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Professionals' Perception on Vulnerability of Buildings to Flooding in Lokoja, Metropolis Nigeria.

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ABSTRACT: One of the major events that happened in 2012 was a massive flood in Nigeria which affected fourteen states with Lokoja as the worst hit. The devastation caused by the flood has huge impact on the people especially on the flood area where great havoc was on the built environment was recorded. This paper attempt to evaluate professionals' perception on vulnerability of buildings to flooding in Lokoja metropolis. The study employed quantitative method using structured questionnaires. 60 questionnaires were distributed and 49 representing (82%) response rate were screened and analyzed using SPSS. The findings reveals that flooding reduce the market value of the residential properly in the flood liable areas.

Keywords: Flooding, Professionals, Perception, Lokoja, Nigeria

I. INTRODUCTION

The world is faced with an increase in disasters due to natural hazards, which often leads to great loss in the society. Hundreds of millions of people are killed and every year millions are injured, affected or displaced. According to International Council for Science (2008) most disaster losses originate from climate related hazards like hurricanes, floods, landslides, heat waves and drought; and current evidence has shown that global climate change will continue to increase the frequency and severity of these hazards.

The risks associated with natural hazards are constantly increasing due to urbanization, rapid population expansion, and widespread poverty in hazard-prone areas (International Council for Science, 2008). For example, most of the largest cities in the world are located in either coastal or seismically active regions, which are dangerous. Also, certain activities of the people increase the risks, like changes in land use which can increase landslides and flooding; destruction of mangroves that can reduce the impact of storms in coastal areas; and slash and burn type of agriculture that contributes to greenhouse gases which increases global warming.

Recent floods and consequences all over the world are becoming too frequent and threat to sustainable development in human settlements (Aderogba, 2012).

Nigeria is one of the luckiest countries on earth in respect to water resources. But we must acknowledge that flooding and water stress in Nigeria, Africa and across the world, are environmental challenges that need intervention to ensure sustainability (Akolokwu,

2012). Flooding is one of the major environmental crises one has to contend within the century.

This is especially the case in most wetlands of the world (Bariweniet al., 2012). The reason for this is the general rise in sea level globally, due to global warming as well as the saturated nature of the wetlands in many parts of the world such as Nigeria.

Periodic floods occur on many rivers, these rivers overflow for reasons like excess rainfall etc. The good thing about river overflows is the fact that as flood waters flow into the banks, sand, silt and debris are deposited on the surrounding land. After the river water subsided and go back to its normal flow, the deposited materials will help make the land richer or more fertile. The organic materials and minerals deposited by the river water therefore keep the soil fertile and productive (Abowei and Sikoki, 2005).

Floods are environmental hazards of meteorological phenomena, but very often induced by man's improper utilization or abuse of the physical environment. Flooding can be defined as an overflow that comes from a river or other body of water and causes or threatens damage. (Adebayo and Jegede, 2010). Floods are among the most dramatic forms of interaction between man and his environment. They occur both in the developed or developing world and are always associated with

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heavy loses of lives and properties, misery, hardship, diseases, and at times, famine.

Floods have benefits but also cause multiple problems. Floods occur world-wide, often after heavy rain in areas. Once the flood water clear away, it leaves behind a variety of different effects on the land, animals and people. While many people view flooding as having a solely negative effect, positive things can also result in aftermath of a flood. Flooding causes structural and environmental damage to landscape. Floods erode soil, often on a large scale bases. This displacement of soil leads to the weakening of structures like houses and bridges. Ebisemiju (1993), opines that the most significant impact of flooding arises from urbanization, because it involves deforestation, land-use changes, temperature modification of soil physical properties and structures and the exposure of bare soil surfaces especially of construction sites all of which bring about changes in the morphological and hydrological state of water.

Flood waters can destroy homes and businesses; disrupt road, rail and communication lines, and rain crops and agricultural land. Floods can also disrupt drainage and sewage systems, presenting a serious health hazard resulting from pollution and water borne-disease. Flooding of river is a natural phenomenon. The damage caused by flooding however has increased due to decreasing space for rivers and growing population pressure on valley grounds and wetlands It is now generally accepted that increasing urban coverage and other development have led to a worldwide increase in both the risk and economic burden of floods.

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Several studies have adduced extreme rainfall to be the major cause of flood worldwide including Nigeria (Ologunorisa and Tersoo, 2006). These studies included Gobo (1988), McEwen (1989), Oriola (1994), Babatolu (1996), FMWRRD (1998), Odekunle (2001),

Fowler and Kilsby (2003) as well as Ologunorisa (2004). But other authors have identified the characteristics of extreme rainfall that are associated with flood frequency in Nigeria to include duration, intensity, frequency, seasonality, variability, trend and fluctuation (Olaniran, 1983; Ologunorisa, 2001; Ologunorisa and Diagi, 2005). Although floodingis a bane to mostpeople, generally it can be quite beneficial. Actually, nature benefits more from natural floods than from not having them at all. What makes natural floods a disaster is when flood waters occur in areas populated by humans and in areas of significant human development (such as Kano, Lagos etc.).

Moreover, previous studies have shown that spatial patterns in vulnerability of buildings exposed to torrent processes exist (Fuchs et al., 2012b) which cannot be satisfactorily explained only by the spatial and temporal process dynamics on the torrential fans. Therefore, a deeper insight into the mechanisms causing losses is necessary as a basis of any subsequent engineering design of feasible and economically efficient risk mitigation strategies (Mazzorana et al., 2012a, b; Mazzorana and Fuchs, 2010). Since in Alpine regions – due to an increasing scarceness of funding available – public investments for natural hazard risk mitigation may decrease significantly, envisaged solutions must be convincing, both from a technical and economic viewpoint (Fuchs, 2013), and also be sustainable from an ecological perspective. This holds also for mainly private capital investments in terms of local structural protection strategies aiming at reducing the physical vulnerability of endangered buildings (Holub and Fuchs, 2009; Holub et al., 2012; Mazzorana et al., 2012b).

