Factors Influencing Households' Environmental Hazard Exposure in Ibadan Metropolis

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Abstract: Environmental hazards constitute a lot of economic development bottlenecks in Nigeria. In this study, the different forms of environmental problems facing households Ibadan were identified and composite indicators of hazard vulnerability were computed from them. Data were collected from 120 households from Ibadan metropolis using the stratified sampling method. Data were analyzed with the Factor Analysis and ordinary least Square (OLS) regression. The results show that majority of the households were faced with bushy and untidy environment, illegal structure/urban slum and improper disposal of domestic wastes. Regression results show that female household heads were significantly more vulnerable to domestic and air pollution hazards ($p<0.05$). Also, as income increased, exposure to domestic and water pollution hazards significantly decreased ($p<0.05$). The study recommended serious enforcement of existing environmental laws in order to ensure safe environment for residents of Ibadan, among others.

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INTRODUCTION

Upsurges in urban population growth, without adequate initiatives for waste management have resulted in catastrophic environmental situations in many Nigerian cities. The dynamics of spatial urbanization in Nigeria can be reflected from social infrastructure proliferation since 1815. Prior to national independence in 1960, the growth patterns of urban centers were drastically influenced by creation of new towns, modernizing physical structures of existing towns and provision of some basic social infrastructures. Some political and economic influences have also resulted in rapid urbanization and population growth (Ekundare, 1973).

Although Nigeria's demographic statistics are sometimes contentious, available data suggest that urban growth has continued unabated (Ayedun *et al*. 2011). Falade (1998) submitted that with annual growth rate of more than 6 percent, Ibadan, Lagos and Port-Harcourt are among Nigerian cities that have surpassed the average national urban growth of 3.6 percent. Alkali (2005) also noted that while average growth rate of Nigerian population was 2.8 percent, urban population had grown at about 5.8 percent since mid-1980s. Given that about 7 percent, 15 percent, 23.4 percent, 43.5 percent and 50 percent of Nigerian populations were living in urban centers in 1945, 1950, 1975, 2000 and 2010, respectively, there are enough statistics to prove the catastrophic tendencies of urbanization (Onibokun and Kumuyi, 1996; Ujoh *et al*, 2010; Ayedun, 2011).

The Nigerian Constitution charges the states with the responsibility of ensuring environmental protection within their domains. Each of the local governments within the states is also mandated according to state legislatives to ensure safe environment. However, several urbanization prompted environmental hazards are common phenomena in many Nigerian cities, majority being the state capitals. The situation in Ibadan is worrisome because the city is endowed with large land areas, which if well planned and judiciously utilized could have made the town an epitome of indescribable beauty.

Specifically, lack of adequate planning, foresights and inability of successive governments to adequately enforce civic compliance with existing environmental laws are notable among the problems that had aggravated environmental hazards. Similarly, corruption in the civil service has influenced the manners in which environmental officers and those that are charged with the responsibility of urban planning carry out their duties. Therefore, recent environmental decays are products of serious enigmas of abject policy failure, which no doubt engenders other adverse socio-economic development consequences (Omoleke, 2004).

Specifically, we now have some of our urban main roads being decorated with heaps of waste disposal bags, drainage channels are blocked with waste materials, major streets are littered with waste papers, nylons and sometimes human excreta and people are denied fresh air due to air pollution. It is therefore pathetic that our governments, more often lack adequate strategies to address emerging environmental challenges in our cities. This, having being the norms in governance has resulted in a

situation whereby Nigerian cities have been ranked among the dirtiest in the world. (Omoleke, 2004; Alabi, 2004)

Environmental pollution is directly related with population density (Inyang, 1997). This explains persistent concentration of environmental pollution in major urban centers. Health hazards that such pollutants constitute result in increased health expenditures, with diverse economic and welfare consequences. Also, rapid urban growth poses some frightening negative social consequences. Perhaps, the most notable of them are environmental poverty, quality of life decline and inability to adequately tap into the wealth of human and environmental resources. Therefore, urban poverty promotes a situation where low income urban dwellers are concentrated in rapidly expanding slums, with deplorable housing and social amenities (Onibokun and Kumuyi, 1996; DANIDA, 2000).

