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Original Article

DETERMINANTS OF RESIDENTS' PARTICIPATION IN DISASTER RISK MANAGEMENT IN LAGOS METROPOLIS, NIGERIA

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Abstract: This study examined the determinants of residents' participation in Disaster Risk Management in Lagos, Metropolis, Nigeria. The metropolis was stratified into two clusters (island and mainland areas). Two political wards were randomly selected in each of the six LGAs identified in the two clusters. A total of 5019 buildings were identified in the study area. Using systematic sampling technique, every 10th residential building was sampled in the selected wards upon which questionnaire was administered. The study established a variation in socioeconomic attributes of residents as well as awareness of disaster types across the two clusters; it also found out that while majority of the residents were aware of DRM, very few proportions had DRM training. The result of the study also revealed that age, monthly income, length of residence and educational status can explain residents' level of participation in DRM. Using regression analysis, the study found out that age, educational status and length of stay with Beta values (.130), (-0.112) and (-0.105) respectively were the determinants of peoples' participation in DRM. It recommends that environmentally concerned stakeholders should invest in DRM in areas of awareness and training of residents, establishment, funding and equipment of DRM agencies.

Keywords: hazards, vulnerability, disaster, disaster risk management, residents, Lagos metropolis.

1. Introduction

Disasters are sudden occurrence that causes damage, ecological disruption, loss of human life, or deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or area (National Emergency

Mnanagement Authority; NEMA, 2013; Olowoporoku, 2017; Okunola, 2017; WHO, 2019). They are also defined as emergencies caused by natural hazards and/or human induced activities that result into significant physical damage or destruction to the environment (Winser, Blaike, Canon & Davis, 2004; Robin & Marti, 2015; United Nations International Strategy for Disaster Reduction [UNISDR], 2017). Several criteria have been proposed to define disasters in terms of their consequences. The Center for Research on the Epidemiology of Disasters (CRED) (2003) requires that for a disaster to be entered into the database: at least one of the following criteria has to be fulfilled: ten or more people reported killed; 100 people reported affected; a call for international assistance; and declaration of a state of emergency.The extent of impacts of disasters, may depend fundamentally on how the social, political, economic, environmental and technological systems interact to manage emergencies in different societies (Olowoporoku, 2018). Therefore, disasters emanates from a combination of hazards and the potential negative consequences of risks (Kihampa, 2010; Okunola, 2018).

The increased rate of the occurrences of disaster over the last two decades in various parts of the world has become alarming. The WHO (2019) noted that about 190 million are victims of various forms disasters with significant impacts on their wellbeing across the world. The outbreaks of these disastsers either have global, national of local consequences. Among the disasters with devastating costs to human lives are drought, cyclones, tsunamis, traffic collisions and fires earthquakes etc. One of the possible causes of disasters is the increasing population of the world which has forced many people to live in disaster prone areas (Van Niekerk, 2015; Wahab, 2013). Cities in the developing countries are the worst hit by disasters because they are exposed to increasing dangers of disasters with limited management capacity (Jinadu & Sanni, 2008). The EM-DAT data collected in Africa between 2010 and 2015 revealed that about 80 million people were affected by large-scale natural disasters which resulted in 45,733 deaths (UNISDR, 2015; Otuseye, Johnson & Brown, 2017). The susceptibility of these African cities to disasters can be attributed to socio-economic stress, inadequate physical infrastructure, lack of awareness, among others (Daramola & Olowoporoku 2019).

Nigeria like other African countries is experiencing both natural and man-induced disasters of various kinds with grievous consequences on sustainable development (Adaku, 2020; Abin & Wahab, 2013). In the country, disasters such as flood, landslide, tidal wave, coastal erosion, sand-storm, dust-storm, locust/insect infestation, oil spillage, building collapse have claimed many lives in Nigeria and many homeless persons (National Emergency Management Agency [NEMA], 2019). Studies such as Okon (2018), National Disaster Management Framework [NDMF] (2010) and Adeoti and Akintunde (2014) opined that the significant loses from disaster occurrences in Nigeria can be attributed to the nation's weak DRM institutions. As such, acute community vulnerability to disasters has added to the growing number of urban challenges confronting the country (Odunsi, 2019; National Planning Commission, 2012), thus seriously threatening sustainable development.

