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ABSTRACT

A dignified and healthy life remains a distant nightmare to the large majority of population in developing countries including Pakistan. Large masses living in this world particularly South Asian country (that is home to over one fifth of the world's population) is still striving for it. Pakistan, being a developing country, is no exclusion to that state. The condition of sanitation and solid waste management (SWM) in the country carriages a grave challenge to health and hygiene. This study was carried out to show at the household's (HH's) demand for improved environmental settings over valuing their willingness to pay (WTP) for better SWM facilities. The study follows contingent valuation method for assessing the HHs preferences for better living standards. Primary data used in the research was gathered with the application of tailor made questionnaire from both rural and urban regions of district Abbottabad, Pakistan at HHs premises. The objective was to discover the determinants of HH's WTP for improved environment through better SWM services; the binomial logit regression method was used. Education, income, awareness, location and HH size were found to be influencing HH's WTP. The study concluded that HHs were WTP, if adequate services were delivered to them.

Keywords: Contingent Valuation Method, Binomial Logit Regression, Willingness to Pay, Solid Waste Management, Environment, Pakistan

1. INTRODUCTION

A dignified and healthy life remains a distant nightmare to the large majority of population. Masses living in the developing world including South Asian countries (that is home to over one fifth of the world's population) is still striving for it. Pakistan, being a developing country, is no exclusion to that state. The situation of sanitation and solid waste management (SWM) in the country poses a serious challenge to health and hygiene. Improper SWM results in air and water pollution, soil degradation and emission of greenhouse gases. Negligence on this part also causes certain societal issues like spread of insects, odour, loss to scenic beauty, loss in property values and vulnerability to the diseases as waste heaps attract animals and birds. The interminable link between quality of life of poor families in the underdeveloped countries (especially South Asia) and inferior state of water, sanitation and hygiene is well established [Malik and Jehangir (2008)]. Correction to the existing worse environmental situation is not only imperative for better life quality but it is also our moral and heritor duty to preserve the environment for our coming generations. We must provide them with environment; at least in a state what we inherited from our forefathers, if not better. Based on such arguments, the sustainability issue is now discussed almost all around the world; however, every country has its own distinct features and environmental endowments. Hence, there is a need to take up fresh research and take into account all costs and opportunities attached with the environment. In this connection, the most important research question is to know the household's (HH's) Willingness to Pay (WTP) for better environmental goods and to pin point its determinants for policy implication. Hence, in order to quantify the HHs demand for better services and find a monetary value for it, this study processes HH's WTP for upgraded SWM facilities and its determinants.

As we know, willingness to pay (WTP) is the maximum amount a person would desire to pay, exchange or sacrifice for any commodity, good or item. There is a need to have a Choice Models to predict efficiently that how individuals would react in a particular situation. These models help us in identifying human qualities that affect their decision making behaviour.

The data used in the study was taken from the Environmental Fiscal Reform (EFR) project IUCN/PIDE sponsored by Swiss Agency for Development and Cooperation.

Literature regarded the use of choice models as the most suitable method for estimating consumers' willingness to pay for quality improvements in multiple dimensions including SWM. We will frame our analysis in the same fashion.

2. QUANTIFICATION AND LINE OF ACTION

Cost estimation is an important stage in ensuring optimal allocation of scarce resources. Especially the problem arises with non-marketed goods in particular with the items which belong to environment. The estimation of monetary cost is aimed to internalise the external costs which generally are derived from social costs instead of private cost. For environmental goods, the absence of visible demand and supply system (which determines the market valuation mechanism), has resulted in the development of other tools which can be used for estimating value for these goods. Among these, the most important valuation techniques include Contingent Valuation Method (CVM), Averting Behaviour Approach, Hedonic Pricing and the Travel Cost Method. Adoption of these techniques depends upon the nature of the study and item in question.