Industrialization is another source of environmental hazards in developing as well as developed countries (Dike, 2005). The magnitude of the problems varies from country to country, and depends on the stage of industrial development and the degree of enforcement of environmental regulations. Urban centers are more often the primary recipients of industrial pollution [United Nations Industrial Development Organization (UNIDO), 2004]. Regrettably, existing legislations on the need for environmental impact assessment are being side-tracked due to persistent corruption in the public work force. A development scenario in which social costs of some production activities outweigh the social benefits has been created. Also, rapid industrialization is always accompanied by environmental hazards, which are sometimes beyond what existing technologies can decisively cope with. Government's lapses to respond to these demands often result in poverty, unemployment, inadequate housing facilities, water pollution, air pollution, among others.

This paper addressed two basic research questions. First, what are major environmental hazards that urban households face? Second, what are factors that explain exposure of urban households to environmental hazards? In the remaining parts of the paper, section two discussed the methods of data collection and analytical methods, section three presented the results and discussions, while section four concluded the study with some insights into policy recommendations.

MATERIALS AND METHODS

The study area and methods of data collection

In geographical size, Ibadan is the largest city in Nigeria. The metropolis comprises of five local government areas which are Ibadan North, Ibadan Northeast, Ibadan Northwest, Ibadan Southeast and Ibadan Southwest local governments. The population these local government areas summed up to 1338659 based on the 2006 National Population Census (National Bureau of Statistics, 2009). Data for the study were obtained from primary sources.

The data were obtained with the aid of well-structured questionnaires administered to households. Stratified sampling technique was employed group the study area into the traditional area, the transitional areas and the elite areas. Simple random sampling was then used to pick equal number of respondents from each of the stratum. The rationale behind the stratification was to ensure equal representation of different classes of people in the selection of the respondents, since the three strata (the traditional, transitional and elite areas) are heterogeneous in terms of settlement pattern and level of planning which are likely to reflect in the socio-economic characteristics of the respondents.

Traditional areas in Ibadan metropolis are places like Beere, Oja Oba, Agugu, Foko, Oje, Idi Arere etc. The transitional area covers place such as Sango, Agbowo, Akobo, Ijokodo, Ashi, Iwo Road etc. while the elite area are well planned areas such as Old Bodija, Agodi G.R.A, Jericho GRA, Onireke, Oluyole extension and so on. For the purpose of this study, 40 households were randomly selected from each of the strata, giving us a total of 120 respondents.

Construction of environmental hazard vulnerability indices and its correlates

Several authors have computed indicators of hazard vulnerability from qualitative or quantitative data, or a combination of these. In this study, environmental hazard vulnerability indices were constructed using information sought on those environmental problems that the households suffer from. Composite vulnerability indices were computed for each of the households, using the factor analysis (FA). The advantage of this aggregation is its ability to extract unique information of vulnerability into a composite index by taking into cognizance their linear combinations with exclusion of any form of collinearity. Four categories of environmental hazards were identified. These are domestic hazards (rodents, insects, bushy environment and illegal structures), air pollutant hazards (noise, dirty air, smoke from refuse burning, kitchen smoke, industrial smoke and bad odour), water pollutant hazards (erosion, flooding and contaminated water) and land pollutant hazards (blockage of drainage systems, traffic congestion and improper waste disposal).

The mathematical expression of FA can be presented as:

$$A_i = f_1(a_{i1} - a_1)/(s_1) + \ldots\ldots\ldots + f_n(a_{in} - a_n)/(s_n) \quad 1$$

$$A_i = \sum_{j=1}^{n} f_j(a_{ij} - a_j)/s_j \quad 2$$

where A_i is the hazard vulnerability index for each household (*i=1....120*). Ignoring the time dimension, f_j is the scoring factor for each weather variable (j=1,….n), a_{ij} is the jth hazard exposure of ith household (i,j = 1,……n), a_j is the mean of ith hazard exposure of households (j = 1,…..n), s_j is the standard deviation of jth hazard exposure (j = 1, …… n) and z is the standardized variables. Derived from FA, scoring factors of the first factor component (the efficient component) was used for constructing the hazard vulnerability index of each household. Since all environmental hazard exposure variables are dichotomous and take only a value of zero or one, then the weight is easy to be interpreted. A move from 0 to 1 changes the index by *fj / sj* .

