ASSESSMENT OF RAINSTORM DISASTER AND COMMUNITY RESPONSE IN BIDA AND ENVIRONS, NIGER STATE,NIGERIA

BY

MOHAMMED MAIKUDI

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ABSTRACT

Rainstorm Disaster is one of the challenges aspect that involve the interaction between man and environment of a wider public concern in the problem of environmental pollution and control. The reduction of the risk of this rainstorm disaster is a major concern to the research work as this natural disaster cannot be stopped but their devastating Effect can be reduced to the barest minimum.The need to sample the opinion of the residence in the study area on how they have been coping with the incidence of rainstorm disaster is of great importance.Findings shows that no landuse is free from this disaster in as much as the land use is vulnerable to effect of the disaster and this effect can be seen in the physical destruction of human abode which is a catalyst to urban decay. This destruction could be in small scale or large scale.Findings suggest that the mitigation strategies employed is such that needs government attention, if the welfare of the citizens is government responsibility. This is because the mitigation strategies have devastating implication to life and property. By the recommendation, Bida town and environs will achieve disaster risk reduction and management if the recommendation is adhered to which is a catalyst for sustainable development because no meaningful economic development without improvement in infrastructure facilities.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Disaster is an extremely devastating events within the natural and man-made environment, with huge economic, social and environmental losses (Samuel,2009).Disasters are the major cause of great lost both to living and nonliving things. However, disasters don't just occur on their own; they are usually triggered by man's influence or developmental activities leading to lost of life and property. Disasters are experienced in our environment when life support system fails in the face of pressure from external stress, resulting in lost of life, damage to property and undermining of livelihoods (Dare, 2010).

Niger state is located within the north central geopolitical zone of Nigeria. It is blessed with different types of natural and human resources. Theoretically speaking, almost all the local governments in Niger State are exposed to disaster in one form or the other. All these are called disaster because of the huge negative impact to human environment. They are natural hazard which has the potential of becoming full fledge disaster, especially when it strikes an unprepared human environment (Habiba,2011).

The occurrence of rain and windstorms disasterin many parts of the world and particularly in Nigeria are keeping many homes miserable.Rainstorm disaster which is a seasonal type of natural disaster often affect and displace people and destroy property and farmlands. Bida been situated in a valley created by the river Landzu flowing right across the heart of the town as created a ready scenario for rainstorm and associated disaster, (Yakatun,2010) . None of the disaster can be treated in isolation since no one knows what may result as the

trend of natural forces may reverse themselves at any given time. However, man must preserve the environment through peaceful means and there must be calculated attempts to preserve the environment (Dare.2010).

Community response in the process of informing the general population of the community, increasing level of consciousness about risk and how people can act to reduce their exposure to hazards. This is particularly important for community officials in fulfilling their responsibilities to save lives and property in the events of a disaster and also to improve the understanding of disaster issues, especially among the general public, school children, women, and to also mobilize indigenous and traditional practice of early warning and mitigation initiatives.

Community response activities foster changes in behavior towards a culture of risk reduction. This involves community information dissemination, education, radio or television broadcasts, use of printed media, as well as the establishment of information centres and networks, and the community participation (Salisu*et al*, 2010) .

The outcome of a disaster is understood to bring about a vulnerable individual or society being hit by a human made or natural event. The vulnerability of an individual or society can be alleviated through short term coping and longer term adaptations that adjust human actions to minimize risk impact or outcomes. It is in the light of this that there is the need to study the various rainstorm disasters and community response adopted in Bida local government area which has increased the society's resilience to a frequently occurring disaster.

1.2 Statement of Research Problem

The rainstorm disaster has overtime been exacerbated by human activities. Such activities are basically due to indiscriminate and unwise land uses, have direct negative impact on the people and their welfare. This could also be as a result of cumulative action of natural and geographical processes on land and nature (Samuel,2009). The magnitude of disaster is not determined by rainstorm disaster alone but also by the pattern of vulnerability of the location in which people live. The lives and livelihoods of many poor people are hardest hit by rainstorm disaster. Many impacts of rainstorm are similar to other disasters although their magnitude, nature and scale may vary and these impacts could be caused in different ways.

Bida local government experiencedrainstorm disasters which occured in recent and previous years affected many wards in the town and environs. Many mud houses were badly damaged, the roads and streets were over flooded with rain water. Wards like Esso, Landzu, Banyaggi, Bariki and Wadata, were overflowed as the rainstorm also destroyed economic trees, buildings, and electric poles. Victims of this disaster include, peasants and retired civil servants. Federal Polytechnic structures; all were seriously hit by the storm, that some of its lecture rooms and laboratory equipment were lost to the disaster. Government establishments like secondary schools, part of Federal Medical Center, shops, mosques, residential buildings, were also not left out.

This work intends to examine the causes and effects of rainstorm on the health, livelihood and environment of the people living in Bida Local Government Area and environs. It will also take into account the role planning, especially disaster planning and management can play in ameliorating the situation whenever it occurs. Planning intervention to achieve stable ecological equilibrium, convenience, aesthetics, fostering of social values, functional and

efficient economic environment with a decent and aesthetically pleasing physical environment. When the environment becomes degraded, all forms of life are threatened. Therefore we need to ensure that our activities do not damage the diversity and integrity of nature.

Effective management of the environment is essential if we are to reduce the impacts of natural disasters and the risk associated with environmental degradation in Nigeria and the world at large. The high incidence of rainstorm in Nigeria particularly in Bida and environs is such that has rendered a lot of people homeless, destroyed large parcel of farmland which indirectly affects socioeconomic aspects of urban life and livelihood activities.

1.3 Aim and Objectives

1.3.1 Aim

The aim of this research is to assess rainstorm disaster and community response in Bida local government area and its environs. This is to highlight possible prevention measures that can eliminate rain storm disasters in urban areas, of Niger State and Nigeria at large.

1.3.2 Objectives

i. To assess the physical extent of damage resulting from the rainstorm disaster.
ii. To examine the socio-economic effects of rainstorm in the study area.
iii. To identify mitigation strategies as a response used by those affected by the rainstorm disaster.
iv. To offer recommendations that will further strengthen disaster mitigation practices in urban areas.

1.4 Research Question

This research project will cover physical assessment of the rainstorm damages, strategies employed to cope with rainstorm disasters, and the level of the people response in Bida local government area of Niger State, Nigeria.

Field work revealed Language barrier as one major impediment to this study while administering questionnaires to respondents who have little or no formal education. However, with the help of interpreters the problem was overcomeand bias attitude of respondent to qualitative research, has further added hurdles to smooth and near perfect achievement of research objective.

1.5 Justification of Research

The people that have worked on similar studies are few (Ibrahim 2007, Samuel, 2009,Dare, 2010, Mike, 2010) thus, the need to undertake this study to further the frontiers of knowledge. Therefore, it is obvious that natural disaster cannot be stopped but their devastating consequences can be reduced by building resistance and community response which will make success of strategies to cope with the event whenever it happens.

1.6 Study Area

Bida local government is about 87 kilometres south west of Minna, the Niger State capital. The local government area is generally situated in the southern Guinea savannah zone of Nigeria. The local government shares boundary with Gbako and Lavun local government areas. Bida local government is one of the 25 local government area that makes up the present Niger State.

It is the third largest city in Niger State, with an estimated population of 178,840(Census,2006). Bida is on latitude 9^0 6^0N and longitude 6^01^0E on the Nupe sandstone formation. It is located 19kms east of River Kaduna, along Mokwa- Bida road and about 87kms south-west of Minna the Niger State capital. The major ethnic group is Nupe. Bida is the headquarters of the Nupe Kingdom led by the EtsuYahayaAbubakar and consisting of many districts, such as Katcha, Lapai, Mokwa, Enagi, Baddeggi, Agaie,Pategi,Lemu, Kutigi, and others. The leadership style of the ancient town of Bida is emirship, and the head of the town is addressed as EtsuNupe.Figure 1.1 and 1.2 shows the geographical location of Niger State in Nigeria and Bida Local Government in Niger State.

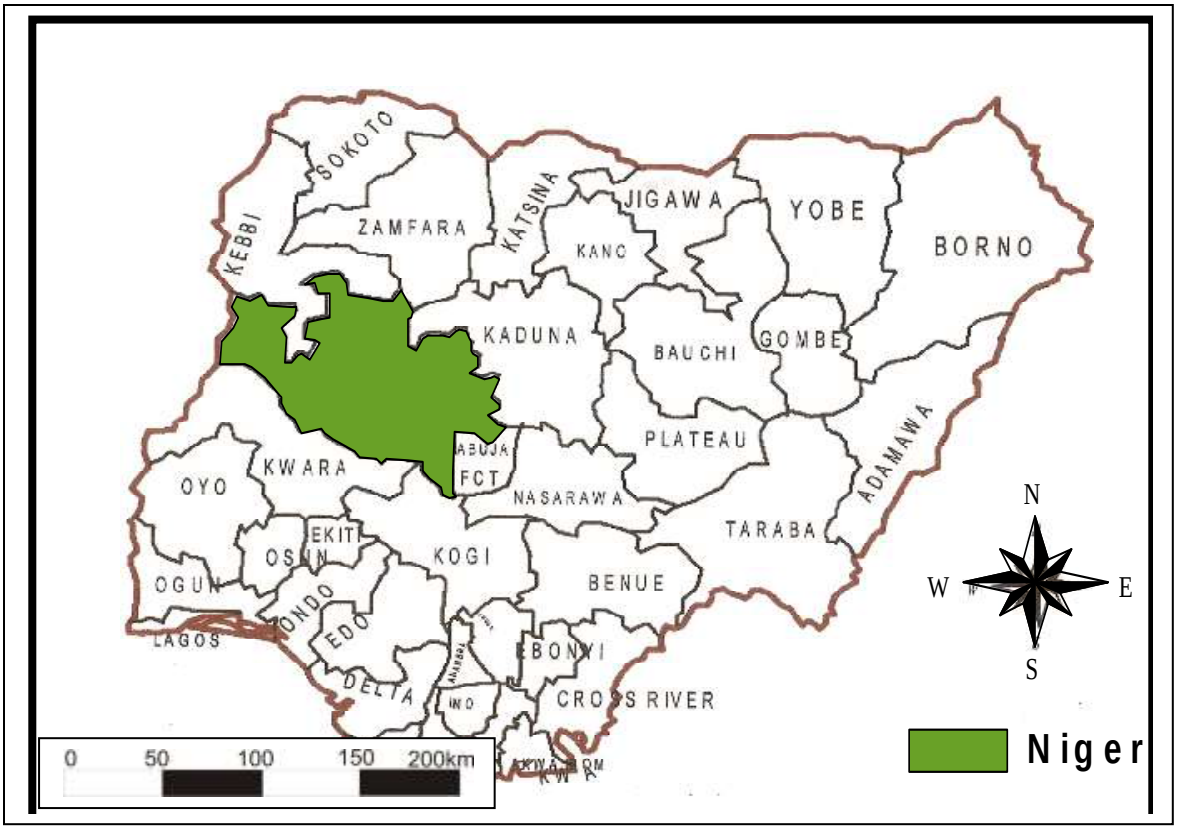

Figure 1.1: Map of Nigeria showing the Location of Niger State
Source: Niger State Ministry of Lands and Housing, Minna.

