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## **Survey of Attitude of Residents towards Environmental Deterioration in Nigeria and Factors Influencing their Willingness to Participate in Reducing the Trend: A Case Study of Waste Management**

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### **ABSTRACT**

This research took a thorough study of how Nigerians view their environment as a prelude to support and participate in any effort aimed at saving the environment. Present results indicate that about 53.6% of our respondents were willing to support any effort to curb the rate of environmental deterioration because majority of the respondents (53.2%) are aware and 53.4% of them are concerned about the increasing environmental deterioration in the country. Using ordered probit model on data collected through questionnaires, it was found that significant factors of willingness to participate in any effort to curb the rate of environmental deterioration include age, sex, level of income, awareness of this trend, concern about its adverse effects and the local level of environmental quality.

**Key words:** Environmental deterioration, ordered probit model, Nigeria

### **INTRODUCTION**

Most developing countries are facing new constraints and pressure with regard to solid waste management (Nnorom and Osibanjo, 2006). Waste management has been a hot issue at national, regional and international levels. There appears to be few, if any, formal take-back program for end-of-life products such as batteries, electronics, automobile tires and other parts in Nigeria (Nnorom and Osibanjo, 2006; Osibanjo and Nnorom, 2007). Formal recycling program for waste materials is required urgently in order to achieve resource conservation and environmental protection.

Nigeria, with a large population put at about 140 million by the last census and increasing industrialization, large quantities of industrial and Municipal Solid Waste (MSW) are generated and disposed in the country. These waste materials end up in open dumps or buried at unlined (approved or unapproved) sites. The disposal of these waste materials at open dumps could result in the release of a cocktail of toxic chemicals into the aquifer. Such toxic materials could also be leached by storm runoff into surface water bodies used for domestic purposes. The open burning of such waste materials (which are often cited within inhabited areas) results in emissions of toxic gaseous materials. The emitted particulates (which are subsequently deposited) and the resulting ash and cinder present potential risk to human health and the environment. This waste

management approach, apart from posing danger to the environment and human health, constitutes nuisance-odor, smoke, insects and pests infestation and impairment of landscape and view of the surroundings.

Participation rate in recycling programs (and in environmental protection programs in general) determines the effectiveness of such programs. Hence there is a need to assess information on the willingness of residents to support any program aimed at protecting the environment. It has been recognized that there are numerous predictors of behavioral intention and that situational and psychological factors can also intervene to effect the intention-behavior relationship (Taylor and Todd, 1995).

Considerable literature is available on the description and analysis of individual recycling behavior especially on the psychological and sociological factors (De Young, 1986; Tucker, 1999; Oskamp *et al.*, 1991). Studies have been conducted in order to assess the participation in environmental protection especially in recycling programs. These studies have most often focused on:

- The frequency of recycling in urban/rural curbside programs
- Factors influencing participation in recycling programs
- Generation of recyclables by households
- Psychological and/or sociological factors that influence household participation in recycling
- Quantities of recyclables collected, etc. (Oskamp *et al.*, 1991; Porter *et al.*, 1995; Vining *et al.*, 1992; Jakus *et al.*, 1996; Tucker, 1999)

Unfortunately, there are few formal recycling programs for recyclables in Nigeria. Most existing recycling programs are in the informal sector and are rarely backed by legislation. Landfills constructed using appropriate technologies are rare in the country. Even where landfills are available, the landfilling of household wastes without treatment or recovery is wasteful because of landfill space required and materials that could be recovered (Sekito *et al.*, 2003). However, concern over environmental deterioration have been increasing as people become more aware of the possible hazards of inappropriate waste disposal practices especially the common practices of open burning of wastes within residential arrears. Several factors affect the attitude of residents towards waste management and environmental protection in general. These include:

- Age and sex
- Level of education
- Environmental awareness
- Socio-economic factors
- Psychological factors