Disaster Risk Management (DRM) is the process of lowering the effects of the occurrences and impacts of disasters. DRM is a uninterrupted, combined, multi-sectoral and multi-disciplinary, activities of preparation and implementation of measures, aimed at anticipating, averting or reducing the risk of disasters, lessen its consequences, emergency preparedness, rapid and operative response to disaster and post-disaster recovery (Bhatti, 2003; National Disaster Management Framework (NMDF), 2010; Adeniran, 2013; UNISDR, 2015). It provides a basis for addressing public and institutional systems, including organizational capacities, policy, legislations and actions (Okunlola, 2017). In most developing countries of the world like Nigeria, DRM is perceived as humanitarian relief supplies which involve costly expenses after emergencies (Aribisala, 2018; Ibem, 2011).

According to Aribisala (2018), the most common approaches to the management of disasters in Nigeria are the post occurrence of disasters. In this sense, contingency thinking and technique of management of disaster is neglected for the supply of relief materials after the occurrence of disaster. This has made residents living in disaster prone areas discouraged from participating in its management, thus, aggravating the incidences (Lamond, Adekola, Adelekan, Eze & Ujoh, 2019; Adebayo, 2014). Residents' participation is crucial to the management of disasters (UNCRD, 2003; 2004). It aids the design and implementation of activities and can contribute to the implementation of disaster management programs tailored to the actual vulnerabilities and to the needs of the affected people (Lewis & Kelman, 2012; Baytiyeh & Naja, 2013; Lewis, 2013). These collective efforts can lessen the level of vulnerability to various types of disasters. With the increased rate of occurrences of disaster in Nigeria, there is a need for a paradigm shift from the conventional emergency responses to the involvement of citizens in every phase of disaster management. In order words Nigeria must depart from that tradition that awaits disaster occurrence to a more responsive, pragmatic and proactively engaging approach of pre-empting disaster occurrence and set measures to either forestall or mitigate them.

Lagos is one of the cities in Nigeria ravaged by several types of disasters (NEMA, 2019; Olanrewaju et al, 2019; Odunsi, 2019; Aribisala, 2018; Okunola, 2017; Adenekan, 2016; Aderogba, 2012). Over the last decade, the occurrence of disasters in the metropolis has increased in frequency and intensity (Lagos State Government, 2020; NEMA, 2016). For instance in the last two years, Legos metropolis have witnessed many forms of disasters such as fire tragedy, flood, pipeline explosion, collapsed building among others in various districts which had resulted into loss of many lives, properties and displacement of people (Thisday, 2020; Nairametrics, 2020; Lagos State Government 2020; Business Day 2020; BBC News, 2020). Also in 2018 Lagos recorded the loss of over 84 lives and about USD 35 million to fire outbreaks in homes, markets and roads (Sahara Reporter, 2019; Vanguard, 2019). In furtherance of these in 2011 flood events in the metropolis affected approximately 5 thousand people and resulted in about 25 deaths with direct economic losses totalled about USD 250 million (Adelekan 2015; Aderogba, 2012; IFRC, 2011; Oladunjoye, 2011). With the devastating consequences of disasters in the metropolis, various management efforts have recorded minimal successes.

Issues related to management of disasters have been a subject of discourse among researchers in Nigeria. For instance, Adaku, (2020), Odunsi, (2019), NEMA (2019), Olowoporoku (2017), Wand, Ayuba & Azika (2015), Kawuwa, Adamu & Umar (2015) and Chukwuma (2014) have examined disaster management activities of the government in Nigeria and studies laid emphasis on government activities in the aftermath of disaster. The studies of Iliyasu (2017), Amanchukwu, Amadi-Alli and Ololube (2015), Ojo (2013), Aderogba (2012), Adelekan (2013) examined issues pertaining to flood disasters in Nigeria. The studies examined the impacts of flood disasters with less consideration on citizens' involvement in its management. Furthermore, Olowoporoku (2017), Hossain (2013) Olorunfemi (2011) and examined residents' knowledge of various types of disasters however; their involvement in its management was not considered. The impacts of disasters could be mitigated if DRM is institutionalised by stakeholders (Aribisala, 2018). Effective DRM, reduces disaster losses, lessen the pains and sufferings of people and also enhances sustainable development (Hossain, 2013). This study therefore examines residents' participation in DRM activities in Lagos metropolis, Nigeria.

