Demand for Healthcare by Rural Households in Bangladesh: Level and Determinants

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Executive Summary

Background: Analysis of demand for healthcare is extremely important for formulating policies and strategies for the health sector. An adequate knowledge about the extent, determinants, and elasticities of healthcare demand is essential for devising strategies to increase allocative efficiency of resources, to ensure proper utilization of the existing resources, and to improve the quality of services. Analysis of demand is also crucial for designing strategies aimed at achieving financial sustainability of a programme. Despite general agreement among economists on the importance of demand-for-healthcare function and the availability of a large volume of literature on the theoretical aspects of demand for healthcare, only a few empirical studies on the shape of function and elasticities of demand exist, especially in the context of Bangladesh. This paper analyzes some of the important aspects of demand for healthcare in the context of rural Bangladesh.

Objectives: The specific objectives of the paper were to:

(a) develop a conceptual framework to derive a demand-for-health-care function in the context of rural Bangladesh;

(b) present a simple report on the survey conducted by ORP on households' willingness to pay and expenditure for different types of healthcare; and

(c) conduct an econometric analysis to identify the determinants of willingness-to-pay and estimate the elasticities of healthcare expenditure.

Conceptual framework: The three conditions required for deriving demand function for any commodity, as implicitly assumed in neoclassical economics, are: existence of a market for the commodity, bidding power and availability of choice to the consumer, and the sellers actually charging price. The main handicap to derivation of a demand function for healthcare in countries like Bangladesh is the absence of the requisite conditions for most health-sector goods and services. In Bangladesh, most preventive healthcare and a substantial portion of curative care are provided by the public sector. As a result, markets only partially exist for a few goods and services. Even for the goods and services for which markets operate, the prices or fees are determined administratively or by the collusive monopoly of sellers/providers and, therefore, choice and bidding capacity of the consumer is strictly limited. Furthermore, for the goods and services which are provided free of charge, buyers do not have to face actual prices or confront sellers. His/her willingness to purchase different amounts at different prices in the actual market situation is not revealed. Despite these peculiarities of the health sector, the demand function needs to be estimated, and several studies have done so. Two methods are usually used, either alternatively or simultaneously, to determine the demand function for healthcare: to estimate the expenditure behaviour and to assess the willingness-to-pay for healthcare. The two methods differ widely in nature and approach, but they are similar as far as the specification of the model is concerned. This is because both the methods purport to arrive at the same demand behaviour of consumers. The specification of the demand function is relevant to both the methods.

Considering the important issues involved in derivation of the demand function from the available literature, a simple model of consumer behaviour has been proposed in this paper, which will establish the demand function for healthcare on a more appropriately theoretical basis. Assuming an utility function and a budget constraint which encompasses all elements of opportunity costs and income and the wealth of the consumer, the utility-maximizing model gives a demand function in which demand for healthcare depends on a number of variables, such as price, travel cost, travel time, severity of disease, quality of care, and health consciousness. The model also adumbrates the nature of the relationship between demand and each explanatory variable.

Methodology: The paper uses a data set collected from rural households for the Operations Research Project of the ICDDR,B: Centre for Health and Population Research to analyze demand for healthcare. Data, collected under the ORP's Sample Registration System, are basically used to evaluate the impact of the operations research interventions of the Project. A structured questionnaire was used for collecting data in 1997 from the project upazilas--Abhoynagar in Jessore district and Mirsarai upazila in Chittagong district. A two-stage cluster sampling design was used. In the first stage, a random sample of four unions from Abhoynagar and five unions from Mirsarai was drawn. In the second stage, a sample of households was randomly selected. The size of the sample households was 2,210. In this paper, data have been analyzed in two steps. First, the main findings of the survey have been reported. Second, attempts were made to identify the determinants of demand using multivariate techniques. Since the data set does not contain all the required information, the empirical work had to be kept confined to exercises which are permissible with the available data.

Results: The data on willingness to pay explicated that most people (80%) in the study thanas were willing to pay for child immunization, TT, and healthcare for children and women. The price elasticity of demand was quite low, so that even a large change in the rate of proposed fees reduced demand only marginally. Income elasticity was considerably high; rate of proportion of households which were willing to pay is much higher in the higher income classes than in the lower income classes. The households (20%) which did not want to pay for healthcare mentioned their "unwillingness to pay for any government service" as the main reason. Even among the households which mentioned that they did not want to pay due to the lack of financial capacity, only a few (2%) were truly poor in the context of rural Bangladesh. The implication is clear: introduction of a fee for healthcare will reduce demand, though not considerably. To counteract the possible decline in demand, a safety net for about 2 percent of the people who are extremely poor and motivation for another 18 percent of the population are needed.

Data on expenditure for healthcare received for the last illness condition of children and women revealed that a rural household spends Tk 100 per illness episode for children and Tk 67 per illness episode for women. The amount of expenditure varies with change in income, type of disease, and type of provider.

The attempt to conduct a multivariate analysis was not successful. The logit regression used to analyze willingness-to-pay (WTP) behaviour of households could not identify the variables which are theoretically expected to determine WTP. The expenditure for healthcare equation estimated using Ordinary Least Squares has a very low explanatory power.

Conclusion: The paper has vindicated the findings of some earlier studies and project observations that a considerable amount of willingness-to-pay for healthcare exists among the rural households in Bangladesh. However, it could not adequately identify the determinants of demand or estimate demand elasticities mainly due to the paucity of relevant data.

The data used for the study were collected mainly for monitoring the project activities, and some important issues which are relevant to demand analysis were not considered. As a result, data on some crucial variables were not at all collected and some data were not collected in the form as required for demand analysis.

In order for a demand for healthcare function to be appropriately estimated, a survey is needed to collect data on all the variables of the demand for healthcare function derived in the General Framework of Analysis of this paper.

Introduction

The importance of analysis of demand for healthcare in the formulation of policies and strategies for the health sector can hardly be exaggerated. In any society, developed or developing, the objectives of a health-sector plan are to: (a) ensure provision of basic healthcare to the entire population; (b) increase allocative efficiency of resources of the sector; (c) improve the quality of services; (d) enhance equity of access to public facilities; and (e) contain costs of service provision. Appropriate strategies required for achieving any of these objectives cannot be devised without adequate knowledge about the extent, determinants, and elasticities of healthcare demand at the household level. For example, in order to launch a programme for providing basic healthcare to the entire population, managers need to know the level and components of demand for and need for healthcare by the population at large. The policies for properly utilizing the existing resources and expansion of facilities should be based primarily on the level of demand for healthcare by different segments of the population. On the other hand, as allocative efficiency of resources is highest at the point of equality of market demand and supply, adequate knowledge about demand is needed to increase efficiency in resource allocation. Similarly, one of the best ways of judging the quality of service provision is to assess the level of clients' satisfaction, and the level of satisfaction is in most cases reflected in the gap between demand and supply. Equity of service provision in the health sector basically refers to ensuring access of the poorer sections of the community to health facilities and services, and an assessment of the demand for and need for healthcare by the poorer segments is required to make necessary arrangements for providing sufficient access to facilities and services.

Analysis of demand for healthcare is especially important in a poverty-stricken country like Bangladesh, which is constantly striving to concomitantly accomplish financial sustainability and universal coverage of health services as rapidly as possible. To perform such an arduous task requires quick expansion of coverage and improvement of quality of services and mobilization of sufficient funds from households through adoption of various financing strategies, such as introduction of user fees, implementation of insurance schemes, and community financing. Analysis of demand is also crucial to designing financing strategies.

Some scholars have long been admonishing that demand for healthcare is predominantly supplier-induced, because in the health sector agents or advisors themselves are also the suppliers of services and, therefore, demand function is distorted or truncated there. Some of them have even argue that demand function does not exist at all in the health sector.[1] Despite this eddy, mainstream health economists generally agree that in the health sector, demand function exists independent of supply function, that it can be estimated if appropriate efforts are made to closely observe

[1]The argument to contravene this extreme position is not far to seek. Demand for most consumer goods, especially in the age of consumerism, is greatly influenced by suppliers through massive advertising and aggressive salesmanship. Despite this, empirical investigations show that demand functions for various consumer goods exist, and the estimates of the functions have been proven useful. Then, why should demand function not exist for healthcare?

household behaviour and carefully analyze the views of individuals, and that the estimates of demand function can be effectively used in national planning, policy-making and decision-making.

