DETERMINANTS OF WILLINGNESS TO PAY FOR ENVIRONMENTAL SOLID WASTE DISPOSAL SERVICES IN OWERRI MUNICIPAL, IMO STATE, NIGERIA

Ben-Chendo, G.N, Gbolagun, A. O., Ehirim, N. C and Igwenagu, M. O

Department of Agricultural Economics Federal University of Technology, Owerri, Imo State

Abstract

In Nigeria, many cities like Owerri Municipal are faced with the problems of rapid expansion due to population increase resulting in unprecedented heap of waste generated on daily basis with refuse and sewage dumped along drainage channels and increasing rate of environmental deterioration. The state's environmental commission (IMO-ENTRACO) has been in the front burner in the waste management program of the state with obvious presence in the area but there is need to educate the public and create some level of awareness to enable members of them to play a role in reducing waste and handling waste efficiently. Hence the study analyzed the willingness to pay for environmental solid waste disposal services in Owerri Municipal Local Government Area of Imo State. The study employed multi-stage purposive sampling to elicit relevant information through well-structured questionnaire and personal interviews from 150 households and was used based on consistency with the objectives of the study. The data generated were analyzed using the dichotomous choice Contingent Valuation Method (CVM), Logit and Tobit models. The results indicated that Almost 31.3% of the respondents were of the opinion that ESWDS is the responsibility of the government and their agency – IMO-ENTRACO and were not willing to commit any of their money to the cause of environmental cleanliness hence bided zero amount for ESWDS. The average bid amount is N285 and this indicated that there is high willingness to pay. Age, educational level, income level, years of residence, responsibility of IMO-ENTRACO to ensure ESWDS, Bid amount and ownership of house were discovered to be determinants of willing to pay for ESWDS while educational level, Income level, ownership of house of residence, Quantity of household solid waste generated and bid amount, age, membership of environmental committee and responsibility of IMO– ENTRACO are factors influencing the amount they are willing to pay for ESWDS in the study area. It is recommended that programmes facilitating investors in waste disposing be initiated while payment for this service should be made affordable to encourage those households that are willing to pay. In addition, public enlightenment campaign through mass media could also be adopted in order to properly inform the citizens on the need to patronize the solid waste disposal investors.

Introduction

Solid wastes include refuse from households, non-hazardous solid waste from industrial and commercial establishments, refuse from institutions like market waste, yard waste, and street sweepings (Cointreaus-Levine, 1994; Alabi, 2004). Broadly, Household wastes otherwise known as residential or domestic wastes are made up of wastes that are consequences of household activities. These according to CASSAD, (1998) include food preparation, sweeping, cleaning, fuel burning and gardening wastes old clothing, old furnishings retired appliances, packaging and reading materials, and where diapers or bucket latrines are used, household waste include fecal material. In Nigeria, many metropolises are faced with the problems of rapid expansion due to population increase and this, no doubt, brought increasing strain on urban infrastructure facilities. One area in which this strain has become obvious is in waste management where the existing system appears to be incapable of coping with the heap of waste generated on daily basis. The urban centers are experiencing an increased rate of environmental deterioration, with refuse dumped along drainage channels. Most cities in Nigeria are faced with waste management problems, and Owerri metropolis is not exempted.

Attempts have been made by scholars, researchers, consultants and government to determine the actual amount of waste being generated in Nigeria (Agbola, 2001). In a survey carried out by (CASSAD, 1998) on waste generation in Nigeria showed that the volume of wastes generated by all the states increased over the period between 1994 and 1996. It was estimated that by the year 2010, Nigeria will generate about 3.53 million tonnes of solid waste, based on a per capita solid waste generation of 20kg per year Agbola, (2001). Nigerian cities have been described as some of the dirtiest, the most unsanitary and the least aesthetically pleasing in the world (Alabi, 2004). This is because some individuals are dirty, this evidence can be seen every day by way of indiscriminate discharge of garbage into drains and the highways. About 75 percent of solid waste collected in most Nigerian cities is disposed in open dumpsites. This method which is rampant is improper as it is not aligned to the sanitary

landfill recommended. It marginalizes the urban environment as a result of the negative externalities it generates (Yusuf, *et. al,* 2007; Adinnu, 1994). In corroborating this assertion, CASSAD (1998) had earlier stated that the decomposition of wastes on dumping grounds emit intolerable smells and attract potential diseases. The dumpsites, which are poorly maintained, are also a source of pollution and a cause of poor urban aesthetic (CASSAD, 1998).

The economic importance of waste management on the quality of life cannot be over-emphasized. Wastes that are not well managed can affect the environment in terms of the contamination of the atmosphere, soil and water. This can cause severe problems for humans and animals population. It can also affect human health in particular by causing convulsion, dermatitis, irritation of nose/throat, anaemia, skin burns, chest pains, blood disorders, stomach aches, vomiting diarrhoea and lung cancer which may lead to death (Alabi, 2004). It is worthy to note that it breed flies (which carry germs on their bodies), mosquitoes, and rats which aids salmonella, leptospirosis and other diseases they cause by biting and spoiling millions of tons of food. Lastly, is the social effect where flood may occur as a result of dumping of refuse in drainage especially during the raining season; an example of this is the incessant flood which usually happened in owerri and several parts of Imo state causing unprecedented loss of properties and occasional displacement of households and communities.

The Government in Imo state had made several attempts aimed at addressing the waste menace which is on the rise as a result of population hikes, growth in industrialization, and consumer attitudes. Although waste management is the constitutional responsibility of the local government (Cointreaus-Levine,1994; Harris, *et. al.,* 2001) but still not mutually exclusive because of the huge financial, technical, administrative and human resource requirements to effectively carry out this constitutional responsibility leaving them fell very short of managing ever-increasing waste generation in the metropolis (Alabi, 2004).

The state's ENTRACO – IMO STATE ENVIRONMENTAL COMMISSION, has been in the front burner in the waste management program of the state with obvious presence in owerri municipal which housed the seat of government. Furthermore, some effort is being made to educate the public and create some level of awareness to enable members of the public to play a role in reducing waste and handling waste efficiently.

However, the level of achievement of this objective leaves much to be desired as there is heavy presence of piles of wastes on the streets, market centers, and homes. Waste management still remains a herculean task to the Municipal as it has not been able to manage and deal with waste problem to the expected level of it. An explanation for the inability of the government to manage solid waste collection effectively arose perhaps from the misconception of this task as a public good. Irrespective of the fact that government gave waste collection a priority in their development objectives, their ability to curtail the problems of waste collection deteriorates with time, due to rising capital costs for plant and equipment, increasing operation and maintenance costs. Considering the rapid spatial and population growth of most urban areas with decreasing coverage levels, and with increase in level of waste generated, confronted by increasing public demand for improved services (Roopa, 2000; Salifu, 2001).