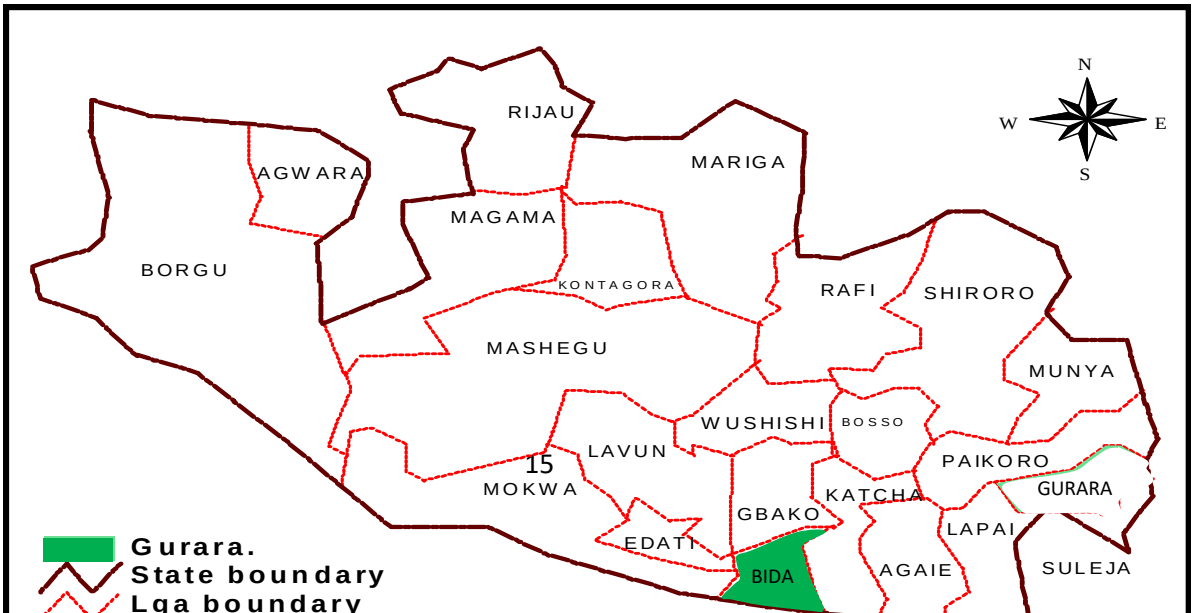

Fig. 1.2: Map of Niger State showing Bida the Study Area
Source: Niger State Ministry of Lands and Housing, Minna.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Frame work

The importance of rainfall cannot be overemphasized. For one, it provides cool weather, rain is a source of water, which is life supporting. Rain is also very important for producing food and cash crops. Without it farm crops cannot grow, consequently, when rainy season is near people look forward to its arrival with great expectations and nostalgia. Water is a friend to all humans, be that as it may, despite its friendliness it can also be an enemy as rainstorm or over flooding can also occur with attendant consequences (Bruce, 2009).

Rainstorm disaster which is a seasonal type of natural disaster often affect and displace people and destroy property and farmlands. This can occur as flash flooding and heavy downpour, thunderstorm and lightning, strong winds.Hence the need to focus on how a town, is expected to grow and develop putting in mind aesthetic, convenience, and economy; and as such it help to combat the problem of rainstorm development and community response.

2.2 Thunderstorm and Lightning

Thunderstorm can bring heavy down pour, flash flooding, strong winds and lightning (Walter,2005). Thunderstorm are usually accompanied by strong winds, heavy down pour and sometimes hail. Thunderstorms results from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, its cools, condenses, and forms cumulonimbus clouds that can reach heights of over 20km. as the rising air reaches its dew point, water droplets and ice forms

and begin fall. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at the earth's surface and causes strong winds associated with thunderstorms(Mooney,2007).

Thunderstorms can generally form and develop in any geographic location, perhaps most frequently within areas located at mid-latitude when warm moist air collides with cooler air. There are four types of thunderstorm: single-cell, multicell cluster, multicell lines and supercells. Supercell thunderstorms are the strongest and the most associated with severe weather phenomena. Mesoscale convective systems formed by favourable vertical wind shear within the tropics and subtropics are responsible for the development of hurricanes (William, *et al* 2003). All thunderstorm, regardless of type, go through three stages: the developing stage, the mature, and the dissipation stage (Mogil,2007). Depending on the conditions present in the atmosphere, these stages take an average of 30 minutes to go through (NSSL,2006).

Thunderstorms are responsible for the development and formation of many severe weather phenomena. Thunderstorms, and the phenomena that occur along with them, pose great hazards to populations and landscapes especially in Nigeria. Damage that results from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy downpour (Mooney,2007). Each year, many people are killed or seriously injured by severe thunderstorms worldwide despite the advance warning.

Lightning is an electrical discharge that occurs in a thunderstorm. It can be seen in the form of a bright streak (bolt) from the sky. Lightning occurs when an electrical charge is built up within a cloud, due to static electricity generated by supercooled water droplets colliding

with ice crystals near the freezing level. When a large enough charge is built up, a large discharge will occur and can be seen as lightning(Giles,2004). Lightning occurs with all thunderstorms. Lightning is a major threat during a thunderstorm. In the Nigeria, between 75 and 100 people are hit and killed by lightning each year. The temperature of a lightning bolt can five times hotter than the surface of the sun (Giles,2004). Contrary to the popular idea that lightning does not strike twice in the same spot, some people have been struck by lightning over three times, and skyscrapers like the Empire State building have been struck numerous times in the storm(GSFC,2003). The loud bang that is heard is the super heated air around the lightning bolt expanding at the speed of sound. There are several types of lightning: In cloud lightning, Cloud to ground lightning, ground to cloud lightning, cloud to cloud lightning, cloud to air lightning. One of the more significant hazards lightning can pose is the wildfires they are capable of igniting (Scott,, 2000). Under a regime of low precipitation, where little precipitation is present, rainfall cannot prevent fires from starting when vegetation is dry as lightning produces a concerntrated amount of extreme heat (Rakov,1999). Wildfires can devastate vegetation and the biodiversity of an ecosystem. Wildfires that occur close to urban environments can inflict damages upon infrastructures , buildings, crops, and provide risk to explosions, should the flames be exposed to gas pipes. Direct damage is caused by lightning strikes which occurs on occasion (Bruce,2009). In areas with a high frequency for cloud to ground lightning, like Nigeria, lightning causes several fatalities per year, most commonly to people working outside.

2.2.1 Flash Flooding and Heavy downpour

Flash flooding is the process where a landscape, most notably an urban environment, is subjected to rapid floods(AMS,2009). Flash flooding can frequently occur in snow-moving

thunderstorms and is usually caused by the heavy liquid precipitation that accompanies it. A flash flood is the fastest moving type of flood. It happens when heavy downpour collects in a stream or gully, turning the normally calm area into an instant rushing current. The quick change from calm to raging river is what catches people off guard, making flash floods very dangerous. Any flood involves water rising and overflowing its normal path. But a flash flooding a specific type of flood that appears and moves quickly across the land, with little warning that its coming. Many things can cause a flash flood. Generally they are the result of heavy downpour concerntrated over one area. Most flash flooding is caused by slow- moving thunderstorms, thunderstorms that repeatedly move over the same area, or heavy down pour from hurricanes and tropical storms (AMS,2009). Dam failures can create the worst flash flood events. When a dam or levee breaks, a gigiantic quantity of water is suddenly let loose downstream, destroying anything in its path. Flash floods are most common in densely populated urban environment like Lagos, where few plants and bodies of water are presented to absorb and contain the extra water. Flash flooding and heavy downpour can be harzadous to small infrastructure, such as bridges, and weakly constructed buildings. Plants and crops in agricultural areas can be destroyed and devastated by the force of raging water. Automobiles parked within experiencing areas can also be displaced. Soil erosion can occur as well, exposing risks of landslides phenomena. Flash flooding can also spread and produce waterborne and insect borne diseases cause by microorganisms. Flash flooding can also be caused by extensive rainfall released by hurricanes and other tropical storms, as well as the sudden thawing effect of dams (NWSFO,2006).

2.2.2 Strong wind

Wind is the flow of air on a large scale. On the earth surface, wind consists of the bulk movement of air. Wind is caused by differences in pressure. When a difference in pressure exists, the air is accelerated from higher to lower pressure. Strong winds can produce numerous hazards to landscapes experiencing thunderstorms. Strong winds can generally be powerful, and are often mistaken for wind speeds produced by tornadoes,(NWSFO,2009) due to the concerntrated amount of force exerted by their straight- horizontal characteristics. Strong winds can be hazardous to unstable, incomplete, or weakly constructed infrastructures and buildings. Agricultural crops, and other plants in nearby environments can be uprooted and damaged. Airplanes and other aviation transportations can be exposed to risks of crashing during takeoffs and landing periods(NWSFO,2009). Automobiles can be displaced by the force exerted by strong winds. Strong winds are usually formed in areas when high pressure air systems of downdrafts begin to sink and displace the air masses below it, due to their higher density. When these downdrafts reach the surface, they spread out and turn into the destructive straight- horizontal winds(Mogil,2007). Strong winds are known to cause damage, depending upon their strength. Infrequent winds gusts can cause poorly designed suspension bridges to sway. When wind gusts are similar frequency to the swaying of the bridge, the bridge can be destroyed more easily, such as what occurred with Tacoma Narrows Bridge in 1940 (Grazulis,2001).

2.3 Community Based Emergency Response Teams

A relatively new approach to local involvement in disaster response is emerging across counties and communities in the United States. The Community Emergency Response Team

(CERT) program seeks to train and empower local community residents to shoulder the responsibility of being first responders to emergencies. CERTs, which are administered by Citizen Corps and FEMA within the Department of Homeland Security, blend a bottom-up appreciation for the role of local volunteers in emergency response with a top-down institutional framework to facilitate training and coordination. There is much promise in the CERT program as a strategy for local empowerment and effective disaster response in rural communities. To be effective, however, the CERT program should be adaptable to different levels of local capacity and should broadly represent the citizenry it is intended to protect and serve. It is also possible that by developing local capacity for disaster response, CERT teams may be able to expand their applicability to non-disaster community development activities(Brennan,2006).

While CERTs have predominantly focused on disaster preparedness and recovery, this does not always need to be the case. CERTs provide a framework for pulling together localities to prepare for times of need. This process of building community and response structures has application beyond the context of disasters. In rural communities with high disaster response capacity, established networks, infrastructures, and alliances are likely to already exist to allow a community to plan for its needs and build on its strengths to achieve desired goals. Such capacity for providing these community services does not always exist, but can be cultivated and should be encouraged and empowered. Extension and other change agents can play a leading role in this process. Where capacity for community involvement in disaster response or broader development is lower, CERT programs provide a potential framework for both (Brennan,2006).

2.3.1 Including Everyone to Community Responses to Disasters.

A critical aspect of CERT effectiveness and potential for expanding into community development or other roles is representation of the entire local population. Drawing together diverse racial, ethnic, religious, and other groups provides a host of resources and experiences, but more importantly provides transparency in the local decision making process. In all communities, a variety of groups exist with diverse skills and abilities combined with personal and professional experiences that are essential to successful preparation and response to disasters (Independent Sector, 2001). Included are residents with needed professional and trade skills for damage control and assessment (engineers, environmental scientists, architects, contractors, and skilled laborers); disaster preparedness and response training (VFW, retired military/national guard/police); medical, psychological and social service delivery experience (health practitioners, counselors, religious/civic groups); and long time residents who have witnessed previous responses to natural disasters.

Such groups and individuals are also directly suited to local empowerment and community development that serves to enhance rural well-being. Effective community response to disaster and other local needs connects diverse groups within the locality. Successfully linking local organizations, citizens, and leaders provides a network and method for local citizens and groups to become actively involved in local preparedness and response efforts and beyond. Individuals currently involved in CERTs are also likely to provide strong personal and professional connections which can link local interests to state/federal agencies and other outside entities. Such connections and partnerships can facilitate access to information, resources, training, and finances necessary to build local capacities.

In this way, CERTs can act as bridges between local and extra-local resources not only to prepare and respond to disaster, but also directly shape rural well-being as part of rural development efforts. Since rural communities are often situated in a unique interface between the physical environment and society, local residents are important to the management of natural resources. CERTs can provide the human resources, initiative, and framework for gathering and disseminating information important to environmental decision making. Such effort is not far removed from disaster preparedness efforts.

Linking local land use and natural resource management with risk mitigation and disaster preparedness weaves together an integrated approach to protecting ecological and human well-being. A model of expanding the traditional role of CERTs can be found in Alachua County, Florida where local CERT volunteers were involved in surveying local farmers about drought protection practices and other natural resource management efforts. Building relationships in quiet times creates a valuable network and sense of community to tap into in times of emergency(Brennan,2006).

