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# Assessing students' awareness of environmental hazards and risks in public tertiary educational institutions in Oyo State, Nigeria

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**Abstract:** Environmental hazards occur in any sphere of human environment and at any locations where human activities take place. One of these locations is the educational campus environment where students reside and carry out their daily academic activities. A cursory observation of campus environments in Nigeria showed evidences of environmental hazards with their associated risks while there has been a dearth of studies on the subject. This paper therefore assessed students' awareness of environmental hazards and risks in public tertiary educational institutions in Oyo State. Questionnaire were administered on 367 students that were selected using probability sampling techniques. Descriptive analysis was used in computing mean Hazard Awareness Indexes ($\overline{\text{HAI}}$s) and mean Risk Severity Indexes ($\overline{\text{RSI}}$s) for the institutions. Findings revealed that students were aware of environmental hazards and the severity of their associated risks in the institutions both in hostels and academic area. However, the level of awareness was higher in some institutions than the other. It was recommended that the school authorities should create enlightenment programmes and implement policies that could enhance students' awareness of environmental hazards and risks in the institutions.

***Keywords:*** environmental hazards, students' awareness, educational campuses, hazard awareness, risk severity.

***JEL codes:*** I21, Q01

## 1. Introduction

Issues on hazards and risks in physical planning and environmental-related studies are centred on environmental hazards and risks (Nicholson, 2005; El-zien et al., 2006; Peng et al., 2012; Ojigi et al., 2013). Environmental hazards are events or occurrences arising from interactions between

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natural, social and technological systems of the environment which are harmful to people and their possessions (Cutter, 2001). They are elements of the physical environment which are threats to man and are caused by forces extraneous to him (Burton et al., 1987). Environmental risk, on the other hand, is the measure of the probability and severity of an adverse effect to health, property or the environment (Australian Geomechanics Society [AGS], 2007).

Environmental hazards are generally classified into natural and man-made (Lechat, 1984; Smith, 2001; Ragheb, 2014). Natural hazards result from natural conditions and sometimes products of negative consequences of interactions between man and nature. Man-made hazards are caused by physical, chemical, biological and technological operations of man. They are the usual consequences of high urbanization and industrialization (McMichael, 2000; Kotter, 2003). Examples of these hazards include earthquakes, hurricanes, tornadoes, tsunamis, land degradation, pollution, desertification, deforestation, wild-land fires, and loss of biodiversity (Kotter, 2003; Amokaye, 2005; Al-Amin, 2013).

Environmental hazards and related risks occur in any sphere of human environment and at any locations where human activities take place (Hilary, 1999). The occurrences have been widely documented in both developed and developing countries of the world (Gurevich et al., 1993; Chilingar and Endres, 2005; Lenon, 2013). The effects of environmental hazards at any of these locations are devastating considering the disaster cases experienced in the world. It was long estimated that between 1975 and 1998, environmental hazards caused an annual death tolls of 9000 lives and over $300 billion in property and crop damages (Mitchell and Thomas, 2001). In recent times, the death tolls resulting from environmental hazards from 2003 to 2012 have an annual average estimation of 106, 654 lives and 96.5 million people were victims of such occurrences worldwide (Lenon, 2013).

The developed world in particular is considered to be vulnerable to typical natural disaster occurrences (Levy and Gopalkrishnan, 2010). Prominent disaster occurrences in the regions comprise the Hurricane Katrina in America and Heat Wave in Europe, among others (Farber, 2011). The situation likewise applies to the developing countries. For instance, disaster occurrences in Asia are more of geophysical and oceania factors with recent events comprising the earthquake, cyclone Phailin and cyclone Utor/Labuyo in Thailand, India and China respectively (Lenon, 2013). In Africa, natural environmental hazards such as flooding, drought and desertification are resultant effects of natural environmental variables such as elements of weather

and climates (Amokaye, 2005). Nevertheless, there is also the prevalence of man-made environmental hazards, especially those that are products of living conditions and behaviour of inhabitants (Afon, 2011). They are observed to have direct link with activities in urban residences.

In Nigeria, environmental hazards and risks resulting from poor living conditions in the residential environments include presence of open site dumps, unkempt waste disposal facilities, overgrown lawns, electric generating plants, open drainages, location and conditions of sanitary facility, and indoor cooking, among others (Afon, 2011). The related risks comprise air quality reduction, offensive odour, food poison, breeding of disease vectors, physical injuries etc. Among the residential areas where residents are prone to environmental hazards and risks are students' residential environments. These are areas where accommodations of students are provided. Of particular concern in this study are residential areas available for students of public tertiary educational institutions.

In Nigeria, tertiary educational institutions comprise universities, polytechnics and colleges. Some of these institutions are mainly residential while others are not. The focus of this study is on-campus residential areas of public tertiary educational institutions. A cursory observation of the on-campus residential environments of public tertiary educational institutions that are mainly residential shows evidences of environmental hazards and risks. A good instance is the case of unkempt indoor and outdoor environment in student hostels that breads cockroaches and rodents that infect students with diseases (Omudu and Akosu, 2013).