Using the vulnerability index computed by this formula, each household can then be gauged on the extent of vulnerability to environmental hazards, while the indices were also subjected to further parametric analysis using the ordinary least square (OLS) method. This is to explore the correlates of hazard vulnerability by estimating the specified equation:

$$A_i = \eta + \beta_j \sum_{j=1}^{8} Z_i + e_i \quad 3$$

With β_j being the estimated parameters, Z_i are the explanatory variables. The explanatory variables are sex of the household head (female =1, 0 otherwise), years of education, household size, private wage employment (yes =1, 0 otherwise), unemployed (yes =1, 0 otherwise), government employment (yes =1, 0 otherwise), income and ownership of house (yes =1, 0 otherwise). Tolerance level was used to address collinearity problem among variables, which resulted in dropping of some highly collinear variables.

RESULTS AND DISCUSSIONS

Socio-economic characteristics of the respondents

Table 1 shows that about 19 percent of the respondents were females. This is in line with cultural norms of the study area, which makes the males breadwinners and head of households. Average age of the respondents is 45.84 years. The variability index of 26.77 percent reveals that there is no much variation in the distribution of respondents' ages. A total of about 33 percent of the respondents were not married, comprising of 15.5 percent singles and 17.5 percent divorcees, widows or widowers. Majority of the heads of households (67 percent) are married. The average household size is 5.42, with coefficient of variation of 46.86 percent. This implies that high dispersion in the distribution of household size.

Occupational group with highest percentage is government employment (28.3 percent). This, together with the private salaried job (15.8 percent) constitutes 44.1 percent of the entire respondents' occupation. This is typical of any urban center, where people always rely on formal sector. The occupation with second highest frequency is private owned business which is 25 percent, while private salaried job and merchandize are both 15.8 percent unemployed constitute 5.0 percent each, while labour and others not included constitute 0.8 and 3.3 percent respectively.

The average year of education is 12.33, which shows a reasonable literacy level. About 8.3% of the respondents had no formal education, 20 percent spent between 1 and 10 years in school, while 41.7% spent between 16 and 20 years. The disparity in the distribution of respondents by educational status is not so high, considering the coefficient of variation of 45.54%. Also, 56.67% of the respondents owned their dwellings. Average income is N33.941.67k. Income variability is very high with coefficient of variation being 74.33%.

Table 1: Socio-economic characteristics of the respondents

Variable	Mean (%)	Std. Dev.	Coeff. of variation
Gender (female)	(19.16)	0.40	-
Age	45.84	12.27	26.77
Marital status (not married)	32.50	0.47	-
Household size	5.42	2.54	46.81
Own house	(56.67)	0.50	-
Unemployed	(5.00)	0.45	-
Government employment	(28.30)	0.37	-
Private wage	(15.80)	0.44	-
Income	33941.67	25228.47	74.33
Years of education	12.33	5.61	45.54

Environmental sanitation practices and rating

The mode of waste water disposal is an indicator of the level of environmental attitudes and concerns of the households. Table 2 shows the mode of kitchen's waste water disposal of the households. Precisely, 35.8 percent of the households disposed the kitchen waste water properly into septic tanks. However, 13.3 percent discharged kitchen waste water into surrounding gutters, while 44.2 percent poured it in some open spaces.

The mode of bathing water disposal is another measure of environmental attitude and concerns of the households in the study area. Table 3 reveals that 45.8 percent of the households had good environmental practice as far as bathing water

disposal is concerns. These are those whose bathing water was disposed of through septic tanks.