2.4 Disaster Response Planning

This could be understood as a disaster risk reduction approach. This approach is used for minimizing the damage and disruption from disasters. According to Olayiwola(2005), disaster response planning embraces a clear understanding of the relationship between how we manage growth and how we plan and develop our communities (neighbourhoods, buildings, infrastructures and other system and components) disaster response planning also accommodate how we relate development with the natural environment the capacity of the environment to resist and minimize the result of the disaster. According to Ologe (2005), it

is disaster strike that the ingenuity and creativity in all of us come to the fore. He further stated that people and communities should not be made to wait for disaster to strike before they put their ingenuity and creativity to work. Rather, they should be empowered to use these attributes to reduce the occurrence or the impact of disaster. That is what disaster reduction is all about. Every community has some form of capacity, no matter how small, to reduce the disaster risk to which they are exposed. For most communities in Nigeria, this capacity needs

To be identified, developed and used for disaster reduction. According to Ologe (2005), grouped this capacity into four categories; Physical or Material resources which include; Able bodied men who can do physical work, work tools, food storage facilities, public building that could serve as temporary shelters etc. Social organizational resources which like traditional institutes, religious organizations, community development associations, cooperative groups and thrift societies etc. The knowledge and skills capacity include knowledge of the local terrain, disaster threats etc, while skills may be in farming, wood work, blacksmithing, commerce, health care etc. The attitude and motivation capacity; these determine peoples outlook on life in general and on disaster in particulars. Positive attitudes and appropriate motivation are required for disaster reduction and sustainable development. According to Ologe (2005), these resources need to be identified, mobilized, developed and applied to reduced the occurrence of disasters or minimize their impact.

2.4.1 Disaster Response Community

It embraces a clear understanding of the relationship between how we manage growth and how we plan and develop our communities (neighborhoods, buildings, infrastructure and

other systems and components). Disaster response planning also accommodates how we relate development with the natural environment, the capacity of the environment to resist and minimize the result of the disaster.

A disaster response community according to Olayiwola (2005) is obtained when the goals of disaster planning are achieved. Disaster response communities are sustainable communities in the local context. A current needs, while ensuring that adequate resources are available for future generation (UNCED 1987). It seeks improved public health and a better quality of life for all its residents by limiting waste, preventing pollution, maximizing conservation and promoting efficiency and developing local resources to revitalize the local economy. A sustainable community formulates goals that are rooted in the respect for both the natural environment and human nature and that calls for the use of technology in an appropriate way to serve both of these resources.

2.5 Mitigation Processes for Disaster Risk Reduction

Mitigation processes for disaster risk reduction could be seen as a means of institutionalizing the appropriate principle and techniques into the daily actions that local governments are required to take as a part of their ongoing planning and development responsibilities (Geis, 1996). The principles and techniques that are needed to be institutionalized by the local government may include town planning tools like the adoption and implementation of city master plans and some development control mechanism. Mitigation is a process of the decision made and action taken at the local level to minimize results of disaster event on human settlements. It is concerned with keeping a hazard from becoming a disaster. Mitigation is charged with planning and building the

various systems and components of the built environment to minimize loss of lives, damage to property from the actual event and the subsequent socio-economic disruption. It is concerned with incorporating the best hazard resistant designs into the building and other facilities. It must also ensure that the very best economic, social and environmental principles of sustainable development be implemented at the same time.

Different mitigation approaches for disaster risk reduction or disaster response planning are discernible. Sheik(2001), identified three major integrative approaches. This includes integrated planning local planning and integration and participatory planning approach. While Sheik (2001), suggested approaches look like workable, localized planning strategies. Geis (1996), suggested more holistic, practice effective disaster resistance planning approaches. These embraces sustainable development planning, community investment and pre-event planning.

2.6 Planning Strategies for Disaster Management

2.6.1 Development plan

This plan is called by different names ‘ general plan’, ‘city plan’ , ‘ master plan’, or even ‘disaster management’. A development plan is defined as the official statement of a municipal legislative body, which sets forth the major policies concerning future physical development of a settlement.

It is a policy instrument, it must provide the basis for fulfilling the yearning and aspiration of the people, therefore it provides legal and technical instrument for such local government control.

2.6.2 Development Control Mechanisms

The development control mechanism provides tools through which planning goals and ideals are achieved. In relation to disaster risk reduction, it provides the tools with which disaster resistance plans are prepared and implemented.

Robert (1974), identified two technical devices used in development control processes. These are the land use zoning and planning standards. The planning standards also have two main divisions. This are prescriptive and the regulatory standards. The perspective standards are the guides or specifications used in dimensioning in the preparation of disaster risk reduction plan, or any development plan for that matter.

Planning standards are used in town planning as recognized models for limitations (Keeble, 1976) ,they are legislated standards which in most cases are mandatory and inflexible. They serve as tools or specifications before building operations can be approved under the law. Example of the planning standards are residential density standard, plot ratio, set back from the stream, river or roads, air space standard, car parking control standards and highway standards among others. Above all, the planning standards are entrenched in the building and sub-division regulations as well as the sanitary and zoning codes of local government councils for enforcement.

2.6.3 Disaster Risk, Condition, Trends and Impact

In this context, natural hazards include earthquakes, hurricanes, tsunami's, tornadoes, landslides, floods, volcanic eruptions and windstorms, rainstorm while human-made hazards encompasses explosions and chemical releases.

However, the conceptual distinction between disasters associated with natural and man-made hazard is increasingly becoming blurred as many human practices, such as the construction of human settlements in flood-prone area or on the slopes of active volcanoes, exacerbate human-made hazards. The focus on natural and human made disaster also response to global trends in increasing number of such event, in people affected and made homeless by the disaster and in the economic impact of disaster especially on the poor and marginalized.

According to global report on human settlements (2007), a disaster is understood here to be the outcome of a vulnerable individual or society being hit by a man-made or natural hazard. The vulnerability of an individual or society is reduced through short-term coping and long term adaptation that adjust human actions to minimize risk impact or outcomes. An overview of the relationship between urbanization and disaster risk, human vulnerability and loss associated with natural and human made hazards nationwide and across cities. Disaster management is seen as best undertaken through a disaster risk reduction approach. Here, disaster risk is address at a number of stages. Before hazards occur, underlying physical and technological processes can be contained through mitigation. Unfortunately, in most cities, mitigation is not sufficient and residual hazard requires preparedness, including education, risk assessment and early warning and evacuation planning disaster response takes place in the first hours and days after a disaster and addresses the basic needs of survivals. Most cities experienced both large and small disasters, but the later seldom systematically recorded and are often ignored, even by the local news media. Human vulnerability also plays large role in determining the scale of disaster. Small hazard events can be turned into large disasters where high vulnerability means many people are at risk, emergency

response is inadequate and critical infrastructure is fragile. Where vulnerability is low, emergency services are adequate and critical infrastructure is resilient, large disaster can be avoided even from large hazards.

Successive disasters can the resilient of people or households to subsequent shocks and stresses. Small disasters can pave the way for large event by eroding people's assets and integrity of critical infrastructure , progressively lowering society's thresholds of resilience. Large event that damage critical infrastructure or urban economies will similarly undermine the capacity of individuals or emergency services to resist even everyday hazards, potentially making small disaster more frequent.

According to global report on human settlements (2007), reports that everyday hazard may be hard to avoid those at risk and indeed, become an intrinsic part of livelihood and survival strategies. In this way, everyday hazards and small disaster losses can mistakenly become accepted as an expected part of life. In turn, this can have the perverse effect of lowering the willingness of individuals at risk development agencies to invest in risk reduction, thus creating a vicious circle where poverty and marginalization coincides with disaster risk. Everyday hazards and small disasters differs from large disaster in that they often seen as a problem of technological efficiency and infrastructure management, in order words as problems of development. This has two consequences: first, everyday hazards tend to be managed by specialist from diverse fields, including engineering, medicine, land use planning and chemistry, making integrated risk reduction more difficult. Secondly, social dimensions are easily overlooked by technological professions and planning agencies that dominate these areas of work. The need to look into urbanization and disaster risk is of paramount interest. The last decade has seen an unprecedented number of disasters events

unfold worldwide. The global incident and impacts of disaster from 1996 onwards illustrates extensive damage both in terms of mortality and economic loses. Transport accident and flood were the most frequently reported disasters. Impacts were highest for natural disasters, with earthquakes and tsunami being the deadliest. Floods and windstorms accounted for the greatest number of disaster events and also affected the greatest number of people. Windstorms were most costly compared to other disaster types. In the new millennium natural and human made disasters are likely to have their greatest impact in cities where half of humanity is expected to reside. The world will become predominantly urban, with the total urban population expected to reach 5 billion by 2030, while rural populations will begin to contract from 2015 onwards. The location of major urban centre's in coastal areas exposed to hydro-meteorological hazards and in geologically active zones is an additional risk factor. The concentration of economic assets, cultural heritage, infrastructure, services and basic life-support systems, industries and other potentially hazardous establishment in cities further exacerbates disaster risk and impacts. The growing numbers of the urban poor, especially the 1 billion slum dwellers worldwide, who resides in hazardous location within cities such as industrial waste site, flood plains, riverbanks and steep slope, are perhaps most vulnerable to the impacts of disasters.

2.7 Disaster Risk Reduction And Sustainable Development

The issue of identification, assessment and monitoring of disaster risks and thus enhancing early warning takes a forefront in adopting national platform framework. The starting point for reducing disaster risk and promoting culture of disaster resilience lies in the knowledge of the hazards and the physical, social, economical and environmental vulnerabilities to disaster that most societies face, and of the ways in which hazards and vulnerabilities are

changing in the short and long term, followed by actions on the basis of that knowledge. This all important task exposes the multidisplinary nature of disaster management and multi-organizational role of disaster managers. Losses of lives and property at the occurrence of disasters can be substantially reduced if people are well informed and motivated towards a culture of disaster prevention and resilience. This in turn requires the collection, compilation and dissemination of relevant knowledge, information on hazards, vulnerability and capacities. We can also use knowledge, innovation and education to build a culture of safety and resilience in the society. Reducing the underlying risk factors implies that concerted effort must be outlined and utilized. Disaster risk is related to changing social, economic, environmental conditions and land uses, as well as the impact of hazards associated with geological event, weather, water, climate variability and climate change. These are all addressed in sector development planning and programmers' as well as post-disaster situations. The requirement focuses on our ability to integrate good programmes of environmental and natural resources development into the social and economic development process and require cooperation of all stakeholders in disaster management process. Finally ,there is a need to strengthen disaster preparedness for effective response. At times of disaster, impacts and losses can be substantially minimized if authorities, individuals and communities in hazard-prone areas are well prepared and ready to act and are empowered for effective disaster management. Strengthening disaster preparedness involve strengthening policies, technical and institutional capacities, promoting support for dialogue and developing coordinated approaches or promoting the establishment of emergency funds where and as appropriate.

According to Olokesusi (2005) , disaster refers to an emergency cause by natural hazards or human- induced action and resulting in a significant change in circumstances over a relative short period of time. Typical examples are death, displacement, diseases, loss of crops, damage to physical and service infrastructure, depletion of natural and social capitals, institutional weakening and general disruptions of economic and social activity. A broad definition of disaster includes the fact that they are dramatic, sudden, unscheduled events that are often accompanied by large loss of human life, suffering and affliction to a society or a significant part of it and temporary breakdown of prevailing lifelines and systems. Such events cause considerable material damages and interrupt the normal functioning of an economy and of society in general.

According Olokesusi (2005), the past four decades have witnessed disasters such as earthquakes, drought, floods, storms, fires and volcanic eruptions have caused major losses to human life and livelihoods, destruction of economic and social infrastructure and significant environmental damage.

CHAPTER THREE

RESEARCH METHODOLOGY

This section deals with the analysis of field data obtained through field surveys. Most of the information used in this study were obtained from reconnaissance survey, administration of structured questionnaires, Focus Group Discussions (FGDs) and further consultation of available secondary data relevant to the study.

3.1 Data Types and Sources

Two different types of data, primary and secondary data were used in this study. The instruments used and the types of information collected under each are considered below.

(a) Primary Data

The Primary data were information collected from the field by the researcher. This involved the direct contact with relevant areas and people. The instrument used in this study is the field survey, questionnaire, photograph and oral interview. It involves the researcher going to the field to get information pertaining to the course of study. It involves the use of well structured questionnaires where questions designed to suit the purpose of the research are administered to inhabitants of the study area. This method is done either by using scheduled questionnaires where the researcher asks questions from the questionnaire and answers given by the respondents are recorded by the researcher. Alternatively the questionnaires are administered to the respondents and collected after completion. Also, primary data collection afforded the researcher the opportunity to get acquitted with the study area.