From a purely theoretical perspective rigorous approaches to vulnerability computations for structures can be derived from physical and numerical analyses of the fluid–structure– soil interaction with free surface flows.With respect to fluid– structure coupling, Walhorn et al. (2005) presented a monolithic model for fluid–structure interaction problems involving free surface using a space–time finite element discretization.

They implemented a strong coupling algorithm and a time adaptable space–time finite element formulation to enforce conservation of momentum and mechanical energy at the fluid–structure interface. Moreover, they obtained an enhanced tracking of the fluid–solid interface through a refined level set method. However, reliable results have been provided so far only for simple geometrical configurations (e.g. single flexure elements impacted by a fluid flow) and the

geomechanical processes have been neglected. Similar arguments hold for challenges involving the coupling between fluid flow and soil mechanics. Although front-end solutions for particular case studies have been obtained, so far there is a particular gap for the specific domain of mountain hazard risk management.

II. STATEMENT OF PROBLEM

Nigeria is one of the luckiest countries on earth in respect to water resources. But we must acknowledge that flooding and water stress in

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Nigeria, Africa and across the world, are environmental challenges that need intervention to ensure sustainability (Akolokwu,2012).

Over the years in Anambra State, flood has remained a worrisome natural problem which successive governments in the State could not effectively solve. Flood therefore is still a problem in areas like Awka, Oko, Onitsha, Agamelu, Aguleri, Umuleri, and Adani. In most areas of the state, such as Awka, Oko and Onitsha, flooding has posed a major concern to the occupants of properties. The access roads to some of these properties during raining season are usually in their worse states and this deteriorates year after year. Flooding is inimical to human activities especially when it occurs on a large scale (Ogunyemi 2002).

Statistic have it that more than 28 buildings, including schools, churches, hospitals and residential homes, have been submerged by flooding in Awka, Anambra State following torrential rain which lasted for about three hours in July 2012, three churches, two primary/ nursery schools and two hospitals were most badly affected while no fewer than 90 families living within Owurah, Ezioka, Court Road, and Kwata Streets were rendered homeless, as their homes were taken over by flood water.

Recently, in Northern Nigeria, flood displaced more than two million people as the flood gates on Challawa and Tiga dams were opened to release rising waters along the Niger River. Flooding has also affected at least 300,000 people, submerging hundreds of Communities in Niger State . Flooding has wreaked havoc across many other parts of Nigeria in recent years, including the following states: Anambra in the east, Sokoto in the northwest, Borno in the northeast, Plateau in the centre and Yobe in the north.

Flooding that occurred in some parts of Nigeria in 2012 is the country's worst in living memory

(Social Action, 2012). Floods are among the most devastating natural disasters in the world, claiming more lives and causing more property damage than any other natural phenomena. In Nigeria, though not leading in terms of claiming lives, flood affects and displaces more people than any other disaster; it also causes more damage to properties. At least 20 per cent of the population is at risk from one form of flooding to another. In Nigeria, flood disaster has been perilous to communities and institutions in Nigeria. It has shattered both the built-environment and undeveloped plan. It has claimed many lives, and millions of properties got lost due to its occurrences.

One prominent feature about it is that flooding does not discriminate, but marginalizes whosoever refuses to prepare for its occurrence (Etuonovbe, 2011). Flood affects more people on an annual basis than any other form of natural disaster, a variety of climatic and nonclimatic processes influence flood processes, resulting in different types of floods (Collins and Simpson,

2007). Increasing flood risk is now being recognized as the most important threat from climate change in many parts of the world (Dyson, 2002).

This environmental hazard used to cause much havoc to lives, real properties and economy of whichever area it occur. The effects as stated by http//en.wiktionary.org/wiki/flood include loss of lives, damage of buildings and other structures, and economic hardship. Over 5.5 million properties in England and Wales are at risk of flooding from rivers, the sea or surface water (Environment Agency, 2009). In the past four decades, economic losses due to natural hazards such as flood disasters have increased in fold and have also resulted in major loss of human lives and livelihoods, the destruction of economic and social infrastructure, as well as environmental damages during these periods. (MunichRe, 2002). This was supported by NEST's (1991) submission "that floods are common and recurrent phenomenon in Nigeria and in some parts of the Country they occur on regular perennial basis".

Floods are among the most devastating natural disasters in the world, claiming more lives and causing more property damage than any other natural phenomena (http://www.cnt.org/resources/the-prevalence-and-cost-of-urban-flooding/ , 2013). In Nigeria, though not leading in terms of claiming lives, flood affects and displaces more people than any other disaster; it also causes more damage to properties. At least 20 percent of the population is at risk from one form of flooding or another.

Alex (2013) confirmed the year's flood severance by saying The Federal Ministry of Water Resources in Nigeria has traced the cause of the 2013 in Sokoto to the 2012 flooding incidence that led to several changes in the watercourse. Flood damages on property could be multiplied if not taken care of and the economical losses would be much (Sebastian, 2012).

With the intention of having a uniform application of set standards and specifications for all manner of buildings that were being put up as part of the planning scheme, the National Building

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Regulations 1996, (LI 1630) was introduced. Meanwhile the pace of development coupled with non-compliance on the part of developers created devastating environmental problems. The District Assemblies were empowered to grant building permits whiles the Town and Country Planning recommended development permit.

According to Owusu (2000) in his study the cumbersome nature of acquiring permits to develop, has made a lot of people ignore this very important requirement of development and go ahead with it. Many developers in the country know of the existence of building regulations, but few of them actually comply with them. The reasons being that they think it is time consuming, costly and labourious. These developers therefore do not apply for permits before commencing projects, especially private developers. Some of the developers who acquire the permit also do not conform to the specifications of the permit. This is usually due to their quest to make supernormal profits. . A typical example is the Melcom building which collapsed in Accra.

Physical developments have been carried out mostly in the urban areas in Ghana without planning permission and those who have permission do not adhere to building regulations. According to Freiku (2003) between 1990 and 2000 only 7.2 percent of buildings in the Kumasi Metropolis had permits. The non-compliance of building regulation has resulted in many buildings not conforming to the development scheme of many communities in Ghana. The effect of this is the annual flooding, fire outbreaks, loss of life, and difficulty in utility services provision among other problems.