In the current literature, CVM is the most frequently used tool for environmental assessment. Contingent Valuation (CV) is assumed to produce reliable estimates for the judicial assessment of damages [Arrow, *et al.* (1993)]. The validity of CVM to estimate monetary valuations for environmental goods have been adequately established in the literature for Pakistan as well [Haq, *et al*. (2008); Mustafa, *et al*. (2009 a,b); Mustafa, *et al*. (2010)]. It is the direct method of enquiry based upon the stated preferences of the consumers for a specific environmental good. CVM is a questionnaire based on valuation technique where the consumers are given a hypothetical situation of an improved environmental situation and are directly asked to value it by expressing their WTP for it.

In CV surveys, HHs are being asked about their WTP if in a particular sector a desired service level is provided [Komives, *et al.* (2005)]. Keeping in view the merits of CVM, our analysis is also based on the CVM technique and we used it to gauge HH's WTP for improved service level for SWM. As discussed, CV is a technique of assessing the monetary worth of non-marketed environmental goods over survey questions that carry out person's inclinations about such goods [Carson and Mitchell (1995)]. In the CVM surveys, the questions regarding the quality levels are carefully described and the respondents are asked for their WTP for the change in service quality [Carson and Mitchell (1995)]. The simple postulation behind this technique is to denote or value the objective quality enhancement that the study enquires the HHs to asses.

In order to capture HH's WTP in the CV studies, question can be structured in a number of ways like dichotomous choice [Mitchell and Carson

(1989); Mansfield (1998); Cameron and James (1987); Hoeln and Randal (1987); Cummings, *et al.* (1986); Berrens, *et al.* (1997)], bidding games [Liu, *et al.* (2000); Amin and Khondoker (2004)], payment cards [Cameron and Huppert (1991)] or open ended questions [Mansfield (1998); Cameron and James (1987)]. However, these methods in isolation are not capable to capture bespoke consumer surplus i.e. a representative value of WTP for any environmental good. Therefore, in this study a combination of the stated methods were used. HHs were questioned in such a fashion that they were obliged to indicate their true WTP. We used the statement of most likely limits for WTP which reduces the opportunity of extreme over pledging [Cameron (1988)]. Such mechanism also encourages participation and avoids protest responses [Loomis (1990)]. Moreover, with the provision of an open ended question at the end, it was tried to overcome the starting point bias.

SWM sector was taken as an experimental field in this study. To find out public WTP for an improved SW management situation, a tailor-made CVM survey was conducted in Abbottabad district of Khyber Pakhtunkhwa province, Pakistan. Keeping in view the nature of the study, the question concerning the WTP for improved SWM services was framed very carefully. First of all respondents were thoroughly briefed about the improved services which they would avail under the improved SWM services system (if they adopt it). The superior SWM services were explained as HHs would be given door to door coverage for waste collection, the street and community waste dumps would be taken away on regular basis and Teshil Municipal Administration (TMA) workers would clean the streets at regular intervals. In addition, to ascertain the people that the new system is reliable and would continue to work they were asked the question as if twenty five percent of the HHs in the locality has already decided to adopt the new system.

Once they were briefed about the improved SWM services, in response they were asked that for such a system 'would they be willing to pay nominal amount' (Rs 50 per month). Their responses were recorded as "Yes" or "No". If the HHs responded with "No", they were asked an open ended question about the amount which they are WTP even if lower than Rs 50. On the other hand, if the HHs responded "Yes", they were again asked, raising the monthly charge to Rs 100 for same services, which was to be answered with "Yes" or "No". Following the second question irrespective of the answer, HHs were yet again asked with an open ended question that what is their maximum WTP for such services above or below the stated amount i.e. Rs 100/month. The open ended question was aimed to capture both the lower as well as upper limits of amount,[1] which respondents want to dedicate in order to acquire the said services. Hence, by this iterative mechanism, it was tried to calculate the presumed consumer

[1]Other than the stated amount of either Rs 50 and Rs 100/month.

surplus that HHs had for such services. Moreover, the value stated in response to the open ended question was used as their final WTP in this study. Thus, it was tried to thoroughly capture the true bespoke value for HHs WTP for improved SWM services.