In the course of this study, primary data was obtained through reconnaissance survey by observing rainstorm activities of 6th May,2011, and the facilities destroyed by the disaster. Also, two sets of structured questionnaires were used. The first was divided into two parts; one was to take inventory of the infrastructure destroyed by rainstorm to some selected areas.

The second set of questionnaire focused on the socio-economic data from the study areas. Questions were asked on residents' income before and after disaster occurrence, occupation, marital status, ethnic group, sex, education level and number of the affected so far.

(b) Secondary Data

These are basically the data collected from texts, journals, manuals, media, internet, and review of the past relevant literature.

3.2 Data Collection Instrument

i. Field Survey: This method is based on ground trothing and observation of the

placesthat were either previously or recently affected by rainstorm in the study area, while photographs were taken during the course of observation.

ii. Oral Interview: this method involves meeting with the residents of each areato enquire and document information on houses that have once been affected by rainstorm disaster in thepast.

iii. Questionnaire Administration: structured questionnaires were printed and administered to individuals and households from sampled units of the sample size.

This section uses Household heads or adult member of the family present at the time of conducting the survey. Those contacted are capable of given relevant information regarding the occurrence of rain storm disaster which a child or under age might not.

3.3 Sample Size and Sampling Procedure

3.3.1 Sampling Size

The samples for this study were drawn from the 14 wards in Bida Local Government Area (LGA) that constitutes the research domain. The population of the wards is not uniform but a sample size was drawn from the total population of the wards that make up each of the study areas in such a way that all the wards were adequately represented. A total of 1,788 questionnaires were administered amounting to about 1% of the total 0f 178,840 people living in the metropolis (NPC, 2006). The study area was divided into 4 quadrant and stratified sampling techniques adopted with Etsu Musa market roundabout which is the central business district of the town use to demarcate other wards as north, south, east and west see fig 3.1. Simple random sampling method of questionnaires administration was employed. Each quadrant was allotted to 494, 367, 379 and 548 questionnaires respectively, with 1 quadrant receiving 494 questionnaires because of the recent effect of rainstorm in the area. Quadrant 1 include Masaba A and B,Cheniya, and Wadata wards. Quadrant 2 consist of Kyari, Masaga A and B wards. Quadrant 3 includeLandzu, Bariki and Dokodza wards. Well Quadrant 4 is made up ofUmaruMajigi A and B, Nasarafu and MayakiNdajiyawards, see fig.3.1.

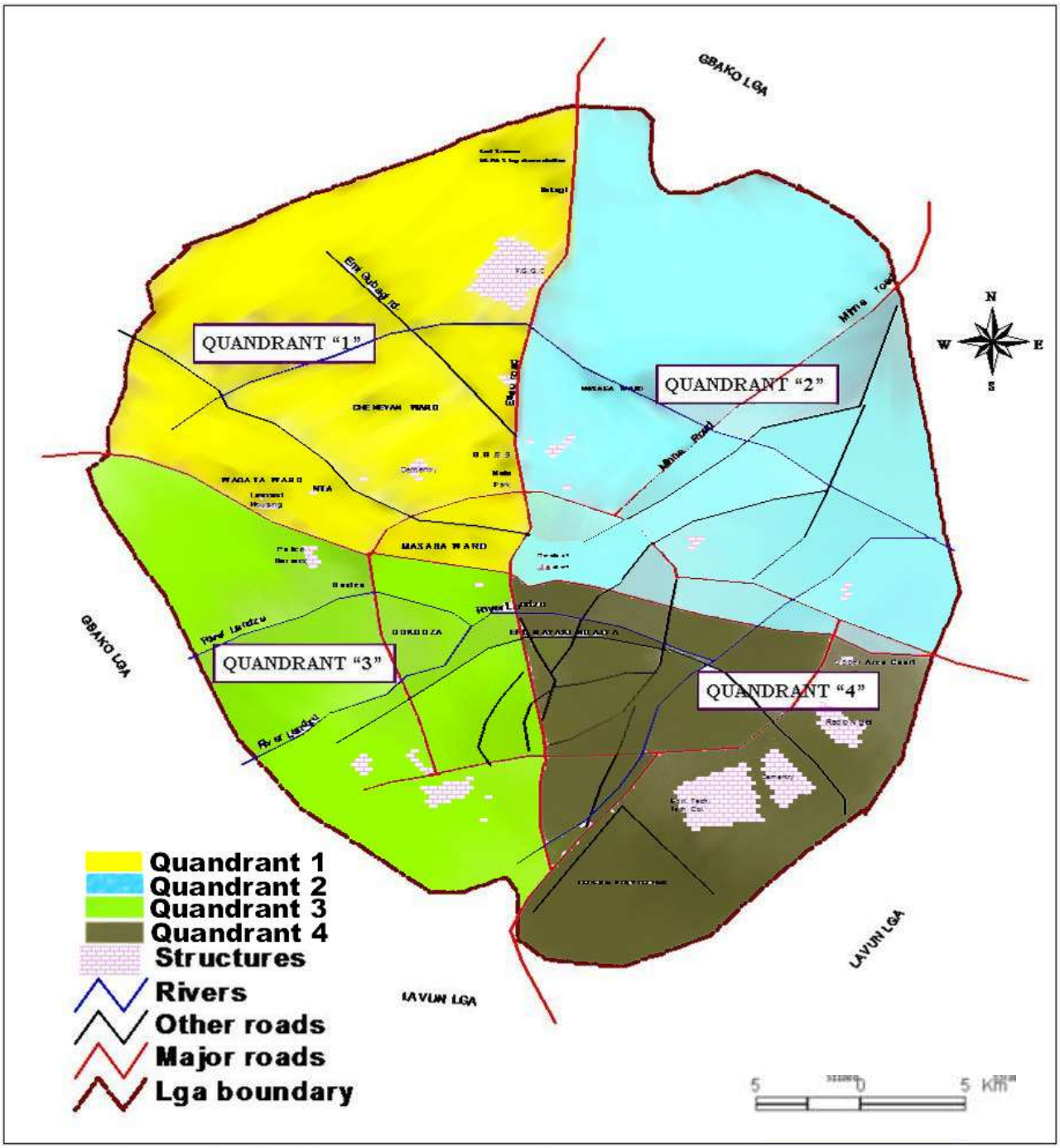

FIG 3.1: Map of Bida Showing The Four Sample Quadrant
Source: Niger State Ministry of Lands and Housing, Minna.

With this vital information about 1% of the population was sampled for questionnaire administration in each of the study areas. A total of 1,788 questionnaires was distributed in the study areas to the fourteen (14) wards in Bida LGA. The pattern of administration is shown in (table 3.1)

Table 3.1: Wards in Bida LGA Rainstorm disaster Questionnaire Administered

Quadrant	**S/No**	**Wards**	**Wards Population**	**Number of Questionnaires Administered**
Quadrant one	1	Masaba A	15,387	154
	2	Masaba B	12,261	123
	3	Cheniya	11,782	118
	4	Wadata	9,943	99
Quadrant two	5	Kyari	13,851	138
	6	Masaga A	10,226	102
	7	Masaga B	12,646	127
Quadrant three	8	Landzu	13,067	131
	9	Dokodza	14,121	141
	10	Bariki	10,718	107
Quadrant four	11	Umarumajigi A	14,698	147
	12	Umarumajigi B	13,921	139
	13	Nasarafu	11,693	117
	14	MayakiNdajiya	14,526	145
		Total	**178840**	**1788**

Source: Author's Field Survey,2011

3.3.2 Sampling Procedure

A systematic sampling technique was used in selecting respondents in each of the wards studied. One of the first five (5) houses was randomly picked to determine the starting point. Thereafter, a sample interval of four (4) houses was used to determine other samples. Questionnaires were administered to either a male or female household heads available at the time of the visit.

3.4 Methods and Techniques

Although a total of 1788 questionnaires were administered in the 14 wards, about 1,734 were returned and hence subjected to statistical analysis. This was possible after the questionnaire had been coded. For preliminary descriptive analysis, frequency of all variable contained in the questionnaires were carried out using Statistical Package for Social Scientist (SPSS). This enabled a further identification of variables to be recorded and computed for subsequent analysis.

Cross tabulation is adopted for data presentation for the purpose of clarity in comparism and ensures quicker understanding of data.

CHAPTER FOUR

PRESENTATION OF DATA AND DISCUSSION

The chapter presents the analysis of result of the data obtained through field survey. Data are obtained from the field through the use of structured questionnaire and oral interview physical observation and opinion surveys on issue related to rainstorm disaster and the community response in the study area. The result are presented in tabular form and the deduction made were discussed below.

4.1 Socio-Economic Characteristics of Respondents

In every research work there is the need to examine the socio-economic life of the population sample frame and size to justify whatever analysis and conclusion one could make at the end of the work. This analysis of socio-economic characteristics of the people basically involves the part of the questionnaire which deals with the age, sex, marital status, occupation, income level and the educational level of the residents sampled for questionnaire administration.

4.1.1 Age of Respondents

The demographic characteristics of sample in this study were measured by gender, age, educational level, marital status, income and occupation of the respondents. The following discussion comprises the major characteristics of such sample collected for this study. The respondents comprised of male (35.5%) and female (64.5%). A total of 616 male response were sampled and gave response to the questions administered forming a 35.5% of the total sample size while a total of 1118 females where sampled and this forms 64.5% of the sampled size. Although, more response was obtained from the females in the area than

males, This is not to say that the town is dominated by females, but for the highest accessible majority in terms of response obtained and at the time of the visit.

After, recording the respondents age, the result shows that about half of the respondents are with the youth age bracket of 16 – 30 and over 94% are of working age, see table 4.3.

Table 4.1: Gender and Age of Respondents

	VALUE	**Quadrant 1**		**Quadrant 2**		**Quadrant 3**		**Quadrant 4**	
		Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Gender	Male	149	30.0	132	35.4	132	35.6	203	41.1
	Female	347	70.0	241	64.6	239	64.4	291	58.9
Ages	16 – 30	249	50.2	177	47.5	181	48.8	254	51.4
	31 – 45	110	22.2	118	31.6	102	27.5	115	23.3
	46 – 60	98	19.7	68	18.2	73	19.7	93	18.8
	Above 61	39	7.9	10	2.7	15	4.0	32	6.5

Source: Author's Field Survey,2011

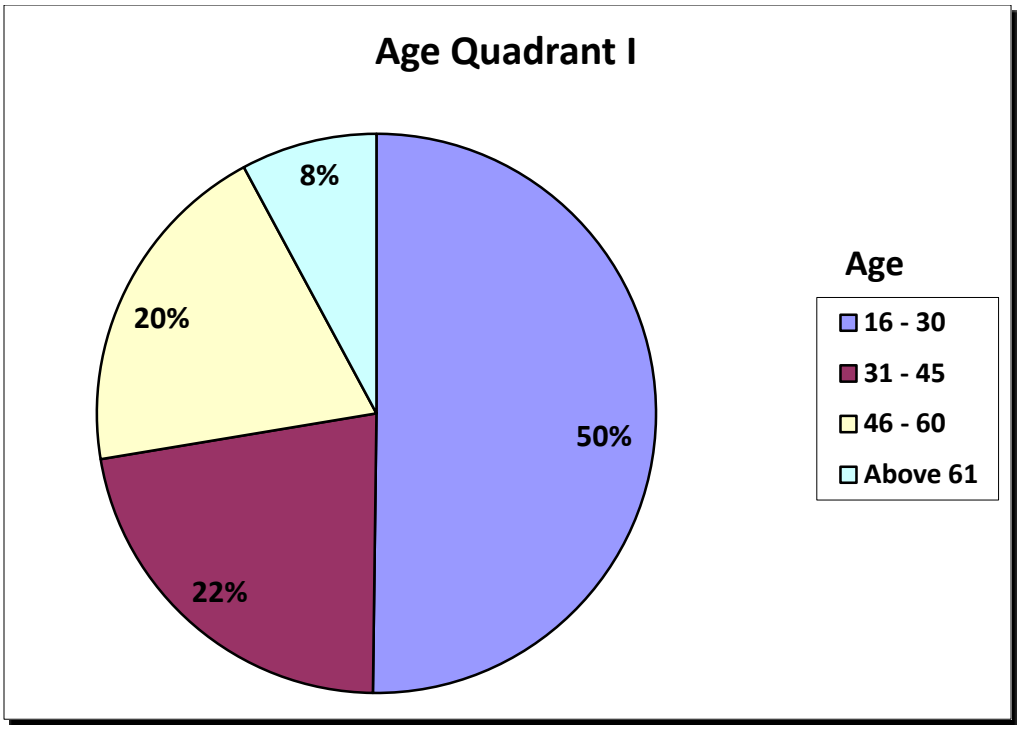

Fig. 4.1: Ages (yrs) of Respondents in Quadrant I
Source: Author's Field Survey,2011

The analysis above indicate that Quadrant I has a youth dominated environment with people between the ages of 16 to 45 been 72.4% of the total population. This implies that the ability to seek for employment is high.

