Household willingness to pay for improved solid waste disposal in Ibadan metropolis of oyo state, Nigeria

Ogunniyi, l.T, Oladejo, J.A and Adepoju, A.A

Department of Agricultural Economics, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.

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ABSTRACT

This study examined the household willingness to pay for improve improved solid waste disposal in Ibadan metropolis of Oyo state, Nigeria. . Data were collected randomly from one hundred and fifty-two (152) respondents with the use of structured questionnaire. Data analysis revealed that 53.3% of the respondents were male while 77% were married. Average household size was 5.87 members while average age was 41.8 years. More than half of the respondents are willing to pay for improved solid waste disposal. Logit analysis revealed that age, marital status, education, total household expenditure, price and bids has effect on willingness to pay for improved solid waste disposal at different level of significance. Tobit analysis showed that household expenditure, price of waste disposal and education have negative coefficient, number of sacks generated, marital status and house ownership has positive effect on the mean amount respondents were willing to pay for improved solid waste disposal.

Introduction

According to UNEP (2004), solid waste generation has become an increasing environmental and public health problem everywhere in the world, particularly in developing countries. The fast expansion of the urban agricultural and industrial activities stimulated by rapid population growth has produced vast amount of solid and liquid wastes that pollute the environment and destroy resources. The changing economic trends and rapid urbanization also complicates improved solid waste disposal in developing countries. Consequently, solid waste is not only increasing in quantity but also changing in composition from less organic to more paper, packing waste, plastics, glass, metal wastes among other types, a fact leading to the low collection rates (Bartone and Berstein, 1993).

Solid waste results from rapid increase in population, massive expansion of the urban areas and the changing lifestyle. Increase in population and income brings about an increase in production of goods and services and thus effluents are discharged into the environment. According to Ita (2003), waste can be defined as any material lacking direct value to the producer and so must be disposed of. Similarly, waste is any material that is thrown away as unwanted (UNICEF, 2006).

According to Tchobanglous (1993), all wastes arising from human and animal activities that are normally solid and are discarded as useless or unwanted are broadly defined as solid waste. It includes municipal garbage, industrial and commercial wastes, sewerage slug, waste of agricultural and animal husbandry, demolition waste and mining residues. Different individuals have defined municipal solid waste (MSW) differently. Medina (2002) defines MSW as "…the materials discarded in the urban areas for which municipalities are usually held responsible for collection, transport and final disposal. It encompasses household refuse, institutional wastes, street sweepings, commercial wastes, as well as construction and demolition debris. For Cointreau (1982), MSW is material for which the primary generator or user abandoning the material within the urban area requires no compensation after abandonment. Cointreau argues, to be qualified as an urban solid waste it should generally be perceived by society as being within the responsibility of the municipality to collect and dispose of.

Based on the sector of the economy responsible for generating them, Egner and Smith (2006) categorized solid waste in to four broader kinds as mining, agricultural, industrial, and municipal solid waste. Municipal solid waste are wastes which are no longer needed by people because they are broke, spoiled, or have no longer use including waste from household's, commercial establishments, institutions, and some industries are classified under. Municipal solid waste can further be classified in different ways, vis-a-vis the point of origin of waste material, nature of material, kind of materials and heat contents of the materials. Based on points of origin of the materials there are six types of municipal solid wastes namely: domestic waste, commercial waste, industrial waste, institutional waste, street sweepings and constructions and demolition wastes (Rand *et al.,* 2000). Based on the nature of waste materials Municpal Solid Waste can be classified as organic, inorganic, combustible, putrescible and non-putrescible factions (Cornwell, 1998). Cornwell regarded waste classifications based on the kinds and heat content of the waste materials as the most useful. Domestic waste or household waste derived from residential neighborhoods is the largest component of municipal solid waste.