For example, it has been observed that women tend to be involved in waste reduction activities than men (Barr *et al.*, 2001), while higher age groups (older respondents) have also been noted to follow this trend compared to the younger generation (Barr *et al.*, 2001; Long, 1997). Similarly, studies have also noted that recyclers had on average greater income than non-recyclers whereas the recycling behavior of friends and neighbors are determining factors of the attitudes of respondents (Long, 1997; Oskamp *et al.*, 1991). Series of studies have been carried out with the aim

of assessing the behavior and attitude of residents in both developed and developing countries towards environmental issues (Sivek, 2002; Tarrant and Cordell, 1997; Porter *et al.*, 1995; Taylor and Todd, 1995).

The search for a sustainable future for the earth is rapidly shifting towards the notion of think global, act local (Steel, 1996). Encouraging people to use their cars less, turn down the thermostat, switch the tap off when brushing their teeth and recycle the waste that they produce have all been advocated by governmental organizations. Indeed, these behaviors are regularly related to national and local environmental issues to provide them with more resonance. Oskamp (1995) has made a compelling case for social science in general and social psychology in particular, to become in the search for a sustainable future for our planet. It is argued here that the waste problem is one that is likely to be resolved only when policies are implemented that are based on a clear understanding of what factors influence individual intentions and behaviors, which in turn have to be grounded in rigorous social research.

This study examines the willingness of residents of two towns (Isuikwuato in Abia State and Okigwe in Imo State) bordering Abia State University in Southeastern Nigeria to support any effort at checking the rate of environmental deterioration in Nigeria. Questionnaires were employed by the authors to measure the level of awareness and concern about the rate of environmental deterioration, environmental quality in the country as well as assess the willingness of residents to support any initiative to curb environmental deterioration in the country. Our model incorporates variables such as awareness of environmental degradation and willingness to check environmental deterioration.

## **MATERIALS AND METHODS**

**The study areas:** This research was undertaken in two towns (Isuikwuato and Okigwe local Government areas) surrounding Abia State University (Southeastern Nigeria). The two towns were selected for this study because of the following:

- They host many youths (university students, traders, etc.) who are the ones to make any difference in waste management in the future, if the right conditions are created
- They host a mixture of rural and urban dwellers
- The residents are from various states of the country especially states in the eastern part of the country and are not just residents of these two towns
- The population of both towns have witnessed a significant increase in recent times, as a result of which large quantities of household wastes are currently being managed. Leão *et al.* (2004) observed that the management of waste disposal is closely linked to the dynamics of urban development and population growth and thus generally leads to increasing waste generation

## **STRUCTURE OF THE QUESTIONNAIRE**

Data for this study were collected from questionnaires distributed to 1000 (500 in each of the study Areas) available respondents between February and May 2009. The survey instrument focused on respondents willingness to participate in curbing the rate on environmental deterioration and assess the level of awareness of environmental deterioration and general concern about the trend in the country. It also aims at surveying the rating of environmental quality in Nigeria. Few well structured questions were selected in order not to bore the respondents and yet achieve the aim of the study.

The questionnaire contained 8 questions with four major parts:

- **Part A: Characteristics of participants/respondents:** This section gathers information about the participants. This includes the gender, age and level of education and income (4 questions)
- **Part B: Measurement of concern and awareness of the deteriorating environment:** The concern and perception of the participants towards environmental issues was assessed. Concern over the environment was assessed using the options: (1) Not concerned, (2) not very concerned, (3) concerned and (4) very concerned while awareness of the deteriorating environment was assessed using a yes or no question (2 questions)
- **Part C: Measurement of environmental quality:** This section assessed environmental quality in Nigeria using the options: (1) Very high, (2) high, (3) low and (4) very low (1 question)
- **Part D: Measurement of willingness to participate in reducing:** The rate of environmental deterioration. The options used are: (1) Not willing at all, (2) not very willing, (3) willing and (4) very willing (1 question)

The questionnaires were administered using the contact and collect method in which the researchers personally delivers and collects the questionnaires. The questionnaires were administered in English language only. Studies such as this may present over-estimates as declared behavior may defer from actual behavior. Literature has shown that declared behaviors, whilst probably over-estimate of actual action, are likely to be proportionally accurate (Barr *et al.*, 2001).