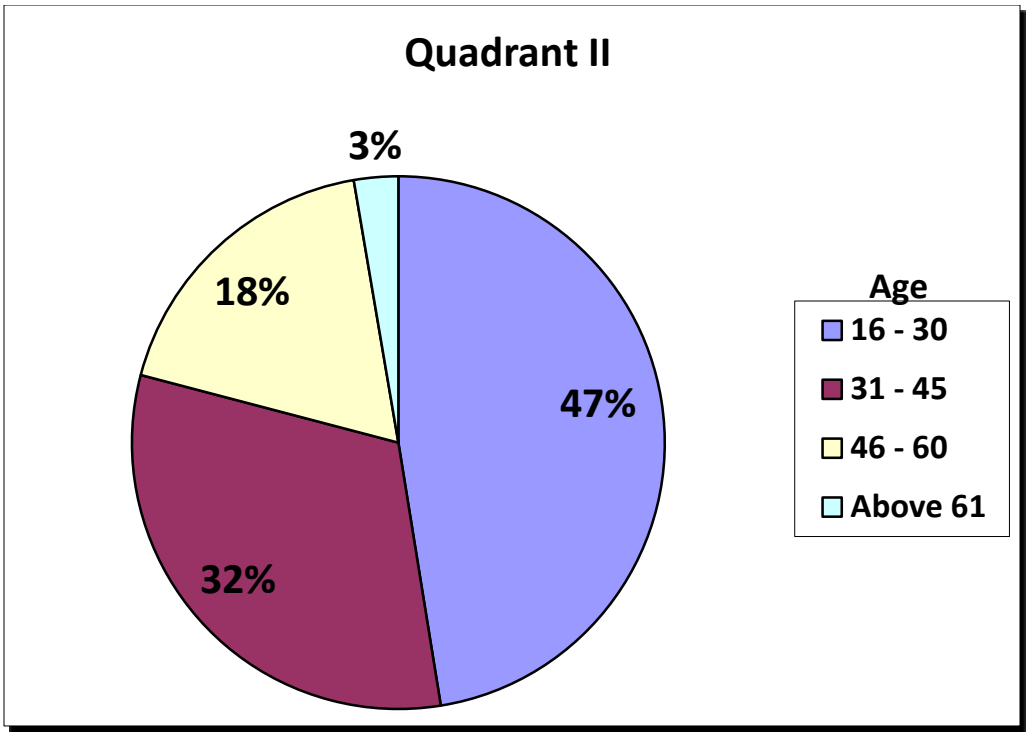

Fig. 4.2: Ages (yrs) of Respondents in Quadrant II
Source: Author's Field Survey,2011

Quadrant II indicate that youth between the ages of 16 t0 45 have population of about 79.1% while the dependents that is the adult is about 20.9% (age between 45 and 60 and above). This also shows that there is high working class people in the quadrant.

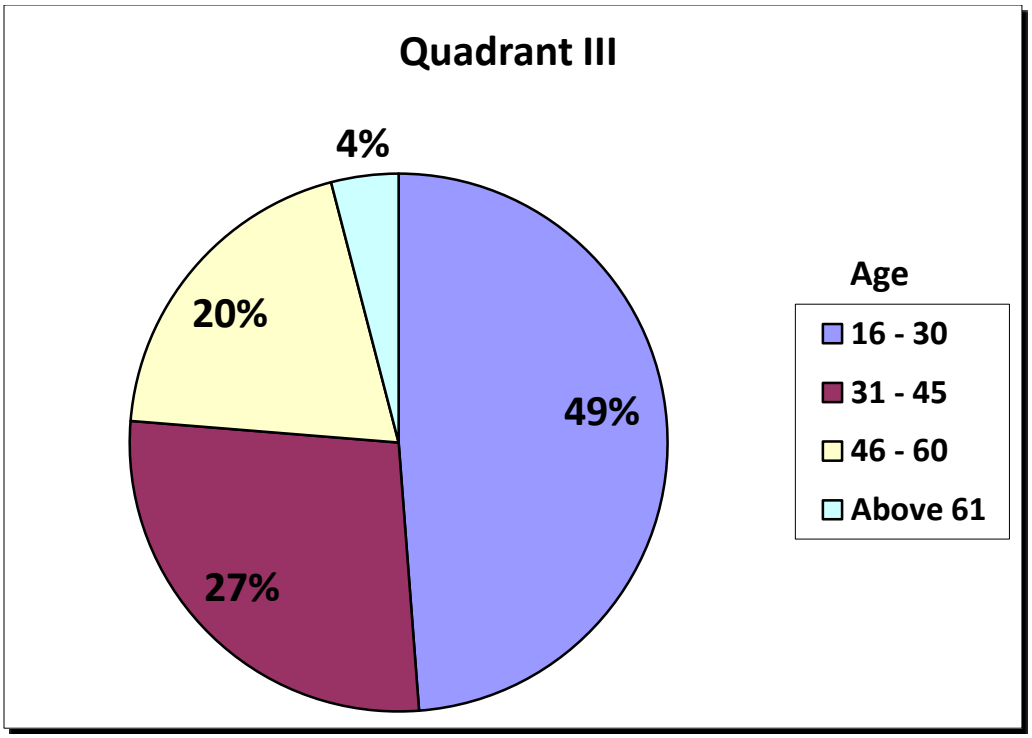

Fig. 4.3: Ages (yrs) of Respondents in Quadrant III
Source: Author's Field Survey,2011

Quadrant III implies that people between the ages of 16 and 45 acount for 76.3% which are the people in the working class age bracket and dependents account for 23.7%.

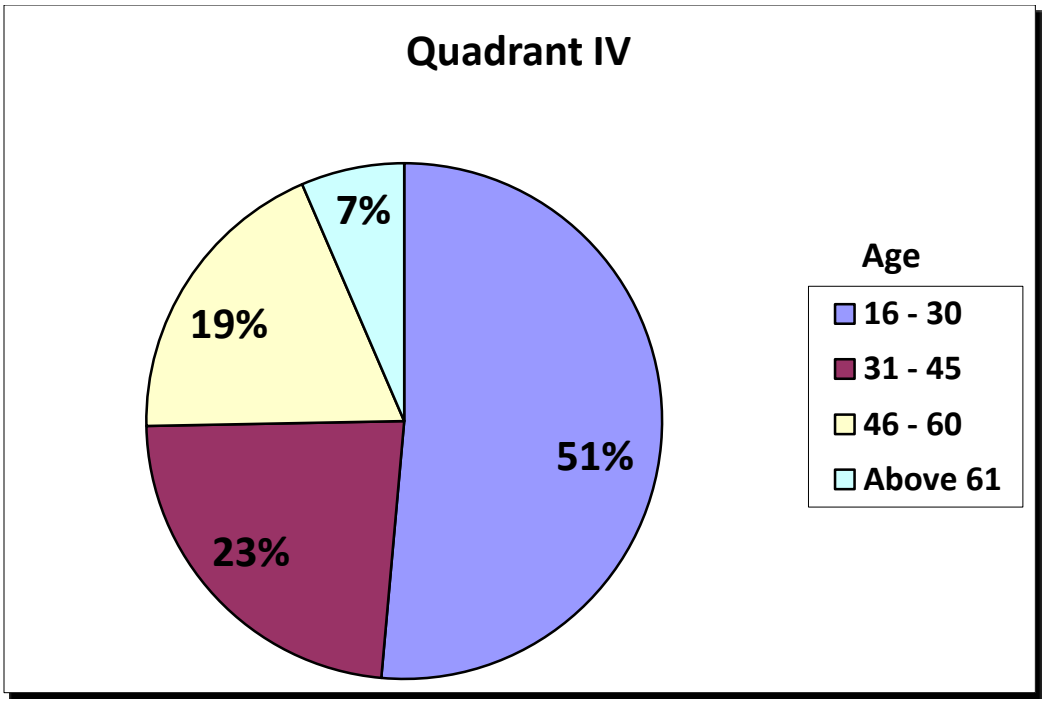

Fig. 4.4: Ages (yrs) of Respondents in Quadrant IV
Source: Author's Field Survey,2011

The analysis of quadrant IV also shows that 74.7% of respondents are between the ages of 16 to 45 while the adults account for the 25.3%. This implies that the people with the ability to seek for employment are high in the quadrant.

On average the youth which account for about 76%. This implies that there is high level of youth in the study area and have higher propensity for the employment, this account for high level of unemployment which is as high as 20.1% . Though it might looked little but by considering the total population, it means there is high level of unemployment with high level of dependency that erodes savings and aggravate poverty that will increase the problem of disaster in the study area and over consumption of resources in the study area.

There is high level of use of wood fuel that exposes the soil to erossion after the rainstorm.

4.1.2 Marital Status and Occupant of Respondents

Accordingly, the majority of respondents were middle aged (49.5%) between 16 – 30 years old and the respondents were fairly normally distributed in entire age groups. In terms of marital status and occupation, the majorities of the respondent are married. (64%) and predominantly trader (29.3%), civil servants (21.3%) while those that engaged in self employed (16.1%) artisan are (15.4%) students 4.5%, employed 13.4%, see table 4.3

Table 4.2: Marital Status and Occupant of Respondents

	VALUE	**Quadrant 1**		**Quadrant 2**		**Quadrant 3**		**Quadrant 4**	
		Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Marital Status	Single	139	28.1	118	31.6	122	32.9	183	37.1
	Married	336	67.7	241	64.6	238	64.2	294	59.5
	Others	21	4.2	14	3.8	11	2.9	17	3.4
Occupation	Unemployed	64	12.9	43	11.5	55	14.8	72	14.6
	Student	20	4.0	12	3.2	16	4.3	32	6.5
	Artisan	54	10.9	96	25.7	41	11.1	69	14
	Trader	112	22.6	156	41.8	102	27.5	124	25.1
	Civil Servant	121	24.4	36	9.7	90	24.3	133	26.8
	Self-employed	125	25.2	30	8.1	67	18.0	64	13