Improved solid waste disposal policy is designated to support policy guideline of National Environmental policy (Kalu *et al.*, 2009). The policy dilemma appears to be how to contain the adverse environmental impacts through proper implementation (Nwaka, 2005). One of the most important objectives of the policy is to solve sanitation problem. Isu (2005) has noted that 87% of Nigerians use unsanitary methods of improved solid waste disposal which constitute nuisance, ugly sight, produce unpleasant odour, and create a breeding ground for pests and diseases. For instance, Bubonic plague in Europe during 14th century was due to mountain garbage in the cities which resulted to 30% increase in the population of rats. Indiscriminate improved solid waste

disposal is actually a menace and embarrassment to the nation where heaps of refuse litter most parts of the city (Isu, 2005).

Though the fundamental objectives of any improved solid waste disposal programme are to minimize environmental pollution, these goals become unachievable in the absence of sustained funding, affordable local technological option and lack of participatory approach to integrated improved solid waste disposal. Currently in Nigeria, household waste of different sources are mixed and co-disposed without any form of segregation and sorting (Longe and Williams, 2006). Household waste could contain hazardous and toxic waste such as expired drugs, dried cells, broken class, syringes and thus constitute serious environmental and health hazards (Delgado *et al* ., 2007).

There is an extensive literature on the willingness to pay for improved solid waste disposal. Some studies have shown that the willingness to pay for improved solid waste disposal is associated with income, education, quantity of waste generated, household size, and age (Alta and Dehazo, 1996). Previous studies have shown that low-income consumers are willing to pay for services they want (Cairncross, 1990). This study therefore examines the household willingness to pay for improved solid waste disposal in Ibadan metropolis of Oyo state.

Methodology

The study area for this research work was Ibadan metropolis. It is the capital of Oyo state. Ibadan metropolis has a total of five local government areas. All households in Ibadan metropolis constitute the population of the study.

Multistage random sampling technique was used in selecting respondents. Two local government areas were randomly selected from the five LGAs which constitute the first stage of sampling. The second stage involves the random selection of five(5) areas from each of the LGAs making a total of ten areas. The last stage involves the random selection of twenty (20) households from each of the areas summing up to 200 households. Due to incomplete response only 152 households were analysed.

Primary data was used for this study and instrument used was structured questionnaires which consist of open and closed ended questions. The data were analyzed using descriptive statistics, severity index and Logit regression model.

Severity Index

The answers to the questions were displayed on a scale of 0 to 4 point likert scale while the severity index (SI) was calculated using the following equation after Al-Hammed and Assaf (1996):

$$SI = \frac{\sum_{1=0}^{4} a_1 x_1}{4\sum_{1=0}^{4} x_1} (100\%)$$

Where:

a_i = the index of a class; constant expressing the weight given to the class

x_i = the frequency of response

i = 0, 1, 2, 3, 4 and described as below: where:

x_0, x_1, x_2, x_3, x_4 are the frequencies of response corresponding to $a_0 = 0$, $a_1 = 1$, $a_2 = 2$, a_3, $= 3$, $a_4 = 4$, respectively. The rating classification was adapted after Majid and McCaffer (1997):

a_0 = Strongly disagree	$0.00 \leq$ SI <12.5
a_1 = Disagree	$12.5 \leq$ SI <37.5
a_2 = Neutral	$37.5 \leq$ SI <62.5
a_3 = Agree	$62.5 \leq$ SI <87.5
a_4 = Strongly agree	$87.5 \leq$ S1 <100

Logit Regression

Logit regression model is specified to identify the relationship between socio-economic variables and willingness to pay of household. Logit is based on the cumulative logistic probability function.

Household Willingness to Pay for Improved Solid Waste Disposal

The Logit regression model specified below was used to obtain the willingness of households to pay for an improved solid waste disposal. The coefficient estimate obtain was used to calculate the mean willingness to pay of the households.

$$P_1 - \sum(Y-1/x_1) = \frac{1}{1 + e^{-(\beta_0 + \beta x_1)}}$$

Where P_1 = Probability that $y_1 = 1$

X_1 = Set of independent variable

Y = Respondent variable

β_0 = Intercept which is constant

β_1 = Coefficient of the price that is willing to pay for improved solid waste disposal.

