WILLINGNESS TO PAY BY AGRARIAN HOUSEHOLDS FOR SAFE DRINKING WATER IN RURAL AREAS OF DISTRICT PESHAWAR, PAKISTAN

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Abstract

Water standout amongst the most imperative blessings of God. Every human body needs about two to three liters of water per day. However, this important gift of God is continuously affected by different organisms making it injurious for humans' health. Safe and clean drinking water is the right of every human being. However, majority of people do not have access to it, especially in developing countries of the world due to lack of resources. Pakistan, as a developing country, is struggling to provide safe drinking water to its masses but up till now, it has not made any substantial step towards successful provision of Safe Drinking Water. This study was undertaken to know about public willingness to pay for the provision of Safe Drinking Water (SDW) by the agrarian households in district Peshawar. A household survey was conducted in the rural Peshawar for this purpose during February-March, 2013. The results indicate that 68% of households are willing to pay for the supply of safe drinking water at their door step. Interestingly, 74% of households show interest in private investment, because they were not satisfied with the municipal corporation services. The results further show that households' income, their level of education, awareness, size and diseases history are also important determinants of willingness to pay for safe drinking water.

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Key Words: Willingness to Pay, Contingent Valuation Method, Safe Drinking Water, Binomial logit Model

Introduction

Water is the most vital blessing of God for living creatures. Humans' concern with water is as old as their presence on the globe. We utilize it for drinking specifically and at the time use it as nourishing element. It is also utilized for hygiene, cleaning of other important items and nourishing other things of our everyday life. Each person should consume five liters of water every day. However, amount of water is not vital than the quality. The scarcity of safe drinking water influences humans' health as well as causes expanding mortality rate. It is additionally, a key component empowering survival and development of microorganisms in nourishment nature. Safe and clean drinking water is a standout amongst the most vital prerequisites for human social insurance. It influences different varieties of financial and non-budgetary exercises. If three percent of the family pay is contributed for gaining safe drinking water, it will bring about one percent development in GDP and avoidance of waterborne maladies up to 70 percent.[1]

All-inclusive standard of drinking water is extremely troublesome to discover particularly in the developing nations of the planet. To tackle the issues confronted by developing and developed nations of the planet, World Health Organization (WHO) began dealing with this growing menace in 1979 to give complete guidelines for the supply of clean and safe drinking water to people. Water, which we utilize for drinking is obtained from surface and underground.[2] The preference for any source differs on some explanations depending on the accessibility of sufficient amounts all around the year and their amiability to treatment. Generally, spillages are found in pipelines which are the primary driver of water

sullying. Subsequently, water needs some proper treatment so that every family may get clean and safe water. Pakistan ought to handle an immense extent of issues in regards to water utilization.[3] The predominant impact of contaminated drinking water is on our new born children as forty percent of urban deaths are caused by waterborne diseases. Administrations of numerous developing nations attempt to furnish safe water supplies as one of their significant obligations, conversely, about 1.3 billion people have no access to safe drinking water. Water contaminated with human and animal wastes is helping in spreading of microscopic organisms, infection and other parasitic human pathogens. Leakage in water supply lines, insufficient chlorination and sewage flooding appear to be identified with self-reported ailments. Quick population development brings about contamination of environment which prompts poor socio-monetary advancement. We can prevent 7.6 million diarrhea cases annually in the world, however it is not possible in short run (WHO, 2004). The World Health Organization (WHO) survey conducted in 2004 shows that around 1.8 million people died from unsafe drinking water all around the world. Most of these cases were found in developing countries of the world, having main effects on children. A waterborne disease can take the lives of more than a million children under the age of five in India per annum.

In ancient time no one had any idea about diseases caused by polluted water. However, today, water contamination is moderately not new issue and it is getting to be more imperative due to persistent expands in populace development, urbanization, and industrialization. Contaminated water has genuine consequences for human nature's domain.[4] Contaminated water supply impact came into notes first the time in 1854, with the outbreak of cholera epidemic in London caused by

contaminated water of river Thames. After that researchers began dealing with this emerging issue in developed and underdeveloped countries. About eighty percent of diseases are directly linked with poor drinking water and sanitary conditions.[5] In a country like Pakistan which has scare resources, provision of Safe Drinking Water (SDW) to each and every individual of the country is not possible due to many reasons. Resource generation on the part of public can share this burden and help in provision of SDW. Peshawar is one of major districts of Pakistan and capital of Khyber Pakhtunkhwa province. This paper attempts to explore the public willingness to pay by agrarian households for SDW in Peshawar district of Pakistan.