## MODELING WILLINGNESS TO PARTICIPATE IN CURBING THE RATE OF ENVIRONMENTAL DETERIORATION

A model was developed to estimate willingness to participate in curbing environmental deterioration. Respondents selected their willingness to participate from four alternatives:

- Not willing at all
- Not very willing
- Willing
- Very willing

When the response variable is ordinal and has more than two levels, researchers have a choice between ordered logistic regression (ordered logit) and ordered probit models. Considering that the ordered probit is theoretically superior to most other models for the data analyzed in this study. The following specification was used:

$$y_n^* = \beta x_n + \varepsilon_n \quad (1)$$

Where:

$y_n^*$  = Latent and continuous measure of willingness to participate in curbing the rate of environmental deterioration

- $x_n$  = A vector of observations of explanatory variables
- $\beta$  = A vector of parameters to be estimated
- $\epsilon_n$  = A random error term (assumed to follow a standard normal distribution)

The observed and coded discrete willingness variable,  $y_n$ , is determined from the model as follows:

$$y_n \begin{cases} 1 & \text{if } -\infty < y_n^* \leq \mu_1 \text{ (Not willing at all)} \\ 2 & \text{if } \mu_1 < y_n^* \leq \mu_2 \text{ (Not very willing)} \\ 3 & \text{if } \mu_2 < y_n^* \leq \mu_3 \text{ (Willing)} \\ 4 & \text{if } \mu_3 < y_n^* \leq \infty \text{ (Very willing)} \end{cases} \quad (2)$$

where, the  $\mu_i$ 's represent the thresholds to be estimated along with the parameter vector,  $\beta$ .

The probabilities associated with the coded responses of an ordered probit model are as follows:

$$\begin{aligned} P_n(0) &= P_r(y_n = 0) = P_r(y_n^* \leq \mu_1) = P_r(\beta'x_n + \epsilon_n \leq \mu_1) = P_r(\epsilon_n \leq \mu_1 - \beta'x_n) = \Phi(\mu_1 - \beta'x_n) \\ P_n(1) &= P_r(y_n = 1) = P_r(\mu_1 \leq y_n^* \leq \mu_2) = P_r(\epsilon_n \leq \mu_2 - \beta'x_n) - P_r(\epsilon_n \leq \mu_1 - \beta'x_n) \\ &= \Phi(\mu_2 - \beta'x_n) - \Phi(\mu_1 - \beta'x_n) \\ &\dots \\ P_n(j) &= P_r(y_n = j) = P_r(\mu_j < y_n^* \leq \mu_{j+1}) = \Phi(\mu_{j+1} - \beta'x_n) - \Phi(\mu_j - \beta'x_n) \\ &\dots \\ P_n(k) &= P_r(y_n = k) = P_r(\mu_k < y_n^*) = 1 - \Phi(\mu_k - \beta'x_n) \end{aligned}$$

where,  $n$  is an individual,  $k$  is a response alternative,  $P(y_n = k)$  is the probability that individual  $n$  responds in manner  $k$  and  $\Phi(\cdot)$  is the standard normal distribution function. This multivariate approach makes it possible to examine the joint influence of several independent variables on the dependent variable which is not obtainable through correlation or contingency table analysis.

## RESULTS AND DISCUSSION

Table 1 shows a breakdown of responses by category on willingness to participate in curbing environmental deterioration. About 28.1% of our respondents are very willing to participate in any program initiated with the aim of curbing environmental deterioration in the country. A breakdown of responses for awareness about the deteriorating environment indicates that about 53.2% of our respondents are very much aware of the rate of deteriorating environmental condition in the country while 46.8% of the respondents answered No to the question are you aware of the deteriorating environmental conditions in the country?. This may indicate that a significant proportion of the respondents are still unaware of the ugly trend.