According to Mensah (2010) few developers in the city have knowledge of building permits including land owners. For instance alterations and extensions are made to dwelling-houses without any prior approval from the city authorities. Even when the authorities have been able to discover an unauthorized development and cautioned the developer they tend to develop at unusual hours. Recently some people have also developed a strategy of writing “stop work” on their own buildings just to elude the city authorities. The end results have been a chaotic situation nobody bargained for. Filth has taken over most parts of the city resulting in outbreak of malaria, cholera and typhoid which have claimed more lives than anticipated. Fire outbreak has had its own toll on the people as it has destroyed investment worth fortunes due to the fact that inhabitants have built on access ways thereby deterring fire fighters from doing their work.

Many previous studies has being carried out on the issue of flooding regarding the building vulnerability for example Irahim M, Kasim M and Yahaya,S (2014) Causes and consequences of flooding in Nigeria: a review Ebuzoeme, O. (2015) Evaluating the Effects of Flooding in Six Communities in AwkaAnambra State of Nigeria Ajibola m, (1998) Assessing The Effects Of Flooding On Residential Property Values In Lekki Phase, Nwoko A (2013) Flooding In Nigerian Cities: Problems And Prospects (UWAKWE A C, 2015) Assessment of physical vulnerability to flood, Mazzorana B,Simoni S, Scherer C, Gems, B Fuchs S, and Keiler M(2014) physical approach on flood risk vulnerability of buildings, Scott MJ et-al (1990)Consequences of climatic change for the human Environment, and Fellmann T, (ND) The assessment of climate change-related vulnerability in the agricultural sector: reviewing conceptual frameworks but none of the studies has being carried out wholly on the professional perception on the vulnerability of building to flooding in Lokoja metropolis, Nigeria. The study will identify the effect of flooding and consequences, determine the effects of flooding on the value of building inLokoja metropolis, Nigeria,.

III. LITERATURE REVIEW

Effects of Flooding and Consequence of Flooding

Especially in the study area cannot be over emphasized. Mike Ahern, R. Sari Kovats, Paul Wilkinson, Roger Few, and FranziskaMatthies, (2005) carried out a research on flooding in Mozambique in Bangladesh using questionnaire. They found out that floods are the most common natural disaster in both developed and developing countries, and they are occasionally of devastating impact, as the floods in China in 1959 and Bangladesh in 1974 and the tsunami in Southeast Asia in December 2004. Their impacts on health vary between populations for reasons relating to population vulnerability and type of flood event (Kovats et al, 2003). Under future climate change, altered patterns of precipitation and sea level rise are expected to increase the frequency and intensity of floods in many regions of the world (Intergovernmental Panel on Climate Change, 2001). In the paper, they review the epidemiologic evidence of flood related health impacts.

The result showed that surprisingly limited evidence base about the health effects of floods, particularly in relation to morbidity were scarce. This may in part be due to the difficulty of carrying out rigorous controlled epidemiologic

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studies of floods, especially in low-income countries. Evidence on public health interventions

(e.g., the need for measures to reduce the spread of infectious disease, dealing with mental health impacts, targeting of vulnerable groups) appears particularly limited. It was also found that there is no study on the effectiveness of public health measures, including early warning systems. Nonetheless, the wide range of risks to health and well-being, both physical and mental, is understood, though there remains scientific uncertainty about the strength of association and public health burden for specific health effects. The immediate risks of trauma and death are generally clear, but it seems that longer-term impacts, specifically on mental well-being, are often underestimated and probably receive too little attention from public health authorities.

Mortality

Deaths associated with flood disasters are reported in the EM-DAT disaster events database (Centre for Research on the Epidemiology of Disasters, Ecole de Sante´ Publique, Universite´ Catholique de Louvain, Brussels, Belgium) (Center for Research on the Epidemiology of Disasters, 2005) and also in two reinsurance company databases (www. munichre.com, www.swissre.com). These databases include little epidemiologic information (age, gender, cause), however. Flood-related mortality has been studied in both high- (Abrahams M. J,et al 1976) and low-income countries. The most readily identified flood deaths are those that occur acutely from drowning or trauma, such as being hit by objects in fast flowing waters. The number of such deaths is determined by the characteristics of the flood, including its speed of onset (flash floods are more hazardous than slow-onset ones), depth, and extent. Many drowning occur when vehicles are swept away by floodwaters (Dietz, Gunn, Rigau- Perez, 1990).

Evidence relating to flash floods in high-income countries suggests that most deaths are due to drowning and, particularly in the United States, are vehicle related (French, Ing, Von Allmen S, 1983).Information on risk factors for flood-related death remains limited, but men appear more at risk than women (Jonkman and Kelman, 2005). Those drowning in their own homes are largely the elderly. Although the risk of deaths is most obviously increased during the period of flooding, in a controlled study of the 1969 floods in Bristol, United Kingdom, Bennet (Bennet 1968) reported a 50 percent increase in all-cause deaths in the flooded population in the year after the flood, most pronounced among those aged 45–64 years.

Few other studies have examined such a delayed increase in deaths, but it was also reported by Lorraine

(Lorraine, 1954) in relation to the 1953 storm surge flood of Canvey Island, United Kingdom, but not in two Australian studies (Abrahams, Price,and Whitlock, 1976).

Inconclusive evidence for diarrheal deaths has been reported from several studies of floods in low income countries. Surveillance data showed an apparent increase of mortality from diarrhea following the 1988 floods in Khartoum, Sudan, but a similar rise was also apparent in the same period (May–July) of the preceding year. Routine surveillance data and hospital admissions records similarly showed diarrhea to be the most frequent (27 percent) cause of death following the severe 1988 Bangladesh floods, but again the effect of the flood was not separately quantified from seasonal influences (Siddique, Baqui, and Eusof, 1988).