It still required private companies' involvement to clear the solid waste which is predominant in the city's ditches and open gutters. There is need for private involvement to cushion the effort of ENTRACO. Thus, the assumption is that if households can engage private waste management companies and pay better, then the waste disposal management would be improved. However, very little has been done to assess the households' willingness to pay for improved waste management services in Owerri metropolis.

In line with this, it is very important and timely to look for the possibility of cost sharing by households, and for this we need to analyze the demand side for improved solid waste management. Therefore, this study is designed to generate demand side information, which is vital for the planning process. There is an extensive literature on the willingness to pay for solid waste management. Some studies have shown that the willingness to pay for solid waste management 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; World Bank, 1996). However, no or very little is known about the determinants of willingness to pay for solid waste management in Owerri Metropolis and its environs.

The research questions then are that Are the households ready to pay for waste disposal?, how much are they prepared to pay?, and what factors determine their motivation to pay and the amount of money they are willing to pay?, as waste generation, disposal and management pose a great threat to the environment and human health, it is mandatory to conduct a research on willingness to pay for improved solid waste management of the populace of the Owerri Municipal and its environs, hence would be very beneficial to the researchers in environmental issues, Imo State Environmental Commission- IMO ENTRACO, The State Government Ministry Of Environment, Policy Makers on Environmental Protection issues, Private Investors in Waste Management and The International

Community on Environmental issues. Hence, this study is to analyze the willingness of pay for Environmental Solid Waste Disposal Services (ESWDS) by Owerri municipal households. With respect to finding answers to the following specific objectives to:

1. determine the socio-economic characteristics of the respondents;
2. isolate the determinants of household heads willingness to pay for ESWDS.
3. estimate the determinants of mean amount of money they are willing to pay for improved waste management services.
4. estimate the mean amount of money they are willing to pay for improved waste management services.

Theoretical framework of willingness to pay for environmental solid waste disposal services (ESWDS).

The consumer's decision process is modeled using a random utility framework as designed by Loureiro and Umberger, (2003); Consumer utility, U(y, x, m), is assumed to have three arguments: willingness to pay for environmental solid waste disposal services (ESWDS) (y), other environmental safety attitudes attributes as well as consumer characteristics which may affect consumer choice (x), and the consumer income level(m). The variable y is an indicator variable equal to one if the household is willing to pay for ESWDS and zero otherwise. The consumer is willing to pay **c** naira to enjoy ESWDS which will make utility/ environmental safety at least as great as it would be without ESWDS. Mathematically, **c** is represented as:

$$U(0, x_o, m) \leq U((1, x_1, m - c)$$

where the 0 and 1subscripts denote the choice of ESWDS respectively. The consumer's utility function is unknown as some components are unobservable, and thus can be considered random variables from the researcher's standpoint. Therefore, utility is decomposed into an unobservable part and an error term, c,. Mathematically, U(y, x,, m) = V(y, x,, m) +cj. The random error term cj is assumed to be independently and identically distributed with a mean of zero. The consumer's decision to pay **c** naira in terms of utility can be represented as:

$$V(0, x_o, m) + \varepsilon_0 \leq V((1, x_1, m - c) + \varepsilon_1$$

which can be expressed in a probability framework as:

$$P(\text{WTP} \geq c) = P(V_0 + \varepsilon_0 \leq V_1 + \varepsilon_1) =$$
$$P(\varepsilon_0 - \varepsilon_1 \leq V_1 - V_0)$$

This theoretical model sets the groundwork for the specific empirical models that follow. In the current study, a binary choice model approach is chosen to analyze the decision of paying for ESWDS.

In an Attempt to estimate the willing to pay for ESWDS, the dichotomous choice Contingent Valuation Method (CVM) as applied by Niringiye and Omortor (2010) would be adopted. In literature, question on willingness to pay a single amount for safety as used by Ehirim *et al* (2007 and 2010) is weak as it restricts respondents from a rational bid amount. The Contingent valuation method (CVM), which ask a series of questions that progressively narrow the bounds on willingness-to-pay (known as the double-bounded model) provides more efficient estimates of WTP than the yes/no model common in questions on willingness to pay a single amount (Hanemann *et. al.*, 1991).

The logit model was used to determine the mean willingness to pay for ESWDS service by households. The logit model which is based on the cumulative probability function was adopted because of its ability to deal with a dichotomous dependent variable on a well-established theoretical background. Logistic regression, according to (Roopa, 2000) is a uni/multivariate technique which allows for estimating the probability that an event will occur or not through prediction of a binary dependent outcome from a set of independent variables. The model specified by (Hanemann, 1989) was adopted for this study as used by (Branka and Kelly, 2001) in a study on willingness to pay for improved conservation of environmental species in the USA and Yusuf *et.al*, (2007).

Concept of Contingent Valuation (CV) Method

Policymakers are often interested in how the public values goods and services such as ESWDS that are not traded in the marketplace. These values can be estimated using contingent valuation (CV) methods, in which survey questions elicit respondents' willingness to pay (Michell and Carson, 1989; Alberini and Kahn, 2006). In recent years, CV has been increasingly applied to topics in health economics (Donaldson *et. al.*, 2006; Smith 2003; Olsen and Smith, 2001; Niringiye and Omortor, 2010). This paper uses the double-bounded CV model, in which survey respondents are asked a sequence of questions that progressively narrows down the willingness to pay, because this method has been shown to generate more efficient estimates than those based on a single question (Hanemann *et. al,* 1991). This method is generally preferred to asking an open-ended question about willingness to pay (Watson and Ryan 2007). For example, researchers found that people commonly gave "protest answers" to open-ended questions, responding with zeros or extremely high values (Haab and McConnell, 2002). Asking simple yes/no questions

eases the burden on the respondent, decreasing the number of protest answers, and the "would not vote" option allows protest answers to be submitted without introducing bias in estimates of WTP. However, there are also limitations of the double-bounded CV model; for example, respondents may become indignant because they believe that they struck a deal with their response to the first question but now are being asked a follow-up question with a different amount, or may feel guilty at having said no to the first question and therefore may be more likely to say yes to the second (smaller) amount (Watson and Ryan, 2007).

Adopting a similar model of Cawley, (2006), we assumed that each person i has a willingness to pay for ESWDS that is equal to Y_i^* and is related to the person's characteristics X_i in the following way: $Y_i^* = X_i\beta + \varepsilon_i$ where $\varepsilon_i \sim$ NID $(0, \sigma^2)$. We do not observe Y_i^* but we know that the willingness to pay of person i lies in the interval $[Y_{i1}, Y_{i2}]$ because of the responses they gave to a series of CV questions. Therefore, the likelihood contribution of the individual is $\Pr(Y_{i1} \le Y_i^* \le Y_{i2})$ or $\Pr(Y_i 1 \le X_i\beta + \varepsilon_i \le Y_{i2})$.

