



WILLINGNESS TO PAY FOR THE TREATMENT OF ENVIRONMENTAL HAZARDS: A CASE STUDY OF PESHAWAR

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ABSTRACT

Safe and human friendly environment is one of the most important issues in world today. This paper has addressed one of such important issue, the treatment of environmental hazard in form of solid waste in Peshawar District of Khyber Pakhtunkhwa province. The study aimed at finding out the public Willingness to Pay (WTP) for the treatment of environmental hazard in the form of solid waste. The study is based on primary data collected from 225 households living in 25 union councils of urban Peshawar. Binomial Logit Model has been used for obtaining the estimation results. Interestingly, 61 respondents, out of total 225, were willing to pay Rs.200 per month for the removal of this environmental hazard. Similarly, 22 respondents were ready to pay Rs.300 and 17 respondents were willing to pay more than 300 for safe disposal of the solid waste. The study finds income of household, family disease history, education and size of households as major factors which affect the household's decision regarding WTP. Majority of the respondents (71%) were willing that the service may be provided by the private sector.

Keywords: Willingness to pay, Environmental hazard, Peshawar, Municipal corporation.

INTRODUCTION

Safe and clean environment is a free gift of God and is an essential requirement for maintaining the life on earth. With the growing population and over exploitation of resources resulted in the increase demand for environmental management. Specifically, in developing countries the people are facing the problems of severe shortage for healthy environment.

Poor solid waste management is the major issue in these countries causing health problems and serious challenges (United Nations, 2000). Solid waste can be defined as “Any remains that cannot

be used further in the present status by the people who caused it". According to [Misra and Pandey \(2005\)](#), "Any substance is converted into waste when it is useless and we expect no further economic value", Waste generation mainly depends on the life style of individuals and size of population. In developing countries of the world proper solid waste management is emerging problem, but still uncontrollable due to insufficient provision of basic services like water supply, sanitation facilities, infrastructure, waste collection methods limited resources, lack of awareness and lack of interest by the public and concerned authorities.

The wastes mainly created by households and industries are contributing a significant amount of waste and are threat to environment ([Salequzzaman et al., 2000](#)). In developing countries people generate less solid waste per capita, due to low purchasing power of the household which led to the low creation of waste materials ([Cairncross and Feachem, 1993](#)) However, population in developing countries is huge enough which contribute massive amount of solid waste to environment to create environmental problem.

Rapid urbanization in Pakistan results in a tremendous increase in population in the cities. Industries in the cities produce huge amount of solid waste which also affect environment. Environmental problems are created from the solid waste of huge population. This large volume of solid wastes produces massive public health and environmental problems in Pakistan. Like most of the developing countries of the world, solid waste management has so far been ignored in Pakistan, but now government and private agencies have taken some positive steps to consider this area for the improvement of public health. The developing countries have scarcity of resources and in most cases it is not possible for the government to make arrangements for the removal of environment hazards like safe disposal of solid waste. Pakistan is a developing country and it is not possible for the government alone to tackle the problem of environmental hazard. The public can help the government to a great extent. If some monetary contribution is made on the part of public, it will motivate government to properly tackle the problems like disposal of solid waste.

The present study is being conducted to find out the consumer behavior in form of Willingness to Pay for the removal of environmental hazards with specific focus on solid waste. It will also highlight the status of public awareness regarding human friendly environment in district Peshawar.

LITERATURE REVIEW

[Arlosoroff \(1991\)](#) found that almost 50 % of the 1.25 billion urban populations of developing countries live in cities having population of up to 1 million. The Solid Waste Management (SWM) services in most of the cities of developing countries are undeveloped. The SWM in developing

countries account for 20% to 30 % of provided operational budget and are able to provide services to 50% of the urban population and collects up to 70% of the refuse arising

Read *et al.* (2001) found that the collected solid waste is brought to landfills where the traditional land filling methods are used to tackle the problem and in these landfills anaerobic conditions are formed. Under the anaerobic conditions, slow process of stabilization produce methane, and toxic leachate in the long run. It is believed that the aerobic degradation of Solid waste in landfills accelerates the waste decomposition, reduce methane gas generation and decrease the level of toxic products.

