

Willingness to pay for vaccination against hepatitis b and its determinants: the case study of an industrial district of Pakistan

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DOI: 10.2427/12954

Accepted on November, 15, 2018

ABSTRACT

Willingness to pay (WTP) for vaccination of hepatitis disease is a good measure to monetize the physical effects of a disease into monetary values. Therefore, the present study aims to find the willingness to pay for self-paid vaccines for hepatitis and its determinants in an industrial district Faisalabad, Pakistan. Primary data was collected from 200 non-patients of hepatitis which were personally interviewed by using convenient sampling method. A scenario was presented to the selected respondents by using CVM technique. The respondents were randomly assigned to pre-chosen payment bids defined on the basis of prevailing market rates for vaccination at the time of survey. The multivariate linear regression was used to find the determinants of WTP. The results show that females are slightly more willing to pay as compared to males. The variables like age, income and awareness about hepatitis have positive impact on WTP for vaccination of hepatitis disease. About 57.3 percent people belonging to low income group wanted vaccination free of cost in Pakistan. Government should launch free vaccination programs for the most vulnerable group (poor) and must launch awareness campaign to increase knowledge about disease.

Key words: economic factors; hepatitis disease; self-paid vaccines; social factors, willingness to pay

INTRODUCTION

A systematic relationship between health and economic growth became the attention of Barro and Sala-i-Martin [1] as they highlighted the correlations between health and wealth. A state of continuous growth cannot be existed unless the labor force qualifies the basic education and health requirements. Sala-i-Martin [2] explained that

most of the less developed countries are essentially poor because the majority of their population is unhealthy where addressing health issues is an apparently impossible task without economic growth (unhealthy is poor; poor is unhealthy). Many developing countries have encountered severe health problems. The most important problem of less-developed countries including Pakistan is hepatitis B. More than 20 million people were annually affected with

this virus in the world while there are around 350 million chronic carriers of this virus in the world [3]. Hepatitis B is one of the common type of hepatitis virus prevailing in the world [4]. Hepatitis B virus (HBV) and hepatitis C virus (HCV) appeared as the great threat to the general wellbeing of masses especially in the developing nations. The developing countries are particularly vulnerable to HBV where medical services frameworks do not have the effective measures which are necessary to turn down the chances of interception. The inadequate and poor public awareness about the methods of disease transmission is also common in developing countries [5]. Literature shows that people (either hepatitis patients or not) have little or no knowledge about hepatitis disease in many countries of the world including Pakistan [6-9]. Such environment has led them to various implications for safeguarding public health along with increased costs to the society for compulsory vaccination by local or international agencies. People in developing countries like Pakistan have become susceptible to this disease as there is a very low trend to get vaccinated for avoiding this disease. The reasons for such behavior are rarely explored along with the possibility of people's own willingness to pay (WTP) for hepatitis B vaccination. Such analysis is warranted in the wake of increased incidence of the disease along with added pressure on public budget to address the recent surge in this disease in the country. Willingness to pay for vaccination of hepatitis disease is a good way to monetize the physical effects of a disease into monetary values. It tells how much amount a person is willing to pay for getting rid of this disease. Therefore, this study is undertaken to evaluate the reasons for low trend of vaccination along with exploring the potential of self-paid willingness to pay (WTP) for hepatitis B vaccination and its determinants.

METHODS

Basically, two theoretical approaches (direct and indirect) are used for making reliable estimates on household's WTP for improved health quality [10]. The direct approach uses stated preference in which individual is directly asked as how much he or she would be willing to pay for the improved health. This method is generally called contingent valuation method (CVM). Under this method, individuals are briefed about a contingent (future) scenario to elicit their responses in case either they are ready or not to take a specific decision regarding a proposed intervention [11].

The indirect approach uses data on observed behavior of households, i.e., how much and how frequently they spend money to avoid health problems like hepatic viral infections (revealed preference) for averting hepatitis B and to avoid harmful effects on health caused by these infections for estimating their WTP. As a starting point,

individuals develop and opt various coping strategies. This coping cost gives an estimate of how much additional money people are willing to pay for an improved health quality for themselves and for their dependents. The difference in expenditure is compensating surplus or equivalent surplus. If the reference level of utility is initial utility then it is compensating surplus and if the reference level of utility is final then it is equivalent surplus.