The campus environment like any other environment where there is evidence of environmental hazards, risk prevention and/or mitigation is pertinent as to guide against environmental disasters. The first approach in enforcing this is to evaluate the knowledge of inhabitants on issues of environmental hazards and risks. This encompasses the process of awareness which involves individuals' knowledge of stimuli which make them to respond to the stimuli based on the knowledge and processing of the situation (Bear et al., 2001). According to Dixon (1981) and Henley (1984), awareness could be measured adequately by allowing the observers to provide answers as to whether or not they consciously see a stimulus. In essence, the observer or perceiver must be duly aware of the perceived object or environment (Rao, 2008).

In this paper, the focus is on assessment of students' awareness of environmental hazards and risks in public tertiary educational institutions in Oyo State. The paper examined students' sources and levels of awareness of environmental hazards and risks in the institutions. It likewise

examined the severity of risks attached to these environmental hazards.

## 2. Material and Methods

The study area is Oyo State, one of the six states in southwestern geopolitical zone of Nigeria. The public tertiary educational institutions selected in the State are University of Ibadan, Ibadan (UI); The Polytechnic, Ibadan (PolyIbadan); and Federal College of Education, Oyo (FCE). This is because they are the public tertiary educational institutions with on-campus accommodation in the State. Data for the study were obtained through administration of questionnaire on students of the institutions. The halls of residence in the institutions were stratified based on gender. In UI, two male and two female halls each were selected. In the Polytechnic, Ibadan, one male and one female hall each were selected. In FCE, the two available halls were selected.

In the four selected halls in UI there are 973 rooms, 501 rooms in the two selected halls in PolyIbadan and 69 rooms in FCE. Using systematic random technique, every 5th room in the selected halls in UI and PolyIbadan was sampled. In UI, 197 rooms were selected out of 973 available in the four selected halls. In PolyIbadan, 101 rooms were selected out of 501 rooms available in the four selected halls. In FCE, Oyo, there are 69 rooms in the two halls and all the rooms were selected. In aggregate, 367 rooms were selected. In each room, one student was selected for questionnaire administration. Thus, a total of 367 students were sampled for this study.

Analysis of the data obtained was carried out using descriptive statistics such as mean indexes. This involved the computation of hazard awareness indexes and risk severity indexes from data that were measure on a five point Likert scale data. The student respondents were requested to rate their level of awareness with the identified environmental hazards on a 5-point Likert scale (1= not at all aware, 2 = slightly aware, 3 = somewhat aware, 4 = moderately aware and 5 = extremely aware). The designated values of 1,2,3,4 and 5 were used to allot weight to the options in the course of analysis. The weighted value for each criterion was obtained by the product of the number of responses for each rating to a variable and the respective weight of the value which was expressed as:

$$\mathrm{WV} = F_i V_i$$

Where WV was the Weighted Value, $F_i$ was the frequency of responses for variable *i*, $V_i$ was the weight attached to responses on variable *i*, and *i* was the designated value of the Likert point response under consideration. The sum of weighted value for each variable was obtained by summing the product of the number of responses of each rating for a variable and the respective weight of the value expressed as:

$$\text{SWV} = \sum_{i=0}^{5} F_i V_i$$

Where SWV was the Sum of Weighted Value, $F_i$ is the frequency of respondents rating for variable *i* and $V_i$ was the weight attached to variable *i*, and *i* was the designated value of the Likert point response under consideration. The mean index for each variable was obtained by dividing the SWV of each variable by the total number of respondents (N=367). This was computed as Hazard Awareness Index (HAI) which is expressed as:

$$\text{HAI} = \frac{\text{SWV} = \sum_{i=0}^{5} F_i V_i}{N}$$

The summation of Hazard Awareness Indexes for the identified hazards divided by the total number of these hazards (n) was used to compute the Mean Hazard Awareness Index ($\overline{\text{HAI}}$). Any HAI with the actual value of the ($\overline{\text{HAI}}$) had an indication of moderate level of environmental hazard awareness.

Deviation about the Mean Hazard Awareness Index (HAI-$\overline{\text{HAI}}$) for each of the Hazard Awareness Indexes was later computed. The deviations were only representative measures of dispersion that provided information on either high or low level of awareness of environmental hazards as perceived by the students. The variables with positive deviations had high level of awareness while those with negative deviations indicated low level of awareness.

For more understanding of the dispersion of the distribution about the mean indexes, the standard deviation (SD) for each institution was computed. The standard deviation measured the degree of spread or dispersion of the level of awareness within the same distribution. A small value of the standard deviation indicated that HAIs clustered around the $\overline{\text{HAI}}$. In further establishing the

above fact and also ascertaining the reliability of the $\overline{HAI}$ based on the data distribution for each of the institution, the Coefficient of Variation (CV) for each institution was computed.