Mean Willingness to Pay for Improve Solid Waste Disposal

$$MEAN_{WTP} = 1* \ln \frac{1 + \exp^{\beta 0}}{\beta_1}$$

β_0 and β_1 are absolute coefficient estimate from logistic regression.

Factors Influencing Willingness to Pay by Household

Where Y = 1 if household are willing to pay otherwise 0

$Z = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 ..... + \beta_7 x_7$

X_1 = Age

X_2 = Gender (Dummy male = 1 female = 0)

X_3 = Marital status (Dummy variable: married = 1, single = 0)

X_4 = Household size (number)

X_5 = Educational level (number of years spent in school)

X_6 = Household total expenditure (N)

X_7 = Number of sacks generated (month)

X_8 = Price (amount collected by service provider)

X_9 = Respondents price Bid

X_{10} = Household ownership(owner=1 otherwise 0).

Results and discussions

Socio-economic characteristics of the respondents

Table 1 shows that 40.8% of the respondents fall within the age bracket of 31-40 years while 10.5% each fall within 51-60 years and greater than 60 years. The mean age was 41.8 years. The implication of this is that most of the respondents were in their active age group and can afford to pay for improved solid waste disposal. The Table also reveals that 50% of the respondents had 1-5 members in their household, while 44.7% of the respondents had between 6-10 members, 5.3% of the respondents had ≥10 members. The mean household size is 5.87 members. The number of members within a household contributes in a way to the level of waste generated.

Table 1 portrays that 53.3% of the respondents are male while 46.7% of them are female. This implies that males are household heads. This study is in line with earlier findings by Adepoju and Salimonu (2010) where majority of the household heads in Osun State were male. Table 1 further indicates that 77% of the respondents are married, 11.2% are single, while 11.8% are either separated, widowed, or divorced. The highest percentage of married households implies that they are likely to generate more waste than others. This study is in consonance with the findings of Longe *et al*., (2009) and Adepoju and Salimonu (2010).Table 1 shows that 53.3% of the respondents had tertiary education, 23.7% had secondary education, 13.2% had primary education, 1.3% had adult literary education and 8.5% had no formal education. The result from this table shows that most of the respondents are educated.

Table 1: Socio-economic characteristics of the respondents

Characteristics	Frequency	Percentage	Mean
Age(years)			
20-30	28	18.5	
31-40	62	40.8	
41-50	30	19.7	41.8
51-60	16	10.5	
>60	16	10.5	
Total	152	100	
Household size			
1-5	76	50	
6-10	68	44.7	5.87
>10	8	5.3	
Total	152	100	
Sex			
Male	81	53.3	
Female	71	46.7	
Total	152	100	
Marital status			
Married	117	77.0	
Single	17	11.2	
Divorced	6	3.9	
Separated	4	2.6	
Widower	8	5.3	
Total	152	100	
Educational level			
No formal education	13	8.5	
Adult literally	2	1.3	
Primary education	20	13.2	
Secondary education	36	23.7	
Tertiary education	81	53.3	
Total	152	100	
Monthly income(#)			
≤ 50,000	103	68.0	
50,001-100,000	24	16.0	#55,901.32
>100,000	25	16.0	
Total	152	100	

Source: Field survey, 2011

Table 2: Distribution of respondents according to their waste components

Major waste components	Frequency	Percentage
Paper	20	13.2
Kitchen left over	115	75.6
Metal(empty can)	8	5.3
Others	9	5.9
Total	152	100

Source: Field survey, 2011

Table 3: Distribution of respondents according to those who patronize OYSWMB

Service providers	Frequency	Percentage
OYSWMB		
Yes	36	23.7
N0	116	76.3
Total	152	100
Truck pushers		
Yes	15	9.9
No	137	90.1
Total	152	100
Private company		
Yes	31	20.4
No	121	79.6
Total	152	100