2. Study Area, Materials and Methods

2.1 Study Area

The study area is Lagos Metropolis which forms the most part of Lagos State, one of the states in Nigeria. It is located in the South-West geo-political zone and situated between 6° 23^0 and 6° 41^0North and 2° 42^0 and 3° 42^0 East. Lagos is the fastest urbanizing city in Nigeria and ranks as the 19th most populated urban agglomeration in the world (World Economic Forum, 2016). With more than 20 million inhabitants, Lagos metropolis accommodates more than 10% of Nigeria's population. The average population density in the metropolis is over 20,000 persons per square km. The physical growth and development of Lagos are tied to its expanding economic and political roles, which is aided by its explosive population growth.

Lagos, which ceased to be Nigeria's administrative capital in 1991 harbors over 50% of the total business and industrial establishments in the nation (Samuel, 2004). There is no doubt that the rising status of Lagos as an emerging megacity and a commercial nerve centre in sub-Saharan Africa has come with a number of challenges. High densities per land use, proliferation of slums and environmental degradation are considered as contributing factors to increasing vulnerability to environmental hazards in this city. In fact, perennial floods, ocean surge, transport accidents, fire incidence, building collapse, industrial and construction related events are among the development-induced hazards and risks that have assumed an alarming proportion in this city (Simpson, 2006; Ana, Sridhar, Olakunle & Gregory 2007; Okunlola, 2017).

2.2. Methodology

Multi-stage sampling technique was utilized in selecting the eligible respondents for this study. The first stage involved the division of Lagos Metropolis into two clusters; island and mainland. There are two Local Government Areas (LGAs) in Lagos Island. These are Lagos island LGA and Eti-Osa LGA. The two LGAs are characterised with administrative, commercial and residential land uses. In the second cluster Lagos mainland, there are 14 LGAs. The two most prominent LGAs in Lagos mainland that are comparable with the LGs on the islands in terms of activities are Lagos Mainland and Ikeja LGAs. The LGAs are also administrative, commercial and reliable centres like their counterparts on the island. Two political wards were randomly selected in each of the identified LGAs. A total of 8 wards were selected for questionnaire administration. Reconnaissance survey revealed that there were 5,019 residential buildings in the selected wards. Using systematic sampling technique, every 10^{th} residential building was selected for sample. Thus, 501 buildings were sampled. The sample size was 501 residents from the selected 501buildings on which questionnaire were administered. Of the 501 questionnaire administered, 474 were retrieved.

Data collected through the questionnaire survey include socio-economic attributes of the residents, those pertaining disaster awareness and preparedness in the study area. The method of analysis is similar to that of Zhang (1993) which was used in the assessment of environmental hazard and risk in China. Analysis of the data collected was carried out using Cross Tabulation, T-Test and Analysis of Variance (ANOVA). Bonferroni correction adjustment was used for multiple comparison analysis (confidence intervals were constructed) while the overall confidence coefficient was maintained. This is done to reduce the risk of making type I error.

Mean indexes was used to determine the level of awareness of disaster in the study area. The views of the residents with these variables were expressed using a five-point Likert scale. Residents were provided with a list of prevalent disasters in the last decade. The analysis of the responses evolved Disaster Awareness Indexes (DAIs) and mean Disaster Awareness Indexes ($\overline{DAI}$). To obtain a DAI, a weighted value of 5,4,3,2 and 1 were respectively attached to rate each response (1= not at all aware, 2 = slightly aware, 3 = somewhat aware, 4 = moderately aware and 5 = extremely aware) on any of the disaster. The SWV for each item was obtained through the sum of the product of number of responses of each item and the respective weighted value attached to each rating. This is expressed mathematically as:

$$SWV = \sum_{I=1}^{5} X_i Y_i$$

Where:

SWV = summation of weight value,

X_i = number of respondents to rating i;

Y_i = the weight assigned a value (i = 1, 2, 3, 4, 5).

The DAI for each item on the scale was arrived at by dividing the Summation of Weighted Value (SWV) by the total number of respondents in each residential area, mathematically expressed as:

$$DAI = \frac{SWV = \sum_{I=1}^{5} X_i Y_i}{N}$$

The $\overline{DAI}$ later was computed by summing residents' disaster awareness and dividing by the number of the functions (n = 15), mathematically expressed as:

$$\overline{DAI} = \frac{DAI}{n}$$

3. Research Findings

This section discusses the profile of the respondents. It also contains discussions on the awareness of disaster and residents participation in disaster risk management activities and determinants of residents' participation in DRM in the study area.