Source: Author's Field Survey,2011

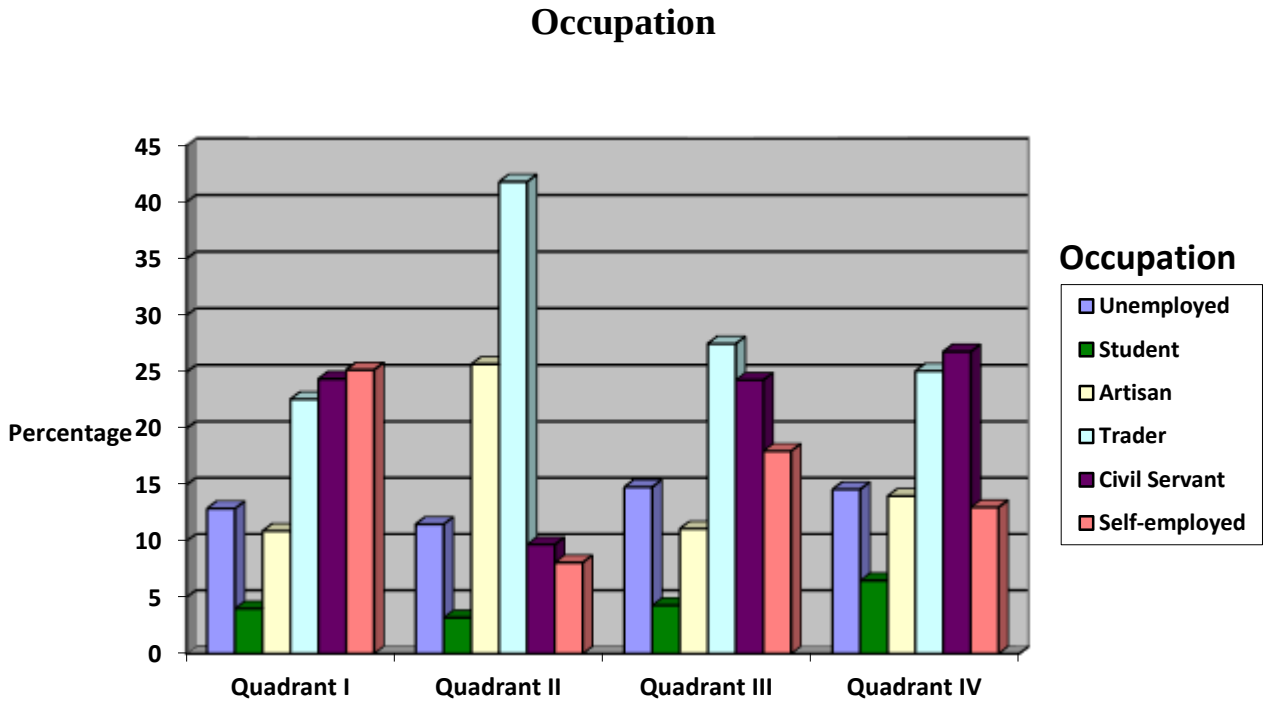

Fig. 4.5: Occupation of Respondents
Source: Author's Field Survey,2011

The graph on occupation of respondents on figure 4.5 shows that Quadrant I has predominantly people that are selfemployed with 25 percent, follow by civil servant with 24.4 percent, while those that engaged in other occupation such as trading 22.6 percent, unemployed 12.9 percent, artisan 10.9 percent, the lowest occupation in Quadrant I is student. This implies that about 83% of the respondents are engaged in one form of occupation with about 17% unemployment people.

The research has show from the graph in Quadrant II that 43 were unemployed with 11.5 percent , 12 were student with 3.2 percent, 96 were artisan with 25.7 percent, 156 were trader with 41.8 percent, 36 were civil servant with 9.7 percent while 30 were self-employed with 8.1 percent respectively. This quadrant indicated that 84.3% of the respondents are

engaged in one form of the occupation, though the level of satisfaction of the work is not measured.

From the figure 4.5 above, the study has revealed that, in Quadrant III 55 were unemployed with 14.8 percent were student with 4.3 percent, 41 were artisan with 11.1 percent, 102 were trader with 27.5 percent, 90 were civil servant with 24.3 percent, while 67 were self-employed with 18.0 percent respectively. In this quadrant, about 81.1% of the respondents engages in one form of occupation while 19.9% are unemployed.

From the figure 4.5 in Quadrant IV above, 494 questionnaires were administered whereby 72 were unemployed with 14.6 percent, 32 were student with 6.5 percent, 69 were artisan with 14 percent, 124 were trader with 2.1 percent, 133 were civil servant with 26.8 percent, while 64 said their self-employed with 13 percent respectively. This quadrant shows that 79.9% of respondents are engaged in one occupation or the other while 20.1% are unemployed.

From the analysis of occupation of respondent in figure 4.5 show that from Quadrant I to IV, Quadrant II and III have highest percent in trader, whereby in Quadrant I self-employed with highest, while in Quadrant IV the civil servant is the highest in all type of occupation we have. Therefore, the lowest of the occupation in the fourth Quadrant is student. This implies that quadrant IV and III have the highest level of unemployment while quadrant I and II have highest level of employment in the study area.

4.1.3: Income Level of the Respondents

Income level shows that 4.5% of respondent had income per month falling below ₦5,000 while 13.6% had income between N5,100 and N10,000. 23% had their income between

N10,100 and N15,000. Also 31.2% had their income between N15,100 and N20,000. Then 27.7% had income between N20,000 and above. This implies that high percentage of respondents are living below Niger State minimum wage of N7,500 and also below Federal Government minimum wage of N18,000. This implies that the propensity to have savings will be lower and can aggravate poverty due to natural disaster such as rainstorm experienced in the study area.

This storm affects the socio-economic life of the people. Field survey analysis revealed that, 4.5% the people affected had monthly income below N5,000, 13.6% earn between N5,100 – N10,000 in a month, 23.0% earn between N10,100 – 15,000 in a month, 31.2% earn between N15,100 – 20,000 in a month, 27.7% earn between N20,100 and above in a month. Therefore, the majority of the victims i.e 73.3% of the respondents earn below N20,100 monthly. The implication of this is that their little income meant for feeding and other up keep were now diverted to coping and surviving the heat of the storm. As such, nothing affects a man's composition or psychology as not having money to meet his household and other pressing needs.

This socio-economic effect could also be viewed in terms of psychological trauma experience at the period of the disaster. The pain of packing one properly to a neighbors' house in the case of a kind neighbour. The research ran into a recent incident to ask the house head for question, and was almost stabbed, and had to run away. Which shows the psychological disorder experienced at that moment. Most people interviewed said as at the time of the incident, they had no money but had to go and borrow from some friends, a civil servant went as far as collecting an over overdraft from bank to address issues raised by the disaster.

Table 4.3: Income Level of the Respondents

	VALUE	Quadrant 1		Quadrant 2		Quadrant 3		Quadrant 4	
		Freq	%	Freq	%	Freq	%	Freq	%
Income	Less than N5,000	15	3.0	22	5.9	11	3.0	30	6.1
	N5,100 – N10,000	56	11.2	51	13.7	59	15.9	66	13.4
	N10,100 – N15,000	96	19.4	102	27.3	93	25.1	100	20.2
	N15,100 – N20,000	161	32.5	137	36.7	17	31.5	119	24.1
	N20,100 – above	168	33.9	61	16.4	91	24.5	179	36.2

Source: Author's Field Survey,2011

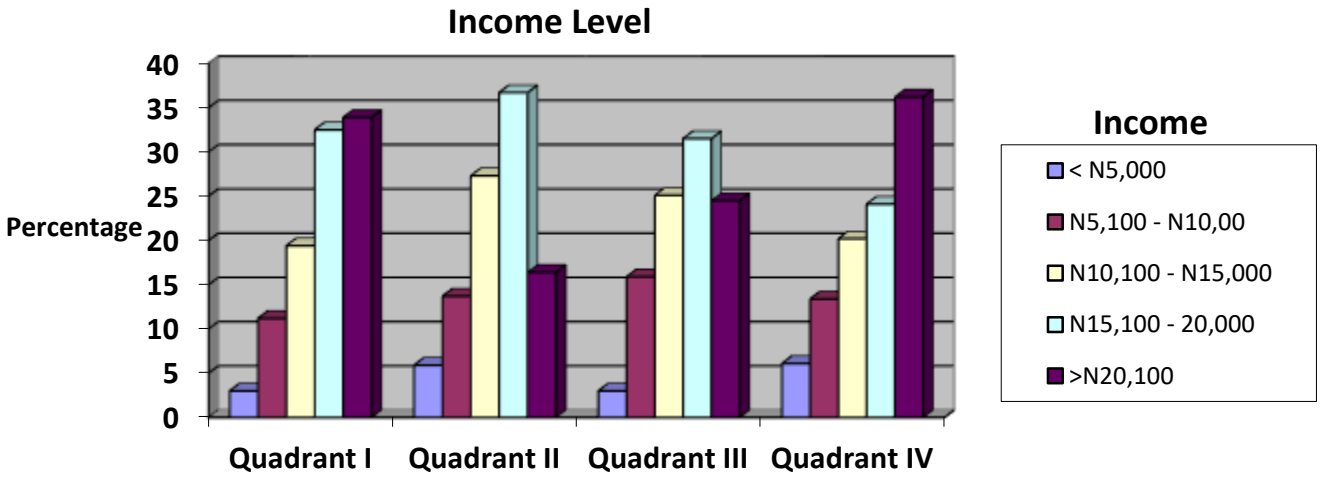

Fig. 4.6: Income of Respondents
Source: Author's Field Survey,2011

4.1.4: Educational Attainment of Respondents

In assessing the educational levels of respondent's the sample survey analysis revealed that 16.6% of respondents have not received formal education, 18.9% had a primary school certificate, 21.4% had secondary education, 371 has attended Quranic school with 21.9% percent and 21.2% had tertiary education only. This result implies that most of the respondents were well educated.

Table 4.4: Educational Attainment of Respondents

	VALUE	**Quadrant 1**		**Quadrant 2**		**Quadrant 3**		**Quadrant 4**	
		Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Educational	Primary	121	24.4	63	16.9	76	20.5	67	13.6
Level	Secondary	133	26.8	76	20.4	77	20.8	87	17.0
	Tertiary	62	13.5	51	13.7	112	30.2	142	28.7
	Qur'anic	78	15.7	112	30.0	79	21.3	102	20.7
	Illiterate	102	20.6	71	19.0	27	7.2	96	19.4

Source: Author's Field Survey,2011

4.2 Physical Characteristics of Infrastructure Damage

This rainstorm disasters are in varying degree in response to land use vulnerability to rainstorm disaster. The following factors are responsible for the variability of the disaster;

1. Structurally weak building, as a result of the age of the building or material composition for construction.

2. Inadequate drainage system which has caused few structures to be pulled down as a result of ran off leaving its course and eating deep into foundation of fence and main buildings in some cases.

3. Lack of wind breaker is another factor responsible for high incidence of rainstorm effect in the study area, as such when wind blows the effect is felt on the structure as such it has nothing to do with weak structures as seen from spot observation, Newly constructed buildings are not left out of the effects of the disaster.

4.2.1 Rainstorm and Residential Structures

The result of field survey had shown that areas in Bida are affected by rainstorm disaster The result shows that 86.4% (1499) of the respondents claimed the occurences of rainstorm in the study area, while 13.6% (235) of the respondents declined occurences of rainstorm disaster in the study area, see Table.4.1.

Table 4.5: Residents Knowledge of the Incidence of Rainstorm

	Quadrant1		**Quadrant 2**		**Quadrant 3**		**Quadrant 4**		**Total**	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Yes	425	85.7	327	87.7	328	88.4	419	84.8	1499	86.4
No	71	14.3	46	12.3	43	11.6	75	15.2	235	13.6

Source: Author's Field Survey,2011

In assessing the effects of rainstorm disaster on the existing land uses in the study area, the result reveals that the storm disaster occurrences cut across various land uses. The survey shows that 85.2% of the respondents had their residential properties destroyed, followed by

commercial land uses amounting to 10.8%, institutional uses has 3.1% while industrial land uses had 0.9%. see plates I, II & III and Table 4.2.

Table 4.6 Existing Land Uses Affected by Rainstorm

Land Uses	Quadrant 1		Quadrant 2		Quadrant3		Quadrant 4		Total	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Residential	436	87.9	318	85.3	308	83	416	84.2	1478	85.2
Commercial	45	9.1	44	11.8	47	12.7	51	10.3	187	10.8
Institutional	11	2.2	9	2.4	13	3.5	21	4.3	54	3.1
Industrial	4	0.8	2	0.5	3	0.8	6	1.2	15	0.9

Source: Author's Field Survey,2011

Plate I: Residential Building Affected by Rainstorm Disaster
Source; Author's Field Survey,2011

Rainstorm has caused devastated damage in the study area. The storm as shown in the plate I above had demolish section of fence of one of the residential area of the study area. This has exposed the house to outside world and is prone to armed robbery attack which is very common in the study area. Also the ability of the residents to mend the fence will take a long time because of poor savings. It is going to cost a fotune for the owner of the house to erect the fence again. The disaster has been a re-occuring decimal in the study area as it as been shown further in Plate II and III below. The rain storm have caused a lot of damages

which are as a result of human induced activities. Rainstorm have proved to be one of the major tropical disaster in the world and it is ravaging the study area.