Willingness to pay (WTP) may depend on a range of factors. These factors may include income, wealth, household educational level; distance from existing sources [12, 13]. This study would fill the gap in literature in terms of coverage of a neglected area like Pakistan. To capture various determinants of WTP, a multivariate regression analysis is conducted.

This study measures the willingness to pay (WTP) for vaccination of hepatitis B disease and effect of its determinants using cross sectional data collected from 200 non-patient respondents. A scenario was presented to the randomly selected respondents using CVM technique. The respondents were randomly assigned to pre-chosen payment bids defined on the basis of prevailing market rates for vaccination at the time of survey. The selected payment options included are: free, Rs.500-800, Rs. 801-1,200, Rs. 1,201-2,000 and above Rs. 2,000. The elicited WTP amount is taken as dependent variable for finding out influencing factors such as socio-economic variables like locality, gender, age, income and education.

Multinomial logistic regression model was used to find out determinants of WTP. The model used for this purpose is given below:

$$WTP = C + a_1 \text{ age} + a_2 \text{ higher education} + a_3 \text{ gender} + a_4 \text{ income} + a_5 \text{ knew HP} + a_6 \text{ locality} + a_7 \text{ attitude category} + a_8 \text{ Knowledge category}$$

Where:

WTP: Households' willingness for vaccination of hepatitis

C: constant of the model

Age: age of respondents in years.

Higher education: dummy variable for higher education. 1 is used to represent respondents whose education is above the intermediate level while 0 is used less than intermediate.

Gender: gender of the respondents (male=1, female=0)

Income: total income of respondents in Rupees which includes total monthly income of the respondent plus income of the other earning family members plus income from other sources (rent, gift or remittances).

Knew HP: if the respondent knew about hepatitis disease (yes = 1, otherwise 0)

Locality: a dummy variable used for rural and urban locality. 1 is for urban and 0 for rural background of the respondents.

Knowledge category: Knowledge categories (high, medium and low knowledge).

Attitude category = Attitude categories (least friendly, moderate friendly and more friendly).

a_1 to a_8 are the coefficients of the independent variables.

RESULTS

In the present study, responses to WTP amounts were sought in the form of respondents' answers to pre-defined and pre-tested five payment options as explained above. Table 1 portrays the distribution of respondents according to their preferences for a specific payment amount.

It is evident from Table 1 that 26.5% people wanted free vaccination for hepatitis. This showed that people will get vaccinated if government does provide it free of cost whereas 18% of the respondents wanted to pay only between Rs. 500-800. Similarly, 13.5% were willing to pay Rs. 801-1,200. A considerable variation is observed in terms of WTP for vaccination among males and females; and respondents from urban and rural areas as shown in Table 1. The preference for free vaccination of hepatitis is almost same among male and female respondents. On the contrary, only 10.3% of female respondents are willing to spend between Rs. 500-800 while 23% of males are willing to spend the same amount for vaccination. More astonishingly, percentage of female respondents willing to spend above Rs. 800 to Rs. 2,000 is relatively more (38.4%) in comparison with male respondents (23%). This shows that females are slightly more willing to pay as compared with males and the result was in line with the findings of Lang [14].

Table 1 also indicates that the majority of rural inhabitants prefer vaccination either free or at a very low price. It indicates low awareness level about the severity of hepatitis disease or lower level of income in rural areas. Some studies reported both of these reasons for low level of WTP for vaccination against various diseases among rural masses in developing countries [15-17]. In addition, more than one fourth of the rural respondents wanted free vaccination which again casts serious implications while planning for public health safety programs in Pakistan. These findings are in line with Kim et al. [18] who stated that most urban respondents are willing to pay relatively more.

Table 2 compares WTP for vaccination across different income categories (low, medium and high) in Pakistan. Results reveals that 57.3% people belonging to low income group wanted free vaccination for hepatitis in Pakistan. Table 2 also indicates that WTP increases as income increases like finding of Asim and Lohano [19] and Kim et al. [18].