Injuries

Flood-related injuries may occur as individuals attempt to remove themselves, their family, or valued possessions from danger. There is also potential for injuries when people return to their homes and businesses and begin the clean-up operation (e.g., from unstable buildings and electrical power cables). In a community survey (108 of 181 households completed the questionnaire) of the 1988 floods in Nımes, France, 6 percent of surveyed households reported mild injuries (contusions, cuts, sprains) related to the flood (Duclos, Vidonne, and Beuf, 1988). In Missouri after the Midwest floods of 1993, injuries were reported through the routine surveillance system. Between July 16 and September 3, 1993, a total of 524 flood-related conditions were reported, and of these 250 (48 percent) were injuries: sprains/strains (34 percent), lacerations (24 percent), ‘‘other injuries’’(11 percent),and abrasions/contusions. Similar data were also reported from Iowa (Public health consequences, 1993).

Surprisingly little information is available on the frequency of nonfatal flood injuries, as they are mostly not routinely reported or identified as flood related. Fecal-oral disease in flood conditions, there is potential for increased fecal oral transmission of disease, especially in areas where the population does not have access to clean water and sanitation.

Published studies (case-control studies, cross-sectional surveys, outbreak investigations,

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analyses of routine data) have reported post flood increases cholera (Korthuis, Jones, Lesmana, 1998 and Sur, Dutta, Nair, 2000), cryptosporidiosis, nonspecific diarrhea, poliomyelitis, rotavirus, and typhoid and paratyphoid. Some of the reported relative risks associated with flooding are substantial. In Indonesia, for example, Vollaard et al. (2004) found flooding of the home to increase paratyphoid fever, with an odds ratio of 4.52 (95 percent confidence interval (CI): 1.90, 10.73), found it to increase the risk of cryptosporidiosis, with an odds ratio of 3.08 (95 percent CI: 1.9, 4.9). In high-income countries, the risk of diarrheal illness appears to be low, as shown by studies from the former Czechoslovakia and Norway (Avitsland, Iversen, and Krogh, 1996).

In the United Kingdom, (Reacher et al ,2004) reported an increase in self-reported gastroenteritis (RR 5 1.7, 95 percent CI: 0.9, 3.0) following the Lewes floods of 2001. Another US study (Mackowiak, Caraway and Portnoy, 1976) investigated an outbreak of oyster-related hepatitis A and, although it was not possible to determine the precise cause of the outbreak, the authors hypothesized that flooding of the Mississippi Valley and discharge of fecal materials in the oyster-growing areas may have been factors.

Vector-borne disease

The relation between flooding and vector-borne disease is complex. Many important infections are transmitted by mosquitoes, which breed in, or close to, stagnant or slow-moving water (puddles, ponds). Floodwaters can wash away breeding sites and, hence, lower mosquito-borne transmission.

On the other hand, the collection of stagnant water due to the blocking of drains, especially in urban settings, can also be associated with increases in transmission, and there have been numerous such reports from Africa , Asia ,and Latin America. The 1982 El Nino event, for example, caused extensive flooding in several countries in Latin America and apparently sharp increases in malaria (Cedeno, 1986) The Mozambique floods of 2000 also appeared to have increased the number of malaria cases by a factor of 1.5–2 by comparison with 1999 and 2001 (Kondo, Seo, and Yasuda, 2002), although the statistics are difficult to interpret in light of the major population displacement that the flood caused.

There have also been reported increases in lymphatic filariasis and arbovirus disease in Africa , Australia , Europe and the United States, although few provide epidemiologic data.

Rodent-borne disease

Diseases transmitted by rodents may also increase during heavy rainfall and flooding because of altered patterns of contact. Examples include Hantavirus Pulmonary Syndrome and leptospirosis. There have been reports of flood associated outbreaks of leptospirosis from a wide range of countries, including Argentina, Brazil, Cuba, India, Korea, Mexico, Nicaragua, Portugal and Puerto Rico (Sanders et al, 1966).

In Salvador, Brazil, risk factors for leptospirosis included flooding of open sewers and streets during the rainy season . After a series of tropical storms in 1995, two health centers in western Nicaragua reported cases of a fever-like illness and some deaths from hemorrhagic manifestations and shock (Trevejo, Rigau-Perez, and Ashford, 1995). Dengue and dengue hemorrhagic fever were initially suspected (74), but after a case-control study, Trevejo et al. (1995) concluded that the most likely explanation was increased exposure to floodwaters contaminated by urine from animals infected with Leptospira species. Although several articles implicate contact with floodwaters, specific analyses have not been presented.

Mental health

The World Health Organization recognizes that the mental health consequences of floods ‘‘have not been fully addressed by those in the field of disaster preparedness or service delivery,’’ although it is generally accepted that natural disasters, such as earthquakes, floods, and hurricanes, ‘‘take a heavy toll on the mental health of the people involved, most of whom live in developing countries, where [the] capacity to take care of these problems is extremely limited’’. Here, the main evidence relates to common mental disorder, post traumatic stress syndrome, and suicide.

Most studies on the effects of flooding on common mental disorders are from high- or middle-income countries, including Australia, Poland, the United Kingdom and the United States, but there is also a study from Bangladesh (Durkin, Khan, and Davidson, 1993). Bennet’s analysis of the 1968 Bristol floods found a significant increase (18 percent vs. 6 percent; $p < 0.01$) in the number of new psychiatric symptoms (considered to comprise anxiety, depression, irritability, and sleeplessness) reported by women from flooded compared with non flooded areas, although there was no significant difference for men. These results broadly agree with the findings for the 1974

Brisbane floods (Abrahams, Price, and Whitlock, 1976), except that in Brisbane men were also affected. Those between 35 and 75 years of age suffered the greatest impacts.