3.1 Socioeconomic attributes of residents

The study examined socioeconomic characteristics of residents that could influence their participation in disaster risk management in the study area. The variables considered in this regard are gender, age, educational status, income, household size and duration of residence. These variables among others have been established as factors that influences people's awareness of environmental issues (Odunsi, 2019; Aribisala, 2018; Olowoporoku, 2017; Daramola, 2016; Muttarak & Lutz, 2014; UNISDR, 2009; Philip & Rayhan, 2004; Lindell & Perry 2000). As presented in Table 1, findings revealed that 52.6% of the respondent in the island areas were males while 47.4% were females. In the mainland areas, 63.4% of the respondents were males while 31.7% were females. In general, 60.8% of the respondents were male while 39.2% were female.

Age is considered a significant factor in assessing environmental awareness. Studies such as Grothmann and Reusswig (2006), Lindell and Hwang (2008) and Olowoporoku (2017b) have established that elderly persons are more environmentally conscious than their younger counterparts. The continuous raw data collected on age of the residents were categorized into four to aid better presentation. These are: teenagers (those less than 20 years); young adults (20 to 39 years); matured adults (40 to 59 years) and elders (above 60). Findings from the island area revealed that 19.8% of the respondents were teenagers, 26.2% younger adults, 18.5% were matured adults while 35.5% of the respondents were elders. Investigation from the mainland areas revealed that respondents within the age group of teenagers, young adults, matured adults and elders constituted 3.7%, 64.6%, 28.0% and 3.7% respectively. Further findings revealed that majority (88.6%) of the residents fell within the adult age group. The mean ages in the mainland and island areas were respectively 43 years and 35 years while the overall mean age in the study area was 34 years. The results of the T-test [T = (468) = 0.001 < 0.05] revealed that there exist a significant variation in difference in the age of residents across the two residential clusters.

The studies Odunsi (2019) and Muttarak and Lutz (2014) have identified educational attainment as an important factor in disaster management. Investigation into the educational attainment of respondents in the study area revealed that 15.8% had primary education, 51.3% had secondary education while 32.9% had tertiary education. In order to determine the number of years respondents spent in school, the data collected was converted into the 6-3-3-4 (i.e. Primary- Junior secondary-Senior secondary -Tertiary) operational education system in the country. The mean number of years spent on educational attainment across the study area was 10 years. The T- test results [T (468) = 0.023 < 0.05)] indicated that there was a significant difference in the mean number of years spent in pursuit of education by residents in the study area.

As expressed by Olowoporoku (2017) and Yodmani (2001) improved source of livelihood influences participation in DRM. For easy analysis, the initial quantitative data on residents' average monthly income was categorised into three (low income; middle income and high income). The low income group, constituted respondents that earned less than ₦51,000, medium income group constituted respondents that earned between ₦51,000 and ₦100,000 while respondents that earned above ₦100,000 were categorised as high income earners. In the island areas, 44.4% of the respondents were low income earners, 38.9% were middle income earners while 16.7% were high income earners. Findings from the mainland areas revealed that the proportion of respondents that comprised low, middle and high income earners were 11.8%, 42.6% and 45.6% respectively. The mean monthly incomes in the island and mainland areas were respectively ₦77,256 and ₦81,838. The result of T- test [T (414) = 0.009 < 0.05] revealed that there was a significant difference in monthly income of residents across the two residential clusters.

Household size was considered important in disaster issues. This is because household size helps in determination of the number of people exposed to disaster. Daramola and Olowoporoku (2016) defined a household as a person or group of people with shared cooking and living arrangements. Household size was measured by the number of people living with these arrangement and households were placed into three categories. Household sizes with one to five members were categorised as small, those with six to ten members as medium while those with more than ten members are categorised as large. In the island area, respondents with small, medium and large household size constituted 41.4%, 25.3% and 33.3% respectively while on the mainland respondents with low, medium and high household sizes accounted for 67.1%, 25.3% and 7.6% respectively. In summary, majority (72.1%) of the respondents across the two clusters have a small household size.