Source: Field survey, 2011

Table 4: Distribution of Respondents by House Ownership

House ownership	Frequency	Percentage
Yes	64	42.1
No	88	57.9
Total	152	100

Source: Field survey, 2011

Table 5: Opinion and perception on improved solid waste disposal

Statement	SD	D	N	A	SA	SI
I enjoy the service of OYSWMB in my area	22(14.5%)	42(27.6%)	45(30.3%)	34(22.4%)	8(5.3%)	43.75%
There is an organized waste disposal in my area	24(15.8%)	45(29.6%)	28(18.5%)	47(30.9%)	8(5.3%)	45.07%
Sacks/nylon bags should be given free to people by OYSWMB	4(2.6%)	9(5.9%)	15(9.9%)	75(49.3%)	49(32.2%)	75.66%
OYSWMB should be privatized	18(11.8%)	26(17.1%)	68(44.7%)	25(16.4%)	15(9.9%)	48.85%
OYSWMB should announce time of collection before collection day	2(1.3%)	7(4.6%)	51(33.6%)	48(31.6%)	44(28.9%)	70.56%

Source: Field survey, 2011

Table 6: Opinion on Willingness to Pay for Improved Solid Waste Disposal Services

Statement	SD	D	N	SA	A	SI
I am ready to pay for waste disposal service	9(5.9%)	34(22.4%)	20(13.1)	74(48.7%)	15(9.9%)	58.55%
Any more income will encourage me to pay for waste disposal service	7(4.6%)	27(24.3%)	23(15.1%)	58(38.2%)	25(16.4%)	58.72%
The fee of OYSWMB is too high	7(4.6%)	29(19.1%)	78(51.3%)	22(14.5%)	16(10.5%)	51.8%
Presently am willing to pay for OYSWMB	17(11.2%)	34(22.4%)	27(17.8%)	64(42.1%)	10(6.6%)	52.63%
Any further increase in fee will discourage me to pay	14(9.2%)	33(21.7%)	31(20.4%)	39(25.7%)	35(23.0%)	57%

Source: Field survey, 2011

SD-strongly disagree, D-disagree, N-neutral, SA-strongly agree, A-agree, SI-severity index.

Table 7: Distribution of respondents by willingness to pay

Willingness to pay	Frequency	Percentage
Yes	88	57.9
No	64	42.1
Total	152	100

Source: Field survey, 2011

Table 8: Distribution of Respondents by Bids

Bids	250	500	750	1000	1500	2000	2500	3000
Yes	82(53.9%)	63(41.4%)	46(30.3%)	36(23.7%)	12(7.9%)	6(3.9%)	1(0.7%)	1(0.7%)
No	70 (46.1%)	89 (58.6%)	106 (69.7%)	116 (76.3%)	140 (92.1%)	146 (96.1%)	150 (99.3%)	151 (99.3%)
Total	152 (100%)	152 (100%)	152 (100%)	152 (100%)	152 (100%)	152 (100%)	152 (100%)	152 (100%)

Source: Field survey, 2011

Table 9: Determinants of willingness to pay for improved solid waste disposal

Variables	Coefficient	t-Value
Constant	0.738	0.034
Age	-0.638	-2.910***
Gender	-0.534	-0.53
Marital status	0.670	2.055**
House hold size	0.338	1.542
Education	0.669	1.764*
Expenditure	0.012	2.590***
Sacks of waste	0.516	0.847
Price of improve solid waste	-0.581	-2.433**
Bid	-0.250	-3.267***
House ownership	0.305	0.249
Number of observation	152	
Chi squared	172.257	
Degree of freedom	10	
Significant level	0.00	
Log likelihood	-17.327	

Source: Field survey, 2011.