The same procedure that was used in computing the hazard awareness indexes and mean hazard awareness indexes was followed in computing the Risk Severity Indexes (RSIs) and mean Risk Severity Indexes ($\overline{RSI}$s) for the three institutions. Deviations about each of their Mean Risk Severity Indexes (RSI-$\overline{RSI}$), as well as their Standard Deviations (SDs) and Coefficient of Variations (CVs) were computed. Variables with the actual value of the $\overline{RSI}$ indicated moderate level of severity of environmental risks; those with positive deviations had high level of severity while those with negative deviations indicated low level of severity of environmental risk.

## 3. Results and Discussions

The results of students' sources of awareness of environmental hazards, level of awareness of environmental hazards and severity of environmental risks are provided and discussed in the succeeding sub-sections.

### 3.1. Sources of Awareness of Environmental Hazards and Risks

Findings on students' awareness of environmental hazards in the institutions are as presented in Table 1. The proportion of students who were aware of environmental hazards in UI (97%) was greater than those of FCE (76.8%), with the latter greater than the proportion of students in PolyIbadan (65.8%). In general, 84.7% of the students were aware of environmental hazards in the institutions. This implies that most respondents in the three institutions had knowledge of environmental hazards and such awareness evolved from various sources which were later identified by the students.

Findings on the sources of awareness of students were also as are presented in Table 2. In UI, 60% of the respondents were aware of environmental hazards through mass media (31.6%) and close associates (21.6%). Likewise, 12.8% of the respondents got their awareness through Non-Governmental Organizations (NGOs) while 11.4% of them were aware through the internet. Few respondents got their awareness from government agencies (8.4%) and their school management (7.4%).

In PolyIbadan, 59.8% of the respondents were aware of environmental hazards through close associates (30.5%) and mass media (29.3%). These were followed by those who got their awareness through NGOs (14.5%), internet (9.9%), school management (8.6%) and government agencies (7.3%). In FCE, 54.7% of the respondents were aware of environmental hazards through mass media (27.9%) and close associates (26.8%). Other sources of awareness included NGOs (19.3%), government agency (9.2%), internet (8.7%) and school management (8.2%).

Further analysis revealed that students of UI and FCE were more aware of environmental hazards through mass media as compared with those in PolyIbadan who were more aware through close associates. However, on the aggregate, 84.3% of respondents got their awareness of environment hazards from mass media (30.6%), close associates (28.6%), NGOs (14.7%) and the internet (10.4%). While only 16.1% of respondents got their awareness from government (8.2%) and school management (7.9%) which was quite minute. This was also reflected while considering the institutions separately. Meanwhile, since the three institutions were owned by government and controlled by the school management, these two bodies were expected to be the greatest sources of awareness. However, their neglects of enlightening the students about issues of environmental hazards have made them no significant sources of awareness to the students.

**Table 1. Students' Awareness of the Environmental Hazards**

| Educational Institutions | Awareness of Environmental Hazards | | Total |
|---|---|---|---|
| | Yes | No | |
| UI | 192 (97.5) | 5 (2.5) | 197 (100.0) |
| PolyIbadan | 66 (65.3) | 35 (34.7) | 101 (100.0) |
| FCE | 53 (76.8) | 16 (23.2) | 69 (100.0) |
| Total | 311 (84.7) | 56 (15.3) | 367 (100.0) |

* Percentages are provided in parenthesis

Source: Authors' Fieldwork, 2016

**Table 2. Students' Sources of Awareness of Environmental Hazards**

| Educational Institutions | Sources of Awareness | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | Close Associates | Mass Media | Government Agency | School | Internet | NGOs | |
| UI | 289 (28.4) | 322 (31.6) | 85 (8.4) | 75 (7.4) | 116 (11.4) | 130 (12.8) | 1017 (100.0) |
| PolyIbadan | 164 (30.5) | 157 (29.3) | 39 (7.3) | 46 (8.6) | 53 (9.9) | 78 (14.5) | 537 (100.0) |
| FCE | 117 (26.8) | 122 (27.9) | 40 (9.2) | 36 (8.2) | 38 (8.7) | 84 (19.3) | 437 (100.0) |
| Total | 570 (28.6) | 601 (30.6) | 164 (8.2) | 157 (7.9) | 207 (10.4) | 292 (14.7) | 1991 (100.0) |

*The total exceeded 367 because of multiple responses

* Percentages are provided in parenthesis

Source: Authors' Fieldwork, 2016

### 3.2. Level of Awareness of Environmental Hazards

Aside assessing students' awareness and sources of awareness of environmental hazards, their levels of awareness of environmental hazards in hostels and academic area were likewise examined. As identified by Afon (2011), environmental hazards relating to living conditions were presence of open site dumps, unkempt waste disposal facilities, overgrown lawns, electric generating plants, open drainages, location and conditions of sanitary facility, and indoor cooking, among others. In this study, ten (10) environmental hazards were identified in the student hostels and nine (9) in academic area of the three campuses. For the three institutions, the mean indexes, deviations about the mean indexes, standard deviations and coefficients of variation for both hostels and academic area are as presented in Table 3.