Table 1. Socioeconomic Characteristics of Respondents

Attribute	Island	Mainland	Total
	Frequency (%)	Frequency (%)	Frequency (%)
Gender			
Male	120 (52.6)	168 (68.3)	288 (60.8)
Female	108 (47.4)	78 (31.7)	186 (39.2)
Total	**228 (100.0)**	**246 (100.0)**	**474 (100.0)**
Age			
< 20	45 (19.8)	9 (3.7)	54 (11.4)
20-39	60 (26.2)	169 (64.6)	219 (46.2)
41-60	42 (18.5)	69 (28.0)	111 (23.4)
≥60	81 (35.5)	9 (3.7)	90 (19.0)
Total	**228 (100.0)**	**246 (100.0)**	**474 (100.0)**
Educational Status			
Primary	18 (7.9)	57 (23.2)	75 (15.8)
Secondary	150 (65.8)	93(37.8)	243 (51.3)
Tertiary	60 (26.3)	96 (39.0)	156 (32.9)
Total	**228 (100.0)**	**246 (100.0)**	**474 (100.0)**
Income Status			
≤₦31,000	96 (44.4)	24 (11.8)	120 (28.6)
₦31,000-₦80,000	84 (38.9)	87 (42.6)	171 (40.7)
≥₦81,000	36 (16.7)	93 (45.6)	129 (30.7)
Total	***226 (100.0)**	***204 (100.0)**	***420 (100.0)**
Household Size			
≤5	93 (41.4)	159 (67.1)	252 (54.6)
6 – 10	47 (25.3)	60 (25.3)	117 (25.3)
>10	75 (33.3)	18 (7.6)	93 (20.1)
Total	***225 (100.0)**	***227 (100.0)**	***462 (100.0)**
Length of Residence			
≤10years	87 (38.2)	117 (50.0)	204 (44.2)
11 – 20years	72 (31.5)	66 (28.2)	138 (29.8)
≥21 years	69 (30.3)	51 (21.8)	120 (26.0)
Total	***228 (100.0)**	***224 (100.0)**	***462 (100.0)**

* Responses were less than 156 because some respondents did not provide information on the variables

The length of stay of residents within the metropolis were categorised into three (≤ 10 years; 11-20 years; > 20 years). Findings revealed that respondents that have spent less than 10 years, between 11 to 20 years and above 20 years residence on the island were 38.2%, 31.5% and 30.3% respectively. Findings from the mainland areas revealed that the proportion of respondents that have spent less than 10 years, 11 to 20 years and above 20 years residence explained 50.0%, 28.2% and 21.8% respectively.

3.2 Residents' Awareness of Disaster

Sequel to the discussion of socio-economic characteristics of the respondents across the metropolis, their level of awareness of disasters is presented in this section. The rating of the level of awareness was premised on the assumption that the highest rated disasters in terms of awareness were the most occurring disaster in the study area in the last decade.

Presented in Table 2 are the mean Disaster Awareness Index ($\overline{DAI}$) for the different types of disaster experienced across the two cluster areas in the study area. The mean Disaster Awareness Indexes ($\overline{DAI}$) for the island and mainland areas were 3.12 and 3.26 respectively. In the island areas, findings revealed that road accident, smoke, flood and house collapse were the four most prominent disasters as they rated 4.49, 4.33, 4.24 and 4.15 respectively while the least rated disasters in the mainland area were earthquake, drought, landslide and industrial/chemical accident which rated 1.26, 1.43, 2.01 and 2.29 respectively. In the mainland areas, the disaster occurrences that respondents took cognisance of mostly were flood, house collapse, electricity accidents, road accident and fire outbreak which rated 4.54, 4.12, 4.05,4.01 and 4.01 respectively while the least rated disasters in terms of awareness were ethno-religious violence (1.49), earthquake (2.04), break out of disease (2.12) and drought (2.38).

Table 2. *Disaster Awareness Indexes.*

Disaster	Island			Mainland		
	DAI	DAI-$\overline{DAI}$	Rank	DAI	DAI-$\overline{DAI}$	Rank
Road accident	4.49	1.37	1	4.01	0.75	4
Smoke	4.33	1.21	2	3.91	0.65	6
Flood	4.24	1.12	3	4.54	1.28	1
Wind/Thunder/Rain storm	3.15	0.03	9	3.20	-0.08	7
Landslide (soil erosion)	2.01	-1.11	13	2.99	-0.29	10
Droughts	1.43	-1.69	14	2.38	-0.88	11
Fire outbreak	3.61	0.49	6	4.01	0.75	4
Earthquake	1.26	-1.86	15	2.04	-1.22	13
Pipeline/Oil tanker explosion	3.33	0.21	8	3.98	0.72	5
House collapse	4.15	1.03	4	4.12	0.86	2
Political crisis	2.93	-0.19	10	3.18	-0.08	8
Ethno-religious violence	3.46	0.34	7	1.49	-1.77	14
Break out of disease	2.49	-0.63	11	2.12	-1.14	12
Industrial/Chemical accident	2.29	-0.83	12	3.00	-0.26	9
Electricity accident	3.72	0.60	5	4.05	0.79	3
Total	46.89	3.12		49.02	3.26	
		Island areas $\overline{DAI}$ = 3.12			Mainland areas $\overline{DAI}$ = 3.26	