For left-censored data (for which a lower bound is not known), the likelihood contribution is $\Pr(X_i\beta + \varepsilon_i \le Y_{i2})$ and for right-censored data (for which an upper bound is not known) it is $1 \Pr(Y_{i1} \le X_i\beta + \varepsilon_i)$. The maximum likelihood function was then estimated with STATA 14.

Analytical Framework of Willingness to pay (WTP) of the households for ESWDS

In estimating households' willingness to pay (WTP) for an improved solid waste management, survey respondents provided 'Yes'/'No' answers to the survey valuation questions. To analyze these dichotomous choices, separate logit models were used based on the following logistic probability function:

$$P_I = F(WTP_I) = \frac{1}{1+e^{-WTP_i}} = \frac{1}{1+e^{-(x_i\beta)}}; i = 1\ldots n.$$

where P_I is the probability that the ith consumer will make a certain choice (answer ='Yes'), given the observed level of socio-demographic characteristics, environment safety attitudes, and information conditions contained in x_i, and β is a conformable vector of parameters. Therefore, if (1) represents the probability a consumer will answer 'Yes' to the question asking whether he or she will pay a premium or bid for improved solid waste management, then $1 - P_I$ will be the probability associated with answering "No." Thus,

$$1 - P_I = \frac{1}{1+e^{WTP_i}}$$

To estimate the odds ratio in favor of answering 'Yes' versus "No," the ratio of both probabilities must be calculated:

$$\frac{P_I}{1-P_I} = \frac{1+e^{WTP_i}}{1+e^{-WTP_i}} = e^{WTP_i} = e^{x_i\beta}$$

By taking the natural log, the odds ratio in favor of those respondents answering 'Yes" becomes a linear function of x_i, where x_i is a vector of environmental safety attitude, socio-demographic characteristics and information conditions. This expression can be written as:

$$\log\left(\frac{P_I}{1-P_I}\right) = WTP_i = x_i\beta$$

The parameter vector β cannot be interpreted as the direct effects on the probability of willingness to pay for improved solid waste management; rather, the parameters measure the change in the odds ratio for a change in a unit of an explanatory variable. In order to estimate the effects on the probabilities directly, the marginal effects must be estimated (Maddala, 1997). The underlying statistical model is based on a latent and continuous unobservable variable (WTP_i) which, in the context of the labeling analysis, could be interpreted as consumers' concerns about source verification. The observable variable, which is modeled by the researcher, is the response to the dichotomous choice. Thus, the latent model is represented by:

$$WTP_i = I_{(o, \infty)}(WTP_i^*),$$

where, $I_{(o, \infty)}$ is an indicator variable that restricts the observable WTP to the positive domain, and $WTP_i^* = x_i\beta + \varepsilon_i$. Therefore,

$$WTP_i = \begin{Bmatrix}1\\0\end{Bmatrix} \text{ if } WTP_i^* = x_i\beta + + \varepsilon_i \begin{Bmatrix}\ge\\\le\end{Bmatrix} 0$$

The ε_i are i.i.d. unobservable random variables, following a logistic distribution with mean zero and variance of $\pi/3$. A 'Yes' response is observed if and only if the latent variable is greater than zero. Conversely, a "No" response is observed when the latent variable (consumers' concerns) is less than or equal to zero.

Methodology
Study Area
The study was carried out in Owerri Municipal L. G. A of Imo State, The L.G.A lies within Latitudes 5^o40^l and 7^o5^l North and Longitudes 6^o35^l and 8^o30^l East. It is geographically located in Capital of the State with Owerri West, Owerri North, Ngor-Okpala sharing boundaries with the L.G.A on the West, North and South respectively. The L.G.A has the mostly densely populated in the State with figure of more than 57,750 people (NPC, 2006). The L.G.A is characterized with major commercial activities by the presence of markets such as Main Market, Douglas and Ikunuowa Market. It is also the most urbanized parts of the state having to

cope with the intended problems such as waste generation, disposal and management.

Sampling Techniques and Research Methodologies

The sample for the study was selected in three stages; first stage involved the purposive selection of three electoral wards in the Owerri Municipal followed by the random selection of two main locations within each selected wards. The selection of the electoral wards was guided by the rate of waste management activities within these areas categorized as high, medium and low. The third stage involved random selection of 20 households in each location of the three electoral wards selected. In all, 120 households were selected for the study. Data and information were collected through individual interviews using well-structured questionnaire.

The primary data would be collected from well – structured questionnaire, personal interview and focus group discussion to elicit information on Age of household head, educational level, length of stay in the area, Education, quantity of waste generated, Gender of the household head, Total income, Ownership of house of the household is living, Responsibility for solid waste management. Secondary data would be collected through relevant journals, textbooks and workshop training proceedings.

Descriptive statistics such as frequency distribution tables, mean and standard deviation were used to analyze the socioeconomic characteristics of the respondents.

Following Yusuf *et. al*, 2007; Adepoju and Omonona, 2009; The logit regression model specified below was used to obtain the willingness to pay of the households for an ESWDS. The coefficient estimates obtained were then used to calculate the mean willingness to pay of the households as used by:

$$P_I = F(WTP_I) = \frac{1}{1+e^{-WTP_i}} = \frac{1}{1+e^{-(x_i\beta)}}; \; i = 1\ldots n.$$

This model was simplified as:

$$Y = \frac{1}{1 + exp^Z}$$

Where Y = responses of household WTP which is either 1 for Yes and 0 for No

$Z = \beta 0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots + \beta_{12}X_{12}$

X_1 = Sex (Dummy: Male=1, Female= 0)
X_2 = Age of the household head (years)
X_3 = Educational level (years spent in the school)
X_4 = Marital status. Dummy variable (married =1, single=0)
X_5 = Household size (number)
X_6 = Bid amount willing to pay for ESWDS in (₦).

X_7 = Household income (₦)
X_8 = Weight of accumulated solid waste in (kg)
X_9 = Responsibility of the IMO – ENTRACO (dummy)
X_{10} = Length of stay in the house in (years)
X_{11} = Ownership status of the household head(dummy)
X_{12} = Membership of the community environmental committee (dummy)

The pseudo-*R* square and the chi-square were used to measure the goodness of fit of the model and the significance of the model used.