*   Statistically significant at 10%

**   Statistically significant at 5%

*** Statistically significant at 1%

Table 10: Determinants of mean amount respondents are willing to pay for improved solid waste disposal

Variables	Coefficient	t-Value
Constant	-51.377	-0.852
Expenditure	-0.004	-1.821*
Number of sacks generated	10.227	2.734***
Price of waste	-0.299	-9.444***
Gender	0.169	0.001
Age	-0.133	-0.100
Marital status	47.837	1.861*
Household size	-4.302	-0.714
Education	-0.421	-2.931***
House ownership	10.862	2.30**
Number of observation	152	
F (9,142)	50.77***	
Log likelihood	-561.957	
Adjusted R^2	0.748	

*   Statistically significant at 10%
**   Statistically significant at 5%
*** Statistically significant at 1%

Table 1 indicates that 68.0% of the respondents earn N50,000 and below as their monthly income, while 16% each earn between N51,000 and N100,000 and greater than N 100,000 respectively. The mean income was found to be N55, 901.32K. The implication is that they earn fairly enough to cater for their basic needs.

Major components of the waste generated by the respondents

Table 2 reveals that 75.6% of the respondents waste are kitchen waste or left over followed by paper components which have 13.2%,5.9% of the component generated are metals and 5.3% of waste particles ranging from nylon, attachment, sawdust, plastics and cloth pieces are also generated by respondents. The implication of this is that almost all the household generates kitchen waste. The 13.2% for paper is close to the 16.95 reported by Lal *et al*., (2007). The 75.6% of kitchen left over is greater than 31.6% reported by Aliyu (2010) in Kano metropolis. The 5.3% of metal is higher than the 2.5% reported by Ogwueleke (2003) and 2.1% of the work of Aliyu (2010) but almost the same as 5.6% reported by Lal *et al*.,(2007).

Services providers

Table 3 portrays that 23.7% of the respondents patronize OYSWMB, while 76.3% of them does not patronize them. This implies that majority of them do not patronize OYSWMB. The Table also shows that 9.9% of the respondents patronize truck pushers and 90.1% of them do not patronize truck pushers. This implies that very few of the respondents patronize truck pushers. Table 3 depicts that 20.4% of the respondents patronize private company, while 79.6% of them do not patronize the service of private company. This implies that those who patronize private company are less than those who do not. This implies that majority of the respondents do not pay for waste disposal.

House Ownership of the Respondents

Table 4 indicates that 42.1% of the respondents stay in their own house while 57.9% stay in rented apartment. This concludes that more than half of the respondents stay in rented apartment.

Opinion and perception of OYSWMB

I enjoy the services of OYSWMB

Table 5 shows that 14.5% of the respondents strongly disagree to enjoying the service of OYSWMB, while 30.3% are neutral to this, 22.4% agreed to this and 5.3% strongly agreed to this. This have a severity index of 43.8% .The severity index for this is found within the neutral range of $37.5 \leq SI < 62.5$ (Majid

and Mc caffer, 1997;Isa et al.,2005).With this opinion range people affirm to enjoy OYSWMB.

There is an organized waste disposal in my area

From the same Table, 15.8% of the respondents strongly disagree to having organized waste disposal programme in their area, 29.6% disagree to this, while 18.5% are neutral to this, 30.9% agree to it and 5.3% strongly agree to it, the severity index of this is 45.1%. The severity index for this is found within the neutral range of $37.5 \leq SI < 62.5$. With this opinion range people affirm that there is an organized waste disposal service in their area.

Sacks and nylon should be given free to people by OYSWMB.

The Table also illustrates that 2.6% of the respondents strongly disagree to OYSWMB giving nylon and sacks freely to people, 5.9% disagree to this, while 9.9% were neutral to this, 49.3% agree to it and 32.2% strongly agree to it. The severity index to this is 75.7%, the severity index for this falls within the agreed range of $62.5 \leq SI < 87.5$.With this, people agreed to the idea of nylon and sacks being given free.

OYSWMB should be privatized

Table 5 reveals that 11.8% of the respondents strongly agree to OYSWMB being privatized, 17.1% of them disagree to it, while 44.7% were indifferent, 16.4% of the respondents agree to it and9.9% of them strongly agree to it. The severity index for this is 48.9%. The severity index for this is found within the neutral range of $37.5 \leq SI < 62.5$. With this opinion range people affirm that there is need to privatize OYSWMB.