3. FIELD VISIT AND METHODOLOGY OF THE SURVEY

As indicated above, this study is based on primary data which is collected from rural and urban areas of district Abbottabad. For this purpose, three stage stratified systematic random sampling techniques was adopted. In the first stage, according to the nature of the study, total population was divided into the interest groups i.e. rural and urban and specific sample weights (40:60) were assigned for data collection from the rural and urban areas, respectively. In the second stage, different strata (streets/wards in urban areas while villages in rural areas, to cover for different income groups into the account) were formed in the selected areas. And finally in the last stage, sample data was collected from each strata. The whole sample size comprising both urban and rural regions was 455 HHs, which contain of 2779 HHs' members. Sample characteristics are given in Table 1.

Table 1

Sample Characteristics

Variable Name	Distribution	Total (Year)
Age	Minimum	Under 1
	Maximum	105
Gender	Male	1587
	Female	1192
Highest Education in a HH	No education	7
	Primary	32
	Metric	155
	Graduate	194
	Post Graduate	67
Education of the HH Members	No education	678
	Primary	728
	Metric	823
	Graduate	448
	Post Graduate	102
House Structure	Non-cemented	96
	Semi-cemented	302
	Cemented	56
HH Size	Minimum	2
	Maximum	18

It is important to indicate here that the SW problem generally pertain to urban area that's why more weight was required to be given to the urban areas. Therefore, purposively 60 percent of the HHs were selected from the urban areas. Nevertheless, because of the rapid urbanisation and limited urban area in Abbottabad, the surrounding designated rural area is sharing the burden of urban population. A large segment of the population is residing in rural area but for daily business they regularly commute to the city. Therefore, it was imperative to assign certain weight to the rural areas as well and accordingly 40 percent of response was collected from rural areas.

A well structured pretested questionnaire was used for data collection. In the first portion, information regarding the socioeconomic situation of the HHs was gathered including income of the HH, employment status and sectors they are engaged in, their dwelling status, health issues and utilities that they are availing. The 2nd part was dedicated to issue in question i.e. SWM and related concerns including HH's WTP for improved SWM services.

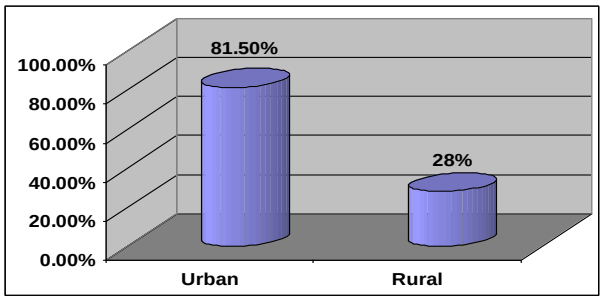
4. QUALITATIVE ASSESSMENT OF PUBLIC'S WILLINGNESS TO PAY FOR BETTER SWM IN DISTRICT ABBOTTABAD

With the passage of time, governments around the world are trying to devolve and deregulate different sectors for efficient services delivery. However, for private sector involvement it is crucial to estimate public's WTP for such services. Moreover, assessment of HH's WTP is also vital in order to grasp consumer's demand for different services.

As discussed earlier, in order to measure HH's maximum WTP, an iterative mechanism was adopted where the basic fee, for the provision of improved services, was increased gradually. In response to the first question (i.e. WTP for Rs 50), overwhelming results were obtained. Ninety eight percent of HHs responded to the question. It was noted that urban HHs were more WTP[2] for improved waste collection and disposal services as compared to the rural dwellers. Within urban, 82 percent HHs replied in affirmation to the question while 28 percent of the rural HHs was ready to pay Rs 50 per month. Hence, overall 62 percent of the samples HHs were WTP for improved SWM services (Figure 1). The difference in response amongst urban and rural HH's can be explained as; firstly, the significant difference in the income level at the rural and urban centres and secondly, a number of alternative avenues are available in the rural areas for waste disposal without any cost. Thirdly, it also depends upon the awareness level of the dwellers. Beside the given rural and urban differences in response, this is still an encouraging proportion of HHs which is WTP and wants improved waste management services. This indicates the importance they attach to the proper disposal of solid waste and avoidance of hazards attach to it.