Misra and Pandey (2005) analyzed the facts behind Industry is one of the most important parts on our modern society and production of waste is unavoidable product of all activities. The material from which we expect no further economic value and having no further role in production process can be referred as waste. These waste from different industries probable environmental hazard for human health and it directly affect water, soil and air by inappropriately treatment. Recently in all developing countries of the world even though dangerous wastes, discharges and overflows are regulated. Solid wastes regularly are likely to be risky for health and environment.

PEPA (2005) found that the collection, transportation and disposal or dumping of household's solid waste is not tackled efficiently and in scientific way irrespective of the size of the city in Pakistan. Due to mismanagement of the solid waste in Pakistan, the environmental and sanitary conditions in the country are worsening year by year which is creating enormous problems for the people in the form of poor health and dangerous diseases. The problems caused by poor SWM services are enormous and needs both direct and indirect consideration of all aspects of solid waste and its management.

Rathi (2007) estimated that 6,256 tons of waste is per day generated in Mumbai. Municipal Corporation of Greater Mumbai (MCGM) is responsible for the removal of Solid Waste Management services in Mumbai. Unfortunately (MCGM) failed in proper disposal and improvement in quantity of waste. Therefore, waste remains at their production points, which led to increase health and environmental related problems in Mumbai.

World Wildlife Fund Pakistan (2001) found that in Pakistan, Municipal solid waste is mostly collected in roadside bins and town administration makes arrangements for its collection infrequently. On the average 0.6 to 0.8 kg is produced in Pakistan per capita and per day. Similarly, the growth rate of Solid Waste is 2.4% per year. Interestingly, 40% of total generated waste remains at collection points, in streets or drains side. It is mostly burnt in open space. The household waste is usually collected by the concerned town and transported through the town vehicles directly to a landfill site. A dangerous practice is that different types of the solid waste are

not collected separately and there is no scientific arrangement for its safe disposal. Solid waste management problems in Pakistan increased due to increase in population and continuous urbanization of people from rural areas of Pakistan.

The literature clearly shows that solid waste is a major problems facing by both the developed and developing countries. The major reasons showing by the all the previous research works especially the developing countries are the lack of policies at government level, institutional barriers, over population, over exploitation of waste is the basic threat for human health, environment as well as effecting economic growth.

It is found out that so far no study has been carried out for analyzing the causes of environmental hazards on solid waste and household willingness to pay for the proper treatment of this basic problems in district Peshawar. The present study has been undertaken is an initiative to examine present environmental scenario and its impact on environment as well as human health in district Peshawar by particularly focusing on the urban areas of the district.

DATA AND METHODOLOGY

Nature and sources of data

In order to obtain the required objectives of the study, selection of suitable sample size is one of the initial steps for any research. The present study is based on primary data. All the data has collected from the town-I which consists of 25 union councils covering almost all urban areas of Peshawar district. The problem of solid waste mainly exists in urban areas of the district. A sample size of 225 questionnaires has been used and data has been collected from all union councils of Town-I Peshawar during October, 2012. The sample was equally distributed in 25 union councils of Town1. Secondary data about the available services was being collected from the Federal and Provincial bureau of statistics and relevant departments.

Methodology

Contingent Valuation Method (CVM) has been used in the present study to find the household's Willingness to Pay (WTP) for the removal of environmental hazards in Peshawar. The study has taken Willingness to Pay as dependent variable. Education level of the household, Income level, Size of household, awareness level and family disease history are the explanatory variables of the study.

The study has used a modified form of the model used by *Khattak et al. (2009)*.

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

WTP_{sw} = Willingness to pay for better solid waste management services

Edu= Education of Household

I_h = Income of Household

DH= Disease History

A_{wh} = Awareness level of Household

HH_s = Household Size

Local Environmental Issues

Peshawar is the capital of Khyber Pakhtunkhwa province of Pakistan. The current estimated population of the city is 3,136,000 with an annual growth rate of 3.56%. Out of the whole population, 51.32% are living in the urban areas, while 48.68% living in the rural areas.