Breakdown of responses on awareness and concern about the deteriorating environment are shown in Table 2 and 3, respectively while that on environmental quality is shown in Table 4.

It is seen in Table 5 that 37% of our respondents is literate, 33.6% is semi-illiterate while 29.2% is illiterate. In Table 6, it is seen that 54% of male respondents are willing (very willing or willing) against 59.4% of the females who are willing (either willing or very willing) to participate.

Table 1: Breakdown of the responses on willingness to participate in curbing the rate of environmental deterioration

Response	Count	Percent
Not willing at all	197	22.62
Not very willing	207	23.77
Willing	222	25.49
Very willing	245	28.13

Table 2: Breakdown of the responses on awareness of environmental deterioration

Response	Count	Percent
No	408	46.84
Yes	463	53.16

Table 3: Breakdown of the responses on concern about the environmental deterioration

Response	Count	Percent
Not concerned at all	188	21.58
Not very concerned	218	25.03
Concerned	220	25.26
Very concerned	245	28.13

Table 4: Breakdown of the responses on rating of environmental quality

Response	Count	Percent
Very high	159	18.25
High	188	21.58
Low	232	26.64
Very low	292	33.52

Table 5: Breakdown of the responses on respondents' level of education

Response	Count	Percent
Primary	254	29.16
Secondary	293	33.64
Tertiary	324	37.20

Table 6: Breakdown of the responses on willingness to participate by sex

Response	Male (%)	Female (%)
Not willing at all	23.11	18.05
Not very willing	22.89	22.61
Willing to support	25.53	27.51
Very willing to support	28.47	31.84

In Table 7, it is seen that majority (57.7%) of the eldest respondents ( $\geq 65$  years) are willing (very willing or willing) to participate. This is quite significant when compared to the other age intervals. In Table 7, it can be inferred that those with higher income are more willing than those with lower income since 59% of those with annual income ( $> \text{N}480,000$ ) are willing to participate. This surpassed the willingness to participate among the other levels of income earners (Table 8).

Ordered probit model that explained willingness to participate in curbing environmental deterioration estimated using Stata (Statacorp LD, College Station, TX) (Table 2) based on 871 valid answers (129 respondents provided incomplete information) is shown in Table 9.

Table 7: Breakdown of the responses on willingness to support by age

Response	Years				
	18-24	25-34	35-49	50-64	≥65
Not willing to at all	21.39	18.87	26.49	27.50	19.07
Not very willing	24.86	28.30	20.54	22.50	23.20
Willing	29.48	25.16	27.03	21.25	24.23
Very willing	24.28	27.67	25.95	28.75	33.51

Results are in %

Table 8: Breakdown of the responses on willingness to support by level of income (X) per annum

Response	Level of Income (X) in 000₦			
	X < 120	120 < X < 240	240 < X < 480	X > 480
Not willing to at all	21.57	23.38	27.78	20.26
Not very willing	32.68	22.73	23.33	20.79
Willing	21.57	28.57	22.78	26.89
Very willing	24.18	25.32	26.11	32.07

Results are in % and ₦156 = \$1 at the time of the survey

Table 9: Model estimation results

Variable	Coefficient	Robust SE	Z	P> Z
Awareness about the deteriorating environment (yes = 1)	-0.1307***	0.0734	-1.78	0.075
Concern about the deteriorating environment (yes = 1)	0.2074*	0.0742	2.80	0.005
Rating of environmental quality in Nigeria (low, yes = 1)	0.1620**	0.0742	2.18	0.029
Age (Above 50, yes = 1)	-0.1391***	0.0732	-1.90	0.057
Sex (Female, yes = 1)	-0.1437***	0.0736	-1.95	0.051
Level of income (Above 480,000 per annum, yes = 1)	0.1248***	0.0737	1.69	0.090
Level of education (Tertiary, yes = 1)	0.0964	0.0743	1.30	0.194
μ <sub>1</sub>	-0.7229*	0.1085	-6.42	0.000
μ <sub>2</sub>	-0.0527	0.1064	-0.48	0.634
μ <sub>3</sub>	0.6327*	0.1080	5.64	0.000