[2]Provided that, there is a continued supply of the given quality of service.

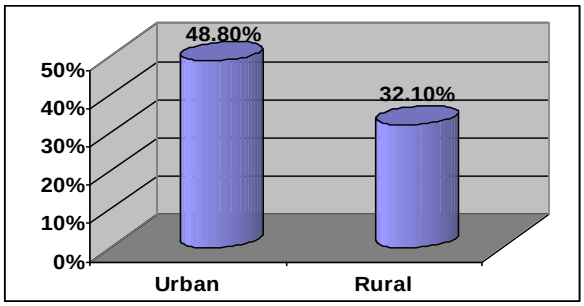
Fig. 1. HHs WTP for Rs 50 for Improved SWM Services



In the next question the bench mark, for improved SWM services, was increased from Rs 50 to Rs 100. In response, 71 percent HHs replied to the question, thus with the increase in fee, the overall response declined from 98 percent to 71 percent. This is indicative of the fact that at higher cost, the sampled people were less interested in the new system for SWM and hence their total response has declined. However, despite the higher charge, urban HHs were still more WTP in comparison with the rural dwellers. Within the urban HHs 49 percent while 32 percent of the rural HHs were ready to pay even the higher amount (Rs 100) for the new improved system.

Being deprived of the facilities, rural HHs are somewhat more consistent in their WTP as compared with the urban dwellers. The ratio of those who accept the new system in the rural areas was 28:72 (yes: no) which changed to 32:68 for the higher charge.[3] On the other hand, the same ratio for the lower WTP was 81.5:18.5 which drastically changed to 49:51 for higher bound of WTP (Figure 2). Nonetheless, in the new response with higher bench mark, the overall percentage of those HHs which are WTP has fallen from 62 percent (for Rs 50/month) to 44 percent.

Fig. 2. HHs WTP for Rs 100 for Improved SWM Services

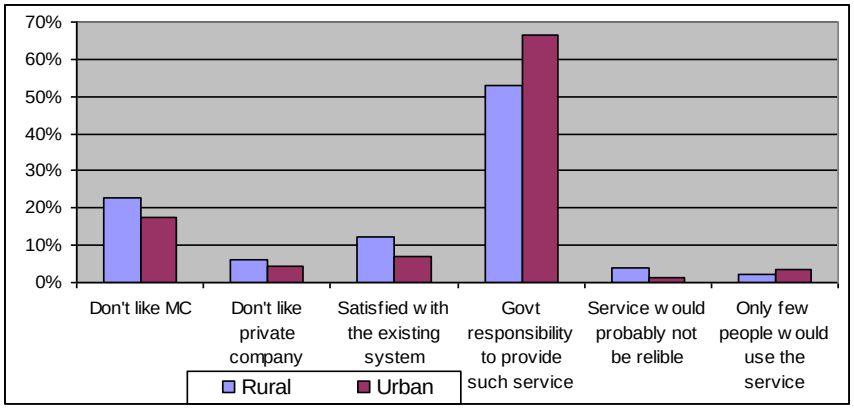


[3]It should be kept in mind that total response to 2nd question had decreased to 71 percent as of 98 percent for the first WTP question.