OYSWMB should announce collection time before collection day

1.3% of the respondents strongly disagree to OYSWMB announcing time of collection before collection day, 4.6% disagree to this while 33.6% of the respondents were indifferent, 31.6% of them agree to it and 28.9% strongly agree to it. The severity index for this is 70.6%. The severity index for this falls within the agreed range of $62.5 \leq SI < 87.5$.With this, people agreed to privatization of OYSWMB for better service.

Opinion on willingness to pay for waste disposal service

I am ready to pay for improved solid waste disposal service

The table 6 depicts that 5.9 of the respondents strongly agree to paying for waste disposal service, 22.4% of the respondents disagreed to it, while 13.1% of them were neutral, 48.7 agreed to it, and 9.9% strongly agree to it. The severity index for this is 58.6%. The severity index for this is found within the neutral

range of 37.5 ≤ SI < 62.5 (Majid and Mc caffer, 1997; Isa et al., 2005).With this opinion range people affirm to being ready to pay for improved solid waste disposal service.

Any more income will encourage me to pay for disposal service

The Table further shows that 4.6% of the respondents strongly disagree that more income will encourage them to pay for improved solid waste disposal service, 24.3% of the respondents disagree to it, while 15.1% were neutral, 38.2% agreed to this and 16.4% of the respondents strongly agreed to it. The severity index for this is 58.7%. The severity index for this is found within the neutral range of 37.5 ≤ SI < 62.5.With this opinion range people affirm that, any more income will encourage them to pay for waste disposal service.

The fee of OYSWMB is too high

From Table 6, 4.6% of the respondents strongly disagreed that the fee of OYSWMB is high, 19.1% disagree to this, while 51.3% were neutral, 14.5% agreed to this and 10.5% strongly agreed to it. The severity index for this is 51.8%. The severity index for this is found within the neutral range of 37.5 ≤ SI < 62.5.With this opinion range people affirm that the fee of OYSWMB is high.

Presently am willing to pay for OYSWMB service

11.2% of the respondents strongly disagreed to willing to pay for OYSWMB service at the present time, 22.4% disagreed to this, while 17.8% were neutral to this, 42.1% agreed to this and 6.6% strongly agree to it. The severity index for this is 52.6%. The severity index for this is found within the neutral range of 37.5 ≤ SI< 62.5.with this opinion range, people affirm that they are willing to pay for OYSWMB service at present.

Any further increase in fee will discourage me to pay

The Table also shows that 9.2% of the respondents strongly disagree that any further increase in fee of the service provider will discourage them from paying, 21.7% disagreed to this, while 20.4% were neutral to this, 25.7% agreed to this and 23.0% strongly agree to this. The severity index for this is 57%. The severity index for this is found within the neutral range of 37.5 ≤ SI < 62.5.With this opinion range, people affirm that any further increase will discourage them from paying.

Willingness of respondents to pay for OYSWMB

Table 7 shows that 57.9% of the respondents are willing to pay for improved solid waste disposal while 42.1% of them are not willing. This indicates that more of the respondents are willing to pay for improved solid waste disposal in the study area.

Respondents Bids with Respect to Waste Disposal Payment

Table 8 reveals the different prices or amount the respondents were willing to pay for waste disposal service which ranges from N250 to N3, 000. This implies that amount willing to pay decreases as the bid increases.

Determinants of willingness to pay for improved solid waste disposal

Table 9 present Logit analyses of the factors that determine the willingness to pay for improved solid waste disposal. The result showed that gender, number of sacks generated, household size and house ownership do not significantly affect willingness to pay for improved solid waste disposal. However, age, marital status, education, expenditure, price of improved solid waste disposal and the various price bids are statistically significant at various levels of significance.

The coefficient of age is positive and statistically significant with willingness to pay for waste disposal. This implies that aged respondents are less willing to pay for improve waste disposal than younger ones. This study is in line with earlier findings by

Zenebe and Dagnew (2010) in the study conducted in Ethiopia and Aggrey and Douglason (2010) in a study conducted in Kampala.