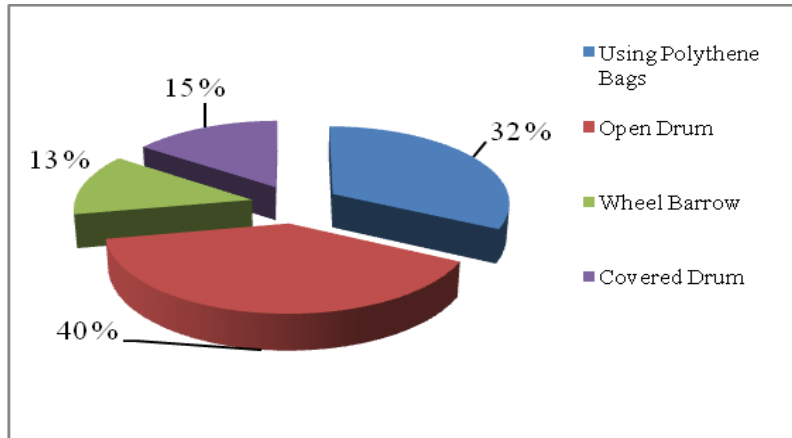
Round about half of the population of Peshawar district lives in urban areas, which are now increasing frequently. Environmental hazards generally exist in urban areas, therefore our main focus is on urban areas of district Peshawar. Extra burden on the urban areas of district has a closed effect on clean water supply and proper solid waste management. Collection of solid waste and supply of clean water is the responsibility of local government. There are four towns in district Peshawar. All of the towns have been suffered tremendously from the problem, due to overpopulation in the district. Entry of afghan refugees into the borders of Pakistan as Peshawar lies near afghan due to which afghan citizen migrated to Peshawar which also disturb the friendly environment of district. Beside this lack of proper resources also results in effecting environment. Solid waste, and air pollution, along with noise pollution important problems face by district.

RESULTS AND DISCUSSION

The results show that majority of the people i.e. 173 out of 225 mentioned that, they know about solid waste and their importance in our daily life. Similarly, 52 respondents pointed out that they have no information about solid waste and their importance. This elaborates public views about different important factors related to SWM sector in Peshawar district. The survey revealed that 77 percent of people know the importance of solid waste and its management.

Solid waste is the major source of creating health problems. Out of 225 respondents 75 percent of respondents consider it, the main factor of effecting healthy life. Similarly, when the households were asked approximate quantity of waste produced by each household, it was really shock as on the average each household produces 6.4 Kg of waste per day. The question arises that where people dispose off such a huge amount of SW. Therefore, during the survey when it has been asked from the respondents about procedure used for disposal off SW from your homes, the following information has been received.

Figure-I. Perception of Household about Disposal of Solid Waste from Home

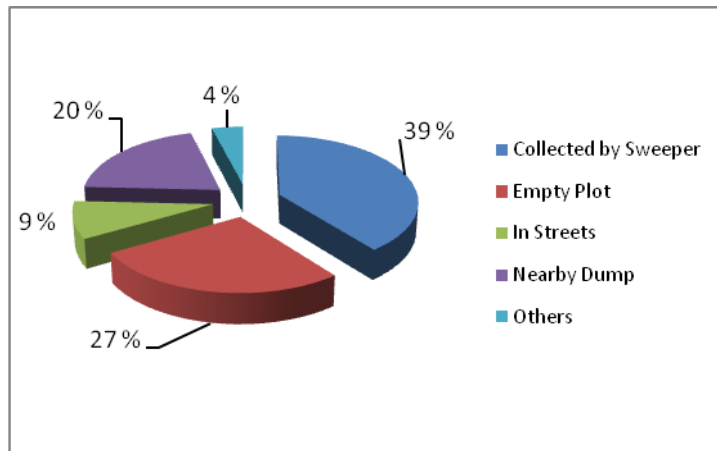


Source: Field Survey

Figure I shows that out of 225 respondents, 40% respondent used open drum for disposing SW and 15% used covered drum for the disposal of SW. Whereas, 13% replied that they used wheel barrow for this purpose. Similarly 32% used polythene bags for disposal of waste materials from their homes. After disposal off from homes where these home waste has been put.