Determinants of the amount willing to pay:

The logit model provides information only with respect to the household heads' decision to pay for improved waste management services or not to pay, but not on the amount of money they are willing to pay. To estimate the determinants of the amount of money they are willing to pay, the Tobit model is employed. The Tobit model allows us to identify the factors that determine how much the respondents are willing to pay for improved waste management services. Therefore, we use a Tobit model to estimate the determinants of the amount willing to pay as described maximum willingness to pay (MWTP) by Dagnew et. al., (2012):

$$MWTP_i^* = \alpha + \beta X_i^{''} + \varepsilon_i$$

$$MWTP_i = MWTP_i^* \; if \; MWTP_i^* > 0$$

$$= 0 \; if \; MWTP_i^* \leq 0$$

where $MWTP_i^*$ is a household's unobserved maximum willingness to pay for improved solid waste management; $MWTP_i =$ is a household's actual maximum willingness to pay for improved solid waste management; X' is vector of independent variables; β is vector of coefficients; α is the intercept; and εi is disturbance term, which is assumed to be normally independently distributed, i other words, NID (0, σ^2) and independent of *xi*. Assuming that censoring point is zero, then:

$MWTP_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots + \beta_{12}X_{12}$

X_1 = Sex (Dummy: Male=1, Female= 0)
X_2 = Age of the household head (years)
X_3 = Educational level (years spent in the school)
X_4 = Marital status. Dummy variable (married =1, single=0)
X_5 = Household size (number)
X_6 = Bid amount willing to pay for ESWDS in (₦).
X_7 = Household income (₦)
X_8 = Weight of accumulated solid waste in (kg)
X_9 = Responsibility.of the IMO – ENTRACO (dummy)
X_{10} = Length of stay in the house in (years)
X_{11} = Ownership status of the household head (dummy)

X_{12} = Membership of the community environmental committee (dummy)

The pseudo-R square and the chi-square were used to measure the goodness of fit of the model and the significance of the model used.

Willingness-to-Pay Estimates

Following Loureiro and Umberger, (2003); Adejare, (2010); Willingness-to-pay estimate for ESWDS obtained as:

$$E\ (WTP) = \frac{1}{\widetilde{\beta_1}} ln \left(\frac{1 + e^{\hat{\alpha}}}{1 + e^{\hat{\alpha} - \widetilde{\beta_1} Bid\ max}} \right)$$

In this expression, $\hat{\alpha}$ denotes the grand constant, which is the sum of all the products of the estimated coefficients (except the one corresponding to the bid amount) times the mean values of their corresponding explanatory variables. $Bid\ _{max}$ is the highest bid amount, and $\widetilde{\beta_1}$ is the estimated coefficient associated with the bid amount. Results from the logit model were used to generate the confidence intervals of the welfare estimates calculated in the above equation by a bootstrapping technique (Adejare, 2010; Loureiro and Umberger, 2003). This technique employs the estimates of the parameter vector, denoted by β, and the estimated variance-covariance matrix, denoted by Σβ, multiple random draws to create a new parameter vector β are made from a multivariate normal distribution with variance-covariance Σβ and mean WTP was calculated.

Results and Discussion

Table 1 revealed the socio-economic variables of the respondents interviewed in the study; 56.7% of them were aged between 21 – 40 years and only 6.6% were aged between 61 – 80 with the mean value of 41.3, this indicated that most of them are youth, because of the metropolitan nature of the study area where able-bodied youth migrated to from all the surrounding towns, cities and villages to engage in economic activities. About 54% are male which implies that most households are headed by male who takes major household and community decisions particularly those relating to waste disposal, management and environmental health in the community they live. About 57.3% of them are married and could indicated large household, which implies large solid waste generation hence management could become an environmental issue to the household and community at large, about 49.3% of them have primary education, and only 23.7% of them had completed tertiary education. This could have negative effects on the consciousness to maintain a proper environmental management and willingness to pay for improved solid waste disposal management.

Almost 43.3% of them were business owners and entrepreneur and this could have adverse effects on the solid waste generation and disposal management in the study area, because several economic engagements could increase solid waste generation. About 40% of the household have a range of 4 – 6 persons per household in the study area, with an average of 6 persons per household, this implies a high solid waste generation index in the study area, Almost 54% of the household head earned an income range of 1,000 – 50,000, 23.3% of them earned between 101,000 – 150,000 and only 4% of them earned more than 150,000 with the average household income of 67,859.30. This indicated a low household income which might not be able to cater for a large household enough and also incapable to back up their willing to pay for improved solid waste disposal and management with reasonable bid amount.

Only 44.7% of them were the owners of the houses they lived, 55.3% of them were tenants to the owners of the houses, because of indifference altitude of the properties they hired, many tenants may be unwilling to manage the houses they lived better than they owners, hence has a negative impact on household and community solid waste disposal management and many may not be willing to pay for such improved solid waste disposal management. Almost 84% of the respondents had spent between 1 – 10 years in the community they lived, only 5.3% of them were in the residence for up to 21 – 30 years, this implies that majority of them were new in the community and could not contribute effectively to the willingness to ensure improved solid waste disposal management of their neighborhood in a situation where many passed blamed on the present decadence to the past bad behavioral altitude in the study area.

About 43.3% of the household generated 0.1 – 2.0 kg of solid waste everyday, 38.0% of them generated 2.1 – 4.0kg of solid waste and the average solid waste generation was 2.72kg per day. Giving the large population of the metropolitan city of the study area, this significant magnitude of solid waste generation of each household could be critical and inimical to the environmental health of the community and the entire city at large. More importantly, almost 50% of the solid wastes generated were food by-products such as banana/plantain peel, beans bran, yam/cassava peel, maize cobs and other bio-degradable food wastes, 34% of the solid wastes were food left–over, which include meals cooked but not eaten and left spoilt, 14.7% of the solid wastes includes inorganic household waste such as nylons, food packs, used children diapers and other non-biodegradable household wastes, 7.3% of the household waste were damaged furniture, electronics, cloths and plastics. These items when decayed would be vectors of many disease epidermis and therefore became a worrisome

issue to environmental and health wellbeing to the households, communities, cities and the entire states.

In addition, 80.7% of them were aware of the involvement of IMO-ENTRACO in the environmental sanitation of the state and 76.7% of them revealed that they observed the visit of IMO- ENTRACO in the collection and disposal of solid waste in their communities, they revealed that IMO –ENTRACO collect solid waste from Government designated dump sites, dumped wastes along the street, even gutter and open drainages along the main roads across the street. However, only 29.3% of them belonged to the environmental sanitation committee in their neighborhood, this could jeopardize the community sanitation and hygiene and willing to pay for improved solid waste disposal management would be very unattractive. This is evidence in the way they dispose solid waste and their environmental cleanliness

About 48% of them disposed the household solid waste generated into the government designated dump sites along the street and main roads across the

state, 12% of them patronized private solid wastes collectors, 10.6% of them involved IMO-ENTRACO directly to collect the solid waste from their households and communities, However, 20.7% of them dumped their solid waste along the street, 8.7% of them dumped their solid wastes on the gutters and open drainages along the street and the neighborhood, and it could harbor germs, breed rats, mosquitoes, cause air pollution amongst others. these constitute a great menace to the environmental health of the communities in the study area. About 57.3% of them are married and could indicated large household, which implies large solid waste generation and management could become an environmental issue to the household and community at large About 49.3% of them have primary education, and only 23.7% of them had completed tertiary education. This could have negative effects on the consciousness to maintain a proper environmental management and willingness to pay for improved solid waste disposal management.