To further dig into the issue, it is important to note down factors that cause non-payment for new improved system of SWM. This will show the preferences and reasons for which people are not WTP for a promised improved system. To capture those elements a question was asked from the respondents to state the reasons for which they were not WTP for the improved SWM services. Total response to the query was 84 percent of the total sample size. Factors that come out to be the major reason for not paying and adopting new system were as 61 percent of the respondents think that its government responsibility to provide such basic facilities. The second important factor for rejecting new system was the dislike towards TMA as a service provider. Twenty percent of the respondents termed it a cause for not going for the new system. The reason for this mistrust might be due to the fact that being the current service provider, public is not satisfied with the TMA's performance. So in order to tap people's WTP in this sector, service provider must meet the required satisfaction level of the public.

Third main answer was of those who mentioned that they are satisfied with the existing system of SWM. Only 9 percent of the respondent indicated positively to this option while the overall whelming majorities (91 percent) were not satisfied with the existing SWM practices (Figure 3). Very little percentage (5 percent) of the respondents was not welcoming the private company in this sector to take initiative of this kind.

Fig. 3. Factors Responsible for Non-payment for Improved SWM Services



So to sum up, consumers WTP is influenced by a variety of factors. HHs was really willing for new and improved SWM services and WTP as well. However, the services should be up to the mark and well maintained. Initially, it is noted that consumer's WTP was very much elastic and negatively responsive to the increase in the charges. One of the major reasons that can explain the situation is that people are used to the problems caused by SW and have not

witnessed any of the positive effects of improved SWM services. Nonetheless, once TMA, either by itself or with the private sector collaboration, provide the HHs with the new, improved and efficient system for SWM services, public will positively respond to the services by accepting relatively higher user charges. In addition proper importance should be given to the factors mentioned by the HHs for not adopting the new system of improved SWM services.

5. QUANTITATIVE ASSESSMENT OF WTP FOR SWM

After having a grasp of general trends from the qualitative analyses, we would use certain more sophisticated techniques to have deep understanding of the situation. Hence, in order to have quantitative analysis and find the major factors which influence HH's preferences, a economic model is developed and discussed here.

5.1. Model for CVM

Solid waste is a factor that negatively affects the environment by deteriorating the living conditions of the public living around. Improper SWM have negative implications on the area like environmental degradation, health hazards and have other potential problems. The perpetual link between quality of life in the underdeveloped countries especially South Asia and state of water and sanitation and hygiene is well established in Malik and Jehangir (2008). Being a non-marketed good there are problems in estimating the cost it causes to the environment and to the people living in the area. Therefore, to estimate public WTP for its avoidance, a non-market valuation method i.e. CVM was used which was discussed earlier. In order to find out the major factors that determines and affects public WTP, an economic model was developed for solid waste management following Haq, *et al*. (2008) and Mustafa, *et al*. (2009a).

In economics, we recognise that individuals have inclinations beyond goods from both market and non-market places. These likings of persons are indicated over their utility functions. Consumer wants to capitalise their utility from quantity and quality of goods and services under their given budget restriction. Thus, the utility function can be framed as:

$$U(w, g) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

w = waste management
g = composite of all market goods

Whereas the expenditure function is

$$e(p, w, u) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Where p = prices and u = utility

Equation 2 the expenditure function dealings the lowest sum of cash the buyer essentially spend to attain the agreed level of utility. This is cumulative function of '*p*' and '*u*' and diminishing function of '*w*'.

Subsequently, customer wants to stay with the identical utility, it is suitable to practice spending minimisation issue.

$$Min\ (g + Pg) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

$$s.t\ U = U\ (w, g)$$

Where price of composite goods are equal to one (Pg=1).

The exceeding minimisation problem can be resolved by adopting Lagrange's multiplier to obtain Hicksian demand for the analogous goods.

The Hicksian demand is assumed by:

$$h_i = h_i(p_w, u^*) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

Substituting the values of matching Hickisian demand in the lowest expenditure function we can calculate the least expenditure function:

$$e^* = e\ (p, w, u^*) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Where "*e*" is minimum expenditure required to achieve fixed level of utility "u^*" and using the waste management "*w*", and is the function of price of other goods, the fixed level of utility and the quality of SWM services itself.