Despite general agreement among economists on the importance of demand-for-healthcare function and availability of plenteous literature on theoretical aspects of demand for healthcare, empirical studies on the shape of the function and elasticities of demand are few and far between, especially in the context of a developing economy. The main reasons for this dearth of studies are the inherent features of the health sector. Public good character and high externality of most health goods and services have impelled the public sector in most countries to play a major role in providing healthcare. Consequently, the market for health-sector goods and services exists only on a limited scale and that too is in a suppressed form and distorted structure. In the absence of any normal market, it has become extremely difficult to obtain information, which is crucially needed to estimate the demand function.

This paper analyzes some important aspects of demand for healthcare in the context of rural Bangladesh. The paper purports to compute the level of demand, identify the determinants of demand, and estimate the elasticities of demand for healthcare.

Some Conceptual Issues and a General Framework of Analysis

In the early age of neoclassical economics, the demand function was postulated as a unique, causal relationship between price and quantity of a commodity. Following Hicks' Value and Capital, the function was broadened to include as explanatory variables, in addition to price, income of the consumer, prices of other commodities, taste of the consumer, etc. One important feature of the demand function is that it is an ex ante phenomenon in that it is a schedule showing the amounts of the commodity the consumer is willing to purchase at different prices, or conversely, how much money the consumer is willing to pay for varying amounts of the commodity. In addition, the function also shows how quantities to be purchased at different prices will change as other explanatory variables including income change, depending on the size of the parameters of the function. Derivation of the exact demand function requires that the market of the commodity with the bidding power of both buyers and sellers exists and that the consumer expresses to the seller the amount of the commodity he is willing to purchase when the actual prices are charged on him/her by the seller. Thus, the three conditions required for deriving demand function, as implicitly assumed in neoclassical economics, are: (i) existence of a market for a commodity, (ii) bidding power and availability of choice to the consumer, and (iii) actual charging of prices by the sellers.

The main handicap to derivation of a demand function for healthcare in the context of countries like Bangladesh is that the requisite conditions are, more or less, absent for most health-sector goods and services. In Bangladesh, most preventive

healthcare and a substantial portion of curative care (facility-based) are provided by the public sector, so that the market exists only partially for a few goods or services. Even for goods and services for which a market operates, the prices or fees are determined administratively or by the collusive monopoly of sellers/providers and, therefore, choice and bidding capacity of the consumers are strictly limited. Furthermore, for the goods and services which are provided free of charge, the buyer does not have to face actual prices or confront sellers, so that his/her willingness to purchase different amounts at different prices in the actual market situation is not revealed.

Notwithstanding the peculiarities of the health sector, the demand function has to be estimated or at least gauged to address the various policy issues. Two methods are usually used, either alternatively or simultaneously, to determine the demand function for healthcare: to estimate the expenditure behaviour and to assess the willingness-to-pay for healthcare. The first method, the method of approximately assessing the demand behaviour by way of estimating the expenditure-on-healthcare function, resembles the device commonly used for assessing the demand behaviour of households with regard to consumption goods (other than healthcare). The method is used since it is always difficult to observe the consumer's responses to prices in the actual market. The major problem with this method is that it assumes that the ex ante behaviour of individuals is same as their ex post behaviour[2]. This assumption is extremely restrictive not only because there is a time gap between the time when the expenditure was incurred and the time when the consumer wants to buy, but also because of some other important reasons: the actual market situation and the socio-economic environment for the consumer may change, the intensity of desire of the consumer for the commodity may change due to change in preference pattern, and, more importantly, an expenditure occurs at equilibrium prices, while the demand function is a schedule showing a relationship between various prices and corresponding quantities to be purchased. The problem is further exacerbated by the fact that expenditure data are usually furnished by consumers themselves and, on the contrary, data for the demand schedule have to be obtained, ideally, through observation of consumer responses in the market by researchers.

Considering the problems involved in approximating the demand function with the expenditure function, some scholars have suggested that the demand function for healthcare can be better assessed by evaluating the consumers' willingness to pay. This method is especially useful in the case of goods or services for which no market exists at present, but the government thinks that user charges should be introduced for these goods and services to enhance financial sustainability [1]. In this method, the consumers are presented with hypothetical markets in which they can purchase the commodity in question and are asked by observers/researchers how much they intend to buy at different hypothetical prices or how much they would be willing to pay for

[2]The ex ante behaviour refers to the behaviour that is expected to occur in the future, while the ex post behaviour means the behaviour that has already been observed or realized.

different quantities of the commodity. This approach is called the contingent valuation method, as "the elicited WTP values are contingent upon the hypothetical market described to the respondent" [2]. A new set of problems is inherent in this method. Obviously, the hypothetical market is not same as the actual market--the hypothetical WTP bids can widely differ from the actual money transactions after fees or insurance schemes are introduced [1]. Nor will the WTP values expressed by the consumer to observers/researchers be same as prices. Consumers will be willing to pay to sellers in the actual market situation. In the WTP method, people are asked questions about their willingness to pay different prices. Selecting the prices for the questions to be asked is also a major problem. Nonetheless, WTP studies are conducted to quantify the value of health services not only in the UK and Sweden where there is large government-funded health sectors, but also in countries like the USA where market rules operate even for the health sector. In the USA, the WTP studies are conducted mainly to ascertain the level of insurance premiums. WTP studies are now being used in developing countries to assess the volume of demand for public services and possible reactions of consumers to introduction of user charges. Such studies have already been undertaken in Burkina Faso, Pakistan, Nigeria, and Tanzania [3,4,5,6]. Gafni (1991), Gertler and Gaag (1988), Gertler and Gaag (1990) are useful studies, which have addressed theoretical aspects of this method in the context of the health sector of developing countries [7,8,9].

Although the two methods of estimating demand function for healthcare differ widely in nature and approach, they are more or less the same as far as the specification of the model is concerned. This is quite obvious because both the methods purport to get at the same demand behaviour of consumers. The specification of the demand function is, therefore, relevant to both the methods.

The demand function for healthcare was originally postulated and estimated from an economic perspective by Acton (1973) and then modified by Heller (1982) and Akin *et al*. (1986) [10,11,12]. They have adapted the neoclassical consumer theory to the context of the health sector. As in consumer theory, in the analytical model proposed by Acton and Heller, consumers maximize a utility index over a vector of purchased medical services and a composite of all other goods. Each medical service commands a cash price and a time price. In the system of demand equations derived from the utility-maximizing model, the choice of medical service is a function of exogenous time and cash prices, income and controls for social, demographic and biological variables for the individuals [12].

Apriori reasoning suggests that prices and income are the main determinants of the demand function for healthcare, as they are for any commodity. However, no conclusive evidence has so far been found from empirical analyses regarding the magnitude of influence of the two variables on demand for healthcare. Akin *et al.* (1984, 1987), Birdsall and Chuhan (1986), and Heller (1982) reported that prices are not important determinants of utilization of medical care in a developing society [13,14,15,10]. On the contrary, a number of important studies have concluded that prices are indeed important [16,17,18,19]. Some studies carried out in developed countries also concluded that prices are important determinants of healthcare demand [20,21,22].

Gertler and Gaag (1990) observed that a paradox stems from the contradictory results of empirical studies [9]. Some studies, as cited above, have shown that prices are more important determinants of healthcare demand in developed countries than in the developing ones, although the reverse seems to be more appropriate from the theoretical point of view. People are expected to be more sensitive to price when it constitutes a larger share of their budget. Per capita income is much higher in developed countries than in developing countries, and, in addition, medical insurance is more or less universal in developed countries and almost nonexistent in developing countries. Due to a higher per-capita income and pervasive insurance coverage in developed countries, medical care is likely to take up a much smaller percentage of household budgets than in developing countries. Besides this theoretical deduction, estimated income elasticities also suggest that price elasticities should be higher in developing countries [23,15,24,25,26,27]. Then, why have prices been found to be such insignificant determinants of healthcare in several seminal studies?