Theoretical Framework

There are two theoretical approaches used for finding household's willingness to pay (WTP) for the improvement of water quality and services: that is direct and indirect. This paper makes use of direct approach. In the direct approach, individual is asked directly that how much he/she would be willing to pay for the quality and service improvement of water. The approach in which people are asked directly about their willingness to pay for the quality improvement. This approach is called contingent valuation method (CVM).[6]

Contingent valuation method (CVM) is used for estimation of economic value of non-marketable environmental goods. This method is widely used in surveys and research to bring out individuals' perception regarding different non-marketable goods.[7] CVM has been found easy among the set of available methods. CVM overviews may as well deliberately depict both quality levels and ask respondent readiness to pay for the change in quality.[8]

Model

Household's willingness to pay (WTP) for better water services depend upon many important variables. In this paper, farming household willingness to pay has been taken as dependent variable. The respondents were asked whether they are willing to pay or not this means that the response was binary. If household is willing to contribute monetarily for quality improvement of the existing situation of drinking water services, the willingness to pay variable may assume the value of 1, while 0 in the other case. Logistic regression model is one of the most essential econometric techniques used for regression analysis in such cases. The dependent variable is appearing as categorical variable with only two outcomes. Therefore, binomial logit regression model is the best econometric method to find out the determinants of household's willingness to pay. The set of independent variables in this paper includes education level, income level, awareness level, previous disease history and household family size.

The model used for household willingness to pay (WTP) for safe drinking water is as follow.

$$\mathbf{WTP_{sdw} = \beta_0 + \beta_1 E + \beta_2 I_h + \beta_3 HH_s + \beta_4 A + \beta_5 DH + u_i}$$

Where

WTP_{sdw}= Willingness to pay for safe drinking water

Edu= Education of Household, I_h = Income of Household

DH= Disease History A_{wh}= Awareness level of Household

HH_s= Household Size

Situation Analysis in Peshawar

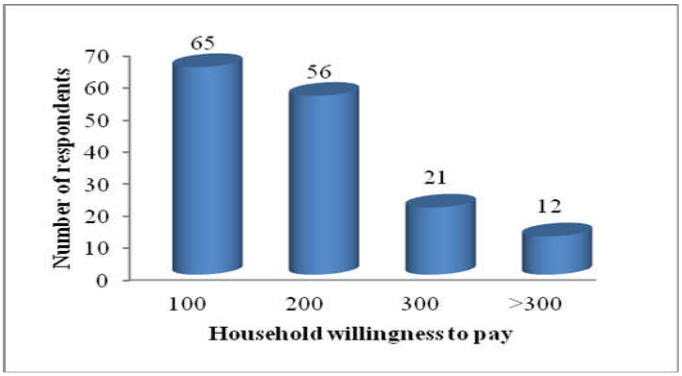
The data used in the study was collected from rural areas of district Peshawar during February-March, 2013. Systematic random sampling technique was used for the collection of data from two hundred and twenty five households who were engaged in agriculture sector. The data was collected from all parts of rural areas because the situation is really worst in these areas of the district Peshawar. According to the 1998 census, 51.32% of whole population of Peshawar is living in urban areas, while 48.68% in the rural areas. Major part of the district population lives in urban area. Out of total 92 Union Councils of the district, 49 are in rural areas of Peshawar.

Drinking water supply service is the responsibility of the Town Committees (TCs) or district council. There is no agency to identify the problem faced by people of the district. Therefore, drinking water is emerging as a major component affecting human health. The existing water resources, both surface and groundwater are under threat due to pollution caused by industrial material which is not properly treated. Solid and liquid wastes of rural households and chemically polluted agricultural runoff. There is no regular monitoring of quality of all water resources and water points in district level. The water is supplied to houses in two different ways; that is through containers and secondly, through pipelines. At the same time, a big proportion of agricultural households get their drinking water from the wells which they use for agriculture and livestock which is not properly treated. Further household were asked about the main source of water supply to their houses for drinking. 40pc of HHs use tube well water supply, and 37% use public tap water and remaining households used their wells.

Drinking water is the most important component for healthy life, therefore, households were asked about the satisfaction level from the current drinking water facilities. 67% of household were not satisfied from the current water supply. Further, it was asked that had they ever felt some sort of taste in their drinking water, the reply was also positive and majority of households replied that they felt taste in their drinking water i.e. 59%. Household were also asked, that how they treated their drinking water to make it safe for drinking.