Marital status has a positive relationship with willingness to pay for improved solid waste disposal. This indicates that the married respondents from the study area have a higher probability to pay for improved solid waste disposal than others. This is because married people are more responsible to keep the environment clean than singles ones.

Education is positive and statistically related to willingness to pay for improved solid waste disposal. This depicts that the more their level of education, the more likely they are willing to pay for improved solid waste disposal. In essence, educated respondents are more willing to pay than non-educated respondents. This is in consonance with the findings of Adepoju and Salimonu (2010).

Expenditure has a positive coefficient and statistically related to willingness to pay for improved solid waste disposal. This indicate that the more the household total expenditure, the higher the probability to pay for the improved solid waste disposal.

The coefficient of price for improved solid waste disposal has negative relationship with willingness to pay for improved solid waste disposal. This means the higher the price, the lower the probability to pay for improved solid waste disposal.

Bid for price of improved solid waste disposal has a negative relationship with the willingness to pay for improved solid waste disposal. This relates that the higher the bid, the less willing to pay for improved solid waste disposal.

Determinants of mean amount respondents are willing to pay for improved solid waste disposal.

Table 10 shows the Tobit regression analysis of the factors that determine the mean amount respondents are willing to pay for improved solid waste disposal. The result shows that gender, age and household size, has no significant effect on amount willing to pay for improved solid waste disposal, while, expenditure, number of sacks generated, price, marital status, house ownership and education are statistically significant at various levels of significance.

The coefficient of total household expenditure is negative and statistically significant at 10% level of significance. This implies that household with higher total expenditure are willing to pay lower amount for improved solid waste disposal.

Number of sacks generated within household has positive coefficient which is statistically significant at 1% level of significance, which implies that household with higher number of waste sacks will be willing to pay more amount for improved solid waste disposal than those that generated less waste. This is in line with the findings of Zenebe and Dagnew (2010).

Price of waste disposal has a negative coefficient that is statistically significant at 1% significance level. This means that with higher price of waste disposal, the lower the amount households will be willing to pay.

The coefficient of marital status is negative and is statistically significant at 10% level of significance, which means that married respondents have lesser probability to pay higher amount than others.

Education has a negative coefficient and is statistically significant at 1% level of significance. This implies that respondents with higher education are less willing to pay higher amount for improved solid waste disposal.

House ownership has a positive coefficient and it is statistically significant at 5% level of significance, this implies that respondents who live in their personal houses are more

willing to pay high amount for improved solid waste disposal than others.

Conclusion

The study examined the willingness to pay for improved solid waste disposal in Ibadan metropolis of Oyo state, 152 respondents in all were randomly sampled with the use of well structured questionnaires. More than half of the respondents (57.9 %) are willing to pay for improved solid waste disposal and the factors affecting willingness to pay are age, marital status, education total expenditure, price and bids.

1. The fact that aged respondents would be less likely to pay for improved waste disposal means that they should be enlightened about the danger associated with having accumulated dirt around residential areas.

2. Some incentives like drums, sacks should be provided in order to encourage service patronage.

References

Adepoju,A.A. and Salimonu, K.K(2010):Household willingness to pay for improved solid waste management in Osun State, Nigeria. 4th International conference on Appropriate Technology, Accra, Ghana.

Aggrey, N. and Douglason,O.G.(2010):"Determinants of willingness to pay for solid waste management in Kampala city". *Current Research Journal of Economic Theory*, 2(3):119-122.

Al-Hammad, A. and Assaf, S. (1996): "Assessment of the work performance contractors in Saudi Arabia". *J. of Managt. in Engn. ASCE*, **12** (2): 44-49.

Aliyu, B.N.(2010):A n analysis of municipal solid waste in Kanu metropolis, Nigeria". *J. Hum. Ecol.*, 31(2):111-119

Alta,A.A. and Deshaz,O.J. (1996): "Households Demand for Solid Waste Management, a case study of Gujarwala Pakistan". *World Development.*, 24(5): 857-868.

Bartone, C.L. and Bernstein, J.D. (1993): "Improving Municipal Solid Waste Management in Third World Countries". *Resources, Conservation and Recycling;* 8; 43-45.