No. of observations = 871. Results for willingness participate in curbing the rate of environmental deterioration; Log-likelihood = -1190.75; LR Chi-square (with 8 degrees of freedom) = 27.48; The corresponding p-value < 0.0006; Pseudo R<sup>2</sup> = 0.0114. \*, \*\* and \*\*\*Indicate significance at 1, 5 and 10% levels, respectively

From the model we have established that significant factors affecting willingness to participate in curbing the rate of environmental deterioration are awareness about environmental deterioration, concern about this ugly trend and the local level of environmental quality, age, sex and level of income. This was evidenced by the breakdown of the survey responses. Present results indicate that about 54% of our respondents were willing (very willing and willing, Table 1) to participate in curbing the rate of environmental deterioration. This is because majority of the respondents (53.2%) are aware of the increasing level of environment deterioration (Table 2). Similarly, 53.4% of the respondents were concerned (very concerned and concerned, Table 3) about the deteriorating environment. This is corroborated by the 60.2% of the respondents who rated environmental quality in the country either low or very low (Table 4).

The populations used in this study are more enlightened and/or educated when compared to the general population of the country. As a result, the findings of this study should be extrapolated with caution especially when considering rural areas that hosts less enlightened/educated populations.



Damage to the environment due to poor waste management can be avoided by implementing environmentally sensitive waste management techniques, through the principle of the best practicable environmental option, whereby minimization, reuse, recycling and recovery techniques are employed, where feasible (Clarke *et al.*, 1999), in order to reduce the amount of waste going to the landfills (open dumps in Nigeria). Unfortunately the absence of formal recycling programs and landfills constructed using appropriate (or state-of-the-art) technology has resulted in the various low-end reuse of EoL goods and recovery of selected waste materials which leads to economic wastages and ecological degradation. Joos *et al.* (1999) observed that improved waste treatment is the most effective way of relieving the burden of waste management on the environment in the short term. As a result, waste treatment should be given preference, as it results in the recovery of waste and tolerable environmental pollution.

The finds of this study are quite interesting and partly agreed and varied with those of previous studies. It is partly in line with previous studies because age, sex and level of income (Barr *et al.*, 2001; Long, 1997; Oskamp *et al.*, 1991) were discovered to influence peoples' willingness to participate in environmental sustainable programmes. However, it is at variance with previous studies in that it was discovered that the level of awareness and concern about the deteriorating environment and the local environmental quality are also significant factors that affect peoples' willingness to participate in curbing the rate of environmental deterioration. This may be as a result of the fact peoples' level of awareness and concern about the deteriorating environment and local environmental quality were not assessed in the previous studies.

The primary management action that affects waste treatment is the waste generation itself (Komilis *et al.*, 1999). It is therefore necessary to create awareness on waste minimization as a tool in checking the increasing waste crisis in the country. Municipal waste minimization involves decision by parties in waste generation and management (product manufacturers, government agencies, householders) to reduce the amount of waste placed in the waste stream (source-reduction) and to divert waste entering the waste stream towards benign purposes (waste diversion) rather than towards disposal. Such waste materials should be channeled towards recycling, composting and waste-to-energy conversions (Taylor, 2000). The NIMBY (Not In My Back Yard) attitude of most residents and industries results in the disposal of waste that the householders and industries knows could impact negatively on the environment and human health, at unapproved points including surface water bodies used for domestic purposes. In such situations, the out-of-sight, is out-of-mind attitude is adopted by the waste generator. The NIMBY attitude has been recognized as a basic participatory problem in waste management (Joos *et al.*, 1999) and is encountered even when environmentally sound waste management facilities are been considered for construction in communities (Leão *et al.*, 2004).

