's diarrhoeal epi-

Table 2: Estimated parental WTP for treating a diarrhoeal episode in rural India [a]

Variable	Male Child	Female Child
Intercept	4.665 (2.226)	2.113 (2.065)
LINC	0.403 (2.218)	0.451 (2.337)
M_EDU	0.445 (2.876)	0.166 (1.776)
F_EDU	0.366 (2.176)	0.220 (1.967)
M_AGE	0.022 (0.997)	0.018 (0.001)
F_AGE	0.009 (0.267)	0.007 (0.215)
C_MALE	0.336 (1.965)	0.155 (1.847)
C_AGE	0.012 (0.044)	0.008 (0.018)
Log_C_DUR	0.157 (1.682)	0.168 (1.826)
C_DOC	-0.162 (0.388)	-0.101 (0.099)
C_SCHL	0.128 (2.109)	0.112 (1.885)
F_WORK	0.227 (1.258)	0.222 (1.138)
F_CHRONIC	0.355 (2.224)	0.301 (1.867)
M_CHRONIC	0.227 (1.259)	0.201 (1.156)
C_CHRONIC	0.338 (2.119)	0.276 (1.887)
σ	1.039	1.031
Log Likelihood	-621.58	-589.56
Median WTP (Indian Rs.)	57.00	37.50
95% CI (Indian Rs.)	38–85	25–54

[a] Absolute value of asymptotic t-statistics in parentheses. Dependent variable is log (WTP)

sode. We used gender as a marker to distinguish parental WTP between male and female children. The setting of the study was in India, where it was generally perceived that parents favoured male children more than female children. This study shows that in terms of the willingness to pay for child's health care, parents differed on their valuations between sexes and were significantly biased towards male children. This differential valuation on the ground of gender raises some policy questions regarding societal development and broader social equity.

In general, we found that educated parents were more willing to pay for their child's health care compared to uneducated parents. In particular, the relationship was found to be stronger in the case of mother being educated. However, the results indicate that gender bias towards male children increased as parental education increased. Although, this result emanated from a small sample of rural households, the result nevertheless insinuates that gender bias does not necessarily diminish with higher educational attainment. If this relationship between parental education and valuation of children (as expressed by WTP) holds true for illness, it may well hold true for education, nutrition, access to information, and other social programmes. In other words, this disturbing trend of gender bias can give rise to an inequitable resource allocation between sexes that may lead to an imbalanced social development.

Similar relationship was found between WTP and household income. In general, well-off patients were willing to pay more than poorer households. However at the same time, well-off households were willing to pay more to treat the female child than the male child.

The study findings have a few limitations. We had surveyed only two rural villages in Chennai, India. Therefore, the generalisability of results is difficult to establish. We did not examine the degree of gender biasness by age of children, i.e., whether the age of the child had any influence on the parental willingness to pay. We did not examine the effect of WTP on family size (i.e., number of children in the household). It may be possible that households with less number of children may be willing to pay more for their children than households with large number of children. Finally, this study should be regarded as an exploratory study to examine parental valuation and gender bias in India.

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