**Table 3. Student's Hazard Awareness Index (HAI)**

| Environmental Hazards | UI | | PolyIbadan | | FCE | |
|---|---|---|---|---|---|---|
| | HAI | HAI-$\overline{HAI}$ | HAI | HAI-$\overline{HAI}$ | HAI | HAI-$\overline{HAI}$ |
| ***Hostels** | | | | | | |
| Open drains | 2.852 | -0.290 | 2.980 | -0.160 | 3.565 | 0.363 |
| Stagnant water | 2.954 | -0.188 | 3.446 | 0.306 | 3.464 | 0.262 |
| Unkempt toilet | 2.742 | -0.400 | 3.455 | 0.315 | 3.551 | 0.349 |
| Open dump sites | 2.964 | -0.178 | 3.277 | 0.137 | 2.768 | -0.434 |
| Bushy areas/ Overgrown lawns | 3.360 | 0.218 | 3.406 | 0.266 | 3.638 | 0.436 |
| Burning of solid waste | 3.432 | 0.290 | 3.079 | -0.061 | 3.290 | 0.088 |
| Unkempt sewage facilities | 3.360 | 0.218 | 2.871 | -0.269 | 2.797 | -0.405 |
| Unkempt waste storage facilities | 3.218 | 0.076 | 2.644 | -0.496 | 2.565 | -0.637 |
| Indoor cooking | 3.218 | 0.076 | 3.069 | -0.071 | 2.899 | -0.303 |
| Damaged electrical fixtures | 3.320 | 0.178 | 3.168 | 0.028 | 3.478 | 0.276 |
| ****Academic Area** | | | | | | |
| Open drains | 2.884 | -0.449 | 3.485 | 0.186 | 3.203 | -0.055 |
| Stagnant water | 3.390 | 0.057 | 3.455 | 0.156 | 3.333 | 0.075 |
| Unkempt toilet | 3.532 | 0.199 | 3.277 | -0.022 | 3.159 | -0.099 |
| Open dump sites | 4.304 | 0.971 | 3.119 | -0.180 | 3.174 | -0.084 |
| Bushy areas/ Overgrown lawns | 4.376 | 1.043 | 3.198 | -0.101 | 2.942 | -0.316 |
| Burning of solid waste | 2.852 | -0.481 | 2.980 | -0.319 | 3.609 | 0.351 |
| Unkempt sewage facilities | 2.954 | -0.379 | 3.446 | 0.147 | 3.507 | 0.249 |
| Unkempt waste storage facilities | 2.742 | -0.591 | 3.455 | 0.156 | 3.594 | 0.336 |
| Damaged electrical fixtures | 2.964 | -0.369 | 3.277 | -0.022 | 2.797 | -0.461 |

| | | |
|---|---|---|
| *UI $\overline{HAI}$ = 3.142 | *UI SD = 0.243 | *UI CV= 7. 8% |
| *PolyIbadan $\overline{HAI}$ = 3.140 | *PolyIbadan SD = 0.269 | *PolyIbadan CV= 8.7% |
| *FCE $\overline{HAI}$ = 3.202 | *FCE SD = 0 .401 | *FCE CV= 12.5% |
| **UI $\overline{HAI}$ = 3.333 | **UI SD = 0.626 | **UI CV= 18.8 % |
| **PolyIbadan $\overline{HAI}$ = 3.299 | **PolyIbadan SD = 0.177 | **PolyIbadan CV= 5.4% |
| **FCE $\overline{HAI}$ = 3.258 | **FCE SD = 0.282 | **FCE CV= 8.7% |

Source: Authors' Fieldwork, 2016

The $\overline{HAI}$ for hostels of UI, PolyIbadan and FCE were 3.142, 3.140 and 3.202. The $\overline{HAI}$s indicated that students' awareness of environmental hazards was more in FCE compared with UI as compared with PolyIbadan. Based on the $\overline{HAI}$ for UI, the three environmental hazards that students were most aware of were burning of solid waste (3.432), bushy areas or overgrown lawns (3.360) and unkempt sewage facilities (3.360). The hazards were unkempt toilets (0.315), stagnant water (0.306) and bushy areas or overgrown lawns (0.266) based on the $\overline{HAI}$ for PolyIbadan. In FCE, the hazards were bushy areas or overgrown lawns (0.436), unkempt toilets (0.349) and open drains (0.363) based on the $\overline{HAI}$. Environmental risks that are attached to all of these highly ranked hazards are closely related to pollution and disease infections. This may likely bring about increased level

of awareness of these hazards, as recent outbreak of diseases such as Ebola and Lassa fever in the country was attributed to environmental factors.

Based on the same mean hazard awareness indexes for the three institutions, awareness that bushy areas/overgrown lawns and damaged electrical fixtures were environmental hazards was high in all the three institutions. This could be based on the fact that most students had the basic understanding that bushy areas or overgrown lawns could be habitats for poisonous reptiles and rodents. More so, electric shocks and even death associated with naked electric wires and damaged electric appliances might be obvious to students. This may result from reports of such incidences from close associates and mass media among others, or bad incidences that have been experienced by the students might increase their level of awareness.