Gertler and Gaag (1990) have argued that prices emerge as unimportant determinants of healthcare due to several factors [9]. The most important reason is that, in most developing countries, healthcare is provided mostly by public facilities where the price of care is zero or negligible. Also, even when considerably high prices exist for some types of medical care, prices are more or less constant, and are determined by the authority. In the absence of prices, the demand function cannot include them as explanatory variables and in the absence of variation in prices the price elasticities of demand cannot be significantly high. Gertler and Gaag have also mentioned that misspecification of the model of demand for healthcare and the dubious quality of data sets used, especially those on income, prices, and travel time are also responsible for the emergence of this paradox.

In order to overcome the problem posed by the non-existence of prices for estimation of demand for healthcare, Acton (1975) suggested including the price of time in the list of explanatory variables [28]. He maintained that when prices do not ration the market, time prices can be expected to ration. Almost all studies in the context of developing countries, as cited above, considered travel time as an explanatory variable and found it to be a significant determinant.[3] However, one problem still remains in those studies. In the utility-maximizing model used for deriving the demand function for healthcare, time prices were specified as non-monetary parameters in the utility function, implying that their coefficients reflect marginal disutility of travelling. Becker

[3]A question arises, however. A demand function is derived from the utility maximizing model in which utility is assumed to be the function of both healthcare and other consumption goods. Time price is involved in obtaining any consumption good, as in obtaining healthcare, especially in rural settings. However, in the model of healthcare demand, time prices of other consumption goods are not considered. Then, why is the time price of receiving healthcare considered? Inclusion of time price of receiving healthcare alone is very likely to produce a biased estimate of the time price coefficient, distorting the whole estimated demand function.

(1965) held that time prices should enter the demand function through the budget constraint [29]. Dor, Gertler and Gaag (1987) included time prices in the budget constraint to estimate travel time elasticities [30].

Gertler and Gaag (1990) pointed out, as an example of other types of misspecification of the demand model for healthcare, that the studies mentioned above "typically model demand as a discrete choice, with the price effect specified to be independent of income. The assumption is restrictive, since one would expect the wealthy to be less sensitive to price differences among providers than the poor. In fact it can be shown that these models are inconsistent with utility maximization" [9].

If price of time is considered as a determinant of demand for healthcare, then the other prices or costs involved in receiving healthcare should also be considered. These include: cost of travel, cost of maintaining attendants, number of workdays lost, waiting time, etc. These variables also should enter the demand function via the budget constraint.

Considering the issues involved in derivation of the demand function mentioned above, a model of consumer behaviour is proposed which is expected to establish the demand function for healthcare on a more appropriate theoretical basis, so that the derived demand function possesses all the required properties. To focus on few crucial aspects of the demand function, the model has been kept as simple as possible. It will deal with the problem of utility maximization of one individual and consider only two commodities: healthcare as a whole (q_1) and other consumption goods (q_2).

It is assumed that the individual has the utility (U) function of the following form:

(1) $U = q_1 q_2$

Total income (Y) of the individual has two components:

(2) $Y = Y_p + Y_t$

where

Y_p = Permanent income and Y_t = transitory income.

The definitions of Y_p and Y_t here are same as those in Friedman (1957) except that the transitory income includes only income, which is gained or lost in the process of obtaining the two goods [31]. Other types of transitory income, such as those due to temporary joblessness, theft, robbery, stock market crash, etc., are assumed to be zero here for the sake of convenience of analysis and clear observation of the crucial properties of the demand function.

The main components of transitory income are:

C_1 = Cost of travelling to health facilities to receive healthcare,

C_2 = Cost of travelling to market to purchase other consumption goods,

C_3 = Value of time lost due to travel to healthcare facility,

C_4 = Value of time lost due to travel to market,

C_5 = Cost of maintaining attendance for the sick person,

C_6 = Value of time lost due to waiting at healthcare centre,

C_7 = Value of time lost due to marketing (searching, choosing, bargaining, etc.) of other consumption goods,

C_8 = Monetary gain accrued to sick person due to reduction of the duration of disease effected by receipt of healthcare.

This can be written as:

(3) $Y_t = -C_1 - C_2 - C_3 - C_4 - C_5 - C_6 - C_7 + C_8$

The components of Y_t can be expressed in terms of the prices and quantities of healthcare and other consumption goods using the following definitions:

$$P_3 = \frac{C_1}{q_1},\ P_4 = \frac{C_2}{q_2},\ P_5 = \frac{C_3}{q_1},\ P_6 = \frac{C_4}{q_2},\ P_7 = \frac{C_5}{q_1},$$

$$P_8 = \frac{C_6}{q_1},\ P_9 = \frac{C_7}{q_2},\ \text{and}\ \ P_{10} = \frac{C_8}{q_1}$$

Equation (3) can be written as:

(4) $Y_t = q_1(P_{10} - P_3 - P_5 - P_7 - P_8)\ - q_2(P_4 + P_6 + P_9)$

The budget constraint facing the individual is:

(5) $Y = Y_p + Y_t = P_1 q_1 + P_2 q_2$

Where $P_1 = \text{charged price of } q_1,$ and

$P_2 = \text{charged price of } q_2$

Substituting eq. (4) into (5), the budget constraint is written as:

(6) $Y_p = P_1 q_1 + P_2 q_2 - q_1(P_{10} - P_3 - P_5 - P_7 - P_8) + q_2(P_4 + P_6 + P_9)$

After rearranging, the following is obtained:

(7) $Y_p = P_1^1 q_1 + P_2^1 q_2$

where $P_1^1 = P_1 + P_3 + P_5 + P_7 + P_8 - P_{10}$, and

$P_2^1 = P_2 + P_4 + P_6 + P_9$

P_1^1 can be considered as the total price, including both direct and indirect costs, per unit of q_1 and P_2^1 is the total price per unit of q_2.

The individual is required to maximize eq. (1) subject to eq. (7). Using the lagrange multiplier method, we first form the lagrange equation, set the partial derivatives of the equation obtained with respect to q_1, q_2, and the lagrange multipier, and solve the resultant three equations for q_1 to get the following demand for healthcare function:

(8) $q_1 = \dfrac{Y_p}{2(P_1 + P_3 + P_5 + P_7 + P_8 - P_{10})}$

The nature of the relationship between q_1 and each of the explanatory variables is evident:

$$\frac{\partial q_1}{\partial Y_p} > 0, \quad \frac{\partial q_1}{\partial p_1} < 0, \quad \frac{\partial q_1}{\partial p_3} < 0, \quad \frac{\partial q_1}{\partial p_5} < 0, \quad \frac{\partial q_1}{\partial p_7} < 0, \quad \frac{\partial q_1}{\partial p_8} < 0, \ and \ \frac{\partial q_1}{\partial p_{10}} > 0$$

Some researchers have argued, and quite reasonably so, that it is not the price as such but the possible amount of money to be taken up from income for consumption of a commodity that is the major determinant of demand [32]. This seems to be true, especially in the context of low-income societies. Lavy and Germain have suggested that the price-income ratio, instead of independent price or income, should be considered as one explanatory variable of the demand function [32]. This suggestion can be incorporated into the above model. Consider the net total price of q_1, rather than all prices separately, as the price variable in eq. (8). The equation, then, becomes:

(9) $q_1 = \dfrac{Y_p}{2p_1^1} = \dfrac{1}{2}\left(\dfrac{p_1^1}{Y_p}\right)^{-1}$

and we obtain

$$\frac{dq_1}{d(p_1^1 / Y_p)} = -\frac{1}{2}\left(\frac{1}{(p_1^1 / Y_p)^2}\right) < 0$$

so that increase in the price-income ratio reduces demand for q_1. The ratio can increase if Y_p increases, or p_1^1 falls, or both p_1^1 and Y increase, but Y increases at a higher rate. Incorporating it into the results of several studies cited above and assuming that price elasticity of healthcare demand is higher in the low-income countries than in the high-income ones, a demand function can be obtained as follows:

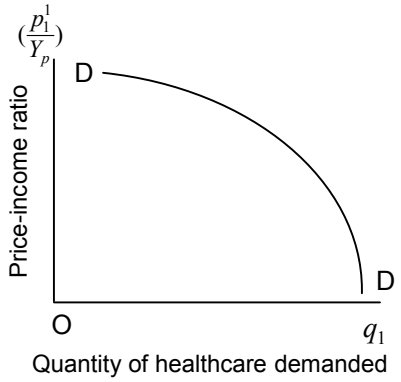

Fig.1. Demand for healthcare as a function of price-income ratio

The demand curve is concave to the origin showing that the elasticity of demand is high when the price-income ratio is high, as in a low-income country, and it is also plausible to argue that the ratio can vary over time mostly due to change in price since the economy is, more or less, stagnant. Thus, an increase in price can drastically reduce demand. However, if the charged price or user fees of healthcare is considered, the price-income ratio will be very low and the consumer demand is likely to be located at a point along the lower range of the curve which is very inelastic. Important implications of the demand function in Fig.1 are twofold: first, increase in charged price or introduction of user fees is unlikely to reduce demand for healthcare to any considerable extent (as shown in the lower range) and second, reduction of the indirect price of healthcare, such as travel cost, travel time, and waiting time, can significantly increase demand for healthcare (as shown in the upper range of the curve).

The demand for healthcare model as expounded above has a number of features which distinguish it from the models used in the studies cited above: First, travel time as an explanatory variable enters into the demand for healthcare function through the budget constraint and not through the utility function.[4] Second, the model considers all opportunity costs of receiving healthcare, and not just travel time, as explanatory variables. Third, the model considers all opportunity costs of other consumption goods as determinants of utility maximizing behaviour of the consumer. Fourth, the model has identified the most important determinants of healthcare demand and has shown that the nature of the relationship between demand for healthcare and

[4] Gertler and Gaag (1988) also mentioned that in a number of studies on this issue, travel time has been included in the budget constraint [8].

each determinant is as expected from observation. Fifth, the model has shown that permanent income, and not observed income, is a determinant of demand for healthcare. The finding partly explains the observation of some surveys that people sell assets or borrow to seek healthcare and also explain another result of some surveys that increase in observed income does not significantly increase demand for healthcare. The implication is that an increase in permanent income is needed for substantially increasing demand. Finally, another demand function which shows the relationship between demand for healthcare and price-income ratio has been obtained from the model. While the exact nature of the relationship between demand and price-income ratio emerges from the model itself, the exact curvature of the relationship or the elasticities at different ranges of the function has been assessed incorporating the findings of some other studies on elasticities of healthcare demand. The shape of the demand function suggests that in a low-income country, such as Bangladesh, increase in charged price or introduction of user fees will not reduce demand for healthcare to any significant extent, but reduction of other costs associated with receiving healthcare may substantially increase demand.

The model can be generalized further. Instead of the form of the utility function as shown by eq. (1), a Cobb-Douglas type of function is assumed which is more general:

(10) $U = q_1^{\alpha} q_2^{\beta}$

α <1 reflects the preference pattern of the individual and increase in the value of α increases consumption of q_1. It is plausible to assume that α has three components:

$$\alpha = \alpha_1 + \alpha_2 + \alpha_3$$

Where α_1 is the magnitude of preference for q_1 determined by severity of disease, α_2 is same determined by actual or perceived quality of care, and α_3 is determined by health consciousness of the individual which, in turn, is determined by education, motivation, and exposure. The utility function can now be written as :

(11) $U = q_1^{\alpha_1+\alpha_2+\alpha_3} q_2^{\beta}$

The demand function for healthcare which can be derived from eq. (11) and eq. (7) will take the following general form:

$$q_1 = \int(P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9, P_{10}, Y_p, \alpha_1, \alpha_2, \alpha_3)$$

The important explanatory variables of the demand for healthcare function can now be listed as:

Price of healthcare	(P_1)
Price of other consumption goods	(P_2)
Cost of travelling to health facilities	(P_3)
Cost of travelling to the market for consumption goods	(P_4)
Value of time lost due to travel to the health facility	(P_5)

Value of time lost due to travel to the market	(P_6)
Cost of maintaining attendance for a sick person	(P_7)
Value of time lost due to waiting at the health facility	(P_8)
Value of time lost due to marketing	(P_9)
Monetary gain accrued due to reduction of duration of disease effected by receipt of healthcare	(P_{10})
Permanent income	(Y_p)
Severity of disease	(α_1)
Quality of care	(α_2)
Level of education and motivation	(α_3)

The expected signs of the partial derivatives of q_1 with respect to the explanatory variables are:

$$\frac{\partial q_1}{\partial p_1} < 0; \quad \frac{\partial q_1}{\partial p_4} < 0; \quad \frac{\partial q_1}{\partial p_7} < 0; \quad \frac{\partial q_1}{\partial p_{10}} > 0; \quad \frac{\partial q_1}{\partial \alpha_2} > 0;$$

$$\frac{\partial q_1}{\partial p_2} < 0; \quad \frac{\partial q_1}{\partial p_5} < 0; \quad \frac{\partial q_1}{\partial p_8} < 0; \quad \frac{\partial q_1}{\partial Y_p} > 0; \quad \frac{\partial q_1}{\partial \alpha_3} > 0;$$

$$\frac{\partial q_1}{\partial p_3} < 0; \quad \frac{\partial q_1}{\partial p_6} < 0; \quad \frac{\partial q_1}{\partial p_9} < 0; \quad \frac{\partial q_1}{\partial \alpha_1} > 0$$

Methodology

Ideally, any study purporting to properly deal with demand behaviour of households with regard to healthcare should estimate a demand function, such as one derived above, in terms of either willingness-to-pay or expenditure incurred. However, estimation of the demand function requires sufficient information on independent variables of the function. The data set which was available for empirical investigations of this study does not contain all the required information on the variables. Therefore, the objectives of the empirical work had to be kept confined to only computations and exercises which are permissible with the available data. Despite its limitations, the data set used in this paper is quite rich in one respect: it has collected information on the willingness-to-pay of households for different types of healthcare, and it has collected that information as precisely and meticulously as possible. The specific objectives of Methodology are, therefore, to report on the magnitude of willingness-to-pay for different types of healthcare, which has serious policy implications, and also to identify the determinants of demand for healthcare, while the task of estimating the demand function is left for a forthcoming paper.

The set of data collected from the rural households for the Operations Research Project of the ICDDR,B has been used for analyzing the demand behaviour at the household level. The propositions of the framework have been examined as far as it was permissible to do so using that data set.

Data were collected under the ORP's Sample Registration System (SRS). These data are used for evaluating the impact of operations research (OR) interventions of the Project, field-tested within the government service delivery system at Abhoynagar and Mirsarai upazilas in Jessore and Chittagong Districts, respectively. A two-stage cluster sampling design was used. In the first stage a random sample of four unions from Abhoynagar upazila and that of five unions from Mirsarai upazila was drawn. In the second stage a complete household listing of each union was conducted and a sample of households randomly selected. Paira union with a CPR of over 50 percent and Durgapur union with a CPR of less than 50 percent, were selected from Abhoynagar and Mirsarai respectively, to field-test an intervention that provided family planning services from the fixed sites. These sites, referred to as Cluster Spots (service sites operating at fixed households in the community to serve a cluster of juxtaposed 40-50 households), were created to replace door-to-door distribution of services by field workers. The total samples of married women of reproductive age (MWRA) in Paira and Durgapur unions prior to the intervention were 485 and 677, respectively. The SRS collected data on performance indicators of family planning and health services from these samples from September 1994 to August 1999 for Paria, and from May 1995 to August 1998 for Durgapur. The shift in service-delivery from households to cluster spots began in January 1995 in Paira and September 1995 in Durgapur. A before-and-after intervention comparison (with time series analysis of the indicators throughout the intervention) was conducted to assess the effects of the change.