Table 2: Distribution of Respondents by the Mode of Kitchen's waste water disposal

Rating	Frequency	Percentage
Septic tank	43	35.8
Surrounding gutter	16	13.3
Nearby canal	6	5.0
Open space	53	44.2
Others	2	1.7

Table 3: Distribution of Respondents by the Mode of Bathing water Disposal

Mode of Disposal	Frequency	Percentage
Septic tank	55	45.8
Surrounding gutter	15	12.5
Nearby canal	5	4.2
Open space	45	37.5

Table 4: Distribution of Respondents by Methods of Household Refuse Disposal

Mode of Disposal	Frequency	Percentage
Collected	45	37.5
Public Approved dumpsite	16	13.3
Unapproved Dumpsite	56	46.7
Burnt by Households	3	2.5
Others	0	0
Total	120	100.0

Refuse waste disposal and management has been described as the most serious problems in most of the urban centers in Nigeria. For instance per capita solid waste generation in Ibadan was estimated at 0.33kg/day as at 1983, while WHO (2006) reported that Lagos generates 10,000 tones of solid waste daily. The result from this study shows that the method of refuse disposal by most of the households is poor and calls for attention. It is evident from table 4 that 37.5 percent of the households surveyed have their refuse being collected, 16 percent dump theirs at publicly approved dumpsites, 46.7 percent dump refuse indiscriminately in various unapproved dumpsites, while 2.5 percent claims they burn their household refuse. Table 5 further shows that about 54 percent of the respondents were using water closet type of toilet. However, 16.7 percent were using pit latrine toilet, 1.7 percent indicated that they were using public toilet and 27.5 percent admitted to be using nearby bush.

Table 5: Distribution of Respondents by the type of Toilet

Types of toilet	Frequency	Percentage
Water closet	65	54.2
Pit toilet	20	16.7
Public toilet	2	1.7
Nearby bush	33	27.5

Table 6 shows the importance of environmental safety to the respondents. It is evident from the table that environmental safety is very important to majority of the respondents (70 percent). About 25 percent of them indicated that it is fairly important and 1.7 percent affirmed that it was not important. Respondents were also asked to rate the levels of environmental safety in their immediate environment. Only 5 percent rated environmental safety in their immediate environment as being good, 55.8 percent rated their as being fair, whilst 28.3 and 10.8 percent rated the level of environmental safety in their immediate environment as being poor and very poor, respectively.

Table 6: Importance of environmental safety and respondents rating of environmental safety

Degree of Importance of Environmental safety	Frequency	Percentage
Very important	84	70.0
Fairly Important	30	25.0
Not important	2	1.7
Don't know	4	3.3
Rating of environmental safety		
Good	6	5.0
Fair	67	55.8
Poor	34	28.3
Very poor	13	10.8

Environmental problems experienced by respondents

Sixteen most common environmental problems, peculiar to urban environments were selected and the respondents indicated the ones being experienced by their households. Table 7 shows the percentage of respondents that indicated each of the problems as part of environmental problems being experienced in their immediate environment. The problems categorized as domestic pollutants were rodents, insects, bushy environment and illegal constructions being experienced by 61.67 percent, 60.00 percent, 78.33 percent and 59.17 percent, respectively. Unhygienic practices at home often provide breeding grounds for mosquitoes, cockroaches, bed bugs, house flies and rats. These have some associated health challenges like cholera, dysentery, yellow fever, plague and filariasis (Omoleke, 2004). Illegal structures are also common in Ibadan, which had resulted in loss of lives and properties. A very insightful reference is recent flood disaster in the town which wrecked such enormous havocs due to non-compliance with urban housing and planning regulations. Greedy landlords and investors have always circumvent laws and build in questionable places such as along the stream, across drainage system, very close to the road and under high tension cables (ACN, 2011).

Table 7: Environmental problems being experienced by urban households

Variable	Mean
Rodents	61.67
Insects	60.00
Bushy environment	78.33
Illegal structure	59.17
Noise	59.17
Dusty air	62.50
Refuse smoke	65.83
Kitchen smoke	42.50
Industrial smoke	19.17
Bad odour	69.17
Erosion	16.67
Flooding	19.17
Water contamination	11.67
Water drainage blockage	75.00
Traffic congestion	46.67
Improper refuse disposal	72.50

Other notable problems reported are those related to air pollution. These include noise, dusty air, refuse smoke, kitchen smoke, industrial smoke and bad odours. However, 69.17 percent, 65.83 percent and 62.50 percent, respectively are for those that indicated bad odours, refuse some and dusty air respectively. It is important to note that though it is a very important environmental hazard, many Nigerian do not know that they have legal constitution against noise pollution. In Ibadan precisely, hawkers of food and other commodities, vehicular horns, generators and radio cassette players are common sources of pollution. Also, domestic wastes are sometimes burnt within the compound, thereby depriving other neighbours their right to clean air. Similarly, industrial smokes, largely through powering of machines during operations and electricity generating plants are real contributors to air pollution.