Likewise, when it was asked from the people, where they put their home waste, 39% responded that they collect their waste through sweepers which visit their home for proper disposal of SW, however 27% of people in district used empty plot for put out homes waste materials. This is shown in Figure II.

Figure -2. Treatment of Household Waste outside of Home



Source: Field Survey

Furthermore, 20% mentioned that, they use nearby dump for putting waste materials. Whereas, 9% replied to put their homes waste in the streets, while 4% of people used different other procedures with the waste materials, when they were asked about other ways some people says they burn out waste materials while most of them replied to put out waste in nearby canals and rivers which passes from these areas. When they were asked about the reason of doing so then some respondents reply was quite interesting, they replied that if these waste lies in our area it will create bad smile and for the saving of time and keeping our own environment clear. Although they are wrong, by doing so it not only affects water but also damaging ozone layer by burning of these waste materials. After that when respondents are asked about the ratio of recyclable and non-recyclable disposables in their daily solid wastages. According to the respondents, their solid waste consists of 69% recyclable and 31% non-recyclable items.

During the survey when the people were questioned about the satisfaction from the current condition of solid waste management process, out of 225 respondents 48 are satisfied while 177 were not satisfied, we can say that 79% of people are not satisfied with the current scenario while 21% of respondent are satisfied.

The results further show that 60% of respondents consider that both government and public are responsible for proper SWM, while 24% of people think that it is only the responsibility of local government to look after all these issues, which are created from SW, however 16% of respondents consider their self responsible for the miss management and proper disposal of SW. as from the above we can know that it is not only government which are responsible for this, but general public also have to fully corporate with local authority. We can also know from the above that all people in district Peshawar are fully aware, but they are not cooperative with the local authority for proper management of waste material. Further it was asked from the respondents that are you satisfied from the municipal corporation services of district Peshawar. The results show that out of 225 respondents 190 are not satisfied form the services provided by Municipal Corporation (MC) of the district, while 35 respondents think that MC is performing their duty properly and we are satisfied from MC services. This show that 84% of people are not satisfied from MC services and 16% are satisfied from services. The reason behind this is that being a competent authority for the facilitation and providing services to the people of district Peshawar, but they are totally failed.

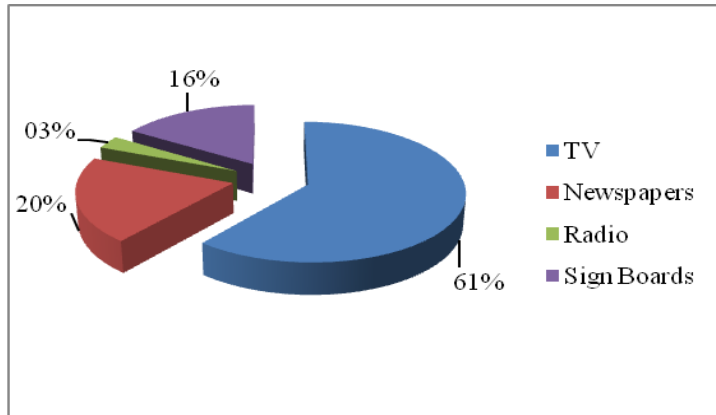
Further it was asked from the respondents whether any member of the MC visit your area for waste collection. Out of 225 respondents only 51 replied that MC visits their area for the collection of SW, however 174 respondents replied that no one visits our site for the collection of wastes. This shows that 77% of area was not clear by MC while 23% of area is under control of MC department. These results clearly shows that on one side majority of people having no facility and either the concerned department visits the area on continuous bases, whereas on the other hand a fewer number of the respondents are having only provided this facility. This discrimination not only

affects that people while another group of people were also affected and led to creates environmental problems in the district.