The total sample size for the present study was 2,210 households. Data were collected using a structured questionnaire administered to the household head in 1997. The questionnaire was administered through a one-shot interview. Questions were also asked about health hazards of and healthcare for all household members. Questions were asked about various aspects of different types of healthcare: immunization, TT, curative care for children and women, family planning, and care received for the last illness condition of children and women. The questions on willingness-to-pay were asked for immunization, TT, and curative care for children and women, while questions on expenditure were asked about family planning, curative care for the last illness condition of children, and curative care for the last illness condition of women.

Data on charged prices of healthcare were not collected, since prices do not exist for public healthcare (facility-based). Information on the rates of fees which the people were willing to pay can be accepted as possible prices of healthcare for which WTP questions were asked. Data on household income also were not available; data on total expenditure were considered as the income data. Some information on other costs involved in receiving healthcare were available, but not in the required form. Only

for family planning and curative care received for the last illness condition of children and women, data on travel cost, travel time and waiting time were collected. However, the ex post data on these variables were not useful in analyzing the influences of these variables on healthcare demand. Rather, ex ante data are needed. For example, the question to be asked to the household should be: "How much healthcare would you purchase if the travel cost or travel time cost per unit of healthcare are such and such?" Instead of collecting and using this type of information on healthcare prices, if ascertaining the influence of the indirect prices on demand by relating the amount of travel cost actually incurred or travel time actually spent to the healthcare expenditure is done, it is likely that a misleading relationship will be obtained. The correlation coefficient may be positive and high, indicating that higher travel cost increases healthcare demand. In fact, households which have received healthcare inspite of high travel costs and households which did not receive healthcare due to high travel cost have to be taken into account in order to reveal an accurate picture about the relationship between different prices and healthcare demand. Additionally, as regards travel time and waiting time, data were collected only on the actual time spent by individuals. To calculate the opportunity cost of time spent for travelling and waiting, information on the activities which the individuals would have done if they were not required to travel or wait, and on the remuneration they could earn from the activities are also needed. These data were not available. Thus, the data on travel cost, travel time, and waiting time, which were available for some healthcares, were not usable. Data on cost for attendance were not available.

Variables, such as severity of disease and education level of respondents, which enter into the demand function via the utility function--these variables as well as quality of care affect the preference pattern of the consumer and as such affect the exponent of q_1 in the utility function, have been considered as explanatory variables. Data on quality of care were not available. Landholding can be considered as the major determinant of permanent income in the rural society, and hence, it has been used as one determinant of permanent income.

Data were analyzed in two steps. First, the extent of WTP for four types of healthcare and the amount of expenditure for two types of healthcare have been reported. Second, attempts were made to determine whether a significant relationship exists between some selected explanatory variables (price, income, education and landholding) and demand for healthcare, using the multivariate techniques, such as logit regression and ordinary least squares method.

Results

We now analyze the findings of the survey as regards households' willingness-to-pay (WTP) for four types of healthcare: immunization, TT, curative care for children, and women's healthcare; and expenditures incurred by the households for curative care for children and women's healthcare received against the last illness episodes before the survey.

Willingness-to-pay for Healthcare

This sub-section reports the magnitude of households' willingness-to-pay for different types of healthcare.

Willingness-to-pay for immunization: In rural Bangladesh child immunization programme is mostly carried out by the public health department of the government. Considering that immunization has enormous externalities and it is an important social investment, the government undertook a massive programme to expand the supply side, and on the demand side it has been pursuing the policy of charging no price. Constant inflow of considerable assistance from donor agencies enabled the government to rapidly increase allocation in the budget for immunization. The outcome already achieved is quite considerable: most of the children of the country are now at least partly immunized. As a result, the child and the infant mortality rates have drastically declined and life expectancy of the population has sharply increased. Nonetheless, universal immunization is yet to be achieved and the government has to increase its allocation further so as to increase the rate of immunization. Given the declining trend of the inflow of donors' fund for this activity, a financing gap is emerging for immunization, which may lead to grave consequences for the programme.

In view of the above, the policy makers are thinking of mobilizing some amount of complementary fund from households by introducing user fee. At the same time, however, an apprehension based on the demand law that imposition of charges for immunization on households may greatly reduce the acceptance of immunization by households is pervasive. The decline in demand for immunization to a considerable extent is an extremely undesirable outcome. The critical issue at stake, therefore, is the possible amount of decline in the demand for immunization resulting from the introduction of user fee. The corollary is to determine the rate of user fee which will not reduce demand, at least not considerably. Analysis of the data under study can provide possible answers.

Table 1 shows the percentage distribution of the sample households which were willing to pay different amounts of fees for immunization by income/expenditure groups. Of the 2,190 households responding to the question on WTP for immunization, 1,880 households (86%) were willing to pay at least some amount of money. The proportion of households willing to pay falls as the amount of possible fees increases: while 86 percent of the households were willing to pay Tk 2.00, 82 percent were willing to pay Tk 4.00 and 80 percent Tk 6.00[5]. The relationship between the proportion of households and the amount of fees presents the relationship between demand for

[5] This finding is more or less similar to that of the study of Ann Levin *et al.* (1997) [33].

immunization and charged price. The relationship is found to be inverse, and the finding is fully compatible with the demand law. However, the price elasticity of demand for immunization is quite low. The demand falls at a low rate when price is increased at a very high rate. As mentioned in page 10, price elasticity of demand is low presumably because price here constitutes a small proportion of household income. This possibility is vindicated by the finding that price elasticity of demand is low for all income groups, including the low-income ones. The amount of fees seems to have been considered even by poor households as constituting a low proportion of income, so much so that they did not feel like reacting to the increase in fees. The finding is in conformity with the relation postulated in the Figure 1.

Table 1. Percentage of households willing to pay different rates/service fees for immunization by income group

Income group in Taka	Taka 2	Taka 4	Taka 6
<500	0.2 (4)*	0.2 (4)	0.2 (4)
500-1000	0.4 (8)	0.4 (8)	0.4 (8)
1000-2000	12.4 (233)	11.7 (211)	11.6 (204)
2000-3000	28.2 (531)	28.2 (511)	28.2 (494)
3000-4000	25.0 (470)	25.4 (457)	25.4 (446)
4000-5000	12.5 (236)	12.6 (228)	12.7 (224)
5000+	21.3 (398)	21.5 (389)	21.5 (379)
Total	100.00	100.00	100.00
All	**85.1**	**81.8**	**79.6**

*Figures in parentheses indicate number of observations

Only 311 households (14%) of the 2,191 did not want to pay any fee for immunization. Among them, as shown in Table 2, 82 percent did not want to pay because they did not like paying for what they considered to be government services. There are also some households (17% of the non-intenders) which reported that they did not want to pay, because they did not have enough money; these households belong mostly to the lower-income groups.

Table 2. Percentage of households not willing to pay for EPI immunization by income group and by reason

Income group in Taka	No. of households	Are not accustomed to paying for services	Do not wish to pay for government services	Do not have enough money to pay	Others	Total
<500	2	0.0	0.8	0.0	0.0	0.6
500-1000	0	0.0	0.0	0.0	0.0	0.0
1000-2000	25	0.0	6.2	17.0	0.0	8.0
2000-3000	87	100.0	29.7	18.9	0.0	28.0
3000-4000	94	0.0	26.2	49.0	100.0	30.3
4000-5000	51	0.0	17.6	11.3	0.0	16.4
5000+	52	0.0	19.5	3.8	0.0	16.7
Total	311	100.0	100.0	100.0	100.0	100.0
All		**0.3**	**82.3**	**17.0**	**0.3**	

Willingness-to-pay for TT: The parameter for TT immunization is almost the same (slightly less though) as those for child immunization. A total of 2,180 households responded to the questions on WTP for TT, of whom 83 percent expressed their willingness to pay at least Tk 2 for receiving TT. Table 3 shows that the proportion of households willing to pay declines as the amount of fees increases, indicating the implicit existence of a downward sloping demand function. However, the rate of decline in demand is much lower than the rate of increase in fees, implying that the price elasticity of demand is very low. The price elasticity of demand appears to be low for all income groups. The most plausible reason for this is that the amount of fees to be charged takes up only a small fraction of income of even poor households.