Table 1: Socio-economic characteristics of the respondents

Variables	Frequency	Percentages (%)	Mean	SD
Age				
21 – 40	85	56.7	41.3	12.0
41 – 60	55	36.7		
61 – 80	10	6.6		
Sex				
Male	81	54.0		
Female	69	46.0		
Marital status				
Single	64	42.7	1.44	0.54
Married	86	57.3		
Educational level				
Primary education	74	49.3	8.77	5.51
Junior secondary	11	7.3		
Senior secondary	28	18.7		
Tertiary	37	24.7		
Occupation				
Civil servant	35	23.3	3.03	1.59
Artisan/Handwork	12	8.0		
Business/entrepreneur	65	43.3		
Teacher/Lecturer	38	25.4		
Household size				
1 – 3	46	30.7	5.5	2.9
4 – 6	60	40.0		
7 – 9	23	15.3		
10 – 12	21	14.0		
Income Level				
1,000 – 50,000	81	54.0	67859.3	57510.7
51,000 – 100,000	28	18.7		
101,000 – 150,000	35	23.3		
> 150,000	6	4.0		
Ownership of household				
Yes	67	44.7	0.45	0.50

No	83	55.3		
Years of residence				
1 – 10	126	84.0	7.3	6.7
11 – 20	16	10.7		
21 – 30	8	5.3		
Qty of solid wastes disposed per day				
0.1 – 2.0	65	43.3	2.72	1.45
2.1 – 4.0	57	38.0		
4.1 – 6.0	28	18.7		
Kinds of household solid wastes produce*				
Food left- over	51	34.0	1.92	0.83
Food by-products	75	50.0		
Inorganic waste	22	14.7		
Household damaged items	11	7.3		
Awareness of environmental committee				
Yes	88	58.7	0.58	0.49
No	62	41.3		
Membership of environmental committee				
Yes	44	29.3	0.29	0.46
No	106	70.7		
Awareness of IMO-ENTRACO				
Yes	121	80.7	0.81	0.40
No	29	19.3		
IMO-ENTRACO's visit				
Yes	115	76.7	0.30	0.68
No	35	23.3		
Mode of solid waste disposal				
Gutters and open drainages	13	8.7	3.16	1.46
Waste dumps along streets	31	20.7		
Govt. designated dump sites	72	48.0		
Private solid waste collectors	18	12.0		
IMO – ENTRACO	16	10.6		
Responsibility of IMO - ENTRACO				
Yes	101	67.3	0.67	0.47
No	49	32.7		
Awareness of private collectors				
Yes	46	30.7	0.31	0.46
No	104	69.3		

Source: Field Survey data, 2017

However, only 29.3% of them belonged to the environmental sanitation committee in their neigbhourhood, this could jeopardize the community sanitation and hygiene and willing to pay for improved solid waste disposal management would be very unattractive. This is evidence in the way they dispose solid waste and their environmental cleanliness. About 58.7% of the respondents were aware of environmental sanitation committee in their community, this indicated that many of them are aware of the need for community sanitation and hygiene for improved environmental health, 80.7% of them were aware of the involvement of IMO-ENTRACO in the environmental sanitation of the state and 76.7% of them revealed that they observed the visit of IMO-ENTRACO in the collection and disposal of solid waste in their communities, they revealed that IMO – ENTRACO collect solid waste from Government designated dump sites, dumped wastes along the street, even gutter and open drainages along the main roads across the street. About 48% of them disposed the household solid waste generated into the Govt. designated dump sites along the street and main roads across the state, 12% of them patronized private solid wastes collectors, 10.6% of them involved IMO-ENTRACO directly to collect the solid waste from their households and communities, However, 20.7% of them dumped their solid waste along the street, 8.7% of them dumped their solid wastes on the gutters and open drainages along the street and the neigbhourhood, these constitute a great menace to the environmental health of the communities in the study area. 67.3% of them revealed that it is the responsibility of the IMO – ENTRACO in the collection and disposal management of solid waste in the study area, this could adversely influence the willingness to pay for solid waste

management in the study area. As a result of their response to their impulse to the responsibility of IMO – ENTRACO in solid waste collection, only 30.7% of them said they were aware of the private collectors. This revealed that there was low awareness to about the involvement of private companies in the improved solid waste disposal management in the study area. This could be evidence in the current state of the sanitation of the study area where dump hills of solid wastes were obviously seen across the streets, communities and as well as blockage of gutters and open drainages with solid wastes causing flooding during rain seasons in the study area.

The logit regression results of factors influencing willingness to pay for improved waste management are presented in Table 2. The logit regression gave Pseudo *R*-squared of about 0.37. The log likelihood ratio (LR) statistic of 75.2 is significant at one percent, meaning that at least one of the variables has coefficient different from zero. Therefore, it can be concluded that the logit model used has integrity and is appropriate. The validity of the logit model in estimating willingness to pay for improved waste disposal is consistent with related studies (Adepoju and Omonona, 2009; Yusuf *et. al.,* 2007).

Seven (7) out of twelve (12) variables used in the model are significant as indicated by the z-statistics and probability level which are lesser than or equal to 5%, 1% level of confidence, they include age, educational level, income level, years of residence, responsibility of IMO-ENTRACO to ensure ESWDS, Bid amount and ownership of house. While the coefficients of age and responsibility of IMO – ENTRACO to ensure ESWDS were negative, it implies that they had negative relationship with willing to pay for ESWDS, However, The coefficients of educational level, income level, years of residence, bid amount and ownership of house were positive and this indicated that they are positively related with the willing to pay for ESWDS. Also, the values and the signs of their marginal effects reflected the responsiveness expressed in magnitude and direction of their willing to pay for ESWDS to a unit additional increase in the values of the explanatory variables.

As shown in Table 2, the value of marginal effect of Age was -0.0023 which implies that an increase in age of the household head by one year tends to decrease the willing to pay for ESWDS by 0.23%. This implies that older people had lower perception for cleaner environment particularly as many of them had been used to the traditional system of categorizing a dirty environment as an act of irresponsibility of the government and her agency like IMO - ENTRACO saddled with the responsibility, they are stocked to the old belief and had little or no willing to pay for ESWDS. Educational level was 0.0534 and this revealed that an additional increase in the educational level would increase the likelihood of person's willingness to pay for ESWDS by about 5.34%. This result supports the findings of Adepoju and Omonona, (2009). This is indicative that the higher the educational level, the higher the probability of the person's willingness to pay for ESWDS. This is because of the fact that as individual receives education; they tend to understand the need for waste management better.