During the survey it was further asked from the respondent that if they do not visits your areas, whether MC installed any dust bin in your area. So that waste material may be collected at a specific point for prevention of surrounding to keep it clean. Out of total 225 respondents, only 70 say that waste bins have been installed, while 155 respondents reply was negative that no waste bin is install for safe collection.69% of area has no proper collection point then how can we kept clean environment in the district. Interestingly, 75% of people wanted to solve this problem, while 25% of were satisfied with the same situation. First of all majority of people need awareness regarding wastes management and different disease forms from these wastes. During the survey question was asked from the respondents about the social awareness program for waste management. The following were the responses that people need awareness about waste management, because out of 225 only 21 people think that there is no need for the social awareness, while 204 means 91% of people think that, this is most important issue and there is a need for proper campaign to be launch for eradication of waste management problems. In addition, another question was asked from the respondents that which medium you will recommend for the awareness program. This means that which medium will suit best for proper awareness about waste management.

Fig.III shows that majority of the people recommended Television as a medium of awareness. 20% of people suggest Newspaper as medium for awareness, while 16% are of the view that sign boards will be best for proper awareness. However 3% of people consider that radio advertisement and programs will be suitable for awareness of people about waste management problem.

Figure-3. Medium Recommended for Proper Awareness about SWM



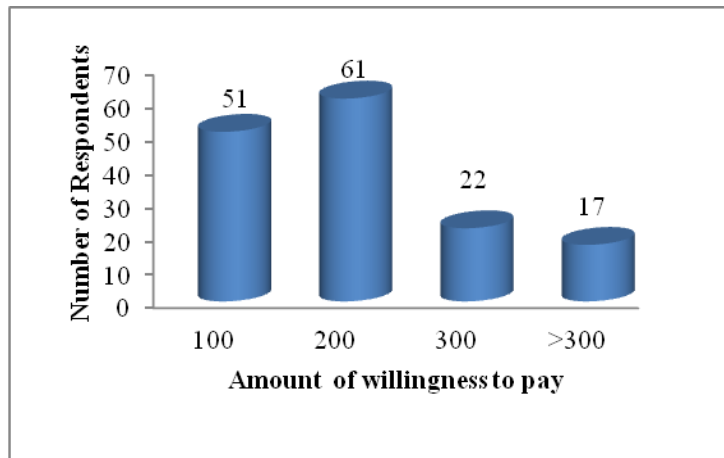
Source: Field Survey

The survey results shows that majority of people are willing to pay for the proper solid waste management services if they are provided by local government. 67% of respondent think that we

will pay for it proper waste management services. Similarly 33% of respondents are not happy from the local authority that's why they are not willing to pay for it to be provided by local government.

Another cause of not willing to pay may be the income level of household. They have not enough money to spend on such activities. However, some of them were satisfied from the current condition of local government. The question was asked from the 67% respondents, who are willing to pay for the proper treatment of SW, that how much money you are willing to pay so that waste material can be properly disposed off from your home and surrounding area, so that not one can face problem from waste material. The below figure shows the amount of money, 151 out of 225 which represents 67% of respondents who are willing to pay for SWM services provided by local government. The amount of money will be taken on monthly bases so we can see that 51 respondents are willing to pay 100 rupees per month, which shows 34% of HH. Similarly 61 respondents will pay amount of 200 rupees per month, which cover 40% of HH. However 22 respondents are willing to pay amount of 300 rupees for treatment of SW properly, this represents 15% of HH which are willing to pay. It has been noted that 17 respondents are willing to pay even more then our expectations which is almost 11% of HH. Some of them are willing to pay for proper management of solid waste in thousands of rupees, while some wants to give more than five hundred rupees per month.