Measuring HHs WTP for safe drinking water was the major objective of the study. During the survey, it was revealed that 68% of the HHs are willing to pay for safe drinking water to their homes. This shows positive attitude of HHs for monetary contribution for this purpose which also generates a source of revenue for government. This means that public is fully aware of the diseases caused by contaminated drinking water. Similarly, 32% of HHs are satisfied with the current situation of water, they think it is safe for drinking. However, as said earlier, 68% are willing to pay for safe drinking water facility and out of this majority of HHs are WTP 100 rupees per month. Besides, there are HHs who are willing to pay WTP Rs 200 per month as well. While other are ready to Pay R. 300 or more than Rs.300 for the same as shown in figure.1

Figure.1. HH's willingness to pay for SDW



This result shows that majority of HHs want to offer a handsome amount of money for this purpose. But the question arises that if the current services of local government failed to meet the expectations of HHs, then what would be the possible alternate to solve this important problem faced by each HH in district. For this purpose, respondents were asked another question about the private sector organization, if the same services are provided by the private firm then were they going to avail this opportunity. The following results were obtained from the HHs. 81% of the HHs responded that they would avail the opportunity of safe drinking water supply to their houses, while 19% of the HHs refused to avail the same opportunity of private firm. This shows that HHs are satisfied with the facility provided by local government.

Results and Discussion

In order to find out the HHs willingness to pay for safe drinking water service in district Peshawar, the Binomial logit Regression model was used. The results were derived by using statistical packages SPSS. The regression results have showed income, education, awareness, households' size and diseases history as significant variables which affect HHs willingness to pay for the safe drinking water model. The result indicates that almost all the variables included in the model remained significant. Households willingness to pay mainly depends on their income level. The coefficient of income remained positive and significant as expected. Similarly, another important variable affecting the households' willingness to pay is their education level. The four levels of education i.e. Primary, Secondary, Graduate and Post graduate or above emerged as determinants for the HHs education. The higher the education level of the households, the higher will be their assent to pay for safe drinking water in the study area. It was found that education became

significant with the expected positive sign. Positive sign shows that HHs want to improve their living standard by preventing themselves from contamination menace. Households with higher education are willing to pay more than household with low level of education.

The awareness of HHs about safe drinking water also emerged as positive and significant variable. If the households are aware, it means that respondents know the benefits of safe drinking water and also know the problems created from drinking water, which affect human body directly. It also shows the HHs demand for clean water. Moreover, Household Size (HH_s) is also positive and significant determinant of WTP_{sdw}. The result is important at 5% on the scale of significance. This shows that with the increase in the number of HH_s, the WTP_{sdw} also increases.

The final variable i.e. disease history of household (DH) also turned positively significant which shows that increase in disease of household brings increase in $WTP_{sdw.}$

The R-square value is 0.78 showing that 78% variation in the dependent variable is explained by all the selected explanatory variables in the model. Moreover, the DW value is 1.99 which indicates that there is no serial correlation problem in the model. The results are displayed below in table 1.

Table 1: Regression Results with Willingness to Pay (WTP) as dependent Variable

Variables	Coefficients	Standard Error	Z-Statistic	P-Values
Income of Household (I_h)	0.358**	0.163	2.196	0.010
Education of Household (Edu)	0.341***	0.117	2.897	0.007
Awareness level of Household (A_{wh})	0.225*	0.118	1.904	0.083
Household Size (HH_s)	0.088**	0.041	2.131	0.032
Disease History (DH)	0.313**	0.140	2.240	0.029
C	0.002	0.011	0.247	0.458
R^2	0.78			
Adj R^2	0.75			
Durbin Watson Statistic	1.99			
F-statistic	214.12			
Prob(F-statistic)	0.0000			

Asterisks "*", "**", "***" stand for 10%, 5%, and 1% confidence level

Conclusion and Recommendation

It is concluded on the basis of the results of the study that the existing system of the drinking water in the district is not up to the standard required for healthy life of HHs. The existing drinking water quality is bad and below the standard in Peshawar. The study concludes

that income, education, HH size, diseases history and awareness are significant determinants of HHs WTP_{sdw}

The following recommendations are made on the basis of the above study for the improvement of drinking water services in the district.

- The available resources of SDW are not according to the requirement of the people in entire district of Peshawar. It is therefore, suggested that the Town Committees in collaboration with Provincial Government should take effective measures and policy strategies regarding the proper services SDW in the study area.
- The government should take some sort of initiatives to satisfy HHs, as they are willing to pay. The amount which they receive from the HHs will lesser their burden of local government.
- The government should launch awareness campaign regarding SDW at schools and colleges with the help of non-profit organizations.
- During the survey, it has also been observed that it will be costly for the local government to support updated services of SDW from their own resources. Therefore local government may encourage private investors.
- People use a lot of energy (Gas and electricity) for the purification of water. If government provides SDW, energy can also be saved.

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