Also, erosion problem, flooding and water contamination were reported by 16.67 percent, 19.17 percent and 11.67 percent of the respondents respectively. These problems can be directly linked with blockages of water channels, traffic congestion and improper refuse disposal which were reported by 75.00 percent, 46.67 percent and 72.50 percent of the respondents, respectively. Erosion is the cause of road damages in many Ibadan metropolis. Also, human activities through dumping of refuse in gutters and at the very onset of rainfall are also problematic. Therefore, drainages are blocked and flooding results. Also, due to congestion and lack of adequate planning, some well are dug close to septic tanks. This, along with flooding often leads to water contamination.

Construction of environmental hazard indicators

We constructed four indicators of environmental hazards with specific focus on domestic hazards, air pollutant hazards, water pollutant hazards and land pollutant hazards. The Factor Analysis results in table 8 shows that the first factor was adequate for use in all the results, accounting for more than 100 percent variance in the results for all hazard groups except domestic hazards. The LR-tests are also statistically significant ($p<0.01$), except for water pollution hazards that is significant at 10 percent. These results show that the aggregation of the data was fitly done.

Table 8: Eigen value of the factor analysis for each of the environmental hazard groups

Hazard classification	Eigen-value	Explained Variance	LR-test Chi square
Domestic pollution	1.24086	0.9931	95.71***
Air pollution	0.8736	1.1906	47.82***
Water pollution	0.3027	3.0256	6.23*
Land pollution	0.6677	1.7534	25.51***

Table 9 further shows the correlation coefficient of the included hazards exposure in the overall prediction of the final indicators. For domestic hazards, exposure to rodents and insects are with highest correlation coefficients with 0.7468 and 0.7357 respectively. Bushy environment has negative parameter. Also, in the group of air pollution hazards, exposure to refuse smoke and kitchen smokes are with highest correlation coefficients with 0.5773 and 0.5415, respectively. Parameters of exposure to industrial smoke and bad odour are with negative sign. Under the water pollution hazards, water contamination has the highest correlation of 0.3451, while flooding is with negatively signed correlation parameter. Blockages of water drainage and improper refuse disposal are with correlation parameters of 0.5436 and 0.5039 respectively under land pollution hazards.

Table 9: Correlation and uniqueness parameters of the factors analysis

Variable	Factor1	Uniqueness
Domestic hazards		
Rodents	0.7468	0.4378
Insects	0.7357	0.4489
Bushy environment	-0.0767	0.7393
Illegal structure	0.3689	0.6718
Air pollution hazards		
Noise	0.3349	0.8484
Dusty air	0.1791	0.8341
Refuse smoke	0.5773	0.6320
Kitchen smoke	0.5415	0.6584
Industrial smoke	-0.2933	0.8998
Bad odour	-0.1298	0.9438
Water pollution hazards		
Erosion	0.2661	0.9292
Flooding	-0.3359	0.8872
Water contamination	0.3451	0.8809
Land pollution hazards		
Water drainage blockage	0.5436	0.7045
Traffic congestion	0.3438	0.8818
Improper refuse disposal	0.5039	0.7461

Table 10 shows the descriptive statistics of the computed composite environmental hazard indicators. It reveals that the mean of domestic hazard (-9.00e-09) is the smallest, while air pollution hazards has the highest value of 9.93e-10. The histogram graphs of the distribution are in figures 1-4

Table 10: Descriptive statistics of computed indicators of environmental hazards

Variable	Mean	Std. Dev.	Minimum	Maximum
Domestic hazards	-9.00e-09	.8264369	-1.228106	.8088478
Air pollution hazards	9.93e-10	.7226099	-1.477281	1.039995
Water pollution hazards	8.69e-10	.4887285	-.7349245	1.339901
Land pollution hazards	-6.21e-09	.6622337	-1.364974	6329107