Figure-4. Amount of money willing to pay by respondents for proper SWM services



Source: Field Survey

Another question were asked from the respondents about the services of waste management provided by a private company then will you like to avail this opportunity. Because most of people in the district are not satisfied from the local government performance therefore the question has been asked that whether they will avail the services of private organization are not. It was observed that majority people of district was not satisfied with the working condition of MC, because 71% of

respondents want to avail the facility of private firm if it was provided in the district, while one the other hand 29% do not want to avail facility of private organization. Those who want to avail services of private organization think that if payment is made to MC they will provide this facility, but after some time this practice will be stop although we will pay as well. Therefore, private organization will be the best and efficient in providing all these facility. Private firm will not only provide cleanness in the district, but they will properly utilize it. The waste material which is recyclable will be recycling, while waste products which are non-recyclable may be buried outside of the populated area. During survey some respondents say that MC can provide the same facility from their own resource, but they are not interested in doing so, political interference and favoritism led to increase the problem of solid waste. It is also suggested that MC in collaboration with private firm can start this project in specific areas of the district, if they received better response from the people.

Regression Results

This section presents the empirical results for finding the Household's Willingness to Pay for Waste management in district Peshawar. The results have been displayed in table

Table-I. Results for the Solid Waste Management Model

Variables	Coefficients	Standard Error	Z-Statistic	P-Values
I_h	0.171***	0.038	4.435	0.007
Edu	1.204***	0.318	3.781	0.002
A_{wh}	0.109*	0.053	2.045	0.063
HH_s	0.049	0.052	0.942	0.625
DH	0.150**	0.064	2.343	0.018
C	-0.517	0.541	0.955	0.319
R^2	0.71			
Adj R^2	0.68			
Durbin Watson Statistic	2.09			
F-statistic	214.12			
Prob(F-statistic)	0.0000			

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

In order to find out HH's willingness to pay for solid waste management in district Peshawar, Binomial logit Regression model was used. The results were derived by using statistical packages SPSS. The regression results indicate that income, education, awareness, households size and diseases history have significant impact on HH's willingness to pay. The results show that almost all the variables included in the model are significant. Household's willingness to pay depends on their income level. The results show that it turned positively significant according to the expectations. 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 HH's education. The higher the education level of the households the higher will be their demand for the willingness to pay for solid waste

management in the study area. It is found that education appeared as significant variable with the expected positive sign. Household with higher education are willing to pay more than household have low level of education. Further the results also show that awareness about proper solid waste management has positive relationship and significant positively. Households are more aware about the waste problem means that respondents knows the benefits of better SW management and also know the problems created from solid waste, which affect the environment. It also shows the HH's demand for clean environment. The variable household size (HHs) has positive sign, but insignificant. This shows that increase in household size affect the willingness to pay for the waste management but not significantly. The final variable i.e. disease history of household (DH) also turned positively significant showing that increase in disease of households brings increase in the willingness to pay for solid waste treatment. The R-square value is 0.71 showing that 71% variation in the dependent variable is explained by all the selected explanatory variables in the model. Moreover, the DW value is 2.09 which indicate that there is no serial correlation problem in the model.

CONCLUSION AND RECOMMENDATIONS

The study finds the current situation of solid waste management very poor in district Peshawar. However, general reason for the poor condition of SWM is lack of services provided by the local government. The SWM services in the district are not up to the standard which is needed for the development of district Peshawar. It is concluded on the basis of regression results that, the income, diseases history, education, and size of households are the important determinants of WTP for the better services of SWM. Due to lack of awareness in HHs, they failed to establish any significant statistical relationship with HH willingness, although maximum numbers of HH claim to be aware of the problem. These types of claims are observed in the survey analysis as respondents feel social pressure while majority of them suggest television as one of the major source of information about awareness program to be run. Majority of households prefer private firm for the services.

Policy Recommendations

The following recommendations have been made on the basis of the study results.

- The available resources of both SWM are not according to the requirement of the peoples in entire district of Peshawar. It is therefore suggested that the MC in collaboration with Provincial Government should take effective measures and policy strategies regarding the proper services of SW in the study area.
- During the survey it has also been noted that the people don't have any knowledge about the proper disposal of SW, and information about the safe drinking water, therefore high awareness program should lunched for the proper solution of the problems.
- It has also been noted that most of the employee in MC department are not working properly therefore local government should ensure the provision of SWM.

- Installation of recycling plants in different areas of the district are strongly recommended, which will generate employment opportunities as well as helping in proper way of disposal to save our environment. Also government starts campaign to avoid the use of non-recyclable goods.

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