Table 2: Determinants of willing to pay for ESWDS

Willing to pay for ESWDS	Marginal effects	Std. Err.	z	P>|z|
Sex	-.0079	.4865	-0.12	0.905
Age	-.0023	.0044	-3.82	0.000**
Marital status	.0534	.4408	0.89	0.373
Educational level	.0503	.0653	5.66	0.000**
Household size	-.0506	.2606	-1.43	0.153
Income level	1.54e-6	6.00e-7	2.55	0.002**
Years of residence	.0058	.0084	5.14	0.000**
Quantity of waste	.0207	.0994	1.53	0.125
Membership of. Envtal. comm.	.0294	.5363	0.40	0.688
Resp. IMOENTRACO	-.0721	.1748	-3.03	0.000**
Bid amount	4.97e-5	.0002	1.99	0.038**
Ownership of House	.1354	.5171	1.92	0.054*

Source: Logit model result, 2017

Number of obs   =   150

Prob > chi^2 =   0.0000

Pseudo R^2 =   0.3723

*Significant at 5%

LR chi2(12)   = 75.18

Log likelihood = -63.3632

**Significant at 1%

Household income level was 1.54e-6, this implies that a naira increase of household income would increase the household's willingness to pay for ESWDS by 1.54e-4%. This result is in agreement with the environmental economics literature on the positive relationship between income and the demand for improvement in the environmental quality. Also, years of residence in the house they was 0.0058 and indicated that additional year stayed in the house they environmental sanitation is a sole responsibility of government through the IMO –ENTRACO that is saddled with such responsibility, tends to decrease their willingness to pay for ESWDS by 7.21%. The Bid amount has a value of 4.97e-5 and this showed that as the individual increases its bid amount by a unit naira, the willingness to pay for ESWDS by 4.97e-3% meaning that an increased bid amount reflected the amount the individual household is willing to commit for environmental cleanliness of the household, neighbourhood, towns in the study area, and a higher commitment to improved environmental health will be evidence as increased willingness to pay for ESWDS. The value of ownership of the house of residence was 0.1354 and this showed that as the numbers of landlords increases by an additional unit, it tends to increase the willingness to pay for ESWDS by 13.54%. This result is in agreement with Awunyo-Vitor *et. al.*, 2013 indicates that landlords are more willing to pay for improved waste management services as compared to tenants. This is particularly so because only landlords are summons in case the city authorities have problem with the sanitation and not the tenants as it

lived tends to increase their willingness to pay for ESWDS by 0.58%. This is because the longer people stay in an area, the more they are concerned about the environment and sanitation in the area. This is coherent with Alabi, 2004 and Niringiye and Omortor, 2010. The value of responsibility of IMO – ENTRACO in ensuring ESWDS was -0.0721 which means that a unit additional increase in the perception of household that

behoves them to take the environmental sanitation of their house seriously.

The figure 1 revealed the frequencies of the responses of the household to the bid amount they are willing to pay for ESWDS. Almost 31.3% of the respondents were of the opinion that ESWDS is the responsibility of the government and their agency – IMO-ENTRACO and were not willing to commit any of their money to the cause of environmental cleanliness hence bided zero amount for ESWDS. About 68.7% of them were willing to commit some bid amount for the ESWDS. 24.7% of them were willing to pay ₦250, 8% of them were to pay ₦300 and ₦350 respectively, 5.3% of them were willing to pay N400, 11.4% of them were willing to pay N500, 6.7% of them were willing to pay ₦750, 3.3% of them were willing to pay ₦900/week and 1.3% of them were willing to pay ₦1000/week. The average bid amount is ₦285 and only less than 44% of them were above bided above the average bid amount, this indicated that there is although, there is high willingness to pay, but little bid amount were committed to the ESWDS in the study area.
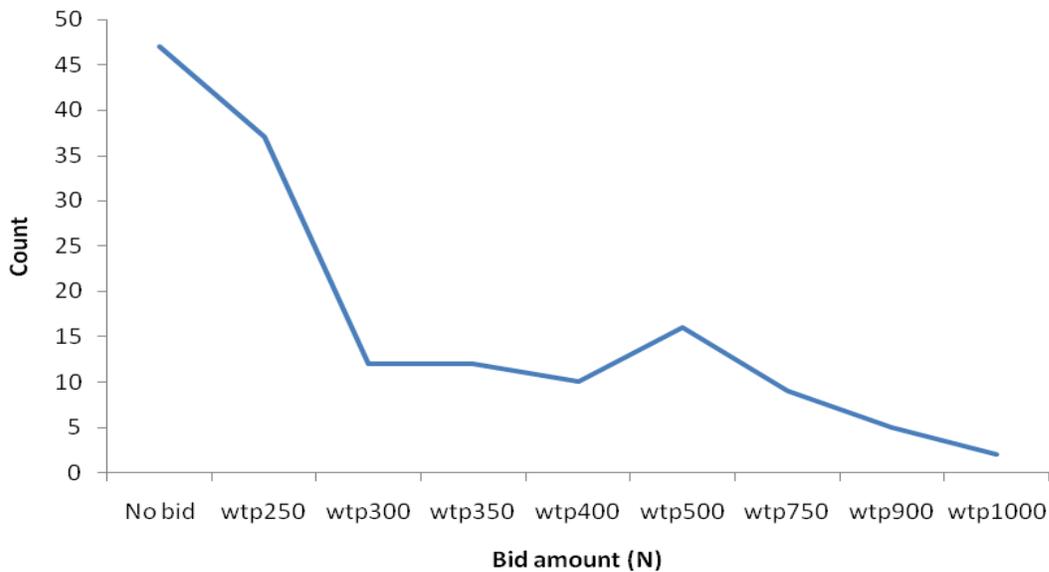
Figure 1: Bid amount of the amount willing to pay for ESWDS.

Tobit regression results of factors influencing the amount of money respondents are willing to pay for improved waste management are presented in Table 3, the results gave the log-likelihood of -715.57 and LR Chi^2(12) of 95.15 significant at 1% level of significance as shown by Prob > chi^2 greater than 0.000, this indicated that the model is well fitted and that at least one of the explanatory variable included in the model has coefficient different from zero. Giving this goodness of fit measure, it can be concluded that the Tobit model used in reliable and has the requisite explanatory power. All the included explanatory variables met the a-priori expectations are indicated by their signs. The values and signs of the marginal effects of the explanatory variables indicated the magnitude and direction of the change in the amount they are willing to pay for ESWDS by the effect of a unit additional increase in an explanatory variable giving other explanatory variables constant. The model showed that Educational level, Income level, ownership of house of residence, Quantity of household solid waste generated and bid amount were positively significant to the amount they are willing to pay for ESWDS. However, age, membership of environmental committee and responsibility of IMO – ENTRACO had negative significant relationship with the amount they are willing to pay for ESWDS.