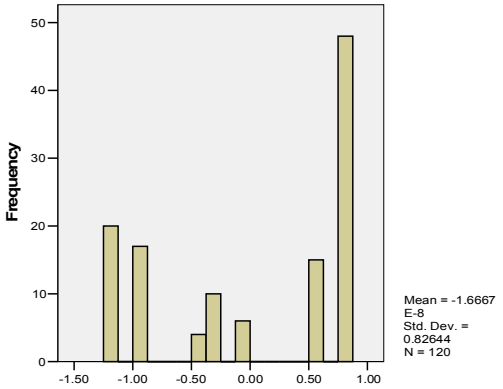

Figure 1: Distribution of domestic hazard's composite indicators

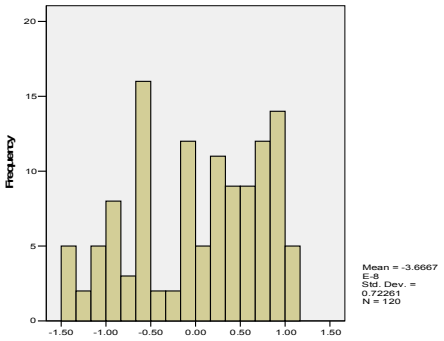

Figure 2: Distribution of air pollution hazard's composite indicators

Tables 11a and 11b contain the results of Ordinary Least Square (OLS) regression analysis of the determinants of environmental hazard exposure. The results show that the models produced good fits of the data, being statistically significant ($p<0.05$). The variables were also tested for collinearity using the variance inflating factor as provided by STATA 10.0 software. The results show that multicollinearity was not a problems because the least tolerance level is 50.65 percent for female household headship.

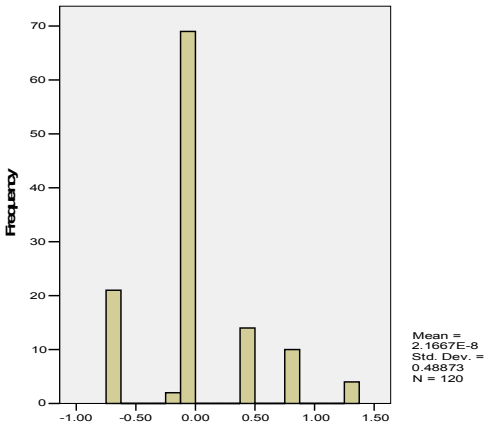

Figure 3: Distribution of water pollution hazard's composite indicators

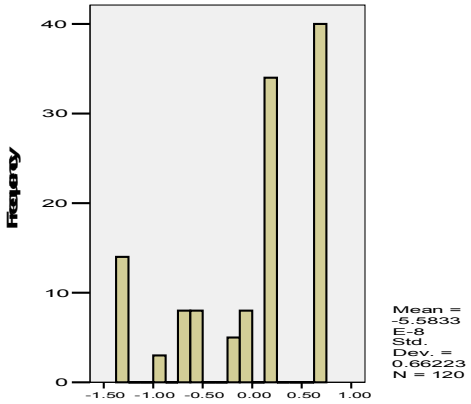

Figure 4: Distribution of land pollution hazard's composite indicators

The parameters of gender for domestic hazard and air pollution hazard models are statistically significant ($p<0.05$). This shows that female headed households show more vulnerability to domestic and air pollution hazards. This lends credence to assertion by Blaikie *et al* (1994), that gender is one of the social factors subject households to hazard vulnerability. It also buttressed the emphasis of DANIDA (2000) and Commission on the Status of Women (2009) that female headed households' deprivation in access to production resources always exposes them to hazard vulnerability.

Table 11a: Determinants of environmental health hazard exposure

Variables	Coefficient	t-statistics	Coefficient	t-statistics	Tolerance
	Domestic Hazards		Air Pollution Hazards		
Gender	.3509688**	2.05	.3339494**	1.99	0.506493
Household size	.0808637**	2.34	.0480628	1.41	0.562668
Own house	.2636106*	1.72	.2282969	1.52	0.585297
Unemployed	.4097978**	2.29	-.1365625	-0.78	0.593947
Government employment	.0968275	0.45	-.2150125	-1.01	0.615970
Private wage	-.299351	-1.61	-.0385359	-0.21	0.648586
Income	-.0000121***	-3.95	-4.29e-06	-1.42	0.673265
Years of education	-.0236339	-1.59	-.0212992	-1.46	0.854135
Constant	-.1834356	-0.48	.0961446	0.26	
F-value	8.05***		3.43***		
Adj R-Square	0.3216		0.1405		