Opting for vaccination against any disease is greatly shaped by people's knowledge about the incidence and severity of that diseases [18, 20] as well as their perceptions about the disease and effectiveness of vaccination [20]. Table 2 also compares WTP for vaccination across people for different knowledge categories (low, medium and high) and attitude categories (negative, neutral and positive attitude). Results reveal that people would opt for vaccination if they become more aware and would not just sit to avail free vaccination. Most importantly, percentage of respondents willing to pay the maximum price such as more than Rs.2,000 increases significantly starting from low knowledge group to high knowledge group [18, 20].

It is clear from Table 2 that WTP for vaccination is generally higher in people having more knowledge about the effects of hepatitis.

Table 2 also portrays and compares WTP for vaccination among respondents with respect to their attitude towards hepatitis such as negative, neutral and positive attitude. It is cleared from the table that majority of less negative and positive attitude people had fallen into high WTP category while people having least friendly attitude fell into low WTP category.

It is imperative to know various factors influencing people's attitude towards paying for vaccination in order to safeguard them against hepatitis. Table 3 presents these determinants among respondents. These determinants are evaluated for the respondents and their families by taking their willingness to pay for vaccination as dependent variable. Multinomial logistic regression model is used to find out determinants of WTP as specified in equation 1.

Table 3 depicts the results of WTP according to the low to high WTP categories in comparison with reference category of free vaccination.

As given in Table 3, first category of Rs. 500-800 is compared with reference category of free vaccination. The variables of age, when respondent came to know about

TABLE 1. Frequency distribution of WTP and WTP with respect to Gender and Locality

WTP FOR VACCINATION	FREQUENCY	GENDER OF RESPONDENT		LOCALITY (URBAN/RURAL)	
		Female	Male	Rural	Urban
Free	26.5%	26.9%	26.2%	35.7%	17.6%
Rs. 500-800	18.0%	10.3%	23.0%	31.6%	4.9%
Rs. 801-1,200	13.5%	17.9%	10.7%	7.1%	19.6%
Rs. 1,201-2,000	15.5%	20.5%	12.3%	13.3%	17.6%
Above Rs. 2,000	26.5%	24.4%	27.9%	12.2%	40.2%

TABLE 2. WTP with respect to different income group, knowledge and attitude scores

WTP FOR VACCINATION	CATEGORICAL INCOME			KNOWLEDGE			ATTITUDE		
	Low	Medium	High	Low	Medium	High	Negative	Less negative	Positive
Free	57.3%	10.2%	6.1%	39.6%	20.7%	5.0%	38.0%	8.3%	2.9%
Rs 500-800	30.7%	22.0%	0.0%	27.9%	17.2%	0.0%	24.8%	8.3%	2.9%
Rs 801-1,200	6.7%	33.9%	3.0%	13.5%	27.6%	6.7%	15.5%	11.1%	8.6%
Rs 1201-2,000	0.0%	23.7%	25.8%	12.6%	13.8%	21.7%	14.0%	19.4%	17.1%
Above Rs 2,000	5.3%	10.2%	65.2%	6.3%	20.7%	66.7%	7.8%	52.8%	68.6%

TABLE 3. Determinants of WTP for Vaccination

VARIABLES	500-800		801-1,200		1,201-2,000		ABOVE 2,000	
	B(Std. Error)	Exp (B)	B(Std. Error)	Exp (B)	B(Std. Error)	Exp (B)	B(Std. Error)	Exp (B)
C	-18.823***[1.999]		-6.489*[2.436]		-6.350**[2.216]		-7.457**[2.393]	
Age	.032[0.027]	1.033	.006[.039]	1.006	.039[.037]	1.040	.044[.043]	1.045
Income	.001[.001]	1.000	.0011**[.0015]	1.000	.001***[.001]	1.000	.001***[.0013]	1.000
Knew HP	.156[.355]	1.168	1.836***[.396]	6.270	1.548***[.392]	4.701	1.752***[.400]	5.766
Low knowledge	18.675***[.931]	128955979	-3.009**[1.323]	.049	-2.068*[1.223]	.126	-3.228**[1.404]	.040
Medium knowledge	18.518[.000]	110266659	-.211[1.201]	.810	-1.931[1.210]	.145	-1.880[1.213]	.153
Negative Attitude	-1.480[1.660]	.228	-1.223[1.499]	.294	-1.717[1.412]	.180	-3.482**[1.497]	.031
Less Negative Attitude	-.136[1.8855]	.872	-1.501[1.654]	.223	-1.589[1.552]	.204	-1.783[1.547]	.168
Female	-.678[.519]	.508	.640[.670]	1.896	.895[.683]	2.446	.609[.778]	1.838
Male	0b	.	0b	.	0b	.	0b	.
Low education	-.177[.735]	1.194	-4.43***[1.212]	83.921	-1.603[1.087]	4.969	-2.629**[1.209]	13.863