Flood exposure was associated with significant increases in depression ($p < 0.005$) and anxiety ($p < 0.0008$) (and also physical symptoms), especially in those with higher levels of pre-flood depressive symptoms and in those from lower socioeconomic groups-a finding that(Phifer et al. 1988) suggest supports Logue et al.'s 1981 assertion that ''low-income people are more vulnerable to the adverse effects of a disaster'' (Phifer, 1990). (Ginexi, Weihs, and Simmens, 2000) were able to compare symptoms for depression in both the preand post flood periods, and they found that, among respondents with a pre flood depression diagnosis, the odds of a post flood diagnosis increased significantly (odds ratio 5 8.55, 95 percent CI: 5.54, 13.2). A more recent case-control study from the United Kingdom (Reacher, McKenzie, and Lane, 2004) found a fourfold increase in psychological distress among adults whose homes were flooded compared with those whose homes were not (RR 54.1, 95 percent CI: 2.6, 6.4).

On the other hand, more equivocal evidence comes from two case-control studies of the mental health impacts of Tropical Storm Agnes, which caused extensive flooding in Pennsylvania in 1972. The first study, conducted 3 years post flood, focused on working-class males aged 25– 65 years; the second, conducted 5 years after the event, focused on women aged 21 years or more. In both cases, respondents from flooded households reported more mental health symptoms than did non flooded respondents, but differences were not statistically significant. The authors speculate that ''the failure to find a stronger relationship, may, in part, be the result of the length of time which had elapsed since the disaster impact'' (Logue, Melick, and Struening, 1981).

Comparatively few studies have examined mental health impacts on children, but an exception is the 1993 study by Durkin et al. (1993) that found post flood changes in behavior and bedwetting among children aged 2–9 years. Before the flood, none of the 162 children were reported to be very aggressive; post flood, 16 children were found to be very aggressive toward others. Bedwetting increased from 16.8 percent before the flood to 40.4 percent after it. In the Netherlands, Becht et al. (1998) interviewed 64 children and their parents 6 months post flood and found 15–20 percent of the children having moderate to severe stress symptoms. Other studies after the 1997 floods in Opole, Poland, also suggest long-term negative effects on the well-being of children aged 11–14 years and 11–20 years, with increases in posttraumatic stress disorder (PTSD), depression, and dissatisfaction with life. Post-traumatic stress disorder. PTSD ''arises after a stressful event of an exceptionally threatening or catastrophic nature and is characterized by intrusive memories, avoidance of circumstances associated with the stressor, sleep disturbances, irritability and anger, lack of concentration and excessive vigilance [and the specific diagnosis of PTSD] has been questioned as being culture-specific, and may be over diagnosed'' (World Health Organization, 2006).

Nonetheless, studies showing increases in PTSD following floods come from Europe and North America . (McMillen, North, and Mosley, 2002), who interviewed those affected by the 1993 Midwest floods, found that 60 subjects (38 percent) met the criteria for post flood psychiatric disorder and 35 (22 percent) met the criteria for flood-related PTSD.

However, the limitations, recognized by the authors, included retrospective data collection, self selection of interviewees, self-reporting, and the absence of a control group. Similar limitations applied only to a study of 1997 flood victims in the Central Valley of northern California ,19 percent of the 128 participants who completed the acute stress disorder questionnaire met the criteria for the disorder's diagnosis, and of the 73 participants who completed the 1-year follow-up, seven (10 percent) met the criteria for full PTSD.

Studies of the 1996 flooding in the Saguenay/Lac St. Jean region of Quebec, Canada, also suggest substantial increases in emotional distress and PTSD among flooded respondents.

Furthermore, in Nigeria Kofo (2012) carried out qualitative studies of recent floods and sustainable growth and development of cities and towns in Nigeria and he found out that extreme weather events have caused havoc to lives and properties in recent years. Research and development have also been focused on these global phenomena and that the situation is getting alarmed in Nigeria. Using topographical maps of 25 cities and towns he studied the incidences of floods in Nigerian cities and towns.

Floods, drainage channels, run-offs and effects of human activities on floods were observed by him.

He also used interviews conducted with 20 professionals, urban dwellers and twenty Local Government Chairmen of the cities and towns. There was a questionnaire that was administered among 2,000 urbanites. He collected data about the

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frequency, sizes and havocs caused by floods. The result showed that some of the cities particularly Lagos, Warri and Port-Harcourt are under the sea level with average gradient of less than 1:100,000.

Run-offs are increasing in volume and areas of coverage but relatively drainage channels are inadequate; and they have been blocked through the adverse living habits of the urban dwellers. Waste waters are contributing as base water to rain water in the drainage channels. These result in grievous consequences of flood. All forms of transportation are affected each time it comes; lives, farm lands and properties are lost; and economic activities are grounded. Human factors are predominantly the cause. More attention has to be paid to urban physical planning.

(Eni et al, 2011) carried out a study of Flood and its Impact on Farmlands in Itigidi, Abi Local Government Area, Cross River State, Nigeria. They noted that flooding has significant impacts on global and regional food production particularly the common stable food crops performance in tropical sub-humid climatic zone. In their study they farm land was divided into fifteen (15) plots for easy analysis. A quadrant of 5Oni x

50m was demarcated and the different types of crop cultivated in the study area were identified. The depth of inundation of river water was measured a meter rule of 100ml. Soil samples were collected and taken to the laboratory to determine the soils physical properties. A semi Structured interview was held with 50 farmers.

The interview covered topics such as farm characteristics causes of floods, types of crops destroyed and factors influencing flood. The result reveals that plot 8 with degraded vegetables covered a total area. 175 hectare, also the crops was inundated to a depth of 15m. Crops such as water leaf, tomatoes, melon and cucumber were highly devastated. Cassava, pepper, potatoes and tomatoes were cu1tivated in soils with 69% sand content and has a textural class known as sandy loam. The mean of sand, silt and the clay content in the study area was 494.5, 18 and 15.8 respectively.

Ph value ranged from 5.10 -6.70. The above result showed that flooding had a significant impact on soil physio-chemical properties because organic matter and nutrients were leached down the soil. It was recommended that plant species that are tolerant to excess water inundation should be improved within the study area to ensure large scale crop production.