Table 3. Percentage of households willing to pay different rates/service fees by income group

Income group in Taka	Taka 2	Taka 4	Taka 6
<500	0.2 (3)*	0.2 (3)	0.2 (3)
500-1000	0.4 (8)	0.5 (8)	0.5 (8)
1000-2000	12.2 (222)	11.5 (202)	11.5 (196)
2000-3000	27.8 (507)	27.7 (484)	27.9 (475)
3000-4000	25.0 (455)	25.3 (443)	25.0 (427)
4000-5000	13.0 (236)	12.9 (225)	12.9 (220)
5000+	21.4 (390)	21.9 (383)	22.0 (374)
Total	100.0	100.0	100.0
All	**82.4**	**79.1**	**77.1**

*Figures in parentheses indicate number of observations

Only 16 percent of the households did not want to pay any fee for TT, and 81 percent of those households did not want to pay because they did not like to pay for what they considered to be a government service (Table 4).

Willingness-to-pay for curative care for children: The extent of willingness-to-pay for curative care for children is almost same as that for child immunization and TT. As shown in Table 5, among the 2,193 households which responded to the question on WTP for curative care for children, 83 percent expressed their willingness to pay Tk 2. The proportion declined as the proposed amount of fees increased: 79 percent of the respondents were willing to pay Tk 4 and 77 percent Tk 6. This indicates that the demand function for curative care for children is downward sloping. However, the price elasticity of demand appears to be low so that the proportion of people willing to pay declines at a slower pace than the rate of increase in fees.

Table 4. Percentage of households not willing to pay for TT immunization by income group and by reason

Income group in Taka	No. of households	Are not accustomed to paying for services	Do not wish to pay for government services	Do not have enough money to pay	Others	Total
<500	3	0.0	0.7	1.7	0.0	0.8
500-1000	0	0.0	0.0	0.0	0.0	0.0
1000-2000	29	0.0	6.9	15.5	0.0	8.1
2000-3000	105	60.0	29.8	24.2	28.6	29.2
3000-4000	109	20.0	27.0	44.8	57.1	30.4
4000-5000	52	0.0	15.9	8.6	14.3	14.5
5000+	61	20.0	19.7	5.2	0.0	17.0
Total	359	100.0	100.0	100.0	100.0	100.0
All		**1.4**	**80.5**	**16.2**	**1.9**	

Table 5. Percentage of households willing to pay different rates/service fees by income group

Income group in Taka	Taka 2	Taka 4	Taka 6
<500	0.2 (3)*	0.2 (3)	0.2 (3)
500-1000	0.4 (8)	0.5 (8)	0.5 (8)
1000-2000	12.0 (221)	11.5 (202)	11.5 (196)
2000-3000	28.1 (514)	28.0 (491)	28.0 (478)
3000-4000	25.0 (455)	25.2 (491)	25.1 (428)
4000-5000	13.3 (243)	13.1 (441)	13.1 (223)
5000+	21.0 (383)	21.5 (230)	21.6 (369)
Total	100.0	100.0	100.0
All	**82.7**	**79.2**	**77.1**

*Figures in parentheses indicate number of observations

Only 17 percent of the respondents did not want to pay any fee for curative care for children and 83 percent of those households did not want to pay because they do not like to pay for any government services (Table 6).

Table 6. Percentage of households not willing to pay for curative care of children by income group and by reason

Income group in Taka	No. of house-holds	Are not accustomed to paying for services	Do not wish to pay for government services	Services are far away/ infrequent	Do not have enough money to pay	Others	Total
<500	3	0.0	1.0	0.0	0.0	0.7	0.8
500-1000	0	0.0	0.0	0.0	0.0	0.0	0.0
1000-2000	35	0.0	8.3	33.3	15.8	0.0	9.6
2000-3000	104	100.0	29.7	0.0	21.0	0.0	28.4
3000-4000	110	0.0	28.7	33.3	38.6	0.0	30.0
4000-5000	45	0.0	11.5	0.0	17.5	0.0	12.4
5000+	69	0.0	20.8	33.4	7.1	100.0	18.8
Total	366	100.0	100.0	100.0	100.0	100.0	100.0
All		**0.5**	**82.8**	**0.8**	**15.6**	**0.3**	

Willingness-to-pay for women's healthcare: The proportion of households willing to pay for women's healthcare was slightly less than that found for the other three types of healthcare. Table 7 shows that about 81 percent of the respondents were willing to pay Tk 2. The proportion declined as the proposed rate of fees increased, indicating the expected shape of the demand function. Table 7 also shows that the price elasticity of demand is low in all income groups. The absolute rate of fee being very low, the price-income ratio is low even for the lower-income groups, so much so that most of the respondents did not react to the change in price (rate of fee).

Table 7. Percentage of households willing to pay different rates/service fees by income group

Income group in Taka	Taka 2	Taka 4	Taka 6
<500	0.2 (3)*	0.2 (3)	0.2 (3)
500-1000	0.4 (8)	0.5 (8)	0.5 (8)
1000-2000	12.0 (215)	11.5 (197)	11.5 (193)
2000-3000	28.2 (502)	28.0 (482)	28.0 (466)
3000-4000	25.0 (446)	25.1 (430)	25.1 (420)
4000-5000	13.0 (230)	13.0 (223)	13.0 (217)
5000+	21.2 (378)	21.7 (373)	21.7 (362)
Total	100.0	100.0	100.0
All	**80.6**	**77.6**	**75.5**

*Figures in parentheses indicate number of observations

Table 8 shows that 19 percent (405 households) of the respondents were not willing to pay for women's healthcare, and 83 percent of them mentioned that they did not want to pay for what they considered to be government services.

Table 8. Percentage of households not willing to pay for women's healthcare by income group and by reason

Income group in Taka	No. of house-holds	Are not accustomed to paying for services	Do not wish to pay for government services	Do not have enough money to pay	Services are far away/ infrequent	Total
<500	3	0.0	0.9	0.0	0.0	0.8
500-1000	0	0.0	0.0	0.0	0.0	0.0
1000-2000	37	0.0	8.3	13.6	25.0	9.2
2000-3000	116	83.3	28.5	23.7	25.0	28.6
3000-4000	120	0.0	28.0	42.4	25.0	29.6
4000-5000	58	16.7	14.3	15.2	0.0	14.3
5000+	71	0.0	20.0	5.1	25.0	17.5
Total	405	100.0	100.0	100.0	100.0	100.0
All		**1.5**	**83.0**	**14.6**	**1.0**	

Expenditure for Healthcare

The survey collected data on household expenditure for healthcare for the last illness condition of children and women. This sub-section analyzes the expenditure data.

Expenditure for the last illness condition of children: Table 9 shows the amount of money spent by the households for treatment of children for the last illness inflicted on them before the survey. The average expenditure was Tk.101, and the amount was higher for the higher income groups, indicating that a considerable income elasticity of child healthcare demand exists for rural households. Drug costs and laboratory fees were the major components of expenditure.