*** significant at 0 % level of significance, ** significant at 5 % level of significance, * significant at 10 % level of significance.

hepatitis disease (knew HP), attitude, higher education and total income of the respondent are positively related to the willingness to pay for vaccination of hepatitis B. Moreover, the coefficient of age is statistically insignificant. Positive coefficient of age shows that older people would tend to pay more to avoid hepatitis.

DISCUSSION

Positive coefficient of income implies that wealthier people are likely to pay more money to avoid hepatitis B disease. This finding conforms to the findings of Asim and Lohano [19], Kim et al. [18] and Lang [14] who concluded that rich people/families would sacrifice more money to avoid any disease. Those people who know more about hepatitis from long time are found to be more willing to pay for vaccination than the people who came to know about this disease very recently. Similarly, knowledge about hepatitis has a positive impact on WTP for vaccination. The respondents' attitude is also positively related with WTP for vaccination. People with friendlier attitude are found to be more willing to pay for vaccination

of hepatitis B. Positive coefficient on the variable 'gender' depicts that males, on an average, have higher willingness to pay for vaccination treatment of hepatitis B than the females in this category (500-800). On the other hand, in case of high WTP category, females are found to be more willing to pay for vaccination than men. Higher education of respondent is found to have a positive effect on willingness to pay for vaccination of hepatitis B. This finding is justifiable as higher education leads to greater quest and accuracy of information about the threats linked with this disease and its potential effects on other family members. Therefore, highly educated people tend to have more knowledge, will and ability to avoid hepatitis B.

Considering the second category of 801-1,200 with reference category of free vaccination, age, the duration of the prior knowledge of the respondents about hepatitis disease (knew HP), the nature of their attitude, knowledge, higher education and total income are positively related to the willingness to pay for vaccination of hepatitis B. However, the coefficient of age of the respondent is statistically insignificant. Positive coefficient of income shows that wealthier people may sacrifice more money to avoid hepatitis B disease. Similarly, the WTP for

vaccination among the people knowing about hepatitis since long time ago would be higher than those who recently came to know about this disease. Closely linked with this finding, knowledge about hepatitis had positive impact on WTP for vaccination implying that people who have more knowledge about this disease are more willing to pay for vaccination than people having less information related to this disease. In this category of WTP, females are more willing to pay for vaccination than male while increased level of education of the respondent is also found to have a positive and significant effect on willingness to pay for vaccination of hepatitis B.

Table 3 also presents results of high WTP categories (1,201-2000 and above 2,000). These both categories have similar results as for previous categories. Age, income and awareness about hepatitis have positive impacts on WTP for vaccination in both categories.

Above findings are well supported by different studies such as Asim and Lohano [19], Kim et al. [18], Lang [14] and Kruiroongroj et al. [20].

Results show that age, income and awareness about hepatitis has positive impact on WTP for vaccination of hepatitis disease. Government should launch free vaccination programs for at least the most vulnerable group (poor) and must launch awareness campaign to increase knowledge of population. Limitation in this study is sample size that can be increased in future to analyze more deeply.

Ethical approval

Ethical approval was not required for this research.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Competing interests

All authors state that they have no competing interests.

Additional information

A.S, M.R.Y., A.B., M.W. and B.A.G undertook the overview, A.S. provided input into the analysis of measures using the framework and M.R.Y provided guidance on the overall analysis. All authors contributed to the drafting, reviewing of the article, and have approved the final article.

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