Awareness of burning of solid waste, unkempt sewage facilities, unkempt waste storage facilities and indoor cooking was of high level in UI compared with low level of awareness that in PolyIbadan and FCE. This may be due to the nature of control imposed by the school management in maintaining environmental cleanliness and students' wellbeing in the hostels which restricted students from cooking inside the hostels and indiscriminately disposing of solid waste and wastewater. Although, the school management might not have directly created awareness that such activities might constitute environmental hazards which could later have effects on the students, the approach could have actually been an indirect means of providing the students with information about environmental hazards.

Awareness about stagnant water and unkempt toilets were high in PolyIbadan and FCE compared with low awareness that was obtained in UI. The reason may be because of the difference in the poor condition of toilets in PolyIbadan and FCE compared with that of UI as rightly observed during physical observation of the institutions. With such condition of toilet facilities and water logged vicinities, the students were highly aware of them as hazards. Awareness of open drains was high in FCE compared with low awareness that was observable in UI and PolyIbadan. This may be because FCE is a tertiary institution primarily established for physically challenged people; but a cursory observation indicated that uncovered drains abound in the school. This is much of a threat to those students with visual impairment or limb challenges among others, and that could have been the reason they were acknowledged as environmental hazards.

The computed standard deviation (SD) for hostels of UI, PolyIbadan and FCE were 0.243, 0.252 and 0 .416 respectively. The SD was very helpful in computing the CV for each of the

institutions which was 7.8%, 8.7% and 12.5% respectively. This implied that 92.2%, 91.3% and 87.5% of the hazard awareness indexes for UI, PolyIbadan and FCE clustered around the mean hazard awareness indexes that computed for the respective institutions. With the higher proportions of CVs of the dataset obtained from these institutions, it could be inferred that the computed $\overline{HAI}$s were very much reliable. These CVs, however, indicated that the awareness was similar in UI than PolyIbadan which was also similar than FCE.

The $\overline{HAI}$s for the academic areas of UI, PolyIbadan and FCE were 3.333, 3.299 and 3.258 respectively. The $\overline{HAI}$s provided an indication that students' awareness of environmental hazards was more in UI compared with PolyIbadan as compared with FCE. Based on the $\overline{HAI}$ of UI, bushy areas or overgrown lawns (4.376), open dumpsites (4.304) and unkempt toilets (3.532) were the hazards with the highest rank in the same order. In PolyIbadan, the hazards were open drains (0.186), stagnant water (0.156) and unkempt waste storage facilities (0.156) based on the $\overline{HAI}$ . In FCE, they comprised burning of solid waste (0.351), unkempt waste storage facilities (0.336) and unkempt sewage facilities (0.249) based on the $\overline{HAI}$.

This result on academic areas of the three institutions was similar to what was obtainable in the hostels that the hazards were closely related to pollution and disease infections. Based on the indexes for all the institutions, it was revealed that awareness that stagnant water constituted environmental hazard in academic areas was high in all the three institutions. Awareness of open dumpsites as hazard was high in UI and PolyIbadan compared with low awareness that was obtained in FCE. This may also be the resultant effect of restrictions imposed on students by UI school management with respect to waste disposal which may likewise apply to PolyIbadan.

Findings also revealed that awareness of bushy areas/ overgrown lawns was high in UI compared with low awareness that was evident in PolyIbadan and FCE while awareness of open drains was high in PolyIbadan compared with low awareness that was obtainable in UI and FCE. Awareness of unkempt sewage facilities and unkempt waste storage facilities was high in academic areas of PolyIbadan and FCE compared with low awareness that was evident in UI. This may result from the fact that UI managed sewage facilities and waste storage facilities in their academic areas better than PolyIbadan and FCE. Hence, they did not constitute hazards to students. Awareness of damaged electrical fixtures in academic areas was low in all the three institutions. This may imply that students had little access to electrical fixtures in their classrooms except for

electrical sockets where they could charge their electronics. While in the laboratories, students hardly handle electrical equipment by themselves without the assistance of technical officers. Hence, hazard awareness could have reduced more than in hostels where there was more access to damaged electrical fixtures.

The SD for UI, PolyIbadan and FCE were 0.626, 0.177 and 0 .282 respectively. Likewise, the SD was significant in computing the CV for these institutions which were 18.8%, 5.4% and 8.7% in same respective order. This shows that 81.2%, 95.6% and 91.3% of the hazard awareness indexes for UI, PolyIbadan and FCE clustered around the mean hazard awareness indexes that computed for the respective institutions. The higher proportions of CVs obtained from these institutions indicated that the $\overline{\text{HAI}}$s were very much reliable. The CVs likewise indicated that students' awareness of environmental hazards was more similar in academic areas of PolyIbadan compared with those of FCE which was likewise of more similar awareness than UI.