Plate II: Damaged Roof from the Effect of Rain Storm
Source; Author's Field Survey,2011

A lot of traditional houses which are common in the study area build of mud which always stand the stenght of time have been given ways nowadays because of high level of downpour. The devastating effect of the down pour with attendant wind has brought about rainstorm that destroyed the buildings in the study area as shown in Plate II above, the rainstorm is beyond the mean capacity of the mud which has been streched and could not

hold the water again , therefore the collapse of the buildings. This has effect on the socio-cultural and economic characteristics of the inhabitant of the study area.

Plate III: Collapse Building Wall after Rainstorm
Source; Author's Field Survey,2011

The rainstorm with high tide have proved to be a great disaster to the study area as a lot of resources (both material and human) are been lost on daily basis as the rain demolishes buildings, fences, trees and the likes. Plate III above shows the aftermarth effect of rainstorm in one of the study area as it pulled down section of classrooms of one private primary school, if the pupils are in school on the faithfull day, it may result to loss of lives.

4.2.2 Physical Damage Caused by Rainstorm

In assessing the nature of rainstorm disaster in the study area, result of field analysis have shown that 880 [50.7%] of the respondent said the damage occurred to them during rainfall andmostly triggered by strong wind and windstorm see table 4.7 and plates.

Table 4.7: Nature of Storm Disaster

	Quadrant 1		**Quadrant 2**		**Quadrant 3**		**Quadrant 4**		**Total**	
	freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Thunderstorm/Lightning	103	20.8	80	21.4	79	21.3	98	19.8	360	20.8
Flash flooding/Heavy downpour	112	22.6	92	24.7	98	26.4	131	26.5	433	25
Strong wind/Windstorm	250	50.4	184	49.3	191	51.5	255	51.6	880	50.7
No response	31	6.2	17	4.6	3	0.8	10	2.1	61	3.5

Source; Author's Field Survey,2011

Plate IV: Collapse Electric Poles on the Road After Rainstorm
Source; Author's Field Survey,2011

Rainstorm has caused a lot of damages in the study area as shown above, electric pole had been pulled down which thereby cut the supply of electricity to household in the study area that uses this transmission line. This has effect on the socio-economic activities of the people and at the same time put their lives in danger because of electrocution , it has also stop access to the study area because of the damage.

Plate V: Collapse Fencing Wall by Rainstorm
Source; Author's Field Survey,2011

Rainstorm as an agent of disaster in the study area shows the aftermarth effect that plate V showed the collapse of a fence of residential building in the study area as a result of the rainstorm and windstorm. The fence was pulled down by the forces of the storms which have caused losses to the owner and inhabitants alike.

Plate VI: Collapse Electric Cable on the Roof After Rainstorm
Source; Author's Field Survey,2011

The effect of raistorm after its devastation of destruction shows that electric cables are cut off the pole and lay on the roof of buildings in the study area. This has a lot of effect on human life; it can lead to electrocution of the inhabitants. It can also lead to cut in the supply of electricity to the households and affect them negatively.

Plate VII: Collapse Ceiling Board After Rainstorm

Plate IV - VII: Extent of damage Caused by Rainstorm on Cross Sections Residential Structure in Bida

Source: Author's Field Survey,2011

4.2.3 Rainstorm Duration and Physical Damage

The physical extent of damage resulting from the storm can be seen from the picture for plates. Though, most people had to quickly borrow money to repair their structure. But from data collected via questionnaire administration, It was gathered that out of 1788 questionnaires administered, 20% of respondents blame the impact of the storm on PHCN electricity poles which was brought down by heavy down pour accompanied by strong wind. This led to power interruption for both domestic use and business activities as such, source of income has been hindered in one way or the other. About 18% of respondents said they experienced removal of their roofs, which is the most pronounced physical damage resulting from the storm effects and apart from their individualistic effects, the damages

create unpleasant sight and a catalyst to urban blight. More than one fifth of the respondents experienced fallen fence, another 12 said they experienced building collapse, while over 21% said they experienced both collapse of fence and roof of their building structures. see Table 4.8.

Table 4.8: Extent and Nature of Damages Caused by Storm Disaster

	Quadrant 1		Quadrant 2		Quadrant 3		Quadrant 4		Total	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Electric pole	102	20.6	71	19.0	77	20.8	96	19.4	346	20.0
Building roof	78	15.7	63	16.9	76	20.5	87	17.0	304	17.5
Fence	133	26.8	112	30.0	112	30.2	142	28.7	499	28.8
Building Collapse	62	12.5	51	13.7	27	7.2	67	13.6	207	11.9
Removal of fence/ roof	121	24.4	76	20.4	79	21.3	102	20.7	378	21.8

Source; Author's Field Survey,2011

Table 4.9: Rainstorm Duration

Hours	Quadrant 1		Quadrant 2		Quadrant 3		Quadrant 4		Total	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
1 hour	17	3.4	6	1.6	4	1.0	15	3.0	42	4.2
2 hours	91	18.3	69	18.5	73	19.7	101	20.4	334	19.3
3 hours	192	38.7	152	40.8	142	38.3	192	38.9	678	39.1
>3 hours	97	19.6	72	19.3	82	22.1	106	21.5	357	20.6
No response	99	20	74	19.8	70	18.9	80	16.2	323	18.6

Source: Author's Field Survey,2011

In other to determine the nature and type of rainstorm witnessed in the study area, the knowledge of the duration of this rainstorm occurrence is required in other to determine the type of rainstorm that occurs in the area. However, 172 respondents accept the fact that rainstorm occurs and spans for about 3hours forming a 39.4% of all the total response got from the site. However, since meteorologically, the duration of rainstorm determines the nature of the rainstorm, it is observable from the table 4.7. above that the rainstorm case in the study area is a flash flooding/heavy downpour and strong wind as it last for about 3 hours after a heavy rainfall, see table 4.9.

More so, the intensity of rainfall in Bida is also observed to contribute to the flood disaster cases in the town as the environs is observed to encounter a minimum annual rainfall of about 1200mm and a very high intensity of about 1600mm around May and September of the year.

Plate VIII: Collapse Economic Tree on a Vehicle After Rainstorm
Source; Author's Field Survey,2011

One of the natural disaster is rainstorm which have been ravaging the North Central area of Nigeria. This is shown in the plate VIII above as rainstorm caused havoc in a packed truck. The economic tree has been in existence for decades and was felled during the storm and damaged the truck. There are losses attached to the storm. There was loss of the economic tree and of the truck. This has implication on the socio-economic status of the people that owned the tree and the truck. This type of disaster though might look natural but are human induced over a period of time. There has been reduction in the number of tree around the place and the Global Climate Change has also affect the rainfall pattern of the area, which invariably causes the falling of the tree on the packed truck.

Plate IX: Flash Flooding on the Road After Heavy Downpour
Source; Author's Field Survey,2011

Due to climate change induced by human activities and the concequences of these activities are disaster of different magnitude and dimention. The study area have shown different varieties of disaster and one of such is the one in Plate IX above. The effect excessive rainfall caused by change in climate condition has brought about erossion in the study area. The flooding was caused by blockage to the drains and buildings on the water channels. The flooding has a great effect on the run off and the land use as erossion has been the consequence of the flooding in recent time. The surface soil is lost and the cost of construction has escallated.

Plate X: Gully Erosion in Dokodza Area of Bida
Source: Author's Field Survey,2011

Aftermath of rainstorm is the erossion of top soil and if not properly managed could lead to gully erossion. The Plate above shows the effect of rainstorm over a period of time that has not been well managed and because water find its level and could not stopped, it add to the disaster caused by the excessive rainfall, the gully erosion causes loss of arable land, built up land and reduce accessibility. The plate shows that the access road are been threatened by the erossion which reduce accessiblity and loss of land. The erossion is a threat to human existence.

Plate XI: Aftermarth Effect of Rainsorm in Bangbara Area of Bida
Source: Author's Field Survey,2011

The major disaster in the study area is the rainstorm followed by downpour and high tide that causes a lot of damages. The plate above shows the effect of the storm as it blown off the roof of buildings and render the house inhabitable. It causes a lot of losses to both human and natural resources. The plate shows properties of the occupants been displayed after the roof have been blown off and it has render the people homeless with a lot of losses.

4.2.4: Residents and Eye-witness Assessment of Rainstorm Activities

In assessing the factors responsible for collapse building from the storm effect, the result shows that about a quarter of the respondents said inadequate drainage as a factor responsible for the damaged they suffered. About 31.6% said the damage happened as a

result of weak structures; this weak structures could be as a result of improper or total lack of structures, while about 20% pointed to at the direct effect of wind on their buildings.

Table 4.10: Reason for Damages Caused by Rain Storm

	Quadrant 1		Quadrant 2		Quadrant 3		Quadrant 4		Total	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Inadequate Drainage	113	22.9	103	27.6	69	18.6	112	22.7	397	22.9
Weak structure	153	30.9	136	36.5	128	34.5	148	30	565	32.6
Lack wind breaker	110	22.2	73	19.5	54	14.6	118	23.8	355	20.5
No response	119	24	61	16.4	120	32.3	116	23.5	416	24

Source: Author's Field Survey,2011

4.3 Response and Mitigation Against Rainstorm Disaster

4.3.1 Mitigating Strategies Adopted By the Dwellers

Various strategies were adopted by the respondent to survive and or cope with the disaster. These mitigating strategies include:

a. Placement of Stones: Respondents said they cope by placing stones or block on the roofs as illustrated in plate 5 so as to give additional strength to the roof in the event of strong winds.

b. Partial Repairs: About one fifths highlighted that they did partial repairs on their roofs by calling carpenter to reconstruct and replace roofing materials.

c. Self Repairs: Another set of respondents said they stayed without doing anything because of lack of finance. However, in cases of fallen fence and minor effects on

their roofs, if seriously affected had to they reconstruct their buildings using new building materials, and further resolve to use generator and candle lights in the case of destruction of PHCN infrastructure.

d. Relocation and Planning: About 15% of respondents have packed to a new place during building collapse or complete blown off of roofs, and recommended the others said they should use physical planning to address this and this and similar issues. These are categorized into:

- Land Use Planning
- Structural Techniques
- Emergency Measures

All these measures are complementary of one another to effectively cope with rain storm disaster in Bida and environs. Thesemitigation approaches are summarized in table 4.11.

Table 4.11: Mitigation strategies

	Quadrant 1		**Quadrant 2**		**Quadrant 3**		**Quadrant 4**		**Total**	
	freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Stone on roof	65	13.1	45	12.1	40	10.8	59	11.9	209	12.1
Repair roof	91	18.3	73	19.6	69	18.6	97	19.6	330	19.0
No repair	104	21.0	94	25.2	88	23.7	94	19	380	21.9
Modern material	45	9.0	36	9.7	31	8.4	50	10.1	162	9.3
Generator	40	8.1	27	7.2	25	6.8	45	9.1	137	7.9
New location	69	13.9	61	16.3	60	16.8	68	13.8	258	14.9
Physical Planning	82	16.5	37	9.9	58	15.6	81	16.5	258	14.9

Source; Author's Field Survey,2011

The analysis of the measures employed by the respondents to mitigate the effect of rainstorm in the study area area shown in table 4.11 above. All the quadrant indicated that there are seven measures employed for mitigation and the method used varies according to different quadrants.

Quadrant I indicate that 13.1% of the respondents uses stone to hold their roof i.e by placing heavy stone on the roof to protect the wind from the storm to blown off the roof of their houses. 18.3% uses to repair the roof after each rainstorm; 21.0% do not repair and allow it to accumulate and cause major havoke before mitigating it; 9.0% uses modern method of uses highly resistance materials for roofing; 8.1% uses generator; 13.9% uses new location as measure while 16.5% employ physical planning measures to mitigate the effect of rainstorm.

Quadrant II on it own shows that 12.1% uses stone to hold their roof; 19.6% do not repaire their roof accodinly; 9.7% uses modern materials; 7.2% uses generator; 16.3% move to new location while 9.9% uses planning measures.