The value of marginal effect of Age is -1.5334 and significant at 1%, this implies that an additional one year increase in age of the household head would decrease the amount he or she would be willing to pay for ESWDS by ₦1.53, This may be explained by the fact that aged people are mostly retired, disengaged from active economic activities, may have little or no access to financial resources to enable them afford ESWDS. Educational level has a marginal effect value of 14.8363 and significant at 1%, this indicated that an additional increase in educational status of the household head by one year increases the amount willing to pat by ₦14.84. It is in line with Awunyo-Vitor *et. al,* 2013 that educated individuals tends to be more environmentally responsible and hygienic than illiterates ones. This may be explained by the opportunity education gives to people to understand the consequence of improper waste disposal.

Table 3: Determinants of amount willing to pay for ESWDS

Amount willing to pay for SWDM	Marginal effects	Std. Err.	t	P>|t|
Sex	-22.445	34.936	-0.64	0.522
Age	-1.533**	0.4523	-3.39	0.000
Marital status	-28.278	27.394	-1.03	0.304
Educational level	14.836**	3.111	4.77	0.000
Household size	14.742	16.943	0.87	0.386
Income level	1.740*	8.740	1.99	0.059
Ownership of House	52.156**	9.570	5.45	0.000
Years of residence	-2.904	2.771	-1.05	0.296
Quantity of waste	1.929**	0.449	4.30	0.000
Membership of Envtal. Committee	4.736**	0.773	-6.13	0.000
Responsibility of IMO-ENTRACO	-35.915**	17.350	-2.07	0.007
Bid amount	0.119*	0.061	1.96	0.057

Source: Tobit model result, 2017

Number of obs. = 120	LR chi^2(12) = 95.15
Log likelihood = -715.574	Prob > chi^2 = 0.000
47 left-censored observations at mwtp<=0	103 uncensored observations at mwtp>0
**Significant at 1%	*Significant at 5%

The Marginal value of household income has a positive, significant value of 1.74. This result is in agreement with the environmental economics literature on the positive relationship between income and the demand for improvement in the environmental quality (Awunyo-Vitor *et. al.*, 2013; Yusuff et. al., 2007). One naira increase in household income is likely to increase the amount of money the respondents are willing to pay by N1.74. The marginal value of the household ownership has positive and significant value of 52.16, It implies that respondents who owned the house lived are likely to pays N52.16 higher than tenants in the same neighborhood. In urban areas like Owerri Metropolis, cost of housing is high and moreover, landlords are persons held responsible for an unclean house in case the actual cause of the filth is not immediately identified. Thus, it is not surprising that respondents living in their own houses would pay a higher amount of money for improved waste management services. The volume of waste generated has a positive and significant relationship with the amount of money respondents are willing to pay. This can be explained by the fact that those who generate larger volume of waste would have more problems

with disposal and hence would be willing to pay more for its disposal. The marginal value of 1.93 indicated that as the quantity of solid waste generated in the household increased by 1kg, the amount they era willing to pay increases by N1.93.

The marginal value of membership of environmental committee was 4.74, this indicated that the respondents that belong to the environmental committee in the community tends to pay N4.74 more than non-members of the committee. This implies that people in the environmental committee tends to be more responsible for hygienic environment than those that are non-members who could show little or no concern to effort targeted at improved solid waste disposal management in the community. The marginal effect of responsibility of IMO – ENTRACO was -35.915, a unit increase in the perception that solid waste management (SWM) would reduce the amount they are willing to pay by N35.91, it means that the perception

that environment cleanliness is the core responsibility of Govt. Agency like IMO-ENTRACO would inversely influence the amount they are willing to pay. However, marginal effect of Bid amount of 0.1193 measured the potential WTP, It revealed that as the bid amount is increased by N1, the amount they are willing to pay for improved solid waste disposal management (SWDM) by N0.12.

The result of the mean willingness to pay estimates in Table 4, the estimated amount willing to pay, E(WTP), was given as ₦972.62k; the minimum (Bidmin) and maximum (Bidmax) bid amount was calculated as ₦7.7k/week and N1000/week respectively. It indicated that the premium wtp for ESWDS was 97.26% of the maximum bid for ESWDS. This implies that households were willing to pay 97.27% of the maximum bid for Environmental Solid Waste Disposal Services (ESWDS).

Table 4: Willingness to pay Estimates.

Willing to pay for ESWDS	β	μ	$\beta.\mu$	β_{min}	β_{max}
Sex	-0.0583	0.54	-0.03	-1.1181	0.8952
Age	-0.0170	41.27	41.27	-0.0236	0.0575
Marital status	0 .3923	1.44	1.44	-0.4717	1.2563
Educational level	0 .3696	8.77	8.77	0.2417	0.4975
Household size	-0.3721	5.45	5.45	-0.8827	0.1386
Income level	1.54e-06	67859.33	0.11	-3.94e-6	7.02e-6
Years of residence	.0430	7.26	0.31	-0.0311	0.1170
Quantity of waste	.1522	13.8	2.10	-0.0425	0.3470
Membership of. Envtal. Comm.	0.2157	0 .29	0.06	0.8354	1.2668
Resp. IMOENTRACO	-0.5298	0.67	-0.35	-0.4751	1.5346
Ownership of House	0.9945	0.45	0.45	-0.0189	2.0079
Bid amount	0.00365	1000	3.65	-0.0189	2.0079
E(WTP)	₦972.62				
E(Bidmin)	₦7.77k				
E(Bidmax)	₦999.99K				

where β = coefficient of estimated parameter, μ = mean values of the estimated parameter,
Source: Logit model result, 2017.

Conclusion and Recommendations
The study revealed that solid waste generation and disposal methods are very great environmental health menace in the Owerri Metropolis and majority of the respondents were willing to pay for an alternative waste disposal services, particularly when it is going to be an improvement on the existing means of services in order to cushion the efforts of IMO–ENTRACO. Age, educational level, income level, years of residence, responsibility of IMO-ENTRACO to ensure ESWDS, Bid amount and ownership of house were discovered to be determinants of willing to pay for ESWDS while educational level, Income level, ownership of house of residence, Quantity of household solid waste generated and bid amount, age, membership of environmental committee and

responsibility of IMO – ENTRACO are factors influencing the amount they are willing to pay for ESWDS in the study area. It is recommended that programmes facilitating investors in waste disposing be initiated while payment for this service should be made affordable to encourage those households that are willing to pay. In addition, public enlightenment campaign through mass media could also be adopted in order to properly inform the citizens on the need to patronize the solid waste disposal investors.