### *3.3 Level of Severity of Risks Attached to Environmental Hazards*

The level of severity of the risks was examined in both the student hostels and the academic environment. The results of the analysis of the data obtained for the student hostels and academic areas for the three selected institutions are as presented in Table 4. The $\overline{\text{RSI}}$s for hostels of UI, PolyIbadan and FCE were 1.815, 3.351 and 3.022 respectively. Therefore, severity that students attached to environmental risks in hostels of PolyIbadan was more than that of FCE which was likewise more than that of UI.

Based on the $\overline{\text{RSI}}$s for the three institutions, it was found out that the severity that students attached to environmental risks such as snakebites due to presence of bushy areas or overgrown lawns and electric shocks resulting from damage electrical fixtures was high in all the three institutions. This finding asserted the assumption that was earlier stated that most students had the basic understanding that bushy areas or overgrown lawns could attract poisonous reptiles and rodents, and electric shocks resulting from naked electric wires and damaged electric appliances could cause injuries or death. In such sense they had developed phobia for the two identified hazards that could cause such risks. The severity that students of UI and FCE attached to odour from filthy drains was high compared with low severity that was attached by students of PolyIbadan.

**Table 4. Student's Risk Severity Index (RSI)**

| Environmental Risks | UI | | PolyIbadan | | FCE | |
|---|---|---|---|---|---|---|
| | $\bar{X}$ | $\bar{X}$-RSI | $\bar{X}$ | $\bar{X}$-RSI | $\bar{X}$ | $\bar{X}$-RSI |
| ***Hostels** | | | | | | |
| Odour from filthy open drains | 1.873 | 0.058 | 3.406 | 0.055 | 3.246 | 0.224 |
| Breeding of mosquitoes from stagnant water | 1.777 | -0.038 | 3.584 | 0.233 | 3.391 | 0.369 |
| Odour from unkempt Toilet | 1.497 | -0.318 | 3.355 | 0.004 | 3.450 | 0.428 |
| Infections from unkempt toilet | 1.558 | -0.257 | 3.425 | 0.074 | 3.145 | 0.123 |
| Odour from open dump sites | 1.777 | -0.038 | 3.327 | -0.024 | 2.797 | -0.225 |
| Infections from open site dumps | 2.076 | 0.261 | 3.178 | -0.173 | 2.870 | -0.152 |
| Breading of disease vectors from open site dumps | 1.746 | -0.069 | 3.337 | -0.014 | 3.348 | 0.326 |
| Breading of disease vectors from bushy areas | 1.741 | -0.074 | 3.178 | -0.173 | 3.072 | 0.05 |
| Snakebites from bushy areas/ overgrown lawns | 1.980 | 0.165 | 3.386 | 0.035 | 3.022 | 0.022 |
| Air pollution from burning of waste | 1.741 | -0.074 | 3.396 | 0.045 | 3.217 | 0.195 |
| Odour from septic tanks/ man holes | 1.741 | -0.074 | 3.337 | -0.014 | 2.855 | -0.167 |
| Breading of diseased vectors from septic tanks/manholes | 1.756 | -0.059 | 3.297 | -0.054 | 3.217 | 0.195 |
| Odour from undisposed waste bin, cans, etc. | 1.548 | -0.267 | 3.366 | 0.015 | 3.101 | 0.079 |
| Breeding of diseased vectors from undisposed waste bins | 1.777 | -0.038 | 3.446 | 0.095 | 2.449 | -0.573 |
| Smoke form indoor cooking | 1.503 | -0.312 | 3.475 | 0.124 | 3.276 | 0.254 |
| Air quality reduction due to indoor cooking | 1.518 | -0.297 | 3.425 | 0.074 | 3.420 | 0.398 |
| Electric shocks due to electrical fixtures | 2.036 | 0.221 | 3.355 | 0.004 | 3.130 | 0.108 |
| ****Academic Area** | | | | | | |
| Odour from filthy open drains | 1.874 | 0.041 | 3.406 | -0.013 | 3.244 | 0.107 |
| Breeding of mosquitoes from stagnant water | 1.802 | -0.031 | 3.634 | 0.215 | 3.391 | 0.254 |
| Odour from unkempt Toilet | 1.496 | -0.335 | 3.347 | -0.072 | 2.594 | -0.543 |
| Infections from unkempt toilet | 1.558 | -0.275 | 3.277 | -0.142 | 2.899 | -0.238 |
| Odour from open dump sites | 1.777 | -0.056 | 3.329 | -0.094 | 2.797 | -0.340 |
| Infections from open site dumps | 2.371 | 0.538 | 3.573 | 0.154 | 3.826 | 0.689 |
| Breading of disease vectors from open site dumps | 1.873 | 0.040 | 3.407 | -0.012 | 3.101 | -0.036 |
| Breading of disease vectors from bushy areas | 1.787 | -0.046 | 3.604 | 0.185 | 3.420 | 0.283 |
| Snakebites from bushy areas/ overgrown lawns | 2.372 | 0.537 | 3.574 | 0.155 | 3.855 | 0.718 |
| Air pollution from burning of waste | 1.875 | 0.042 | 3.405 | -0.014 | 3.246 | 0.109 |
| Odour from septic tanks/ man holes | 1.777 | -0.056 | 3.584 | 0.165 | 3.391 | 0.254 |
| Breading of diseased vectors from septic tanks/manholes | 1.497 | -0.336 | 3.347 | -0.072 | 2.594 | -0.543 |
| Odour from undisposed waste bin, cans, etc. | 1.558 | -0.275 | 3.297 | -0.122 | 2.971 | -0.166 |
| Breeding of diseased vectors from undisposed waste bins | 1.807 | -0.026 | 3.327 | -0.092 | 2.855 | -0.282 |
| Electric shocks due to electrical fixtures | 1.590 | -0.243 | 3.178 | -0.241 | 2.870 | -0.267 |