The derivative of expenditure function with respect to price gives corresponding Hicks Compensated demand function for good under consideration.

$$\partial e/\partial p_i = h_i\ (p_w, u^*) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

WTP for the change in SWM services is the integration of marginal WTP to achieve better waste management from "*w*" to "w^*"

$$WTP = -\int_{w}^{w^*} \partial\ e\ (w, u^*)/\partial\ w\ .\ dw \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

WTP is the full amount of money a buyer would contribute to appreciate an enhancement in the value of life due to better SWM. The WTP for the improved SWM is:

$$WTP = e\ (p, w, u) - e\ (p, w^*, u) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

Where, "*w*" is a tainted level of waste management and "w^*" is a better level of SWM.

The change in spending is either rewarding excess or corresponding surplus, if the situation is close of the initial utility, it is reimbursing and if the situation level of utility is final then it is corresponding surplus. Now taking into account the model findings, we can predict that HH's WTP, including other factors, rest on income, wealth, education level and reserve from the prevailing

solutions. Hence, to capture major determinants of WTP following regression model can be finalised and would be used for estimation

$$WTP_i = \alpha_0 + \alpha_1 (H_i) + \alpha_2 (D_i) + \alpha_3 (A_i) + \alpha_4 (V_i) + u_i \quad \ldots \quad \ldots \quad (9)$$

Where:

WTP_i = *HHs*' willingness for better *SWM*.
H_i = Households features (Highest education level of the HH, income level of the HH and HH size).
D_i = Demographic characteristics of the Households (urban, rural).
A_i = Awareness about adverse effects of improper SWM.
V_i = Vector born Diseases.

5.2. Important Variables

In order to have brief introduction about the characteristics of the variables that were used in the model, variables of interest are presented in summarised form (Table 2). The mean income of sample respondent was Rs 13701 per month. Income of the HHs ranges from Rs 700 to Rs 94000 per month, thus the sample consists of both the poor and non-poor. As there is huge variation among the income variable, therefore, in the model, income was converted into four quartiles and they were turned into dummies to analyse their incremental effect on HH's WTP for better SWM services.

Table 2

Summery Statistics of Important Variables

Variable	Obser-vation	Mean	Standard Error	Min	Max	95% Conf. Interval Min	95% Conf. Interval Max
Income per Month	455	13701.8	682.17	700	94000	12361.19	15042.41
Highest Education among the HH	455	11.21	0.17	0	18	10.87	11.55
Awareness	455	0.78	0.02	0	1	0.74	0.82
HH Size	455	6.11	0.12	2	18	5.88	6.341
Disease History	455	0.36	0.02	0	1	0.318	0.407
Average WTP	455	34.46	1.96	0	200	30.61	38.32
None zero WTP	241	65.06	2.33	10	200	60.46	69.66

Another important variable discussed in the model is the education level. The highest education among the HH members was considered to check HH's behaviour towards environment. In the model, it was assumed that if there are more educated persons in a HH, their attitude towards SWM would differ from those who have less educated persons. According to the sample, average educational level hover around 11 years of schooling i.e. above metric. In the education variable, there are cases for illiterates while at the same time some HHs members have up to 18 years of education. Therefore, education levels too,

were converted into dummies i.e. metric, graduate and post graduate keeping the primary or below education as the base category.

Awareness regarding the importance of SWM is another variable which need special attention. As evident from summary statistics, 78 percent of the HHs was aware of the hazards that result from the mismanagement of SW. This variable was also treated as categorical variable. HH size is important determinant of HH WTP for improved SWM facilities and is therefore included in the analysis. Average HH size of the sample was 6.11, which ranges from 2 to 18 persons in a HH. Diseases caused by SW were kept as a single variable in the model. Major diseases caused by SW and reported in our sample were related to skin, asthma, hepatitis, stomach, kidney problem, malaria and diarrhoea. On average 36 percent of the HHs had some history of diseases mainly caused due to the mismanagement of SW.