Barr *et al.* (2001) observed that recycling behaviors are associated with three sets of variables:

- **Environmental values:** People who value the environment for its intrinsic worth have been found more likely to behave in environmentally appropriate ways
- **Situational factors:** This includes enabling and disabling influences
- **Psychological factors:** These are unique perceptual traits of the individual

It is therefore necessary to assess the perception of environmental standards in Nigeria and the likely attitude of residents towards environmental protections should there be a program.

## CONCLUSIONS AND RECOMMENDATIONS

The fundamental finds of this study are that factors affecting willingness to participate in curbing the rate of environmental deterioration are age, sex, level of income, awareness and concern about the deteriorating environment and the local environmental quality. It is surprising in this study that education was found not to be a significant factor considering that it is expected that not having a good education decreases the willingness to participate and vice versa.

The rate of environmental deterioration is a growing concern across regional, national and international boundaries, therefore awareness and concern programs need to be created among people in order to make them willing to participate in any efforts aimed at controlling the rate of environmental deterioration such as recycling EoL consumer goods, pay more for environmentally friendlier goods, adoption of environmentally sustainable behavior and so on. For such programs to be effective, there is need for a sound understanding of the factors affecting peoples' willingness to participate in curbing the rate of environmental deterioration. Based on the finds of our study there is need to create educational programmes on environmental issues targeting men, the younger population and the lower income earners in view of the fact that they are less willing to participate.

The results of this study indicates that a significant proportion of the sampled population are aware of the increasing environmental degradation in Nigeria and are willing to participate in any effort aimed at checking this ugly trend. There is a need for the government to introduce policy measures to halt the present waste management practices and introduce/develop an integrated set of policy measures to assure effective waste management practices in the country. Such policy instruments should encourage prevention of waste at source, reduction of pollutants both in the production processes and finished goods, reduction of waste by improving recovery and the environmentally compatible treatment of the remaining waste (Joos *et al.*, 1999). In order to achieve this, the following are inevitable:

- Introduce an information dissemination mechanism to create awareness on appropriate waste management practices
- Provide infrastructure for waste collection and appropriate management, giving preference to recycling wherever possible
- Implement producer responsibility (mandatory producer responsibility preferably) to achieve sound management of EoL consumer goods.
- Introduce incentives (tax incentives, financial encouragements, partnerships) to encourage effective waste management
- Introduce legislation restricting the options available legally in the management of certain waste materials
- Encourage recycling by developing market for recycled materials as well as encouraging the supply of waste materials towards the recycling channel

To achieve resource conservation and minimize environmental impact and resource consumption in Nigeria, policy instruments and legislation are required and these should be based on the 3R principles, i.e., reuse, reduce and recycle. Though the 3R will not eliminate waste entirely, it will however be required in reducing the volume of waste to be managed. Appropriate disposal methods (engineered landfills and incinerators) will then be required in the management of residual wastes (Rehardyan *et al.*, 2004).

The increasing problem of waste management in Nigeria can be resolved by cutting back on waste generation and through waste minimization practices and by recycling more of the waste generated. The time to act is now. A generational change is required and this can be achieved by introducing waste awareness educational programs in our schools. Information dissemination instruments are required to inform the population what is expected of them and to persuade them to do same. Wilson (1996) observed that a well coordinated publicity and educational programs must form an integral part of any waste reduction program. The residents need simple information and publicity campaigns which should be backed by longer term education programs integrated into the curricula of our schools.

Finally, basic waste management infrastructure is required in the country. There is a need for modern landfills that uses engineered barriers and leachate collection systems. Such facilities reduce the possibility of leachate contamination of underground water (Slack *et al.*, 2005).

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