| | | |
|---|---|---|
| *UI $\overline{RSI}$ = 1.815 | *UI SD= 0.194 | *UI CV= 10.7% |
| *PolyIbadan $\overline{RSI}$ = 3.351 | *PolyIbadan SD = 0.100 | *PolyIbadan CV= 3.0% |
| *FCE $\overline{RSI}$ = 3.022 | *FCE SD = 0.279 | *FCE CV= 9.2% |
| **UI $\overline{RSI}$= 1.833 | **UI SD= 0.280 | **UI CV= 15.3% |
| **PolyIbadan $\overline{RSI}$ = 3.419 | **PolyIbadan SD = 0.141 | **PolyIbadan CV= 4.1% |
| **FCE $\overline{RSI}$ = 3.137 | **FCE SD = 0.393 | **FCE CV= 12.5% |

Source: Authors' Fieldwork, 2016

Students of UI attached high severity to infections from open dumpsites compared with low severity that was attached by students of PolyIbadan and FCE. This could collaborate the information provided by the students that the school dumpsites were not too distant from their hostels. Also, the severity that students of PolyIbadan attached to breading of disease vectors from site open dumps and odour from undisposed waste bins and cans was high compared with students of UI and FCE that attached low risks to these risks. This may be that the immediate environment of PolyIbadan hostels was often littered with waste while the waste facilities were not taken care of. Students might then resolve to dumping waste on open space which had accumulated over time into open dumpsites within the school premises. Meanwhile, such situations were very risky to students' wellbeing.

Breeding of disease vectors from undisposed waste bins as well as breeding of disease vectors from septic tanks had high severity as considered by students of FCE compared with the low severity attached to them by students of UI and PolyIbadan. This may be that some of students were exposed to diseases that have resulted from such risks. Students of PolyIbadan and FCE attached high severity to risks such as breeding of mosquitoes from stagnant water, air pollution from burning of waste, odour from unkempt toilets, infections from unkempt toilets, smoke resulting from indoor cooking and air quality reduction resulting from indoor cooking compared with low severity that students of UI attached to such risks. This may be due to the fact that there were less environmental control and management in these two institutions as evident in UI. It was also found out that environmental risks such as odour from open dumpsites and odour from septic tanks/ manholes was observed as having low severity in the three institutions. This may be that the effects of such risks have not by any means and at any time manifested in these institutions.

The standard deviation (SD) for UI was 0.194, that of PolyIbadan was 0.100 and that of FCE was 0 .279. The coefficients of Variation (CVs) were 10.7%, 3.0% and 9.2% for UI, PolyIbadan and FCE respectively. This shows that the data distribution of PolyIbadan was most reliable as 97.0% of the risk severity indexes clustered around the mean risk severity index ($\overline{\text{RSI}}$). This was followed by the data distribution for FCE where 90.8% of the mean indexes clustered around the $\overline{\text{RSI}}$. The dataset of UI was least reliable with 89.3% of the mean indexes clustering around the $\overline{\text{RSI}}$. With the higher proportions of CVs of the dataset obtained from these institutions, it could be inferred that the computed mean risk severity indexes were very much reliable. Likewise, going by the CVs, the severity that they attached to environmental risks in hostels of

PolyIbadan was more similar compared with hostels of FCE which was likewise more similar than those of UI.

In academic areas of UI, PolyIbadan and FCE, the $\overline{RSI}$s were 1.833, 3.419 and 3.137 respectively. The $\overline{RSI}$s thus indicated that the severity that students attached to environmental risks in academic areas of PolyIbadan was more than that of FCE which was likewise more than that of UI. Based on these mean indexes for the three institutions, it could be inferred that the severity that students attached to risks such as infections from open site dumps and snakebites that could result from bushy areas or overgrown lawns was high in all the three institutions. There might likewise be presence of open dumpsites in academic areas of such institutions. In UI and FCE, students attached high severity to environmental risks such as odour from filthy open drains and air pollution resulting from burning of waste compared with the low severity attached by students of PolyIbadan. This findings show evidence of burning of waste in these institutions whereas these activities have been globally accepted to be detrimental to human health.