4.3 Residents' Participation in DRM

The study also examined the awareness and involvement of residents in DRM across the metropolis as presented in Table 4. One identifiable parameter in DRM is awareness and participation of residents. Awareness and involvement aid the population in preparing for, coping with and recovering from disasters. The findings revealed that the proportions of respondents who had knowledge of DRM in the island areas constituted 31.2% while respondents who did not possess knowledge of DRM accounted for 61.8%. On the mainland, respondents who indicated having knowledge of DRM constituted 72.0% while 28.0% admitted a lack of DRM awareness.

As for respondents' who had previous trainings on DRM in the study area, 41.3% in the island areas affirmed training on DRM while 58.7% revealed they had never undergone DRM trainings. On the mainland, 64.4% of the respondents indicated receiving training in DRM while 35.6% had not. Across Lagos metropolis, respondents who had not received any type of training on DRM accounted for 68.4% of the respondents. Findings on the organisations which DRM training was received revealed that in the island areas 40.9% of the respondents were trained by government agencies, 13.6% were trained by private institutions while 45.5% were trained by NGOs. On the mainland areas, the proportion of respondents trained by government, private institutions and NGOs constituted 52.8%, 5.6% and 41.6% respectively.

On respondents' involvements in DRM programs in the metropolis, findings revealed that 77.3% and 75.0% of the respondents on the island and mainland areas respectively, were trained in DRM and were involved in DRM related activities in their areas. On the other hand, 22.7% and 25.0% of respondents who had DRM trainings did not participate in DRM activities in their respective areas. Overall, the majority (75.9%) of the respondents indicated engaging in DRM activities after receiving DRM trainings.

As shown in Table 3 is respondents' roles in DRM. On the island area 41.9% of the households were engaged in raising the community's awareness about disasters, 20.3% sourced for funds during disasters, 14.9% engaged in provision of relief materials and 23.0% played no role in DRM. In the mainland areas, respondents who participate in community awareness about disasters constituted 43.5%, those who participates in the disaster relief works were 15.2% and 13.0% source for funds during disaster. Respondents who are not involved in DRM accounted for 28.3%. Findings on the availability of DRM agencies in respondent's area revealed that 80.3% of the respondents in the island areas indicated lack of DRM agencies. Similarly in the mainland areas, as a higher percentage of the respondents (76.8%) indicated the absence of DRM agencies in their LGAs. From the study, absence DRM agencies in respondents' LGAs could be responsible for the relatively low level of awareness, knowledge and participation in DRM in the study area.

Table 3. *Residents' Awareness and Participation in DRM*

Options	**Island**	**Mainland**	**Total**
	Count (%)	Count (%)	Count (%)
Awareness of DRM			
Yes	87 (31.2)	177 (72.0)	264 (55.7)
No	141 (61.8)	69 (28.0)	210 (44.3)
Total	**228 (100.0)**	**246 (100.0)**	474 (100.0)
Training in DRM			
Yes	36 (41.3)	114 (64.4)	150 (56.8)
No	51 (58.7)	63 (35.6)	114 (43.1)
Total	***87 (100.0)**	***177 (100.0)**	**264 (100.0)**
Sectors from which DRM Training was received			
Government agencies	27 (40.9)	57 (52.8)	78 (42.3)
Private institutions	9 (13.6)	6 (5.6)	15 (8.6)
NGOs	30 (45.5)	45(41.6)	75 (43.1)
Total	***196 (100.0)**	***108** (100.0)	***174** (100.0)
Respondents Involved in local DRM activities			
Yes	51 (77.3)	81 (75.0)	132 (75.9)
No	15 (22.7)	27 (25.0)	42 (24.1)
Total	***66 (100.0)**	***108 (100.0)**	***174 (100.0)**