There is no doubt that the world is under serious threat from the environment: From China to Mexico,

Indonesia, United States of America, United Kingdom and Nigeria, analysts have argued that the environment was only responding to the abuses heaped on it by man's activities (Christopherson, 1997). The concern is that the world may be getting close to extinction through natural disasters unless immediate actions are taken; and the signs are just too apparent to be ignored (Christopherson, 1997).

Specifically, in May 2008, floods triggered by torrential rains killed dozens of people across China, while thousands of others were victims of landslides caused by the downpours. China is not alone. In the United

States of America, the Mississippi River caused damages put at several millions of dollars when it over flew its banks, flooding some cities, towns, farmlands and major industrial installations over a distance of about 250km and ravaging Iowa before it heaped downstream.

Apart from the Mississippi-Missouri River Systems of 1993, and that of 1995, world records of flood have it that recently severe floods were experienced in Norway, China, Bangladesh, Ghana, The Netherlands and South Florida, (Christopherson, 1997). In February 2000, a cyclone swept across Mozambique which left some

950,000 people homeless as floods devastated huge areas of low-laying lands. Roads, homes, bridges and crops were destroyed.

It is over 14 million Indians that were victims to the flood of August 2007 in SathyaSai Baba, a major human settlement, of that region. The nation's government could not organize any emergency relief immediately. Rather, it spent over $1.6 billion on Hawk Jets. Hunger and diseases stalked the India children and the poor in the region. In Nigeria, apart from the Ogunpa Stream in Ibadan that killed several people and completely grounded socio-economic activities in 1980, in August 2008, the residents of Makurdi were thrown out of their residences and their farmlands left impoverished after two days of heavy down pour of rainfall. It was described as very disastrous, (Taiwo, 2008). He also reported in This day (August 18th) that "at least five hundred people were rendered homeless and properties worth several millions of Naira were destroyed when a flood, occasioned by torrential rainfall ravaged Babura, a town in Jigawa State in a period of two days". Akani and Bilesanmi (2011) report how a Lagos flood forced Lagosians to relocate as a result of heavy rain of 7th and 8th of July 2011 not knowing there was going to be a more devastating torrential rain that will result in "more disastrous floods in Lagos Metropolis" in the following week.

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Often, "Send down the rain" is the supplications of Nigerians early in the years in expectation of bountiful harvests. In the recent years, the rains came indeed, but in torrents, giving rise to deadly floods instead, causing harvests of pains. From Lagos, Ibadan, Abeokuta, Calabar, Port-Harcourt and Warri in the southern region through Ilorin, Abuja, Lokoja and Minna in the Middle belt to Kano, Kaduna Jalingo, Maiduguri and Lokoja in the North, the rains came down and floods came-up, washing away streets, battering dams, collapsing bridges, submerging buildings, killing people, trapping some in their homes and separating thousands of others from theirs.

However, from the whole old worldwide story from the book of Genesis (Genesis 7:4-10,) and the recent experiences and records, it is clearly known that a flood is a high water level that overflows the natural

(and or artificial) levees along any portion of a stream. It is common throughout the world and it is a natural response of a river or stream or mere drainage valley/channel that has too much water to cope with. Heavy rainfall (combine with snow melt in the temperate regions) causes channels to be overtopped, and flood waters surge over the neighboring floodplain. It is usually "very large body of water covering the land that were usually dry and beyond its banks" - destroys farm lands, property, industrial installations, roads, railways, residences and it carries people away.

In other words, it is usually abrupt, accidental, destructive and harmful. It is usually very devastating to any community and our nation it affects economically and socially. Though, sometimes, it is not without some advantages (Pilgrim and Cordery, 1993) and (Aderogba, Oredipe, Oderinde and Afelumo, 2009).

Occurrences of floods in the cities and towns of Nigeria in recent times have been great concern and challenge to the people, Governments and researches. There have been journalistic and non-quantitative reports of flood for several parts of Nigeria including Lagos. But they are superficial and lack directions for professionals and policy makers (Aderogba, 2011). Above all, there is none, of recent, to describe the magnitude and criticality of the phenomena with the attendant problems. The works of Adeaga (2008), Oyegbile (2008) and Oyebande (1990 and 2005) are paraphrasing, disjointed or sectional. They are not laconic. Adeaga (2008) Flood

Hazard Mapping and Risk Management in Part of Lagos N.E is only on mapping of the hazards caused by flood in the North Eastern part of Lagos Metropolis.

Similarly, the work of Aderogba (2011) on the Challenges of Global Warming and Floods in LagosMetropolis, Nigeria is an expository of the poor planning of the physical environment of Lagos Metropolis and poor living habit of the residents vis-a-vis the resultant floods. The entire nation requires attention, More importantly, the frequency of occurrence and in several parts of the nation with the attendant havocs call for concern and serious attentions too.

Human activities such as dam construction, irrigation, bridges and others have impacted on free flow of water in the drainage channels, rivers and streams. Particularly at the urban centers, construction of roads, buildings, factories, manufacturing plants, farmlands and others have reduced their channels and or have attempted diversion of the natural courses of others. The vegetation cover typically reflects rainfall patterns, soil types and variations in altitude. In general, rainfall diminishes from the south and south-east towards the north.

The coast has rain during all months of the year while the north has rain for approximately half of the months of the year. In the coastal regions, the annual rainfall is of the order of 4,000mm dropping to about 500mm in the extreme north. The assured supply of rainfall, especially during the rainy season, and the consistent high temperature throughout the year make for plant growth everywhere, (Afolabi, 1973).

But urban activities of man have changed the face of the earth. What is often found is man-made: Roof top of buildings, concrete surfaces and bare grounds. Road constructions, residential and commercial buildings, hospitals and maternity homes, schools and colleges, research institutes, markets and stores, filling stations and others demanded for concrete surfaces all of which have increased surface run off from rainfall and the wastes waters which have inadvertently added to the waters in the rivers, streams and drainage channels. Apart from those that are found dotting the outskirt of major cities and towns, manufacturing and other industrial processes and productions are most concentrated at the urbanized Lagos-Sango/Ota-Abeokuta-Ibadan industrial Axis, Kano-Kaduna-Jos Triangle, Asaba-Onitsha-Benin-Sapele-Warri Sector and Aba-Port-Harcourt-Enugu-Onitsha- Owerri Complex.