The severity that students of FCE attached to odour from septic tanks or manholes was high compared with the low severity attached by students of UI and PolyIbadan. It may be that damaged septic tanks were evident in academic areas of these institutions and they always constituted nuisance to the students while receiving lectures. Students of UI attached high severity to risk as breeding of disease vectors from open site dumps compared with low severity that students attached to it in PolyIbadan and FCE. While breeding of mosquitoes from stagnant water and breeding of diseases from bushy areas was high in PolyIbadan and FCE compared with low severity that students of UI attached to these risks. This may result from poor waste disposal methods and poor environmental sanitation on the part of both the students and school management.

In all the three institutions, students attached low severity to risks such as odour from unkempt toilet, infections from unkempt toilet, odour from open dump sites, breading of diseased vectors from septic tanks/manholes, odour from undisposed waste bin and cans, breeding of diseased vectors from undisposed waste bins and electric shocks due to electrical fixtures. It could be inferred that the effects of these risks less in academic areas of all the three institutions as against what could be obtainable in their various hostels. This is because many of these risks were much associated with residential environment compared with academic areas.

The SD for UI was 0.280, that of PolyIbadan was 0.141 and that of FCE was 0 .393. The CV for UI was15.3%, that of PolyIbadan was 4.1% while that of FCE was 12.5%. This shows the

data distribution of PolyIbadan was most reliable as 95.9% of the mean indexes clustered around the mean. This was followed by the data distribution for FCE where 87.5% of the mean indexes clustered around the $\overline{RSI}$. The dataset of UI was least reliable with 84.7% of the risk severity indexes clustering around the mean risk severity indexes. The very high proportions of CVs obtained for the institutions showed a very high reliability of mean risk severity indexes. The CVs also indicated that the severity that students attached to environmental risks in academic areas of PolyIbadan was more similar compared with academic areas of FCE which was likewise more similar than those of UI.

## 4. Conclusion

The study revealed that students were aware of environmental hazards and risks in their institutions. It was concluded that student' awareness of environmental hazards and risks in the selected institutions was high. In hostels, the highest level of awareness was in FCE, followed by UI and PolyIbadan. In the academic areas, students of UI were higher in level of awareness than students of PolyIbadan and FCE. The awareness emanated from various sources with little contributions from school management and the government across the institutions. The risks that were attached to the environmental hazards were much more of pollution and disease infections. In hostels, the highest level of severity was in PolyIbadan, followed by FCE and UI. In the academic areas, students of PolyIbadan were higher in level of severity than students of FCE.

These findings make it imperative for the management of the three schools to seek for means of enhancing student's awareness of campus environmental hazards in order to abate its imminent consequences. One of such remedies is creating enlightenment programmes. The programmes could be organized as environmental symposiums, seminars, workshops and/or conferences which would create an enabling environment for environmental health and safety experts to interact with students. More so, there could be implementation of existing environmental policies or formulation of new policies that could eliminate environmental hazards and risks in educational institutions.

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Oluwole DARAMOLA and Oluwafemi ODUNSI

## *Ocena świadomości co do zagrożenia i ryzyka środowiskowego studentów publicznych instytucji edukacyjnych trzeciego stopnia w Stanie Oyo w Nigerii*

### *Streszczenie*

Ryzyko środowiskowe występuje w każdej sferze środowiska człowieka i w każdym miejscu działalności ludzkiej. Jednym z takich miejsc jest środowisko kampusu uniwersyteckiego, w którym mieszkają i wykonują swoje codzienne czynności studenci. Wstępna obserwacja środowisk kampusów w Nigerii wykazała, że występują w nich zagrożenia środowiskowe i powiązane z nimi ryzyka, natomiast bark jest badań na ten temat. Niniejszy artykuł ma na celu zbadania świadomości studentów co do zagrożeń i ryzyk środowiskowych w publicznych instytucji edukacyjnych trzeciego stopnia w Stanie Oyo w Nigerii. Przeprowadzono badania kwestionariuszowe wśród 367 studentów wybranych za pomocą technik doboru próby badawczej. Analiza opisowa została wykorzystana do obliczeń średniego Indeksu Świadomości Zagrożenia (ang.: Hazard Awareness Indexes ($\overline{\text{HAIs}}$)) oraz średniego Indeksu Intensywności Ryzyka (ang.: Risk Severity Indexes ($\overline{\text{RSIs}}$)) dla instytucji. Wyniki wykazały, że studenci są świadomi zagrożeń środowiskowych i powagi związanych z nimi ryzyk w instytucjach, zarówno w akademikach, jak i na terenach akademickich. Jednak poziom świadomości był wyższy w odniesieniu do niektórych instytucji. W artykule zaprezentowano rekomendacje, zgodnie z którymi władze uczelni powinny stworzyć programy uświadamiające oraz wdrożyć polityki na rzecz podniesienia świadomości studentów co do zagrożeń i ryzyk środowiskowych w instytucjach.

***Słowa kluczowe**:* zagrożenia środowiskowe, świadomość studentów, kampusy edukacyjne, świadomość zagrożenia, intensywność ryzyka.