The dependent variable in the analysis was the HH's WTP that was captured through CVM. It is bifurcated in two types. If we consider the overall response and include those who have shown even zero WTP, the average WTP comes out to be Rs 34 per month with limits ranging from zero to 200 rupees. The reason for including those who are not willing to pay in monetary term is that, in the CVM zero WTP is also considered a response. On the other hand, if we want to analyse only those who have responded positively and have indicated their WTP with some positive integer, their mean WTP is Rs 65 per month. This WTP ranges between Rs 10 to Rs 200 per month to attain the benefits from improved SWM system.

6. EMPIRICAL RESULTS

In order to estimate the above mentioned equation and to capture the effects of different independent variables on the HHs WTP, the binomial logistic regression technique was applied. HH's WTP was defined in two categories i.e. zero and one, according to the response given by the HHs during the survey. Zero WTP depicted that HH is not WTP to pay for improved SWM services while the integer one was showing that HH is WTP. The responses i.e. HH's WTP was considered as dependent variable. On the other side the factors which influence public's WTP (i.e. independent variables) consisted of, the highest education level within the HHs (Metric, Graduate and Post graduate), the Income quartiles (Q2, Q3, Q4), household size, HH's awareness level regarding SWM, disease history related to SW and lastly the demographic location (i.e. the rural/urban divide). Hence, after finalising the variables, the regression results are given at Table 3.

Income level is always conceived as an important determinant that would influence public WTP for any service. In our analysis, HHs were divided according to their income levels into four quartiles. In the model, the lowest income quartile was taken as the base and the remaining three higher income

Table 3

Marginal Effects of Binomial Logistic Regression

Independent Variables	Dependent Variable Willingness-to-pay dy/dx
Second income quartile	-0.068
	(0.347)
Third income quartile	0.063
	(0.369)
Fourth income quartile	0.198*
	(0.006)
Metric (Maximum HHs level of education)	0.245*
	(0.012)
Graduation (Maximum HHs level of education)	0.278*
	(0.005)
Post-graduation (Maximum HHs level of education)	0.256*
	(0.011)
Location (Urban/Rural)	0.202*
	(0.000)
Awareness about importance of SWM	0.158*
	(0.009)
Household Size	-0.021**
	(0.051)
Disease history	0.088
	(0.102)
Log likelihood	-279.031
Total number of observation	455
LR chi2(10)	71.10
Prob > chi2	0.0000

In parentheses probabilities of critical values are reported.
* = significance at 5 percent level.
** = significance at 10 percent level.

levels were used as independent variables to know the relationship between the HH's WTP and their income level. Interestingly people in the second and third income quartile were not WTP for an improved SW collection, transportation and disposal services. On the other hand, people which fell in the highest income category i.e. 4rth income quartile, they were found WTP in this range.

These results were in the line with facts because everyone is trying hard to earn his livelihood and to fulfil his HH necessities. So, being at the lower income quartile, HHs finds it hard to set aside any money for the improvement in the SWM services and could not afford to set aside amounts to preserve the

environment. Thus, according to the regression results, for the group of HHs which falls in the fourth income quartile, their WTP was found 19 percent higher as of Q1, while the other who has less income (Q2, Q3) were not willing to pay at all (Table 3).

Education is always a crucial factor in achieving higher awareness. It positively affects the public attitudes towards health and hygiene. According to the regression results, education significantly affects HH's WTP. All the three education levels (metric, Graduate and postgraduate) do have positive and significant effect on public's WTP. So, those who had certain level of education were round about 25 percent more WTP as compared to others who have less or no education.