Quadrant III also indicate that 10.8% uses stone and other materials to hold their roofs; 18.6% usually repair their roof after each rainstorm; 23.7% do not repair their roof after the storm; 8.4% uses modern materials for roofing that can resist the effect of storm; 6.8% uses generators; 16.8% move to new location to minimise the effect of the storm while 15.6% employ physical planning measures so as to reduce the effect of storm on their properties.

Quadrant IV shows that the respondents uses stones and other measures to protect their roof (11.9%); 19.6% usually repair their roof after the storm to forstall re-occurence; 19.0% do not repaire their premises after the storm; 10.1% uses modern building materials that have high resistance to storm; 9.1% uses generator; 13.8% move to new location while 16.5% uses physical planning measures to mitigate effect of rainstorm.

On the average it was revealed that 12.1% uses stones and other materials to hold their roof against rainstorm as shows in plate XII and XIII. This shows that majority of the people that uses this medium as measures against rainstorm are poor and have no enough savings to ameliorate effect of disaster; also 19.0% repairs their roofs immediately after rainstorm to forstall future occurrence because they have the means at their disposal and sees disaster as natural occurrence that cannot be prevented this categories of measures require some level of expenditure that the poor can not afford. Also 21.9% does not have any measure put in place to avert disaster and does not repair their properties after the storm because of the capital outlay requiredto do so therefore, live by faith. 9.3% of respondents uses modern

technology to mitigate the effect of disaster in the study area because of their capacity and ability. The modern technology requires education, finance and proper understanding of the environment and when to act appropriately; 7.9% uses generator for the mitigations. Furthermore, the development of new locations has been favoured to mitigate the effect of disaster as this will require putting all the necessary measures in place. The new location will have necessary facilities and properly managed environment to mitigate the disaster. Finally, the use of proper phyical planning measures such as proper towm planning, bye laws, layouts etc. that enhance judicious use of land and environment will help to reduce the effect of disaster and about 14.9% of respondents are using this measure in Bida to mitigate the effect of rainstorm on their properties.

Plate XII: One of the Mitigation Method Adopted in TswataMukun Area Bida
Source: Author's Field Survey,2011

Several mitigation methods are used to reduce the effect of natural disaster in the study area, the aftermarth effect of rainstorm in the blowing off of roofs in the study area and the inhabitant are using, heavy stones, types are placed on top of the building to add more weight to the roof so as to make sure that the forces of the wind storm will not be able to blow the roof off. This is paramount in Tswata Mukun area of Bida.

Plate XIII: Mitigation Method Employed in EfuTuri Area Bida
Source: Author's Field Survey,2011

This is another area in Bida where similar measures like that of plate VII are been used to reduce the forces of tide in blowing the roof of building in Efu-Turi area of Bida. This method is common among the poor.

Table4.12: Implication of Adopted Strategies.

S/N	Strategies	Reason	Income status	Implication
1	Stone/tyre on roofs	To give more resilience to roofing sheet	Mostly low income earners	Stone could roll off due to stronger wind
2	Partial repair on roof	To avoid rain from dropping into the building via the roof	Mostly low income earners	During repair more stress is applied to the building which weakens and cause crakes on wall and stress of evacuating belongings, psychological trauma.
3	No repair strategy	Unavailability of finance	Mostly low income earner	Minor damages on roofs and fence may pave way for large destruction, insecurity and unpleasant sight
4	Total reconstruction of building	To prevent further re-occurrence	High income earners	Psychological trauma as a result time, money and energy put into reconstruction
5	Generator/candle	For alternative source of power	Low and high income earners	Noise pollution, poisonous gas emission, high inflammability of petrol and candle
6	New location	Irreparable structure	Low and high income earner	Loss of social and community ties
7	Physical Planning	To Improve Conducive Environment	Low, medium and high income earner	Loss of life and property as a result of flooding

CHAPTER FIVE

CONCLUSIONAND RECOMMENDATION

This section is aimed at summarizing various data collected from the site and also drawing conclusion for the purpose of making recommendations that will help alleviate the effects of perennial rainstorm problem witnessed in the study area.

5.1 Summary of Findings

This research clearly shows the devastating effect of rainstorm disaster and the various mitigation strategies adopted by dwellers in the study area.The places affected cut across all the study area, out of 1734 administered questionnaires, 1499 affirmed that they were affected by rainstorm. The land use affected includes; Residential, Commercial, Institutional and Industrial land use. Out of this affected land uses, residential area is most hit by the storm with 85.2 percent effect, commercial 10.8 percent, institutional 3.1 percent and industrial 0.9 percent.

From the socio-economic characteristics of the affected people, 63.8 percent of the respondent earns belowN20,000 per month and about 59.5 percent of the respondents are married as such, to cater for the family and coping with disaster with less than N20,000 is a great challenge. This is also viewed in terms of psychological trauma experienced at the period of the disaster, pain of looking for where to relocate to, loss of properties, business environment and loss of family or community ties are major socio-economic effect of rainstorm disaster.

The physical extent of the damage resulting from the storm can be seen in the destruction of infrastructural facility which is a major catalyst for urban decay and dilapidation of

structure. Structures affected include PHCN poles, removal of building roofs, fallen fence, in some cases total building collapse. Building roof removal is a major physical damage seen all around Kyari, Wadata, Masaba A, Masaba B, Masaga A, Masaga B etc.

The strategies adopted by dwellers to cope or build resilience against the effect of storm include; placing block or tyre on roofs, repair and replacement of destroyed roof, some adopted the do nothing approach, reconstruction of building in the event of total building collapse, generator as alternative source of power in the event of PHCN poles destruction others relocate entirely to another building.

However it most be pointed out that the implication of these strategies at times could be more dangerous than rainstorm disaster itself. For instance, stone could roll down on person or animal in the event of stronger wind causing more damage, stress of packing to new location. While the implications of electric generator is that it is highly inflammable and the gas emission is very poisonous which has killed many. Unfortunately, it is noted that most people do not know where to go or what emergency numbers to call when this disaster occur as such, they are left to there own fate.

5.2 Conclusion.

The rainy season which is supposed to be a blessing to man in terms of agricultural production and cool weather condition has however transcend into a disturbing phenomenon especially in Bidatown and environs as rainfall over the past years have often led to the agony of flood and rainstorm disasters in the area.

The potential disaster posed by rainstorm effect cannot be stopped but their effect can be drastically reduced by building resilience. In this part of the country, flood and rainstorm are

the two major disaster which claims lives and properties. Therefore, the need to preserve the city including the life in the city is of paramount importance to Disaster Risk Reduction, town and country planning and other professional in the built environment.

In conclusion, there is need to build on the local coping strategies which often time pose as a potential danger to lives of people in the environment.

5.3 Recommendations

The devastating state of uncontrolled residential building amidst other land uses in Bida and its environs is an emerging challenge as it contributes to urban decay and the inability of the city to maintain its aesthetics.

In order to keep the metropolis from rapid dilapidation, there is the need to embrace the following strategies.

5.3.1 Enforcement of Building Law and Regulations

These recommendations highlights the research objectives of mitigation strategies appropriate for the study area.

- Enforcement of building code in the building industry so as to encourage the use of standard and quality building materials, which can withstand wind, rainstorm and other disasters.
- There is an urgent need for development control mechanisms to be put in place and capacity building for the town planners in the area for efficiency of services.

- The use of town planning tools such as development plans and development control mechanisms should be intensified to correct every human error on space such as haphazard developments as in residential and commercial developments.

- Laws on building maintenance should be enacted and enforced through relevant authorities to ensure the conservation of the built environment.

- Adequate Setbacks from electricity power lines should be emphasized to every developer by the development control department of each State and LGA; and the use of concrete electric poles to replace the wooden types which has been shown to be more susceptible to storms.

5.3.2 General Enlightenment

The following recommendations are directed towards reducing the physical extent of damage to housing general infrastructures in the study area.

- There should be regular public enlightenment at the beginning and ending of rainy season, when the wind is stronger so as to prepare the people and to further build general resilience in the area.

- The General public especially builders should be made to embark on protective roof designs against rainstorms in the communities.

5.3.3 Establishment of Institutions

The following recommendations are directed towards the establishment of various institutions for effective implementations of environmental policy in the study area.

- Establishment of a formal institutional structure to manage every issue of rainstorm disaster as is in the case of fire disaster and the fire service, to provide immediate relief before state emergency agency set in. this would reduce the loss of life and properties

- The need to intensify the tree planting campaigns in the built- environment to serve as wind breakers. Such as landscaped environment can also be very conducive for relaxation and recreational activities.

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Appendix I

CENTRE FOR DISASTER RISK MANAGEMENT AND DEVELOPMENT STUDIES,

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

QUESTIONNAIRE ON: ASSESSMENT OF RAINSTORM DISASTER AND COMMUNITY RESPONSE IN BIDA AND ENVIRONS, NIGER STATE, NIGERIA

NOTE: *Please be informed that all information provided will be treated confidential. You are required to read through carefully before answering. The questionnaire is intended to assist in carrying out very important research work; whose final result will only appear in the form of statistical reports. Please tick the appropriate options or fill in the spaces provided. Thank you for your cooperation*.

1. Location……..
2. Street name…….
3. Rank of the officer…….
4. The working place/organization……
5. Nationality…….
6. Gender: (a) Male ( ) (b) Female ( )
7. Age Group: (a) 16-30 ( ) (b) 31-45 ( ) (c) 46-60 ( ) (d) Above 61 ( )
8. Marital Status: (a) Single ( ) (b) Married ( ) (c) Others ( )
9. Occupation: (a) Unemployed ( ) (b)Student( ) (c) Artisan ( ) (d) Trader ( ) (e) Civil Servant ( ) (f) Self Employed( )

10. Income level: (a) < 5,000( ) (b) 5,100-10,000( ) (c) 10,100-15,000( ) (d) 15,100-20,000( ) (e)20,100 and above( )

11. Educational level: (a) Primary( ) (b) Secondary( ) (c) Tertiary( ) (d) Qur'anic( ) (e) Illiterate( )

12. Are you aware of rainstorm disaster in Bida? (a) Yes ( ) (b) No ( )

13. The existing land use affected by rainstorm (a) Residential ( ) (b) Commercial ( ) (c) Institutional ( ) (d) Industrial ( )

14. What is the nature of rainstorm disaster common in the area? (a) Thunderstorm/Lightening ( ) (b) Flash flooding/Heavy downpour ( ) (c) Strong wind/Windstorm ( ) (d) No response ( )

15. What is the nature of damages caused by rainstorm disaster? (a) Electric pole ( ) (b) Building roof ( ) (c) Fence ( ) (d) Building collapse ( ) (e) Removal of fence/Roof ( )

16. How long have you been residing in this area (a) 4yrs( ) (b) 5-9yrs( ) (c) 10-14yrs( ) (d) 15-19yrs( ) (e) 20yrs and above( )

17. What is the duration of rainstorm (a) 1 hour ( ) (b) 2 hours ( ) (c) 3 hours ( ) (d) > 3 hours ( ) (e) No response ( )

18. What are the reasons for damages caused by rainstorm (a) Inadequate drainage ( ) (b) Weak structure ( ) (c) Lack wind breaker ( ) (d) No response ( )

19. What are the mitigation strategies used after rainstorm disaster (a) Stone on roof ( ) (b) Repair roof ( ) (c) No repair ( ) (d) Modern material ( ) (e) Generator ( ) (f) New location ( ) (g) Physical Planning ( )

20. What has been the attitude of Bida people towards rainstorm disaster (a) Positive ( ) (b) Negative ( )

21. What is the attitude of government and NGOs towards rainstorm disaster in Bida (a)Encouraging ( ) (b) Discouraging ( )

22. When often does this disaster occur (a) Beginning of rainy season ( ) (b) Middle of rainy season ( ) (c) Ending of rainy season ( )

23. What year do you experience storm last……

24. Are the response adequate enough to protect you from any re-occurrence of such disaster (a) Yes, how…… (b) No, why…….

25. Suggest the possible measure to mitigate future re-occurrence of storm disaster in your area…….

26. When this disaster occur, do you call on government or its agency (a) Yes (b) No

27. Has there been any assistance from government or its agency to victim of rainstorm disaster (a) Yes (b) No

28. What is the form of assistance (a) Relief materials ( ) (b) Relocate to a better place ( ) (c) None (d) Other specify ( )