Similarly, Kofo, (2012) carried out a research titled "Global Warming and Challenges of Floods in Lagos Metropolis, Nigeria and found out that global warming and extreme weather events have caused havoc to lives and property in recent years. Research and development, workshops,

conferences, seminars and others have also been focused on these global phenomena. In his research his studied the parameters of floods and effects of urbanization and living habits of the urban dwellers using questionnaire that was administered among 2,000 Lagosian to collected data about the frequency, sizes and havoc caused for most of the time it occurred. The result showed that the Metropolis is on low land with an average gradient of less than 1:100,000. Run-offs are increasing in volume and areas of coverage but relatively drainage channels are inadequate; and they have been blocked through the living habits of the urban dwellers.

Waste waters from homes, hospitals and maternity homes, markets, Schools and colleges, manufacturing industries and others are contributing as base water to rain water in the drainage channels. There are grievous consequences of flooding at some localities. All forms of transportation are affected each time it comes. Weather related disasters are becoming increasingly common. He suggested that the Lagosian and the governments should not allow global warming to compound the challenges of flood in the metropolis. Lagos state according to him needs proper drainage system maintenance, awareness on why people should not dump/block their drainage system.

Assessing the effects of flooding on residential property values in Lekki Phase 1, Lagos, Nigeria was carried out using survey approach. A total of 200 copies of the questionnaire were administered on the residents while 126 copies were retrieved (63%). Also, a total of 81 questionnaires were administered on Estate Surveyors and Valuers within Victoria Island and Lagos Island axis and 43 (53%) were retrieved. The data collected was analysed using both descriptive and inferential statistical tools. The study found that almost 70% of the properties are owner occupied; prominent causes of flood are drainage problems and rise in sea level.

The study further found that there is disparity in rental values of properties in flooded and non-flooded areas. The paired sample t-test conducted showed that there is statistically significant relationship between four pairs of the properties. The study therefore recommends that construction of drainage channels should be made wide enough to drain a large quantity of water.

Various studies had identified location, neighbourhood characters, property characters and environmental characters as factors affecting property values. Flooding in most cases are natural occurrence that damages life and properties whenever it occurs. Lekki Phase I, having experienced consistent flooding over the years.

Effects of Flooding on Values of buildings

Various scholars have researched on the impact of flooding on property values in different nations. In the United States of America existing studies have examined the impacts of both flood risk and a particular flood event on house prices. A consensus reached stated that flood risk lowers house prices after controlling for property attributes, location and neighbourhood characteristics, although the magnitudes of price discounts vary (MacDonald, Murdoch and White 1987; Holway and Burby, 1990; Bartosova et al., 1999; Harrison, Smersh and Schwartz, 2001; Hallstrom and Smith, 2005; Bin and Polasky, 2004). Tobin and Montz (1988) compared means/medians of property values before and after the 1985 flood event in Yuba County, California, using simple t-tests. They found that immediately after the flood event there was no property market in the flooded area and houses were sold in the next few months but at a lower price; as memories of the flood receded, the housing market picked up to better than pre-flood levels. These findings are based on a small sample size (62 properties) and no allowance was made for the differing characteristics between houses. In the authors' following paper (1989), No significantly negative effect of flooding was reported. Montz (1992) examines the relationship between flooding and residential property values through repeat sales techniques, in three New Zealand communities, TePaeroa, TeAroha and Thames. He finds differing reactions to the disaster in different communities. For example, in TePaeroa flood-free properties experienced a significant increase in prices following the flood event while those flooded did not. In TeAroha the entire community experienced a decline in property values. In Thames however, no price decrease existed. Another study in Pennsylvania, California and Illinois finds that selling prices fell following flood events but recovered to levels at or above pre-flood values; and the recovery period was shorter for places experiencing less severe flooding (Tobin and Montz, 1994). Three possible explanations exist to interpret the inconsistent results about the house price effects of a flood event. First, different socio-economic contexts and flood experiences may result in differences in people's perception of flood hazard and therefore market behaviour of house prices (Montz, 1992; Tobin and Montz, 1994). If flooding occurs only rarely in an area and there is a long time gap between two flood events, it is likely

that house price falls immediately after a flood event and then recovers, as people tend to forget flood risks. If flooding occurs frequently, house prices may remain low as the market does not have enough time to recover between flood events. In this case, flood risks have been completely capitalised into house price and future flood has no impact on property values. A second explanation for the mixed findings in the literature is that sample sizes in some studies are too small to reach robust conclusions, e.g. 62 properties in Tobin and Montz (1988). A third explanation concerns different methods used by researchers in various studies. For example, some studies controlled for property attributes while others did not. Bin and Polasky (2004) uses the 1999 Hurricane Floyd as a natural experiment to analyse property prices of 8,375 homes between 1992 and 2002. The authors reported that houses located within the floodplain were worth on average 5.7% less than a comparable property located outside of the floodplain. This price discount doubled after Hurricane Floyd. In United Kingdom, Eves and Brown (2002) wrote on the impact of flooding on residential property values in England. The objectives of their research were to determine the performance of flood affected properties in comparison to similar nearby residential properties that are not flood liable, to establish if there is an increasing reluctance for insurance companies to insure residential property in flood liable areas, and to determine if flood liable residential property provides an additional security risk to financial institutions in the home lending market. Eves and Brown(2002) quoting the Environmental Agency (2001) stated that over 10% of the population of England and Wales is directly at risk from flooding, with a greater percentage of the population being indirectly affected by flooding due to road closures, service disruption and the loss of goods and produce. This was equated to 1.85 million residential properties in England being at risk of flooding, with an additional 185,000 commercial properties also being situated in flood prone areas. Based on these residential and commercial property numbers, Environmental Agency (2001) stated that there were up to five million people in England and Wales who were directly at risk from flood event and that as at 2001 the value of residential and commercial properties subject to flooding was over £200 billion, with a further £14 billion of rural land subject to flooding. The study was based on the survey of chartered surveyors in all counties of England that had been identified as flood liable and subject to coastal tidal flooding. These counties were identified from the Environment Agency flood maps. The result of the survey showed that out of the 23 counties surveyed, 12 counties rarely experienced any residential property flooding, with a further 4 counties experiencing frequent flooding and seven counties being subject to regular flooding. Their findings also revealed that the decline in residential property values is linked to the availability of both residential property insurance and finance. In areas where insurance is difficult to obtain, the impact on residential values is more significant. Eves and brown, (2002) concluded in their research that there is a direct significant correlation between the severity of a flood and a reduction in residential property values. A severe flood provides a very visual short-term impact on the property buyer, seller, chartered surveyor, insurer and financier. Previous research by Eves (1999) indicated that this perception of flooding reduces in relation to purchasers and sellers but is still a significant factor for the other parties involved in residential property.