Respondents' Roles in DRM activities			
Fund raising	45 (20.6)	36 (13.0)	81 (16.3)
Disaster relief work	33 (14.9)	42 (15.2)	75 (15.1)
Community awareness education	93 (41.9)	120 (43.5)	171 (42.8)
Not involved	51 (23.0)	78 (28.3)	129 (25.9)
Total	**222 (100.0)	**276 (100.0)	**498 (100.0)
Availability of DRM agencies in Respondents Metropolis			
Yes	45 (19.7)	57 (23.2)	102(21.5)
No	183 (80.3)	189 (76.8)	372 (78.5)
Total	**218 (100.0)**	**246 (100.0)**	**474 (100.0)**
Preventive actions against disaster			
Avoidance of disaster condition	81 (25.6)	73 (19.2)	154 (22.1)
Purchase of disaster kits	65 (20.6)	69 (18.2)	134 (19.3)
Report early warning signs	47 (14.9)	69 (18.2)	116 (16.7)
Participation in disaster prevention project	123 (38.9)	169 (44.4)	292 (41.9)
Total	**316 (100.0)	**380 (100.0)	**696 (100.0)

* This is lower than the total number of respondents because some respondents do not participate in DRM activities in the area

** The total is higher than the number of respondents because respondents selected multiple options of their roles in DRM

Findings were also made on the preventive actions carried out by respondents in the management of disaster. On the island, 25.6% of the respondents claimed they avoid disaster conditions, 20.6% purchase disaster combat kits, 14.9% report early warning disaster signs while 38.9% participates in disaster prevention projects. On the mainland, 19.2% of the respondents claim they avoid disaster situations, 18.2% purchase disaster combat kits, 18.2% report disaster signs to the necessary agencies while 44.4% participates in disaster prevention projects. Overall, the majority (41.9%) of the respondents indicated participating in disaster prevention projects.

3.4 Difference in Involvement in DRM based on Socioeconomic Characteristics

The study also examined the statistical significant in involvement in DRM based on socioeconomic characteristics as it is suggested that socioeconomic attributes influence environmental concerns (Philip & Rayhan, 2004; UNISDR, 2009; Muttarak & Lutz, 2014). In order to achieve this, tests of statistically significant difference in involvement in DRM by residential characteristics were conducted using Analysis of Variance (ANOVA). The results of these tests are presented in Table 4. The included factor variables in the tests are place of residence, gender, age, monthly income, household size, length of residence, and educational attainment. The individual scores of awareness of DRM, trainings on DRM, respondents' involvements and roles in DRM were summed to create a sum-score for the participation of residents in DRM. The sum-scores were then added up to create the respective composite sums. A mean value of the variables was later computed to arrive at residents' participation in DRM.

Table 4. *Difference in Participation in DRM by Residential Characteristics*

		Sum of Squares	Df	Mean Square	F	Sig.
Place of residence	Between Groups	3231.390	2	1615.695	8.906	.002
	Within Groups	65209.760	424	57.250		
	Total	68477.150	426			
Gender	Between Groups	.722	2	.241	.957	.415
	Within Groups	34.943	424	.251		
	Total	35.664	426			
Age	Between Groups	2986.072	4	746.518	11.908	.000
	Within Groups	23416.907	422	58.467		
	Total	26402.979	426			
Monthly income	Between Groups	3525.616	3	1175.205	7.049	.001
	Within Groups	270375.982	423	57.580		
	Total	273908.958	426			
Household size	Between Groups	247.411	3	82.470	2.634	.052
	Within Groups	4257.761	414	56.307		
	Total	4505.171	417			
Length of residence	Between Groups	2292.790	3	764.263	9.013	.003
	Within Groups	271615.810	423	58.960		
	Total	273908.598	426			
Educational status	Between Groups	3599.976	4	899.994	7.192	.001
	Within Groups	270308.622	401	58.476		
	Total	273908.598	405			

The ANOVA tests results revealed that there were statistically significant differences in residents' participation in DRM based on their place of residence, age, monthly income, length of residence and educational status in all the LGAs. The analyses were further subjected to post hoc tests for multiple comparison analysis for those with more than two categories using Bonferroni. Findings revealed that significant difference existed within and between the groups in residents' participation in DRM. For instance, significant statistical differences were found between each of the place of residences, and between categories of monthly income, length of residence and educational status in terms of participation in DRM of residents across the LGAs in the two clusters in the study area. Nevertheless, there are no statistically significant differences in participation in DRM based on gender and household size in the study area. The implication of these findings is while socioeconomic characteristics such as age, monthly income, length of residence and educational status may be used to explain some level of participation in DRM in Lagos metropolis. Gender and household size may not be used likewise in the study area.