References

Adepoju A.A and Omonona B.T (2009): Determinants of Willingness to Pay for Improved Water Supply in Osogbo

Metropolis; Osun State, Nigeria. *Research Journal of Social Science, Vol 4 p16*

Adejare A.A, (2010): Consumer perception and preference for safety attributes in sugar and vegetable Oil among Households in South-Western, Nigeria, Unpublished M.Phil Dissertation. Department of Agricultural Economics, University of Ibadan.

Adinnu, I.F (1994): Landfill and Urban Residential Rental Values: A Case Study of Achapo landfill facility in Ojo LGA, Lagos State'. Unpublished MURP Dissertation. Centre for Urban and Regional Planning, University of Ibadan.

Agbola, T (2001): Turning Municipal Waste into Compost: The Case of Ibadan'. In Drechsel, P. and D. Kunze (eds), Waste Composting for Urban and Peri- Urban Agriculture Closing the Rural-Urban. Nutrient Cycle in Sub-Saharan Africa, International Waste Management Institute, Food and Agriculture Organization of the United Nation, CABI publishing, OXon, UK,pp. 69-81.

Alabi, M (2004): Waste Products Survey For Identification and Quantification Of Different Wastes Generated In Nigeria. An Unpublished PhD Thesis in the Dept of Geography, University of Ibadan

Alberini, Anna, and James R. Kahn, (2006): Handbook on Contingent Valuation. (Northampton MA: Edward Elgar).

Alta, A.A. and O.J. Deshaz, (1996): Households Demand for improved solid waste management, a case study of Gujarwala Pakistan. Word Dev., 24(5): 857-868.

Branka T and Kelly G. (2001): Contingent valuation willingness to pay with respect to Geographically nested samples: Case Study of Alaskan Steller Sea Lion". 2001 W-133 Western Regional Project Technical Meeting Proceedings. pp 2-4.

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

CASSAD - Centre for African Settlement Studies and Development, (1998): Workshop on Turning Waste to Weath-Strategies, Options, Appropriate and Affordable Technology for Waste Management, Training Module Prepared Course Codes CASTWW/98 April

Cawley, John (2006): Contingent valuation analysis of willingness to pay to reduce childhood obesity. National Bureau Of Economic Research. NBER Working Paper Series. 1050 Massachusetts Avenue Cambridge, MA 02138 September 2006. Working paper 12510 http://www.nber.org/papers/w12510

Cointreaus-Levine, S. (1994): Private Sector Participation in Municipal Solid Waste Services in Developing Countries Volume 1.The Formal Sector.Published for Urban. Management Programme by The World Bank, Washington, D.C.

Dagnew Hagos, Alemu Mekonnen, and Zenebe Gebreegziabher, (2012): Households' Willingness to Pay for Improved Urban Waste Management in Mekelle City, Ethiopia , Environment for Development, Discussion Paper Series Apri l 2012 EfD DP 12-06

Awunyo-Vitor Dadson, Shaibu Ishak, and Godfred Seidu Jasaw, (2013): Urban Households' Willingness to Pay for Improved Solid Waste Disposal Services in Kumasi Metropolis, Ghana Urban Studies Research Hindawi Publishing Corporation Volume 2013, Article ID 659425, 8 pages http://dx.doi.org/10.1155/2013/659425

Ehirim, N.C., Mark, H.O., Ogueri, C, Adaka, G.S. and Awoyemi, T.T., (2007): Determinants of Consumers willingness to Pay for Fish Safety in Bayelsa State of Nigeria. The Social Sciences, 2(4):399 – 404.

Ehirim, N.C., (2010): Determinants of Consumers' Preference for Safe Chicken Consumption in Imo State, Nigeria. *Researcher* USA

Haab, Timothy C. and Kenneth E. McConnell. (2002): Valuing Environmental and Natural Resources: The Econometrics of Non-Market Valuation. (Northampton MA: Edward Elgar).

Hanemann M. (1989): Welfare evaluations in contingent valuation experiments with

discrete responses data. American Journal of Agricultural Economics 71(Nov.):1057-61.

Hanemann, Michael, John Loomis, and Barbara Kanninen. (1991): "Statistical Efficiency of Double-Bounded Dichotomous Choice Contingent Valuation." AmericanJournal of Agricultural Economics, 73: 1255-1263.

Harris, PJC, M. Allison, G. Smith, HM. Kindness and J Kelley (2001): 'The Potential Use of Waste –stream Products for Soil Amelioration in Peri-urban Interface Agricultural Production Systems'. In Drechsel, P. and D. Kunze (eds), op.cit., pp. 1-28.

Loureiro M.L. and Umberger, W.J., (2003); Estimating Consumer Willingness to Pay for Country-of-Origin Labeling, Journal of Agricultural and Resource Economics 28(2):287-301Copyright 2003 Western Agricultural Economics Association.

Maddala, G. S., (1997): Limited-Dependent and Quantitative Variables in Econometrics. Econometric Society Monographs, 3. London mew York: Cambridge University Press, 1997.

Mitchell, Robert Cameron, and Richard T. Carson. (1989): Using Surveys to Value Public Goods: The Contingent Valuation Method. (Washington DC: Resources for theFuture).

Niringiye, A and Omortor, D.G., (2010) Determinants of Willingness to Pay for Solid Waste Management in Kampala City Current Research Journal of Economic Theory 2(3): 119-122, 2010

NPC (National Population Commission) (2006).Census Publication.

Olsen, Jan Abel, and Richard D. Smith. (2001): "Theory Versus Practice: A Review of Willingness-to-Pay' in Health and Health Care." Health Economics, 10:39-52.

Roopa KS (2000): Qualitative choice and their uses in environment economics. Land Economics 90 (4):499-506.

Salifu, L (2001): 'An Integrated Waste Management Strategy for Kumasi' In: Drechsel, P. and D Kunze (eds), op.cit., pp. 112-114.

Smith, Richard D. (2003): "Construction of the Contingent Valuation Market in Health Care: A Critical Assessment." Health Economics, 12: 609-628.

Watson Verity and Mandy Ryan. (2007): "Exploring Preference Anomalies in Double Bounded Contingent Valuation." Journal of Health Economics, 26: 463-482.

Yusuf, S. A, Ojo, O.T & Salimonu K.K (2007). Households' Willingness to pay for improved household solid waste management in Ibadan –North LGA of Oyo State, Nigeria. J. of Environmental Extension University of Ibadan. Vol: 6 pp 57-63.