Cairncross, S. (1990): Water Supply and the Urban Poor. In: Hardoy, J.E., S. Cairncross and D. Satterthw aite (Eds.), *The Poor Die Young: Housing and Health in Third World Cities.* 1st Edn., Earthscan Publications, London, pp: 109-126. ISBN: 13: 9781853830198.

Cointreau, S. J. (1982): Environmental management of urban solid waste in developing countries: a project guide. Urban Development Technical paper No 5. The World Bank, Washington, DC. June.

Cornwell, D. (1998): *Introduction to environmental Engineering.* 3rd ed. McGraw-Hill Company: USA

Delgado, O.B., Ojeda-Bínitez, S. and Márquez-Benavides, L. (2007): Comparative analysis of hazardous household waste in two Mexican regions. Waste Managt., **27** (6): 92-801.

Egner, D. and Smith, B.F (2006): *Environmental Science: A study of interrelationship.* 10th ed. McGraw-Hill company: New York USA.

Isa, M.H., Asaari, F.A.H., Ramli, N.A., Ahamad, S. and Siew, T.S. (2005): Solid waste collection and recycling in Nibong, Tebal, Penang, Malaysia: a case study. Waste Managt & Res., **23**(6): 565-570.

Isu, B. A. (2005): The pains of waste .A Paper presented at the workshop organized by committee on vital Environmental Resources for Teachers/ Students, Eghosa Anglican Grammar School, Benin City, 1-6pp.

Ita, M. (2003): Waste- is the developing world ready? *Science in Africa.* Africa's First On-line Science Magazine. Science Magazine for Africa. MERCK.

Kalu, C., Mogudu, W.W. and Ubochi, I. (2009): "Evaluation of solid waste management policy in Benin metropolis, Edo State, Nigeria." *African Scientist,* Vol. 10, No. 1 March 31, 2009.

Lal,P., Tabunaka, M. and Singh, S.K. (2007): Economics of rural waste management in the Rewa Province and the department of a rural solid waste management for Fiji.IWP-Pacific Technical Report(International Water Project) No.57.ISSN 1818-5614.

Longe, E.O., Williams, A., (2006): A preliminary study of medical waste management in Lagos metropolis, Nigeria. Iranian J. Env. Health Sci. Eng. **3**(2): 133-139.

Majid, M.Z.A. and Mc caffer, R. (1997): Discussion of Assessment of Work Performance of Maintenance Contractors in Saudi Arabia.J. Managt. In Eng.,ASCE,13(5):91.

Medina Martin (2002): Globalization, Development, and Municipal Solid Waste management in Third World Cities, El Colegio de la Fronera Norte, Tijuana, Mexico.

Nwaka, I. G. (2005): The urban informal sector in Nigeria: Towards Economic development, environmental health and social harming, Global Urban Development.

Ogwueleka, T.Ch. (2003): "Municipal solid waste characteristics and management in Nigeria." *Iran. J. Environ. Health. Sci.,*6 **3**4):173-180.

Rand T., Haukohlu, U. and Marxen,U (2000): Municipal solid waste Incineration: Requirement for successful projects, Report of World Bank. Technical paper No 462,World Bank Washington D.C.

Tchobanglous, G. (1993): *Integrated Solid Waste Managementl: Engineering Principles and Management Issues,* McGraw-Hill, Inc., N.Y.

UNEP (2004): *The Use of Economic Instruments in Environmental Policy: Opportunities and Challenges,* Geneva.

UNICEF (2006): Solid and Liquid Waste Management in Rural areas. *A Technical Note,* 108.

Zenebe, G. and Dagnew, H (2010): Household willingness to pay for improved solid waste management: the case of Mekelle city, Ethiopia. Eighth international conference on the Ethiopian economy, Ethiopian Economics Association held on June 24-26, 2010, EEA Conference Center, Addis Ababa. http://www.webmeets.com/WCERE/2010/prog/viewpaper.asp?pid=983. Retrieved on the 7th of February, 2012.