Table 9. Average amount of money spent by rural households for receiving child healthcare by income group (in Taka)

Income group by Taka	Registration fee	Consultation fee	Laboratory fee	Cost of drugs	Others	Total
<500	0.0	0.0	0.0	20.0 (2)*	0.0	20.0 (2)
500-1000	0.0	0.0	0.0	40.0 (1)	0.0	40.0 (1)
1000-2000	159.1 (12)	16.8 (26)	21.6 (23)	66.9 (61)	0.0	96.9 (67)
2000-3000	23.1 (10)	17.3 (79)	102.9 (3)	58.3 (167)	40.2 (4)	68.6 (172)
3000-4000	31.7 (9)	31.4 (66)	32.9 (5)	99.0 (137)	74.4 (2)	113.5 (143)
4000-5000	45.9 (4)	24.3 (31)	90.0 (2)	85.0 (78)	21.0 (2)	95.0 (82)
5000+	33.6 (6)	36.1 (65)	110.9 (8)	108.7 (114)	69.2 (3)	132.2 (146)
Average	**68.5**	**26.1**	**76.4**	**84.3**	**50.8**	

*Figures in parentheses indicate number of observations

In order to find out whether child healthcare expenditure varied by income for particular diseases, a three-dimensional table was computed. Table 10 shows expenditure for child healthcare by income groups and by diseases. For most diseases, the child healthcare expenditure increased as the household income increased. However, in the cases of some diseases, such as fever, mucoid diarrhoea, scabies, and vomiting/nausea, change in expenditure was not found to be correlated with the change in income. The findings suggest that while child healthcare demand is usually income-elastic, severity of disease is also an important determinant of demand. Since the number of observations is too small in most cells, findings should be treated with sufficient caution.

Table 10. Average amount of child healthcare expenditure by income group and by disease (in Taka)

Illness condition	<500	500-1000	1000-2000	2000-3000	3000-4000	4000-5000	5000+	Total
Aches all over body			26.0 (2)*					26.0 (2)
Asthma					150.0 (2)	137.3 (3)	460.0 (1)	195.3 (6)
Bloody diarrhoea			35.0 (1)	65.0 (2)	36.6 (3)		107.6 (3)	66.4 (9)
Burns				62.0 (1)	200.0 (1)	15.0 (1)		92.3 (3)
Chicken pox						154.0 (2)		154.0 (2)
Cough/cold/ nose run	5.0 (1)		120.5 (14)	69.6 (28)	62.0 (14)	53.5 (17)	76.4 (23)	74.0 (97)
Cloutes/ bruises			20.0 (1)	89.0 (3)	150.0 (1)		10.0 (1)	74.5 (6)
Difficulty in breathing				60.2 (4)	86.7 (4)			73.5 (8)
Ear pain						52.5 (2)	40.0 (1)	48.3 (3)
Eye problem			31.6 (3)	13.0 (1)	12.4 (5)		100.0 (1)	27.0 (10)
Fever	35.0 (1)	40.0 (1)	58.2 (25)	53.9 (61)	58.0 (40)	47.7 (23)	74.2 (49)	59.4 (200)
Measles			60.0 (1)	57.5 (2)	52.5 (2)	30.0 (1)	125.0 (3)	76.1 (9)
Mucoid diarrhoea			63.7 (4)	37.9 (10)	123.8 (8)	37.0 (5)	50.8 (6)	64.0 (33)
Scabies			132.5 (2)	45.3 (3)	103.0 (3)	25.0 (3)	145.5 (4)	91.1 (15)
Stomach pain				38.7(4)	37.5 (2)		90.0 (1)	45.7 (7)
Vomiting/ nausea				100.0 (2)	61.5 (2)	140.0 (1)	53.3 (3)	77.8 (8)
Watery diarrhoea			21.6 (6)	78.9 (27)	225.1 (30)	244.1 (13)	163.1 (31)	151.9 (107)
Worms			44.5 (2)	202.5 (2)	42.6 (3)	24.6 (3)	140.0 (2)	81.3 (12)
Others			39.7 (2)	66.0 (8)	138.7 (20)	182.1 (6)		215.4 (67)
Average	**20.0**	**40.0**	**96.9**	**68.6**	**113.5**	**95.0**	**132.2**	**100.7**

*Figures in parentheses indicate number of observations

Table 11 shows the amount of child healthcare expenditure by sources of care and by income groups. The expenditure for child healthcare was incurred mostly at two sources of care: Thana Health Complexes/District Hospitals (THC/DH) and Private Clinics. The amount of expenditure at the public facilities (THC/DH) was much higher than the private clinics. The finding suggests two alternative possibilities: first, the public facilities actually charge higher prices (official charges as well as non-formal

payments) than the private facilities, and second, mostly the complicated and severe cases were referred to the public facilities and treatment of those cases required a higher expenditure.

Table 11. Average amount of expenditure for child healthcare by source of care and by income group (in Taka)

Income group by taka	Home delivery	FWC/Rd	THC/Dist	Pharmacy/ shop	Private clinic	Others
<500	0	0.0	0.0	0.0	0.0	20.0 (2)*
500-1000	0	0.0	0.0	0.0	0.0	40.0 (1)
1000-2000	0	0.0	66.0 (6)	11.3 (3)	92.5 (4)	73.3 (51)
2000-3000	0	0.0	64.0 (8)	56.4 (15)	113.4 (16)	63.3 (135)
3000-4000	0	63.3 (9)	358.1 (8)	27.6 (14)	385.5 (10)	72.8 (109)
4000-5000	0	0.0	1038.5 (2)	32.6 (13)	75.8 (9)	79.1 (56)
5000+	370 (1)	1.2 (8)	1289.0 (4)	28.8 (20)	201.2 (20)	81.9 (101)
Average	**370**	**34.1**	**393.0**	**34.8**	**182.2**	**67.1**

*Figures in parentheses indicate number of observations

Expenditure for the last illness condition of women: Table 12 shows that the average amount of household expenditure for women's healthcare was Tk 185. Drug costs and laboratory fees were the main components of the total expenditure. Expenditure for women's healthcare and income seem to be positively correlated, although the relationship between expenditure and income is not quite discernible.

To more clearly assess the relationship between women's healthcare expenditure and household income, Table 13 has been computed to show the amount of expenditure by income and diseases. As income increases, expenditure increases for some diseases. For some other diseases, such as aches all over body, cloutes/bruises, eye problem, fever, and mucoid diarrhoea, expenditure was more or less insensitive to income. Severity of disease, for which income elasticity of women's healthcare expenditure was negligible, seems to be high in most cases, implying that severity of disease was the main determinant of expenditure for some diseases.

Table 12. Average amount of money spent for receiving women's healthcare by income group (in Taka)

Expenditure group by taka	Registra-tion fee	Consulta-tion fee	Laboratory fee	Cost of drugs	Others	Total
<500	0.0	60.0 (1)*	0.0	40.0 (1)	0.0	50.0 (2)
500-1000	0.0	0.0	0.0	26.0 (1)	0.0	26.0 (1)
1000-2000	206.1 (10)	33.6 (22)	273.3 (6)	153.5 (46)	2.0 (1)	225.6 (51)
2000-3000	28.0 (14)	25.9 (98)	140.7 (8)	110.2 (192)	88.8 (2)	126.4 (201)
3000-4000	44.9 (10)	25.4 (88)	273.2 (12)	192.7 (171)	56.9 (3)	214.8 (182)
4000-5000	69.6 (4)	31.9 (52)	176.6 (6)	147.7 (111)	99.9 (1)	171.0 (114)
5000+	18.1 (8)	42.3 (92)	216.1 (8)	188.1 (191)	102.2 (4)	218.2 (193)
Average	**72.3**	**31.5**	**220.8**	**159.3**	**78.1**	**185.1**

*Figures in parentheses indicate number of observations

Table 13. Average amount of women's healthcare expenditure by income group and by illness condition (in Taka)

Illness condition	<500 (n=4)	500-1000 (n=5)	1000-2000 (n=142)	2000-3000 (n=396)	3000-4000 (n=378)	4000-5000 (n=200)	5000+ (n=299)	Total
Aches all over body			250.0	40.7	33.5	105.5	87.8	121.4
Asthma	100.0				41.0	11.3	75.0	48.5
Bloody diarrhoea					1.0	70.0	450.0	147.7
Chicken pox				30.2	53.7			122.0
Cough/cold/ nose run				19.2	30.0	28.9	60.3	72.7
Cloutes/ bruises			65.0	80.0	150.0		10.0	113.7
Difficulty in breathing		26.0		14.8		15.0	732.0	330.1
Eye problem				134.0	0.3	161.6	28.4	128.7
Fever			33.1	20.4	53.8	88.4	49.0	85.8
Mucoid diarrhoea				80.4	676.5	10.0	60.0	353.6
Scabies			32.5	40.0	9.2	87.5	346.6	184.6

Contd...