Note : *** Statistically significant at 1 percent, ** Statistically significant at 5 percent, * Statistically significant at 10 percent

Table 11b: Determinants of environmental health hazard exposure

Variables	Coefficient	t-statistics	Coefficient	t-statistics	Tolerance
	Water Pollution Hazards		Land Pollution Hazards		
Gender	.0410405	0.35	-.0065889	-0.04	0.506493
Household size	.0167167	0.70	.1066386**	3.37	0.562668
Own house	.026558	0.25	.3280707**	2.34	0.585297
Unemployed	.312867**	2.54	-.2698662*	-1.65	0.593947
Government employment	-.0604936	-0.40	-.0458773	-0.23	0.615970
Private wage	.0001358	0.00	.107036	0.63	0.648586
Income	-4.41e-06**	-2.08	-3.35e-06	-1.19	0.673265
Years of education	.0340778***	3.34	.0037965	0.28	0.854135
Constant	-.5985719**	-2.28	-.5224706	-1.50	
F-value	2.26**		2.91***		
Adj R-Square	0.0783		0.1138		

Note : *** Statistically significant at 1 percent, ** Statistically significant at 5 percent, * Statistically significant at 10 percent

Household size variable parameters are with positive sign and statistically significant for domestic hazard and land pollution hazard models. The results imply that increasing household size by one unit will increase indicators of domestic hazard and land pollution hazards by 0.0809 and 0.1066, respectively. These results are in line with submissions by Inyang (1997) that environmental hazard exposure is directly related to population density. Therefore, when the house is overcrowding, there are tendencies of having too many things packed in small rooms, which can easily serve as breeding ground for pests and rodents. Households with many members are also going to generate a lot of kitchen wastes and disposal may be a problem, depending on house location. The parameters of ownership of house variable for domestic hazards and land pollution hazards are with positive sign and statistically significant ($p<0.10$). These show that those that owned the houses where they were resident have higher exposure to land pollution and domestic hazards.

Being unemployed also significantly increased ($p<0.05$) vulnerability to environmental hazard exposures (domestic and water pollution hazards). This may result from poverty that is expected to be associated with unemployment. Our results can be buttressed by the assertion of Onibokun and Kumuyi (1996) that urban poverty promotes environmental hazard exposure because the poor cannot afford accommodation in a decent environment. It should also be noted that the parameters of income variable in all the models are with negative sign but statistically significant domestic hazard and water pollution hazard exposure ($p<0.01$). The results confirm the findings of Onibokun and Kumuyi (1996), Adger (1996) and DANIDA (2000) that poverty or low income is directly associated with environmental hazard exposures. However, the parameter of education variable is positive and statistically significant for water pollution hazard model. This is contrary to our expectation and implies that as household heads' years of education increases by one unit, indicator of

water pollution hazard significantly increases by 0.0340.

RECOMMENDATIONS

Environmental safety is a prerequisite for healthy living and socio-economic development of any nation. Without it, economic development will be compromised and households resources will not be optimally utilized. Given the findings from this study, some issues should be addressed by policy makers. First, there is need to initiate community based self-help efforts in provision of certain amenities such as toilets, drainages, dumpsites and refuse evacuation facilities. This is highly needed in those areas that are not well planned (traditional areas) where people live under deplorable environmental condition. These people, being largely poor need government's assistance in evacuating their domestic wastes for ensuring environmental safety.

Second, relevant government agencies should enforce provision of certain environmental amenities by individuals building houses in all the existing and newly developed areas. These include safe toilets, septic tanks and drainage system. Similarly, efforts should be made to ensure effective sanitary inspections and monitoring of environmental practices of people. This can be effectively achieved through enforcement of existing environmental laws by appropriate government agencies.

There is also the need to enact laws to protect citizens from externalities resulting from activities of some other players in the society. These may include restrictions on noise pollution whether in markets or at home, restrictions on refuse burning, mandatory compliance with urban house planning and regulations.

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