3.5. Determinants of Residents' Participation in DRM in the Study Area

In this section, residents' participation in DRM was the dependent variable while the independent predictors were the identified socioeconomic characteristics of the respondents. The predictors comprised characteristics such as gender, age, education status, income status, household size and duration of residence. The categorical variables were transformed into interval data to make them suitable for parametric tests and binary categorical variable gender was coded as "0" and "1". A multiple regression analysis was conducted. This was carried out in order to determine whether the identified socioeconomic characteristics can predict a

significant amount of the variance in participation in DRM among residents. The regression model summarizes these factors in relation to residents' participation in DRM.

Table 5. *Residents' Participation in DRM Regressed on Socioeconomic Characteristics*

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	18.550	.749		24.779	.000
Gender	-.006	.008	-.071	-.780	.437
Age	-2.873	.628	.130	-5.321	.000
Educational status	-1.356	.355	-.112	-5.715	.000
Monthly income	3.541E-006	.000	.089	.982	.328
Length of residence	-1.424	.511	-.105	-.4157	.003
Household size	-.048	.019	-.093	-2.516	.013

R = 0.291; R Square = 0.093

The combined effects and the relative contributions of each independent variable on participation in DRM are presented in Table 5. The composite correlation coefficient of the relationship between socioeconomic characteristics and residents' participation in DRM is 0.291. This value provides a good estimate of the overall fit of the regression model. The regression value (R^2), which provides a good gauge of the substantive size of the relationship, is 0.093 for this model. This implies that 9.3% of the variance in participation in DRM is accounted for by the predictor variables. Furthermore, presented in the table is the relative contribution of each predictor variable to the variance in residents' participation in DRM. Age has the highest beta value (.130), followed by educational status (-0.112), length of residence (-0.105). However, the predictor variables of gender, monthly income and household size have no significant effect on residents' participation in DRM.

These findings are consistent with the results of earlier studies by (Aribisala, 2018 and Olowoporoku 2017b; Olowoporoku, 2017; Muttarak & Lutz, 2014; Bourque *et al.* 2012; UNISDR, 2009; Lindell & Hwang 2008; Philip and Rayhan, 2004) have indicated that there is a significant statistical association between socioeconomic characteristics such as age, educational status and length of residence and residents participation in disaster management. Thus, these variables serve as strong predictors of residents' participation in DRM in the study area. The analyses also revealed results that do not reflect findings of studies like those of (Olowoporoku 2017; Daramola & Olowoporoku, 2016; Yodmani, 2001) that have identified gender, income and household size as being strong predictors of environmental concerns. The basis for the difference may be due to the peculiarity of the study area.

4. Conclusion

This study assessed the determinants of residents' participation in DRM in Lagos, Metropolis, Nigeria. Based on the findings of the study, it suggests that majority of the residents were unfamiliar with DRM and those who were aware of DRM did not engage in disaster preparedness and reduction activities. Also, the study identified inadequacy of available environmental protection agencies and residents' limited concerned for environmental threats as contributors to disaster. Furthermore, it suggests that socioeconomic characteristics such as age, educational status and length of residence can be used to explain variance in residents' participation in DRM. These factors could inform residents' involvement in DRM

activities in the study area and other Nigerian city with similar background. These results on residents' participation in DRM would limit losses that emanates from disaster occurrences. These findings have policy implications for effective management of disasters both in Lagos, Nigeria and other area with similar urban settings. The study recommends the following;

- The government should develop a strong awareness system among residents on DRM in the study area. Adequate awareness is essential in achieving success in environmental issues. This can be achieved through introduction use of billboards, television and radio jingle and leaflets and also formation of environmental awareness groups who would engage residents on the need to embrace DRM. This will invoke a mind-set reorientation to make management of disaster not an after-thought idea in the planning process;
- The government and all concerned stakeholders should invest in the training of residents especially landlords about DRM; and
- Concerned stakeholders such as government and NGOs should establish, fund and equip environmental protection agencies in the study area.

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