Location is another important factor which affects HH's living standards. People living in the urban areas are more concerned about their surroundings due to two reasons. First is that urban places are more congested as compare to the rural areas and secondly they are dependent on the government agencies for the SWM services due to lack of community ownership to the areas, as well as absence of alternative waste reduction possibilities which do exists in the rural areas. Moreover, there is some demonstration effect in practice as well. That's why, in the regression too, the rural/urban divide was an important determinant of the HH's WTP for better SWM services. According, to the results, people who live in the urban areas had 20 percent higher WTP as compared to the rural dwellers. This provides evidence in favour of the fact that public's WTP is strongly influenced by the location where they live.

HH's WTP for improved SWM services is also influenced by their awareness level. As the level of awareness increases, HH become desperate to avoid the negative consequences associated with the unmanaged SW. It is also clear from our estimation results that the HHs which possessed some sort of knowledge (regarding the adverse affects of SW) they were really WTP for the improvement in the service levels. HH's awareness (regarding the problems related to improper SW management) has positive and significant relationship with their WTP for an improved SWM services. According, to our estimated results, if HHs have some awareness regarding the adverse effects of SW they have 15 percent higher WTP for improvements in the existing system to have better services quality. This also provide evidence that as people would become more aware of the negative effects of SW, they would be more willing to pay for avoidance.

Another important variable, which has bearing on HH's WTP and discussed in the model, is the HH size. It is a very important factor and affects WTP of the family. Interestingly, HH size has a significant but negative relationship with the HH's WTP. This negative relationship explains that as the HH size increases, the WTP goes down. There are several reasons for this negative significant relationship. One is that as the HH size increases people face more economic burden and their purchasing

power goes down (there is a positive correlation between size of household and poverty) that's why they are less WTP for environmental issues. Besides, it can also be interpreted in a way that with the increase in the family size, HHs member increases and they have more workers to get rid of waste properly and hence they don't consider waste a problem. Moreover, with the increase in size of family, the overall production of waste per head decreases gradually. All these factors lead to negative relationship between the two variables i.e. HH WTP and HH size.

The last variable discussed in the model, is the disease history of the HH. Here specifically those diseases were captured and regressed which were caused by SW or its mismanagement. The important diseases were skin diseases, asthma, hepatitis, stomach and diarrheal diseases and malaria etc. However, according to the regression results, no significant relationship was found between HH's disease history and their WTP.

7. CONCLUSION

With the application of tailor made questionnaire for CVM estimates, the study tried to capture unbiased real WTP for better SWM services. This study not only tried to avoid the negative influences of over pledging, start or end point bias in valuation but also encouraged participation. The adoption of said technique helped in finding actual contribution which HHs are ready to make so as to get rid of adversities attached with mismanagement of SW. Furthermore, analysis of the determinants of the HH's WTP helped in finding out the contributing factors which affects the HH response.

The existing system of solid waste in Abbottabad is not up to the expectation of HHs both in amenities and value to happen the requirements of the HHs. This study explores that 78 percent of the HHs were aware of the importance of SW management and they are sensitive to it. It is also encouraging to note that 62 percent of the HHs was willing to pay for improved solid waste management services. This suggests that people were aware but they need some light at the end of the tunnel to take practical steps and conserve the environment. From the discussion it is clear that urban HHs are not only in need of better SWM services as of rural but are also willing to contribute monetarily to avoid it. On the other hand, less of the rural HHs were WTP for improved SWM services but they are consistent in accepting levy (even of higher charges) for better SWM services.

According to expectations, education has a significant contribution in framing HHs behaviour towards environmental goods. Those who had certain level of education were more WTP as compared to others. Similarly, demographic location, awareness and higher income were the important determinants of HH's WTP. In addition, HHs size has a negative and significant effect on the said variable.

Hence, education plays its actual role in persuading the broad community observation towards the prospect price for living in unhygienic conditions. Thus government should increase its investment in education and awareness campaigns. TMA should come up with certain projects to encourage composting either by natural methods or via aerobic composting methods and giving licenses to the private sector. No doubt, the given factors are imperative but service quality is of extreme importance. HHs should be provided clean and hygienic environment to live in which will convince the public and persuade them to share the burden of the government through paying appropriate levy.

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