In Australia, Eves (1999) researched on the long term impact of flood effect on residential property prices in Australia. The research was conducted to determine the performance of flood affected properties in comparison to similar nearby residential properties that are not flood liable and to establish if the difference in values between flood liable residential properties and flood free residential properties is constant, or decreases as the time period from the last known flood increases. In his research he quoted Lambley and Cordery (1991) stating that the property that is subject to over floor flooding can result in the overcapitalization of the property due to the requirement to restore the property after flooding has occurred and that not rectifying the damage from flooding may minimize the problem of overcapitalization but would result in the loss of property value due to the neglected state of the building and overall structural depreciation. He also quoted Fibbens, (1992) stating that flood prone properties are not considered as attractive as other residential properties and this results in a lower price or value and that on this basis the greatest impact on value or price would be immediately after a severe over floor flood where both disruption and property damage occur. Eves, (1999) analysis, showed a definite price differential between similar types of properties that are flood free compared to the same type of properties that are flood liable. He noted that the price differentials were not uniform but varied on an annual basis. His research confirmed that the results of earlier studies that flood liable property has a lower value than

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similar property that is not flood liable. The study also showed that following a period of both decreasing property prices and only small annual increases in property prices,

IV. RESEARCH METHOLOGY

The methods employed for this study embrace extensive searching of literatures connecting to the study such as journals, textbooks and internet. Primary data were collected in Lokoja, Kogi State. The sample frame for this study comprised of Architects, Builders and town planners. 60 structured questionnaire were administered to the respondents (Architects 20, Builders 20 and Town planners 20), after selecting them by simple random sampling technique. On the whole, a total of 49 (82%) questionnaires were returned completed in a suitable format. After preliminary analysis of the data, the screened questionnaires for analysis accounted for: 15 from Architects; 16 from Builders; and 18 from Town planners. Data analysis were undertaken of using descriptive statistics by the application of Microsoft excel and statistical packages for social science (SPSS) where frequency mean and percentages were employed to interprete the results.

V. RESULTS AND DISCUSSION

This section presents the findings for this study. In Lokoja, the study area, 30.6% are Architects, 32.7% are Builders and 36.7% are Town planners. The distribution of professionals shows adequate representations as their contributions will help to source reliable findings (Table 1)

Table 1. Distribution of Professionals

Profession	Frequency	Percentage
Architects	15	30.6%
Builders	16	30.7%
Town planners	18	36.7%
Total	49	100

Findings as shown in Table 2 reveals that majority of the respondents have between 6 to 15 years of experience with an aggregate percentage of 65.4%. This indicates their possession of value knowledge in the built environment and therefore better placed to contribute meaningfully.

Table 2 Experience of respondents in the construction industry

Years of experience	Frequency	Percentage %
1 – 5	2	4.1
6 – 10	16	32.7
11 – 15	16	32.7
16 – 20	11	22.4
Over 20	4	8.1
Total	49	100

Table 3 findings reveals that registered professionals with HND qualification accounted for 20.4%, Bsc accounted for 49.0%, M.sc accounted for 26.5% and others which include those with PGD qualification accounted for 4.1%. This is a proof that majority of the professionals possessed the necessary qualification and training for efficient delivery of responsibilities. Furthermore, they are in a better position to offer professional advice with regards to the construction of the housing facility.

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Table 3: Respondents Educational Qualification

Educational Attainment	Frequency	Percentage %
HND	10	20.4
B.Sc	24	49.0
M.Sc	13	26.5
Others	2	4.1
Total	49	100

Findings on the effects and consequences of flooding reveal that, mortality ranked 1st, injuries ranked 2nd, Vector – borne disease ranked 3rd, Rodents – borne disease ranked 4th while mental health ranked 5th respectively. This shows that the rate of death rate during flood disaster is high as shown in table 4.

Table 4 Effects and consequences of flooding

Consequences of flooding	N	Sum	Mean	Rank
Mortality	49	174	3.55	1st
Injuries	49	168	3.42	2nd
Vector – borne	49	156	3.18	3rd
Rodents – borne disease	49	153	3.12	4th
Mental health	49	141	2.87	5th

Table 5 shows effects of flooding on the values of buildings. Reduction of the amount of rent with mean of 4.51 ranked 1st, reduction of the remaining operating life period with mean of 4.38 ranked 2nd, increase in maintenance cost with mean of 4.30 ranked 3rd, consideration of actual cost for restoring the original condition of the property and degree of difficulty in obtaining residential property insurance in flood liable area with a mean of 4.28 and 4.24 ranked 4th and 5th respectively (Bin &Polasly, 2004, Tobin and MonEZ, 1994).

VI. CONCLUSION

Sea level rise, increase of storms and heavy rain that result in flooding and a general higher flood risks, these are the consequences of climate change we have to expect in the future. Even if some studies did not show an influence on the price of real estate most of the findings of this study see a negative influence on the market value of real estate by flooding.

Climate change means that natural disasters such as flooding will be more common in the future and financial losses will increase.

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