Table 13 *(contd.)*

Illness condition	<500 (n=4)	500-1000 (n=5)	1000-2000 (n=142)	2000-3000 (n=396)	3000-4000 (n=378)	4000-5000 (n=200)	5000+ (n=299)	Total
Stomach pain			121.6	131.2	161.9	154.7	275.9	275.6
Vomiting/ nausea				22.7	48.3		38.3	36.3
Watery diarrhoea			7.5	101.0	70.7	173.6	275.4	176.7
Others			107.3	87.7	124.3	106.3	161.9	285.3
Average	**100.0**	**26.0**	**225.6**	**126.4**	**214.8**	**171.0**	**218.2**	**185.4**

Determinants of Demand for Healthcare: Multivariate Analysis

A multivariate analysis was carried out to identify the determinants of demand for healthcare. Two techniques of multivariate analysis were used: logit regression was used to ascertain whether the selected explanatory variables significantly affect willingness-to-pay for four types of healthcare (for which households do not have to pay any price at present) and the ordinary least squares method was used to estimate the magnitude of influence of some explanatory variables on expenditure for treatment for the last illness condition of children and women.

Determinants of WTP for healthcare: In conducting the logit regression for each of the four types of healthcare, the following variables in the regression equation were included:

Dependent variable (dichotomous)	Willingness to pay for healthcare = 1 Do not want to pay = 0
Independent variables:	
Rate of fees or possible price of healthcare (dichotomous)	Tk 4 or more = 1 Less than Tk 4 = 0
Income (continuous)	Actual income of households
Education 1	Respondent passed Class V or below
Education 2	Respondent passed any class between V and X
Education 3	Respondent passed a class higher than X
Landholding (continuous)	The amount of land owned by household

Table 14 shows that the following odd ratios are significant: odd ratio for income variable for child immunization, odd ratios for income and moderate education for TT, odd ratio for income for children's curative care, and for income and moderate education for women's healthcare. Even the few odd ratios which are significant do not show that the corresponding explanatory variables positively affect the WTP for the particular healthcare.

Table 14. Odd ratios of willingness-to-pay for healthcare (n=2,210)

Explanatory vairables	Child Immunization	TT immunization	Curative care for children	Curative care for women
Price	0.00	0.00	0.00	0.00
Income	1.00**	1.00*	1.00*	1.00***
Education 1	0.76	0.71	0.79	0.76
Education 2	0.83	0.46***	0.69	0.59*
Education 3	0.90	1.08	1.09	0.96
Land holding	1.07	1.08	0.99	0.98

** indicates significance at 10 percent level*
*** Indicates significance at 5 percent level*
**** Indicates significance at 1 percent level*

Determinants of expenditure for healthcare received for the last illness condition of children and women: The explanatory variables which were included in the expenditure functions are:

Y = observed income of households (Taka)
S = severity of diseases (index)
D = duration of diseases (number of days)
C = source of care (dummy variable), and
H = level of respondent's education (highest class passed).

Using the ordinary least squares method, two logarithmic equations were estimated–one for the expenditure for child healthcare (Ec) and another for the expenditure for women healthcare (Ew). The estimated equations are as follows:

$$\ln Ec = 2.24 + 0.20^{***} \ln Y + 0.03 \ln S + 0.29^{***} \ln D - 0.50^{**} \ln C + 0.004 \ln H$$
$$(2.83) \quad (0.30) \quad (2.25) \quad (-2.09) \quad (0.11)$$

Adj. $R^2 = 0.03$

$$\ln Ew = 2.34 + 0.12 \ln Y + 0.44^{***} \ln S + 0.79^{***} \ln D - 0.24 \ln C - 0.09^{**} \ln H$$
$$(1.34) \quad (2.98) \quad (7.37) \quad (-0.94) \quad (-2.18)$$

Adj. $R^2 = 0.09$

The figures in parentheses show the t-values.

Three variables are found to have significant influence on the expenditure for child healthcare: income, duration of disease, and source of care. Child healthcare expenditure was positively correlated with income and duration of disease, and quite expectedly so. But child healthcare expenditure was negatively correlated with the source of care variable indicating that expenditure at public health facilities is higher than that at private facilities. This is possible if the location of a public health facility is more distant and/or a public facility charges a good amount of "unofficial fees". However, the explanatory power of the estimates is very low. Also low are the elasticities of expenditure.

In the expenditure for women healthcare equation, the estimated coefficients are significant for three variables: severity of disease, duration of disease, and level of education. Severity and duration of disease positively affected the expenditure. But expenditure and education of the respondents were negatively correlated. The elasticities of expenditure were very low. The explanatory power of the estimates was also very low.

Summary and Conclusions

The main objectives of this paper were to analyze the level of demand for healthcare and to identify the important determinants of demand. Since a market does not exist in Bangladesh for the majority of types of healthcare, attempts were made to analyze demand for healthcare in terms of willingness-to-pay of households for some healthcare. For some healthcares markets exist, distorted though, but the data on the ex ante demand for these healthcares were not available. Attempts were made to assess the demand behaviour for those cases in terms of expenditure already incurred.

The paper first discussed some conceptual issues relating to demand analysis and critically examined some important studies on healthcare demand. Considering a number of methodological limitations found in the available studies, the paper posited a model of demand for healthcare which is expected to overcome some of the conceptual and analytical problems of the demand models found in the available studies. The model developed here clearly shows the important explanatory variables of the demand function and postulates the direction of change in demand as each of the variables changes. Furthermore, the model has theoretically derived some useful implications.

The empirical analysis was carried out using data collected by the ORP of ICDDR,B from selected rural areas. Since data on all the variables of the demand model were not available in the set used, the multivariate analysis remained confined within what is permissible with the available data set.

The data on willingness to pay have explicated that most people in the study thanas (about 80%) were willing to pay for child immunization, TT, healthcare for children and women's healthcare. The price elasticity of demand was found quite low, so that even a large change in the rate of proposed fees reduces demand only marginally. Income elasticity was considerably high; proportion of households willing to pay was much higher in the higher income classes than in the lower income classes. The households which did not want to pay for healthcare (20%) mentioned their unwillingness to pay for any government service as the main reason. Even among the households that mentioned that they did not want to pay due to the lack of financial

capacity, only a few (2%) were extremely poor in the context of rural Bangladesh. The implication is clear: introduction of a fee on healthcare will reduce demand, but not considerably. To counteract the possible decline in demand, a safety net for around 2 percent of the people who are extremely poor and motivation for another 18 percent of the people are needed.

Data on expenditure for healthcare received for the last illness condition of children and of women revealed that a rural household spends Tk 100 per illness episode of children and Tk 67 per illness episode of women. The amount of expenditure varies with change in income, type of disease, and type of provider.

The attempt to conduct a multivariate analysis was not quite successful. The logit regression used to analyze WTP behaviour of households could not identify the variables which are theoretically expected to determine WTP. The expenditure for healthcare equation estimated using OLS has a very low explanatory power. The main reason for failure of the multivariate techniques to adequately identify the determinants of demand or estimate the elasticities of demand seems to be the paucity of relevant data. The data used for the study were collected mainly for the purpose of monitoring of the project activities and as such, it did not consider some important issues which are relevant to demand analysis. As a result, data on some crucial variables were not collected, and some data were not collected in the form as required for a demand analysis. To estimate a demand for healthcare function appropriately, a survey is needed to collect data on all the variables of the demand for healthcare function derived under General Framework of Analysis of this paper.

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